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Published by The Penton Publishing Co., Penton Building, Cleveland, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

Member, Audit Bureau of Circulations; Associated Business Papers, Inc., and National Publishers' Association.

Published every Monday. Subscription in the United States and possessions, Canada, Mexico, Cuba, Central and South America, one year $6; two years $10; all other countries, one year $12. Single copies (current issues) 25c.

Entered as second class matter at the postoffice at Cleveland, under the Act of March 3, 1879.

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Conversion TO WAR PRODUCTION CALLS FOR MORE INFORMATION ABOUT ALLOYS...

Conversion to war production makes great demands upon both plants and personnel. While altering plant layouts, experienced employees must be taught correct methods of handling new operations on different metals. New employees must be trained... and taught to avoid waste and spoilage of critical materials.

You can *quickly* obtain practical answers to questions about the selection, fabrication and uses of ferrous and non-ferrous alloys containing Nickel by asking us. We have on hand a fund of information collected through years of research, field studies and experiences of alloy users.

This data has been checked and edited into convenient charts and pamphlets. These printed pieces range from technical data for engineers to simplified guides for apprentices.

Now... with minutes and materials so vital to Victory... make full use of this metal-working experience. Our technical staff also offers personal assistance in overcoming problems created when Nickel was allotted to places where it serves the Nation best.

★ ★ Nickel ★ ★

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

HIGHLIGHTING

this issue of STEEL

NEWS The war production effort now has reached the stage where the supply of materials is not sufficient to keep all facilities going at capacity, says Donald M. Nelson, declaring that production schedules in certain items which are ahead or behind the general level are to be adjusted so as to get the whole program in balance. July production, although 16 per cent ahead of June, was 7 per cent short of expectations. The Production Requirements Plan, as now revised, will prove of great help in bringing about this balance (p. 18). About 95 per cent of industry now is operating under this plan.

Until the integrated companies produce more steel than they can roll on their own finishing mills it will be difficult for the nonintegrated mills to get enough metal to operate to capacity; that seems to be the current thinking at Washington (p. 29).

Now that "Big Steel" has been ordered to effect retroactively a wage increase of 44 cents a day as well as to establish maintenance of membership and the check-off, it is hoped that this will stabilize the steel labor picture for some little time to come (p. 43).

Office of Defense Transportation has designated a new division to supervise inland water transportation (p. 29).

The price on one large shell contract has been slashed 51 per cent (p. 36).

TECHNICAL To weld the new low-alloy substitute steels successfully it is necessary to know about the hardening effects of the elements in the material, the influence of joint design and related information. The discussion of this subject by Harold Lawrence, therefore, is of timely value (p. 60). R. S. Pratt analyzes requirements in heat treating brass cartridge cases and tells how to meet them (p. 48).

Gerald E. Stedman describes the important service to Detroit's war industries that is being rendered by the Wilbur Wright high school, that city, in "talent training" to furnish new workers or upgrade them (p. 50). Already some 74 manufacturers are cooperating with this school in an effective apprenticeship training program—just one of the school's activities. Every day some 2500 learners are in training and the school operates on a 24-hour schedule.

Two new series of NE (National Emergency) steels, the 9500 and 9600 series, are announced (pp. 76 and 41). Eight additional charts set forth results of end-quench hardenability tests on more of the 8000 series.

Hobart M. Kraner, in an analysis of the mechanism of wear of blast furnace linings, presents some unusual charts that show the chemical content of the scab-brick interface of a lining and also the minerals found there. He emphasizes the importance of carbon disintegration (p. 66).

Engineered containers help a company to "streamline" its packing and shipping activities (p. 64).

PRODUCTION Steel production rose half a point last week, to 98 per cent of ingot capacity (p. 20). Scrap collections are sufficient to support this rate but not large enough to permit accumulation of a surplus so badly needed for the coming winter months(p. 87). Canadian steel production in 1942 is expected to be around 3,200,000 tons (p. 26).

The fifth aluminum producing plant in the Pacific Northwest now is in preliminary operation. (p. 44).

Donald M. Nelson calls for sustained production over Labor Day (p. 43).

CONSERVATION More than 1,000,000 tons of finished rolled steel already has been moved out of frozen inventories for essential purpose and a great deal more remains to be liquidated (p.29).

At the present rate of consumption no more Lake Superior iron will be left within 15 years, states R. C. Allen (p. 21).

PRIORITIES By Aug. 31 end-use symbols must be on existing orders for steel or they will have no standing (p. 87).

A General Metals Order now being written will list not products that may not be made of metal but, rather, products that may be made of metal. It will contain a provision under which manufacturers may appeal for exceptions (p. 29).

Use of aluminum by the armed forces has been limited to "implements of war" (p.29).

Material now is being diverted from the manufacture of products such as machine tools to make it available for conversion into war materiel (p. 36).

How We Cut Excessive Breakage

An Actual Experience—told by an Inland Customer

"We've recently learned a lot about lubrication during deep drawing operations.

"For years we were pretty smug about our practices, believing that our methods were as good as, if not a little better than, the average.

"That was before the war, when wastage was important, but not too important—when we could specify 'tailor-made' steels—when we could stoutly defend our practices and blame failure on the steel.

"Well, that all changed in a hurry when we were betrayed by false Jap diplomacy.

"Suddenly we found ourselves working on new products—war products—made of many kinds of steel. Somehow wastage threatened to get us down. There we were trying to help our fighting men, but production records looked bad. It seems funny now, but we could have been charged with wasting vital steel.

"We had to move fast, and we did. We called in an Inland metallurgist. That fellow was a storehouse of information on lubrication for forming and drawing steel.

"He studied the construction and condition of our dies. He checked hold down pressures. We learned from him the effect of surface temperature generated when drawing. He also had answers on chemical attack on dies, film strength and compounding. His suggestions on the proper application and the frequency of application of lubricants went a long way toward helping us out of our troubles. He also gave us valuable tips on cleaning lubricants from formed parts.

"Here is the end of our story. Wastage almost vanished—production in our shop climbed up, so now we can hold our heads high when there is talk about mass production of equipment for America's fighting men.

"Our advice to you is—*call for an Inland metallurgist.*"

SHEETS · STRIP · TIN PLATE · BARS · PLATES · FLOOR PLATE · STRUCTURALS
PILING · RAILS · TRACK ACCESSSORIES · REINFORCING BARS

Dedicated to Victory

INLAND STEEL CO.

STEEL
August 31, 1942

The Future of Alloy Steels

Considerable printed and spoken comment of late has been devoted to speculation as to the future of alloy steels in the United States. A number of commentators, declaring that the American people will never go back to "wasteful" use of materials as in the past, have advanced the opinion that the age of alloy steels has passed its peak.

It may be assumed that a good many consumers will have learned to get along with carbon steels during the war and that many of them will be disposed to stick with such materials. That would be nothing new, however, because metallurgical history always has been featured by sharp competition between different types of materials. Displacements of one material for another are commonplace. It even has been quite customary, in fact, for different consumers in the same industry to specify entirely different types of steels for the same use.

But there is no reason for assuming that we are learning how to get along without alloy steels. Alloy steels are bought and used—not because we Americans are a wasteful people—but because we demand quality, and there can be no doubt about the place of intelligently conceived alloy steels in satisfying this demand.

It should be quite clear that there is no present question as to what is "best." Rather, it is a question as to "what material can be obtained."

It should be remembered that the present shortage of alloy steels results from the huge Army and Navy demands for them. The Generals and Admirals demand them, not because they want extra icing on their cake, but because tests and experience over many years have enabled them to determine what materials are best for the waging of war.

The plain fact is that we are beginning to get into some trouble as a result of the length to which we already have gone in conserving alloying elements through reduction of alloy contents. Already the war production program is suffering in certain phases from maintenance problems created through use of low-alloy steels in applications for which high-alloy steels normally are used. More of these cases will turn up as we get farther along into wartime metallurgy.

It already is a certainty that we will emerge from this war with a large, unsatisfied demand for alloy steels for many uses.

E C Kreutzberg
Editor

Balancing Munitions Output New Phase in WPB Program

Control over production and materials intensified to eliminate unevenness. . . Processing of Production Requirements Plan applications to be revamped for fourth quarter

MORE careful balancing of the war production program to adjust materiel output to requirements last week emerged as a principal task of the War Production Board.

To date, the War Department, the Navy Department and the Maritime Commission have scheduled production semi-independently. This has resulted in uneven progress and some scheduling ahead of productive capacity.

Forecasts of production have been increased frequently and the meeting of all schedules has been difficult.

This situation, according to WPB Chairman Donald M. Nelson, has made it necessary to reconcile needs with resources, necessitating the adjustment of schedules, reducing some, and, perhaps, increasing others.

"We must redouble our efforts, particularly on the low spots, if we are to make our goals by year's end. The recent realignment of WPB, plus the further development of scheduling and the use of the Production Requirements Plan—now our basic device for controlling industrial operations—all are designed to help us do this job."

Up 16 Per Cent

Notwithstanding a certain unevenness of progress, Mr. Nelson announced that July munitions production increased 16 per cent over June. July output, however, was 7 per cent short of forecasts made at the beginning of the month. A breakdown of the progress in various items follows.

Aircraft production increased in July 11 per cent over June. Although combat plane production rose 6 per cent, it was not up to expectations. For the next few months, aircraft production is not expected to reach the production planned earlier in the year, due in part to the difficulty of balancing so vast a program.

Overall ordnance production increased 26 per cent over June, and was very close to schedules.

Production of medium tanks (measured numerically) was 35 per cent greater than in the previous month and considerably ahead of schedules.

Light tanks showed a somewhat smaller percentage of gain, 15 per cent, but also were ahead of schedules.

Production of antiaircraft guns leaped upward, one class of guns showing a gain of 64 per cent in production, while output of another class shot upward 50 per cent—both of them exceeding schedules by a wide margin.

Output of ammunition and explosives also was in excess of goals set at the beginning of the month, with exceptions in a few classifications.

71 Cargo Ships Delivered

Record on heavy artillery was mixed, some classes of these weapons showing much better gains than others. Some types expected to come into production during the month failed to do so.

Maritime Commission reported the delivery during July of 71 merchant vessels weighing 791,667 deadweight tons, compared with 67 vessels of 747,900 deadweight tons in June—an increase of almost 6 per cent.

A gain of about 22 per cent in construction of naval vessels was made, overall production being nearly one-fourth greater than in June.

Deliveries of major combat vessels were ahead of those in June and considerably ahead of forecasts. Marked progress over June production of minor naval vessels was reported, although output was behind expectations.

"Any inference that the war effort as a whole is slowing down is unwarranted," declared Mr. Nelson, "although difficulties in maintaining such large monthly increases will become greater as we approach maximum output. This will mean increased planning, increased effort, and firm use of the production controls and materials controls.

In connection with the increased emphasis on controlling the flow of materials a new method has been evolved for handling Production Requirements Plan applications for the fourth quarter. It includes the following steps:

1. Each application is acknowledged as it is received. The applicant is notified of the serial number of his case and the branch to which it will be sent for processing.

2. One copy of each application is sent to the Bureau of Census, where the indicated total materials requirements will be tabulated in terms of over 200 end product classifications.

3. Another copy of the application is sent to the branch responsible for processing it, where a tabulation of materials requirements of all industries and companies assigned to that branch will be made.

4. Both the Bureau of Census and the various industry branch tabulations will be submitted to the Requirements Committee, together with reports on prospective supplies for the quarter from the materials branches. The Requirements Committee, under the chairmanship of J. S. Knowlson, WPB vice chairman on Program Determination, includes representatives of the Army and Navy and other claimants for material.

After examination of the figures, the chairman of the Requirements Committee will determine the general pattern of materials distribution, both in terms of the 223 end products and in accordance with the companies assigned to the various branches, after setting aside a "kitty" for contingencies, readjustments, and for the use of smaller companies not under PRP.

Strict Check Provided

5. These determinations of the Requirements Committee will then go to the various industry branches, which will process the individual applications in accordance with the amounts of materials which may be authorized for each end product. At the same time, a strict check will be provided by the fact that each branch must keep the total authorizations to all of the companies whose applications it processes within the tabulation as approved by the Requirements Committee.

In authorizing receipt of materials by each company within the established limits, and in the assignment of preference ratings, the branches will be under rigid instruction to give the same treatment to similar cases. However, the inventory position of each applicant and the pattern of preference ratings on the orders he will fill during the quarter will be given full consideration.

For the purpose of processing these applications, various units of the Army and Navy Munitions Board staff (such as ordnance, aircraft, etc.) will be treated exactly like industry branches, and they will process all applications from companies whose production is now 100 per cent military. The authorized quantities will be limited by the determinations of the Requirements Committee exactly like those of the industry branches.

6. All processed applications, before being sent back to the applicants as

WPB Chairman Donald M. Nelson reports on war production at a Washington press conference. Although munitions output gained 16 per cent in July, closer control over materials and operations by WPB will be effected to even up production. Seated beside Mr. Nelson is James S. Knowlson, vice chairman of WPB on program determination. NEA photo

approved PRP certificates, will be checked by a Review and Approval section.

7. A copy of each PRP certificate authorizing receipt of scarce materials, or a report giving the same information, will be sent to each of the materials branches responsible for month-to-month allocations of the scarcest materials. On the basis of these authorizations, and of individual reports as required by the various "M" orders, the materials branches will fit the authorized deliveries of materials into the delivery schedules of primary materials producers.

The materials branches will thus provide a further check of the operations of the system, and at the same time will be in a much better position than before to handle individual allocations in proper relationship to the overall picture.

8. Fourth quarter applicants under PRP have been authorized by a recent amendment to Priorities Regulation No. 11 to place orders for fourth quarter delivery in anticipation of receiving their PRP certificates. As soon as the certificates are received, they must make any necessary adjustments in these purchase orders to bring them into line with the authorizations, in order to receive not more than 40 per cent of the total authorized amount in October, an additional 30 per cent in November, and the remainder in December.

Various degrees of preference ratings will have been assigned on the PRP certificates to make sure that materials producers will give primary consideration to orders having the greatest urgency in the war program, but virtually all companies which are authorized to receive materials under PRP for the fourth quarter should be assured of delivery without unreasonable delay, since the total amount of materials authorized will not exceed the available supply.

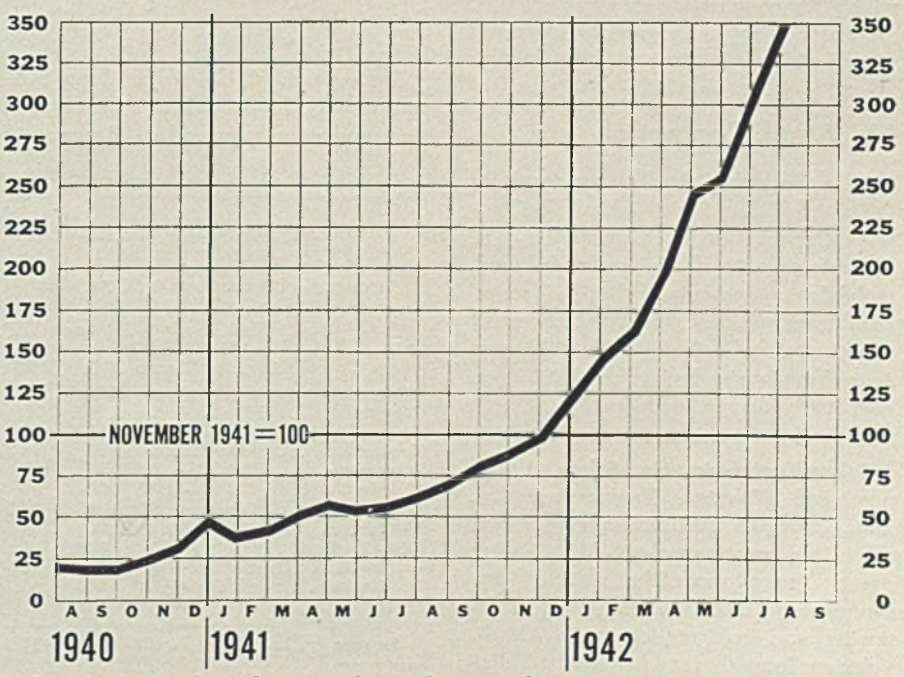
9. Careful checks will be made, company by company, to see that all materials authorized and received are actually put into production in the fourth quarter, or used to maintain a practicable working minimum inventory.

These checks will also reveal whether the materials should properly be put into production in the next quarter to meet delivery dates essential to the war program. Authorizations may be withdrawn if it is found that the items being manufactured are not required until some time after completion, even though the items themselves may be of great military importance.

10. Materials in the "kitty" will be delivered on preference ratings assigned by P orders, PD-1A and PD-3A certificates, project ratings, and on interim applications under PRP. An account of such authorizations will also be kept so that preference ratings will not be assigned to a greater volume of materials than is available.

"The fourth quarter materials control system," Mr. Houghton said, "will tend to counteract any inflation of preference ratings by restricting the amounts of materials authorized for the various essential military and nonmilitary purposes, regardless of the ratings which have been assigned.

"New high ratings may be used to expedite deliveries but they will not increase the quantities which any company is authorized to receive. An increase in the quantity authorized may be obtained only by submitting an interim application to WPB on Form PD-25F."



Index of munitions production—ships, planes, tanks, guns, ammunition and all field equipment—has advanced from 23 in July, 1940, to 350 in July, 1942

J. M. Hopwood To Head War Materials Inc.

WASHINGTON

J. M. Hopwood, president, Hagan Corp., Pittsburgh, has been made president of the new scrap subsidiary of RFC, War Materials Inc. Other officers of the new organization will be elected at the next meeting.

Directors of the new organization include the following: G. Temple Bridgeman, executive vice president, Metals Reserve Co., Washington; A. C. Clarke, chief engineer, Baltimore & Ohio railroad; L. D. Greene, assistant purchasing agent, Bethlehem Steel Co.; J. M. Hopwood, the new president; C. R. Miller Jr., vice president in charge of purchases, United States Steel Corp.; L. Morris Mitchell, chief engineer, Merritt, Chapman & Scott, New York; C. W. Nichols, vice president, Metals Reserve Co., Washington; A. G. Pape, general purchasing agent, the Stanley Works, New Britain, Conn.; and S. R. Tyler, vice president, Laclede Steel Co., St. Louis.

The corporation will have its main office in Pittsburgh at the Ninth and Liberty building.

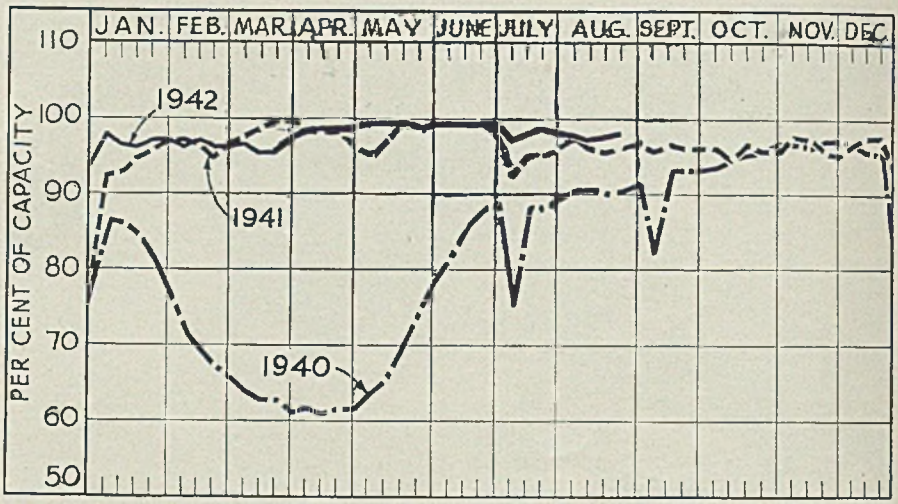
At the request of Metals Reserve Co., E. A. France Jr. and John Levinson have been released from their duties at OPA and will be located at the corporation's central office at Pittsburgh.

It will be the policy of the War Materials Inc. "to acquire, dismantle and make available to the consuming industries all types of scrap material, such as bridges, abandoned buildings, etc., which for commercial or other reasons are not moving in the normal channels of trade."

NE Steel Correction

Near the end of the first paragraph in the article "New Series Added To Conserve Critical Alloying Elements", p. 41, the reference to chromium, nickel and molybdenum contents of the 9500 series should read ". . . . the 9500 series of manganese and silicon with 0.60 per cent chromium and nickel and 0.25 per cent molybdenum combinations. . . ."

Salem Engineering Co., Salem, O., has purchased Tolerton Engineering Co., Youngstown, O., and will operate it as a subsidiary, continuing at 813 Market street, Youngstown. The new division manufactures, sells and installs air conditioning and refrigeration units. O. R. Tolerton, formerly president of the Tolerton company, has been named manager of the division.



PRODUCTION . . . UP

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced ½-point to 98 per cent. Operations increased in six districts, declined in two and were unchanged in four. A year ago the rate was 96½ per cent; two years ago it was 91½ per cent, both based on capacity as of those dates.

Cincinnati—Moved up 3 points to 91 per cent, with two open hearths idle for routine repairs.

St. Louis—One mill restored two open hearths and another lighted one, causing an increase of 12 points to 95.5 per cent.

Detroit—Dropped 2 points to 89 per cent.

Chicago—Rose 1 point to 103 per cent, highest in eight weeks. All six plants produced at 100 per cent or better and no capacity was idle for lack of scrap, though the margin is narrow.

Buffalo—Lighting of an open hearth by Wickwire Spencer Steel Co. caused the rate to advance 2½ points to 93 per cent.

Youngstown, O. — With three bessemers and 76 open hearths in operation production remained at 96 per cent, the best rate possible until pig iron and scrap supply is better.

Pittsburgh—Steady at 94 per cent.

Wheeling—Declined 5½ points to 78 per cent.

Central eastern seaboard—Unchanged at 95 per cent.

New England—Advanced 2 points to 92 per cent, minor repairs preventing full operations.

Cleveland — Increased production at two plants caused a rise of 4½ points to 99 per cent, the highest rate since October, 1941.

Birmingham, Ala.—Held unchanged at 95 per cent of capacity.

District Steel Rates

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Aug. 29	Change	Same week 1941	1940
Pittsburgh	94	None	100	86.5
Chicago	103	+ 1	101.5	99
Eastern Pa.	95	None	95.5	89
Youngstown	96	None	98	84
Wheeling	78	— 5.5	93	98
Cleveland	99	+ 4.5	93	90
Buffalo	93	+ 2.5	93	90.5
Birmingham	95	None	95	88
New England	92	+ 2	90	80
Cincinnati	91	+ 3	88	77
St. Louis	95.5	+12	98	80
Detroit	89	— 2	92	93
Average	98	+ 0.5	*96.5	*91.5

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

Two Firms Charged With Evading Price Ceilings

Office of Price Administration entered Federal Court at Cleveland last week against the Kaiser Co. Inc., holder of a provisional agreement with the government to build Mars transport planes, and against the Builders Structural Steel Co., Cleveland warehouse, in a follow-up of charges made in the recent Higgins shipbuilding investigation that steel could be purchased in the "black market."

The court granted OPA attorneys a temporary restraining order against both firms from continuing the alleged violations of OPA price ceilings.

Affidavits were filed with the court charging the warehouse firm had sold steel to the Kaiser firm at prices above those allowed by OPA.

Salaries of "white collar" employes of Acme Steel Co., Chicago, have been increased approximately ten dollars per month, retroactive to Feb. 8.

Armco Dedicates New Blast Furnace

STEEL production should reach a rate of 98,250,000 net tons annually by the middle of next year, consuming our reserves of high-grade iron ore at a tremendous rate.

This was the prediction of R. C. Allen, deputy chief, Iron and Steel Branch, War Production Board, speaking at a banquet at the Henry Clay hotel, Ashland, Ky., Aug. 24, closing the dedication of a new blast furnace of the American Rolling Mill Co. More than 200 out-of-town guests attended.

This modern 1200-ton stack was blown in Aug. 20 and was named the Bellefonte furnace after an old stone furnace built nearby in 1826. During the afternoon of the dedicatory service, Lieut Gen. W. S. Knudsen, United States Army, and G. M. Verity, chairman, American Rolling Mill Co., Middletown, O., unveiled a monument located in the furnace yard, made of stones taken from the old Bellefonte stone furnace.

The new stack was completed in less than 300 days from the time ground was broken until the first cast was made and is 235 feet high from ground level to the top of the bleeder.

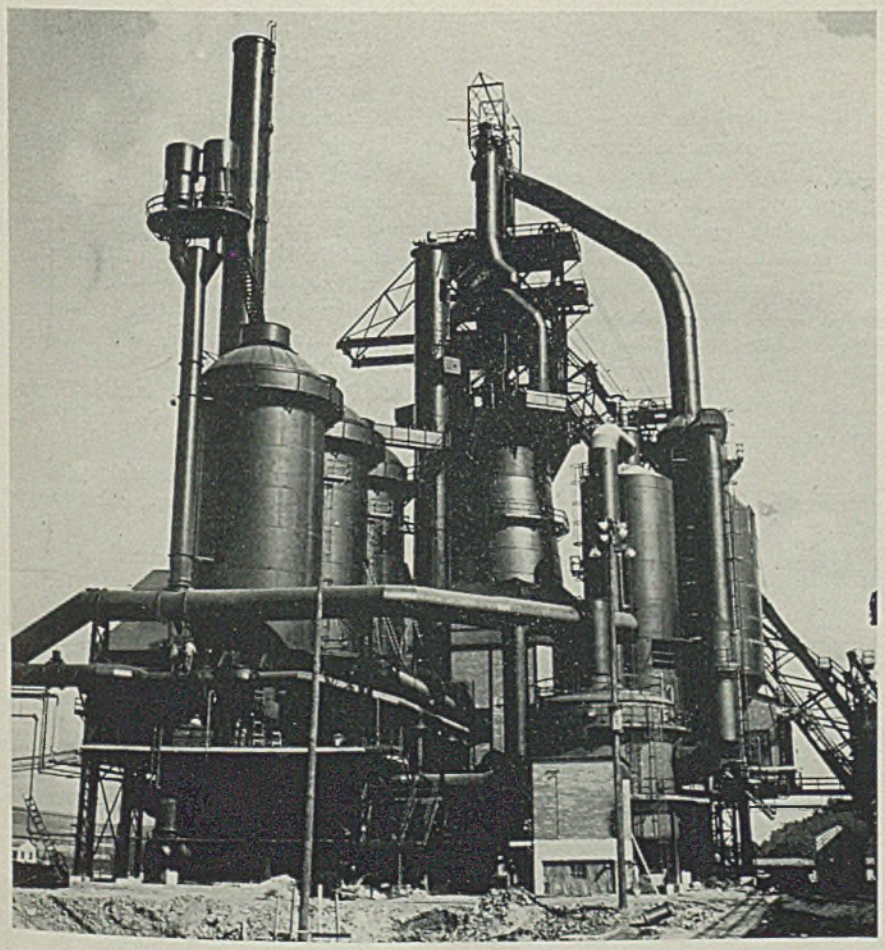
Mr. Allen warned that we are using up the reserves of the United States at a rapid pace. We thought we in this country could live alone, he stated. But we are finding this is not true because we need many mineral products not found in our land, including manganese, chromite, nickel, tungsten, diamonds, and other vital materials.

We possibly are not self-sufficient in iron ore. We thought a few years ago that we had an endless supply of Lake Superior iron ore. At the rate we are using this ore none will be left in 15 years, he continued. At the outbreak of the war our iron industry depended upon open-pit mining and if it were not for this type of mining ore we would be unable to operate the number of blast furnaces now active and under construction.

At present there is estimated to be 550,000,000 tons of Mesabi ore in the pits. This will last 9 years at the present rate of shipments. If the war doesn't last too long, the speaker pointed out, we will have plenty of iron ore from the Lake Superior region. But at the present rate of consumption we shall have to obtain iron ore from sources outside our country.

So that, as the years go by, Mr. Allen contended, we are less sufficient in productive elements. For the first 25 years of this century the world used more minerals than in all time.

The United States is favored with mineral wealth. If Great Britain is included with this country, he explained, we jointly are in possession of 75 per cent of all the mineral wealth of the world. This, he contended, is one of the reasons why the world is at war. Germany has some mineral wealth; Italy and Japan practically are barren. These nations are weeping for minerals. This unequal distribution of minerals created the present war. The axis says "we'll have the mineral wealth of the world on our own terms." What are we going to do about it? What arrangements can be made after the war in order that other people may have their fair share? Some solution to these questions must be found if wars are to be stopped, Mr. Allen concluded.



New Bellefonte stack of the American Rolling Mill Co. at Ashland, Ky., dedicated last week, rises 235 feet from ground level to top of bleeder

Follansbee Producing Alloys in Open Hearths

High-grade alloy steels are now being produced in open-hearth furnaces at the Follansbee Steel Corp., Pittsburgh, John Follansbee, chairman, announced last week. Company's open-hearth capacity, partially abandoned prior to the war, is now occupied 100 per cent in the production of alloys.

"The production this year of over 100,000 tons of high-grade alloys, in our medium size open-hearth furnaces, will prove a factor in meeting the rapidly growing demand for alloy steels," Mr. Follansbee said. "As a further step in converting facilities to the war effort, the company has brought back into active service annealing equipment which had been unused because of conditions in the automotive industry."

Collapsed Foundry Stack Replaced in Record Time

Less than a week after a sudden storm caused the collapse of a 125-foot foundry open-hearth stack at Gary, Ind. works of Carnegie-Illinois Steel Corp., United States Steel subsidiary, a new smokestack was in place and the foundry operating normally.

Operators observed that this work normally would require a longer replacement time, but that every effort was made by employes to minimize the repair period.

Scores of Metalworking Companies Honored for Excellent Performance

ALBANY, N. Y.

THROUGH award of the Army-Navy "E" to Simmons Machine Tool Corp. Aug. 20, attention has been focused on a little known fact—that Albany, N. Y., now occupies a unique and important place in the machine tool industry. This point was strongly emphasized by Capt. E. D. Almy, Bureau of Ships, U. S. N., when he presented the coveted pennant to Charles A. Simmons Sr., founder of the company.

Captain Almy said: "Having been associated for many months in Washington with your beloved and efficient president, it is no surprise to me that the Simmons Machine Tool Corp. has won the Army-Navy "E" production award, or that it is in the first group of companies to be given this honor. Charles Simmons' untiring efforts, his energy and his resourcefulness have endeared him to all.

"The question of repair and conversion of used machine tools has been and is of paramount importance in connection with our war effort.

"Such restored used tools have been and are vital to our war effort. The 40,000 used tools put back into production in the year 1941 have been of untold value. Since you have today's manifestation of the regard in which the armed services hold the Simmons organization, you must realize that the work of the company in the restoration of critical machine tools has been outstanding."

Others who participated in the ceremony held before a throng of over 1000 in front of the plant, and at the reception and dinner which filled the main dining room of the De Witt Clinton hotel in the evening, were the following:

Brig. Gen. Ames T. Brown, adjutant general of the state of New York; Lieut. Col. S. L. Conner, Ordnance Department, U. S. A., engineering officer, Watervliet Arsenal; John A. Ruso, mayor of Menands, the Albany suburb in which the Simmons plant is located; John Phelan, who represented the employes; Rev. William R. Charles, who made the invocation; Peter D. Kiernan, prominent Albany business man who was master of the afternoon ceremonies; and Howard W. Dunbar, vice president and general manager, Grinding Machine Division, Norton Co., Worcester, Mass., who presided during the evening activities. Mr. Dunbar was closely associated with Mr. Simmons for many months in the Tools Branch of the War Production Board in Washington. Among the numerous out-of-town guests was Jack C. Carlton, president and general manager, Carlton Machine Tool Co., Cincinnati. A few days after the Simmons award, Mr. Carlton's company likewise received the Army-Navy "E".

Guests Tour Plant

Before the afternoon ceremonies, guests were conducted through the Simmons plant in which unique equipment, some of extraordinary size, is employed not only on reconditioning operations but also in the manufacture of new machine tools, including large lathes, planers and boring mills. One of the unique machines is a combination planing, milling and surface grinding machine for machining and finishing bed ways. This is typical of the special equipment which has been developed to handle the specialized work of this company.

Army-Navy "E" pennant flies with stars-and-stripes over main plant of Simmons Machine Tool Corp., Albany, N. Y., following impressive presentation ceremonies

"E" Flag Recipients

The Army and Navy have announced the joint award to nearly 200 other war plants, all of whom have made outstanding production records.

Presentation of the awards has been attended by colorful ceremonies, similar to that described above.

Among recipients are:

Abrasive Machine Tool Co., East Providence, R. I.

Aetna-Standard Engineering Co., Ellwood City, Pa.

American Lava Corp., Chattanooga, Tenn.

American Locomotive Co., Schenectady, N. Y.

American Tool Works Co., Cincinnati.

Albert & J. M. Anderson Mfg. Co., Boston.

Automatic Machine Products Co., Attleboro, Mass.

Axelson Mfg. Co., Los Angeles.

Barium Reduction Corp., South Charleston, W. Va.

W. F. & John Barnes Co., Rockford, Ill.

Bauer Brothers Co., Springfield, O.

Bell Aircraft Corp., Buffalo and Niagara Falls, N. Y.

Belmont Radio Corp., Chicago.

Bendix Aviation Corp., (Bendix Radio division), Baltimore.

Bendix Aviation Corp. (Eclipse Machine division), Elmira Heights, N. Y.

Blanchard Machine Co., Cambridge, Mass.

Boeing Airplane Co., Seattle.

Borg-Warner Corp. (spring division), Bellwood, Ill.

S. F. Bowser & Co. Inc., Ft. Wayne, Ind. (Fostoria Screw Co., subsidiary, Fostoria, O.)

Boyt Harness Co., Des Moines, Ia.

Briggs & Stratton Corp., (West plant), Milwaukee.

Bryant Chucking Grinder Co., Springfield, Vt.

Buffalo Forge Co., Buffalo (Buffalo Pumps Inc., subsidiary).

Builders Iron Foundry, Providence, R. I.

Bullard Co., Bridgeport, Conn.

Byron Jackson Co., Los Angeles.

Cambridge Screw Co., Cambridge, Mass.

Carlton Machine Tool Co., Cincinnati.

Chain Belt Co., Milwaukee.

Champion Pants Mfg. Co., Perkasie, Pa.

Chemurgic Corp., Richmond, Calif.

Charles C. Allen Co., Barre, Mass.

Chatham Mfg. Co., Elkin, N. C.

Chevrolet Motor Car Co., (Chevrolet Gear & Axle division), General Motors Corp., Detroit.

Chrysler Corp., (Detroit Tank Arsenal), Centerline, Mich.

Cincinnati Bickford Tool Co., Cincinnati.

Columbiana Boiler Co., Columbiana, O.

Commercial Shearing & Stamping Co., Youngstown, O.

Cone Automatic Machine Co. Inc., Windsor, Vt.

Continental Motors Co., Detroit.

Crawford-Austin Mfg. Co., Waco, Tex.

Crawford Mfg. Co., Richmond, Va.

H. L. Crowley & Co., West Orange, N. J.

Cummings Machine Works, Boston.

Curtiss-Wright Corp. (Airplane division, plant No. 1 and plant No. 2), Buffalo.

Cushman Chuck Co., Hartford, Conn.

Delco Products division, General Motors Corp., Dayton, O.

Diebold Safe & Lock Co., Canton, O.

Duplex Printing Press Co., Battle Creek, Mich.

Eastman Kodak Co., (Kodak Park Works, Camera Works, Hawk-Eye Works and Eastman Office), Rochester, N. Y.

E. I. DuPont de Nemours Co., (Indiana Ordnance Works), Charlestown, Ind.

Eitel McCullough Inc., San Bruno, Calif.

Electromaster Inc., Detroit.

Erie City Iron Works, Erie, Pa.

Ex-Cell-O Corp., Detroit.

Federal Screw Works (plant No. 4), Chelsea, Mich.

Federal Shipbuilding & Dry Dock Co., Kearny, N. J.

Fellows Gear Shaper Co., Springfield, Vt.

Firestone Rubber & Latex Products Co., Fall River, Mass.

Firestone Tire & Rubber Co. (Firestone Park plant), Akron, O.

Food Machinery Corp., Lakeland, Fla.

Fosdick Machine Tool Co., Cincinnati.

Galvin Mfg. Co., Chicago.

General Machinery Corp., Hamilton, O.

General Machinery Ordnance Corp., (U. S. Navy Ordnance Plant), South Charleston, W. Va.

General Motors Corp., Oldsmobile division, Lansing, Mich.

Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

Gilbert & Barker Mfg. Co., West Springfield, Mass.

Gisholt Machine Co., Madison, Wis.

Gleason Works, Rochester, N. Y.

Greenfield Tap & Die Corp., Greenfield, Mass.

Greenlee Brothers & Co., Rockford, Ill.

Guide Lamp division, General Motors Corp., Anderson, Ind.

Hallicrafters Co., Chicago.

Hampshire Woolen Co., and Ware Woolen Co., Ware, Mass.

Handy & Harman, New York.

Hanson-Whitney Machine Co., Hartford, Conn.

Harrisburg Steel Corp., Harrisburg, Pa.

Heald Machine Co., Worcester, Mass.

Hercules Powder Co. (Radford Ordnance Works), Radford, Va.

Hershey Chocolate Corp., Hershey, Pa.

R. Hoe & Co. Inc., Bronx, N. Y.

Hooker Electro-Chemical Co., Niagara Falls, N. Y.

Humble Oil & Refining Co. (Baytown Ordnance Works), Baytown, Tex.

Independent Lock Co., Fitchburg, Mass.

Iowa Transmission Co., Waterloo, Ia.

I-T-E Circuit Breaker Co., Philadelphia.

Jones & Lamson Machine Co., Springfield, Vt.

Kearney & Trecker Corp., Milwaukee.

Kelsey-Hayes Wheel Co., Plymouth, Mich.

Kendall Co. (Bauer & Black division), Chicago.

Landis Machine Co. (M52 Fuse plant), St. Louis.

Landis Tool Co., Waynesboro, Pa.

Lapointe Machine Co., Hudson, Mass.

R. K. LeBlond Machine Co., Cincinnati.

Leland-Gifford Co., Worcester, Mass.

Levingston Shipbuilding Co., Orange, Tex.

Lincoln Engineering Co., St. Louis.

Lundguist Tool & Mfg. Co., Worcester, Mass.

Marchant Calculating Machine Co., Oakland, Calif.

McCord Radiator & Mfg. Co. (plant No. 1), Detroit.

Micromatic Hone Corp., Detroit.

Miller Printing Machinery Co., Pittsburgh.

Milwaukee Saddlery Co., Milwaukee.

Minneapolis-Honeywell Regulator Co., South Minneapolis, Minn., and Wabash, Ind.

Murray Mfg. Co., Brooklyn, N. Y.

National Automatic Tool Co., Richmond, Ind.

National Pneumatic Co. (Rahway plant), Rahway, N. J.

National Twist Drill & Tool Co., Detroit.

National Zinc Co., Bartlesville, Okla.

Navy Yard, Portsmouth, N. H.

Norris Stamping & Mfg. Co., Los Angeles.

Ohio Injector Co., Wadsworth, O.

Ohio Locomotive Crane Co., Bucyrus, O.

Omaha Steel Works, Omaha, Nebr.

Otis Elevator Co. (Yonkers Works), Yonkers, N. Y.

Phelps-Dodge Copper Products Corp., New York (Habirshaw Cable & Wire division, Yonkers, N. Y.)

Philco Corp., Philadelphia.

Picker X-Ray Corp., Cleveland.

H. K. Porter Co. Inc., Pittsburgh.

(*Please turn to Page* 27)

1650 YEARS OF SERVICE

THIS group of employes—representing a total of 1650 years of service with Pratt & Whitney Division, Niles-Bement-Pond Co., West Hartford, Conn.—was photographed during a recent noon-hour ceremony in recognition of long and faithful service. The 82-year old gage and machine tool company awarded a button to Nicholas W. Prumbaum for 50 years of service; also two for 40 years; 21 for 30 years; 20 for 20 years; and 44 for 10 years. Clayton R. Burt, president of the company, presided and the board of directors witnessed the ceremony

MEN of INDUSTRY

W. E. Vogt

W. J. Reagan

K. C. Frazier

Joseph E. Moody

WILLIAM E. VOGT has been elected secretary, Electro Metallurgical Sales Corp., a unit of Union Carbide & Carbon Corp., New York. Mr. Vogt, associated with subsidiaries of Union Carbide & Carbon Corp. more than 30 years, has been active in the sale of ferroalloys and metals.

♦

W. J. Reagan has been appointed melt shop research metallurgist, Copperweld Steel Co., Warren, O. Mr. Reagan, formerly associated with Edgewater Steel Co., Oakmont, Pa., is vice chairman of the Iron and Steel Division, American Institute of Mining and Metallurgical Engineers.

♦

Maj. A. E. R. Peterka, formerly assistant to president, Lamson & Sessions Co., Cleveland, and now with the Army Air Corps, has been appointed chief of the Material Branch, Industrial Planning Section, with headquarters in the Steele High building, Dayton, O.

♦

J. Carlisle MacDonald, assistant to the chairman, United States Steel Corp., New York, has been appointed a member of the American Industries Salvage Committee, 350 Fifth avenue, New York, as alternate for **Charles R. Hook,** president, American Rolling Mill Co., Middletown, O., who is now in England.

♦

R. H. Langdon has been named field engineer in the Pittsburgh district by Norton Co., Worcester, Mass., and **E. P. Gregory** has been made field engineer in the Chicago district. Both Mr. Langdon and Mr. Gregory have had considerable experience in the company's research laboratories and sales engineering department at Worcester.

♦

J. Norman Sherer has been elected vice president and director, Richard Ore Co., Wharton, N. J., wholly owned subsidiary of E. & G. Brooke Iron Co. He will continue as treasurer, which office he has occupied since formation of the company a year ago. Mr. Sherer was associated for a number of years with Thomas Iron Co., predecessor of Richard Ore Co.

♦

K. C. Frazier, the past ten years southwestern manager, Southern Alkali Corp., an affiliate of Pittsburgh Plate Glass Co., Pittsburgh, has been appointed district sales manager in the New York metropolitan area for the Columbia Chemical Division of Pittsburgh Plate Glass.

♦

E. C. Jennings, manager of the order department, Strip Steel Division, Cold Metal Products Co., Youngstown, O., has been granted leave of absence to accept a commission as lieutenant in the Coast Guard Service. **W. H. Rees,** formerly associated with Carnegie-Illinois Steel Corp., is now serving in Mr. Jennings' place.

♦

G. F. Ahlbrandt, assistant vice president, American Rolling Mill Co., Middletown, O., has been appointed civilian chairman, Armor Plate Production Committee, recently formed by the Tank and Motor Transport Branch of the United States Army Ordnance Department. **Lieut. L. S. Wilbur,** United States Army Ordnance, has been assigned as government representative to Mr. Ahlbrandt, with headquarters in Middletown.

♦

Hugo E. Becker, since 1925 a sales engineer on the Pacific Coast for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed supervisor of the newly created maintenance sales department for the company's Pacific Coast district.

♦

William N. Grooms, Salt Lake City, has been appointed district sales agent by Roller-Smith Co., Bethlehem, Pa. He will handle all Roller-Smith products in Utah, Idaho, Montana and the southwest corner of Wyoming, maintaining offices at 630 Dooly block, Salt Lake City.

♦

Joseph E. Moody has been named manager of industrial relations, York Ice Machinery Corp., York, Pa., a new division which will be located at the West York plant.

♦

George A. Anderson has been elected treasurer and assistant secretary, Athey Truss Wheel Co., Chicago, succeeding **Robert W. Baltz,** who has resigned to enter military service. Mr. Anderson formerly was secretary, Federal LeMoon Truck Co., Chicago.

♦

James R. Beers, associated with United States Steel Corp. subsidiaries since 1920, has been appointed manager, Milwaukee sales office, Scully Steel Products Co. He succeeds **John E. Hayes,** retired. Mr. Beers was first employed in the sales department of the former Illinois Steel Co., Chicago. He was transferred to Milwaukee in 1938, serving as a sales representative for Scully Steel Products.

♦

John Munro has been promoted to vice president in charge of a new Procurement Division, Whiting Corp., Harvey, Ill., which will take in purchasing, expediting and priorities. The company is almost 100 per cent devoted to war materials production such as aircraft handling equipment, steel forming machinery, cranes and other products. In his new position, Mr. Munro will speed delivery of these vital war materials to various shipyards, iron and steel works, and munitions manufacturers.

♦

James R. Connell has been appointed vice president in charge of sales, Fibre Conduit Co., Orangeburg, N. Y. Mr. Connell has been a member of the board of directors of the company since 1939 and

will continue to serve in that post. He resigned as a partner in charge of the New York office of Kebbon McCormick & Co. to join Fibre Conduit, with offices 292 Madison avenue, New York.

♦

John Van Zandt, identified with the Milwaukee office of Carnegie-Illinois Steel Corp., has been called to Washington to assist with steel problems for the Materials Section, Machine Tools Division, War Production Board.

♦

C. C. Morfit has been named a vice president, Pennsylvania Coal & Coke Corp., in charge of operations at Cresson, Pa. The past several years he has been a consulting engineer with offices in New York.

♦

Willard S. Crandall has been named director of engineering, Fostoria Pressed Steel Corp., Fostoria, O., succeeding

Willard S. Crandall

Lieut. Ray N. Green, who joined the armed forces last fall. Mr. Crandall's first connection with Fostoria was as western district manager, later assuming managership of the entire western division. He held that post until early this year when he was placed in charge of product development activities.

♦

Charles E. Hall, since 1932 western traffic manager, Delaware, Lackawanna & Western railroad, Chicago, will retire Sept. 1. **J. H. Christy,** assistant western traffic manager, will succeed Mr. Hall.

♦

Chester W. Smith has joined Detroit Rex Products Co., Detroit, as research chemist in the Alkali Division. Mr. Smith has been a specialist in the field of electrochemistry as applied to electroplating for the past eight years. He was formerly associated with J. C. Miller Co. as chief chemist.

♦

David H. Kempler, associated with the Austin Co. 27 years, since 1934 as Cleve-

F. Ward Coburn

Who has been elected president, E. & G. Brooke Iron Co., Birdsboro, Pa., as announced in STEEL, Aug. 24, page 28. He has also been elected president, Richard Ore Co., Wharton, N. J., a wholly owned subsidiary of the Brooke company

land district auditor, has been appointed general auditor. In this capacity Mr. Kempler will supervise all fiscal procedures and cost accounting for the organization, which is currently engaged on war projects throughout the country. **Harold A. Hallstein,** vice president and assistant general manager, who has been Austin's general auditor the past 16 years, will devote himself entirely to general executive duties.

♦

S. B. Taylor, works manager, Reliance Electric & Engineering Co., Cleveland, announces the following promotions in manufacturing department personnel, coincidental with the start of manufacturing operations in the company's second Cleveland plant.

R. W. Cornell becomes superintendent and **Frank Yusek,** assistant superintendent of the company's two plants, including dispatching and control of material in storage or in process. Mr. Cornell was formerly production manager, and Mr. Yusek assistant production manager.

K. H. Meyer, works engineer, in addition to his present responsibility for tool design and plant engineering, assumes additional responsibilities for all manufacturing facilities, including design, specification, manufacture, physical arrangement and maintenance.

Walter H. Haber, supervisor of production planning, will be in charge of a new production planning department. **Walter J. Rubin,** standards engineer, will assume the functions of standard costs and cost estimating in addition to his responsibilities for manufacturing standards and routing of work. **W. J. Hall,** in charge of the stores department in plant 1, becomes general foreman of plant 2.

DIED

William Henry Swanger, 51, metallurgist, National Bureau of Standards, Washington, at his home in Edgemoor, Md., Aug. 19. Associated with the bureau since 1921, he was principal metallurgist and assistant chief of the Division of Metallurgy at the time of his death. Mr. Swanger was well known for his researches on the chemistry of platinum alloys and the preparation and properties of metals of extremely high purity. He was a member, American Society for Metals, American Institute of Mining and Metallurgical Engineers and American Society for Testing Materials.

♦

Gordon Stoner, 62, since 1933 vice president and general manager, Midland Steel Products Co., Cleveland, Aug. 18, at the University Hospital, Ann Arbor, Mich., after an illness of seven months. He became associated with Detroit Pressed Steel Co. in 1919, soon thereafter becoming secretary. When Midland Steel Products was formed in 1923 by merger of Detroit Pressed Steel and other properties, Mr. Stoner was named secretary; became vice president in 1927 and six years later assumed responsibilities of general manager.

♦

P. W. Seyl, 67, for 24 years manager, Gary plant, American Bridge Co., in Hammond, Ind., Aug. 25. Mr. Seyl retired in 1941 after 38 years of service.

♦

Hugo D. Sharp, 57, manager, electrical sales, American Steel & Wire Co., Boston, Aug. 22, at Sutton, Mass. He was associated with the company more than 40 years.

♦

Francis J. Arend, president, DeLaval Separator Co., New York, and of De Laval Steam Turbine Co., Trenton, N. J., Aug. 24, in Neptune, N. J.

♦

Harold Clark, assistant secretary and treasurer, International Nickel Co. Inc., New York, Aug. 25, at his home in Westfield, N. J.

♦

Thorvald H. Hansen, 70, Aug. 20, at his home in Kenosha, Wis. For 18 years he was employed by A. O. Smith Corp., Milwaukee, serving as chief engineer, general manager and a director. In 1932, Mr. Hansen bought Cedarburg Mfg. Co. and shortly thereafter began production of the Thor outboard motor, which he designed himself. After selling the plant in 1937 he was a consulting engineer and in this capacity designed the prefabricated homes manufactured by Harnischfeger Corp., Milwaukee. At the time of his death he was consulting engineer for General American Transportation Corp., Chicago.

BIBLIOTEKA POLITECHNIKI

Dominion Doubling War Goods Output

TORONTO, ONT.

CANADA'S war industry now has passed the "tuning up" stage and has entered production on a broad scale. According to government heads, enlarged plants will attain capacity production in the first quarter of next year, when current output will be more than doubled.

By that time substantial additions will have been completed to primary steel producing plants and the Dominion will be in a better position to meet enlarged demand for all classes of steel. Canada's steel production this year will reach the all-time high record total of approximately 3,200,000 tons, for which about 2,000,000 tons of scrap iron and steel is required. According to plans already announced for expansion of steel mills, about 500,000 tons will be added to output in 1943, with a corresponding jump in consumption of scrap and iron ore.

In addition to large expansion of Canadian steelmaking facilities, the greater part of which has been financed by government capital, arrangements have been made for general increase of imports of steel from the United States.

C. D. Howe, Minister of the Department of Munitions and Supply, announces that to speed flow of vital war materials from the United States, regional offices of the priorities officer have been opened in Montreal and Hamilton. At the same time he announced the appointment of two priorities representatives: W. D. Lachapelle, Ciba building, Montreal, and A. W. Rymal, Terminal building, Hamilton. Previously offices of the priorities officer had been established in Toronto, Halifax and Vancouver.

Mr. Howe states that facilities are being provided to double production of Bren guns. Capacity output under the expanded program, amounting to several thousand units per month, is expected to be attained between December, 1942, and March, 1943. He also stated that the output of Sten machine carbines is being guadrupled, with a planned capacity equal to that of the Bren gun. In addition, the new Browning tank-type machine gun is now in production, with a 100-round Bren gun magazine, a 90-millimeter antiaircraft gun barrel, and a 4.5-inch antiaircraft gun carriage. By September, Lee-Enfield rifles will be produced at a rate of many hundreds a day.

"When Canada undertook the manufacture of guns," Mr. Howe stated, "our industries had no knowledge of the complicated designs, the many parts, the extremely fine tolerance, the metallurgical difficulties, or the huge and expensive machine tools which are essential to their production. At the beginning of the war Canada obtained an order for a small quantity of extra barrels for antiaircraft guns. So fine was the quality of the output of these barrels that an initial order was received from Great Britain for the manufacture of a light antitank gun and mobile carriage. Then with the fall of France, Canada was called upon suddenly to turn out in quantity, guns, carriages, mountings, barrels, small arms and even the most complicated electrical fire-control equipment. To implement a program of this magnitude required plant capacity, labor, management, raw materials, and machine tools on short notice. All suitable buildings and equipment were immediately put to use and capital assistance amounting to tens of millions of dollars was made available for construction of new plants and their equipment. A government-owned company was incorporated for the purpose of making small arms."

CANADIAN GIRLS BUILD SMOKE-BOMB THROWERS

GIRLS from all stations in life make up more than 50 per cent of the staff of this Canadian factory, converted from manufacture of elevator equipment to production of two-inch smoke-bomb throwers for tanks. Many are highly skilled operators who perform intricate machine work. Employe at left in the photograph is checking junction nuts which enable the tank gunner to open bomb throwers for loading, girl in the center is gaging barrels, while the one at right inspects completed throwers

MEETINGS

Iron and Coke Operators To Hold Joint Meeting

Eastern States Blast Furnace and Coke Oven Association and the Chicago Blast Furnace and Coke Oven Association will hold a joint meeting at Hotel Del Prado, Chicago, Oct. 16.

Tool Engineers To Discuss Critical War Materials

Production problems and plans to solve the present bottlenecks in war industry because of critical materials will be discussed at the War Production Conference of the American Society of Tool Engineers, Kimball hotel, Springfield, Mass., Oct. 16-17.

Housing Bureau To Handle Hotel Accommodations

Hotel rooms for those planning to attend the National Metal Congress, Cleveland, during the week of Oct. 12, are being allocated by the Housing Bureau, care of the Cleveland Convention and Visitor's Bureau, Terminal Tower, Cleveland. Nearly 100 technical papers have been approved for presentation at the various sessions.

More than $12,000,000 in War Bond purchases has been made by Bethlehem Steel Co. employes under the savings plan inaugurated a year ago.

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-39-b (Amendment): Cobalt, effective Aug. 21. Limits use of cobalt for ground frit in any one quarter to 35% of amount used in first six months of 1941.

M-208: Softwood Lumber, effective Aug. 27, replacing L-121. Establishes rigid control over distribution and use of all types and grades.

M-211: Heat Treating Equipment, effective Aug. 22. Authorizes WPB to establish production and delivery schedules in such instances as may be necessary.

L ORDERS

L-30 (Amendment): Kitchen, Household Articles, effective Aug. 24. Makes clear that order restrictions covering manufacture of pails and tubs do not apply to such articles designed for use in shipping and packing. Removes order restrictions on use of critical materials in making fireplace grates and dampers.

L-97-a-1 (Interpretation): Railroad Material, effective Aug. 26. Permits sale of surplus freight car material by car builders to railroads under same regulations applying on interchange of material between builders.

L-140 (Amendment): Cutlery, effective Aug. 25. Removes restrictions from orders placed by War Shipping Administration and military orders placed by jobbers, wholesalers and other dealers.

L-161: Electric Fuses, effective Sept. 9. Prohibits use of copper or its alloys to make fuses, other than current carrying parts. Bans assembly of fuses containing copper other than current carrying parts, effective Sept. 24. Restricts manufacturers' sales to other manufacturers or to orders rated A-10 or higher, effective Sept. 9.

L-174: Manufactured Gas, effective Aug. 25. Exempts war plants and essential civilian industries from reduced gas deliveries in event of inadequate supply for all users. Restricts gas deliveries for use in equipment not operated prior to Sept. 1, 1942.

L-178: Film, effective Aug. 20. Freezes all motion picture film in manufacturers' hands until released by WPB authorization.

E ORDERS

E-7: Metal Cutting Saw Blades, effective Aug. 31. Limits sales of band and hack saw blades to orders rated A-9 or higher. Excepted are hand-frame hack saw blades made of low-grade steel, stocks of small retailers valued at $50 or less, and sales among retailers, distributors or manufacturers purchasing for resale and not for use.

No. 36 (Revised)—Acetone, effective Sept. 3. Reduces prices delivered in Eastern territory (add ½-cent for Western territory) to following: 8.5 cents per lb. in tank cars; 9.5 for carloads in drums; 10 for less-carloads in drums.

No. 37 (Revised)—Butyl Alcohol, effective Sept. 3. Reduces prices for normal butyl alcohol delivered in Eastern territory (add ½-cent for Western territory) to following: 12.5 cents per lb. in tank cars; 13.5 for carloads in drums; 14 for less carloads in drums. Butyl acetate is 1 cent higher.

Joint Army-Navy "E" Awards

(*Concluded from Page* 23)

Pratt & Whitney division, Niles-Bement-Pond Co., West Hartford, Conn.

Putnam Tool Co., Detroit.

RCA Mfg. Co. (Radiotron division), Harrison, N. J.

Reed-Prentice Corp., Worcester, Mass.

Regina Corp., Rahway, N. J.

Remington Arms Co. (Denver Ordnance plant), Denver.

Remington Arms Co. Inc. (main plant), Bridgeport, Conn.

Remington Arms Co. (Lake City Ordnance plant), Independence, Mo.

Remler Co. Ltd., San Francisco.

Rivett Lathe & Grinder Inc., Boston.

Robertshaw Thermostat Co., Youngwood, Pa.

Rogers Brothers Corp., Albion, Pa.

Savage Arms Co., Utica, N. Y.

Scovill Mfg. Co., Waterbury, Conn.

Sheffield Corp., Dayton, O.

Skinner Engine Co., Erie, Pa.

J. Sklar Mfg. Co., Long Island City, N. Y.

Simmons Machine Tool Corp, Albany, N. Y.

A. C. Spark Plug division, General Motors Corp., Flint, Mich.

Standard Piezo Co., Carlisle, Pa.

Star Electric Motor Co., Bloomfield, N. J.

Stewart-Warner Corp. (south plant), Chicago.

A. O. Smith Co., Milwaukee.

Southwest Boat Corp., Southwest Harbor, Me.

Stickle Steam Specialties Co., Indianapolis.

J. L. Stifel & Sons Inc., Wheeling, W. Va.

Stockham Pipe Fittings Co., Birmingham, Ala.

Strontium Products Co., Chauncey, O.

Struthers Wells-Titusville Corp., Titusville, Pa.

Timken-Detroit Axle Co. (Illinois Mfg. division), Waukeegan, Ill.

Timken-Detroit Axle Co., Detroit.

Timken-Detroit Axle Co. (Oshkosh plant), Oshkosh, Wis.

Towmotor Co., Cleveland.

Tube Turns Inc., Louisville, Ky.

United Aircraft Corp., Hamilton Standard Propeller division, East Hartford, Conn.

United Engineering & Foundry Co., Youngstown, O.

United Shoe Machinery Corp., Beverly, Mass.

Universal Boring Machine Co., Hudson, Mass.

Universal Unit Power Shovel Corp., Milwaukee.

Vendo Co., Kansas City, Mo.

Victor Chemical Co., Mt. Pleasant, Tenn.

Vilter Mfg. Co., Milwaukee.

Virginia Bridge Co., Roanoke, Va.

Western Cartridge Co., East Alton, Ill.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. (five divisions).

Western Electric Co., New York.

Williams Oil-O-Matic Heating Corp., Bloomington, Ill.

William Sellers & Co. Inc., Philadelphia.

Whittington Pump & Engineering Co., Indianapolis.

White Motor Co., Cleveland.

Wisconsin Bridge & Iron Co., Milwaukee.

Winter Weiss Co., Denver.

W. & L. E. Gurley, Troy, N. Y.

Wright Aeronautical Corp., division of Curtiss-Wright Corp. (Cincinnati plant), Lockland, O.

Wright Aeronautical Corp., division of Curtiss-Wright Corp., Paterson, N. J.

Wright Machine Co., Worcester, Mass.

Wyckoff Drawn Steel Co., Pittsburgh.

Zenith Optical Co., Huntington, W. Va.

7-Month Scrap Use Exceeds All of 1939

Domestic consumption of iron and steel scrap in July is estimated at 4,600,000 gross tons, compared with 4,608,000 tons in June and 4,415,000 tons in July, 1941, according to the Institute of Scrap Iron and Steel Inc., Washington.

According to the institute, consumption of scrap in the first seven months of 1942 has totaled 32,443,000 gross tons, which compares with 30,948,000 tons in the corresponding period of 1941 and 21,738,000 tons in the 1940 period.

"The seven-month total for 1942 is greater than the scrap melted in an entire year like 1939," said Edwin C. Barringer, president of the institute. "On the basis of the monthly average thus far, consumption in 1942 will approximate 57,000,000 tons or about 2,500,000 tons more than in 1941."

Martin H. Schmid, manager, alloys division of Republic Steel Corp., Massillon, O., has been elected chairman of the Armament Steels and Alloys Advisory Committee, OPA.

WINDOWS of WASHINGTON

Libbey incident typical of sniping at Donald M. Nelson and War Production Board. CIO leaders protest consultant's dismissal for unauthorized "report" criticizing Iron and Steel Branch

THE Frederick I. Libbey incident can be cited as a typical example of the type of sniping to which Donald M. Nelson continually is subjected in an effort on the part of certain elements to undermine him as chairman of the War Production Board. The Libbey case appears to have been one of infiltration with the purpose of obtaining endorsement from an "expert" with a genuine WPB label of the attacks which have been made at different times by CIO's Philip Murray on the steel industry.

Mr. Murray, it may be recalled, had charged that the steel production program was suffering from three bottlenecks, a shortage of armor plate for tanks, a shortage of plate for shipbuilding, and a shortage of iron and steel scrap necessary for full production. He alleged that these bottlenecks were the results of inadequate planning. In particular he complained that the facilities of smaller steel plants were not mobilized sufficiently in the war program and that they suffered because of discrimination in favor of the larger companies.

Based on Murray Criticisms

Mr. Libbey, a $5600-a-year "engineering consultant" in the office of Production Planner Robert Nathan, was loaned to Wendell Lund, director of the WPB Labor Division, for the purpose of studying and reporting on existing utilization of steelmaking facilities. The first thing he did was to visit a number of steel plants. Then he submitted an analysis of the Murray recommendations to Mr. Lund, finding merit in many of Mr. Murray's proposals. Next he went to work on a report to contain his own recommendations.

On Tuesday, Aug. 18, one of the lead stories on the first page of the *Washington Post* carried the head "Inefficiency, Waste, Laid to WPB Iron, Steel Branch" and under it were two columns giving the principal findings that Mr. Libbey intended to include in his report. In general they were largely along the lines of the criticisms that previously had been made by Philip Murray.

The newspaper story added some fancy trimmings—as that the Iron and Steel Branch is manned with men who are primarily steel salesmen, "salesmen whom the major steel companies were glad to palm off on the government after the rapidly expanding war program made further efforts to sell steel unnecessary." Mr. Libbey was represented as calling for new blood in the Iron and Steel Branch, involving the appointment of men who are familiar with small mills as well as large ones.

Publication of this story caused a furore in the Iron and Steel Branch and it was rumored that some 40 or more key men in the branch went into the office of Reese H. Taylor, chief, and resigned. Parenthetically it may be said that most of these men would like nothing better than to get back to their homes. They are under the necessity of working long hours and living away from their families and in such quarters as they can find in this over-crowded city. Of course, they all trooped back to their desks and resumed their duties.

The first thing that Donald Nelson did after having the case investigated was to fire Libbey. Mr. Nelson made it clear that any further unauthorized releases of confidential information would be dealt with severely. One aftermath of the firing of Libbey was a protest signed by CIO members of WPB's Labor Advisory Committee, who held that Libbey had been "fired for telling the truth." They asked for rehiring of Libbey and the firing of dollar-a-year men blamed for paralyzing the war effort through inefficient planning. Signers of this petition included Clinton Golden, assistant to the president of the CIO United Steelworkers of America, John Green, president of the CIO International Union of Marine and Shipbuilding Workers of America, and Walter Reuther, vice president of the CIO United Automobile and Aircraft Workers of America. Thus became quite clear the particular banner Mr. Libbey was carrying.

Since then a number of other firings have been made and some more are under consideration.

Mr. Nelson does not intend to tolerate any fifth column activities in the War Production Board. The extent of the firings to come, of course, cannot be predicted but any competent observer can see justification for a considerable amount of house cleaning in a number of WPB divisions. At the same time any observer familiar with the way things have to be done at Washington these days, in view of the existence of strong political factions, would be justified in believing that there will be a disposition not to be any more drastic than is strictly necessary.

Then, there is another kind of trouble that Mr. Nelson has on his hands at all times. That is that he and the WPB are unable to plan the production of materiel of war until he is told just what the Army and Navy want. Unfortunately the programs of the generals and admirals never can stay put very long since sudden shifts in the war picture make mandatory changes in the production effort. Steel company sales departments should understand that it is because of these changes that the job of handling mill rolling schedules is such a headache.

"Struggle for Power" a Myth

A lot of newspaper stories, particularly to be found in the Washington papers, would seem to indicate that there continually is a struggle for "power" between the Army and Navy Munitions Board and the WPB. While there has been a certain amount of friction—which is readily understandable in view of the tension under which those responsible for our war effort have to work—there actually can be no basis for such a struggle inasmuch as Mr. Nelson, under the terms of President Roosevelt's orders of Jan. 16 and Jan. 24, 1942, has supreme power over war production. It is not an issue as to "power"; rather it is the difficulty of directing war production programs that do not stay put.

In connection with the CIO charges about not employing fully the facilities at smaller nonintegrated steel plants, it

"Best Men We Can Get"

Vigorous defense of Iron and Steel Branch executives criticized in the Libbey report was made last week by WPB Chairman Nelson, who pointed out it was necessary to have steel men and "not grocers" handle the branch's problems.

"We have in our Steel Division, I believe, the best men we can get. The fact that a man may have come to us who may have been in a sales department doesn't mean that he hasn't come up through the production end of steel.

"I have perfect confidence that we have gotten, that the industry has given us good men in the Steel Branch. They are from the steel industry. You can't get grocery clerks to come in and show how to distribute steel; you have got to get people from the steel industry and we have attempted to get the best people we can get who know steel."

Mr. Nelson said he had not authorized Libbey to make the report and had not seen anything of it, except what he had read in the newspapers.

may be said that the WPB is fully aware of this situation.

The trouble, it is pointed out, is a lack of metallics. At present the big integrated mills are able to handle on their own finishing capacity all the steel they can produce and this results in faster and more efficient production, as well as in economy. Were steel billets to be shipped cold to nonintegrated plants in adequate volume to keep these plants going at capacity, there would be considerable delay, additional costs and a further burden for our transportation system. Until more steel is produced than the integrated companies can roll on their own mills it is unlikely that the position of the small nonintegrated companies will improve to any material extent.

New Order To List Products That "May" Be Made of Metals

A General Metals Order now in process of being written, to be announced soon, instead of listing products that no longer may be made of metals, will do just the reverse. It will list those products that may be made of metals. It is admitted that this order may prove too drastic in that certain omissions may prove untenable. Provision will be made, therefore, for giving manufacturers the right of appeal for exceptions.

Fourth quarter allotments of metals under the Production Requirements Plan for the first time will be based on reports of tonnage actually required.

"For the first time," explains a high priorities official, "we were able to look at the whole picture and then distribute to each company on the basis of what it needs, for what, and on the basis of the total available supply. The result has been to distribute under authorizations rather than allocations. At least 95 per cent of all metals to be consumed in fourth quarter will be distributed under the Production Requirements Plan.

"The whole accomplishment represents one of the biggest statistical jobs ever done in this country.

"Our objective is to allow nothing to be used up in this country excepting in ways that will help the war effort. The Production Requirements Plan is of tremendous assistance in making that possible."

Much thought continues to be given to steel warehouse stocks and the applications for which these stocks are used. No fool-proof setup to get 100 per cent compliance from the warehouses yet has been devised and priorities authorities freely admit that it just seems impossible to get full compliance from the warehouses no matter how hard they try. Even the larger warehouse interests who employ priorities specialists have to ask questions right along as to what orders they may ship against. The present disposition is to rely to a considerable extent on the good faith of warehouse distributors.

Any manufacturer needing steel and unable to get it from usual sources may be able to get help at Washington provided he has a sufficiently high priority. If he needs more than 5 tons of an item he should get in touch with Ralph J. Stayman, Distressed Stocks Unit, Products Section, Iron and Steel Branch, War Production Board, Social Security building, Washington. If he is interested in 5 tons or less he should call on George P. Torrence, Inventory and Requisitioning Section, Iron and Steel Branch, War Production Board, Temporary "E" building, Washington.

These units are directing distribution of surplus steel and steel in frozen inventories and the conditions under which they may operate are detailed in Priorities Regulation No. 13. Well over a million tons of steel so far have been cleared by the Distressed Stocks Unit and reports continue to come in every day on additional inventories. The Distressed Stocks Unit sends out some mimeographed copies of each inventory to some 1500 companies or procurement offices each day and in addition the American Steel Warehouse Association mails some 500 to 600 copies to the steel warehouses.

The Distressed Stocks Unit has cleared many large tonnages—in one case a lot of 40,000 tons of steel was cleared immediately after it became available. In another case the Army was kept from getting into trouble on its transportation program by getting some 10,000 tons of this distressed material. This frozen material in many cases has saved the day by enabling production lines to keep going on occasions when they were within hours of a shutdown due to material shortages.

The Distressed Stocks Unit has no means of knowing how much more of the frozen steel is available but knows that a great deal more still is to come out, so that it will not be exhausted for a long time to come.

Aluminum Use by Armed Forces Limited to "Implements of War"

WPB has limited the use of aluminum by the military forces to "implements of war" through supplementary order M-1-i, which revokes orders M-1-e and M-1-f. Implements of war are defined as "combat end products for field or combat use."

Other changes effected by the order are:

"Low-grade" aluminum, which is the only aluminum permitted for certain purposes, is defined as aluminum containing more than 4 per cent copper and either iron or zinc in excess of 1 per cent.

Procedure for applying for allocations of aluminum are formalized under the order. All requests for allocation of "eligible" items, as listed in the order, are to be made on Form PD-26. Requests for allocation of aluminum for purposes not "eligible" are to be made directly to the Aluminum and Magnesium Branch, by the manufacturer who wishes to use the aluminum. If approved, the order may be accepted by the fabricator of aluminum.

Use of aluminum in alloys, other than zinc alloys, is limited to a maximum of 15 per cent in any one alloy, and a maximum average of 12 per cent of aluminum in any one month. The former order did not limit aluminum content of specific alloys.

Aluminum for carbometer wire is added to the list of eligible uses. This wire is used for testing in steel manufacture.

Aluminum for essential chemical plant equipment may now be allocated only if the purchaser submits proof of his need for aluminum to WPB.

Procedure for obtaining aluminum for plant maintenance and repair, where no substitute is practicable, is clarified.

Core boxes and core dryers are added to the list of uses eligible for low-grade aluminum.

Waterway Transportation Division Set Up by ODT

To bring about better co-ordination and more efficient use of domestic waterway facilities, Joseph B. Eastman, Defense Transportation Director, has named Ernst Holzborn, who has been director of the division of coastwise and intercoastal transport, as assistant director of ODT in charge of all waterway transportation.

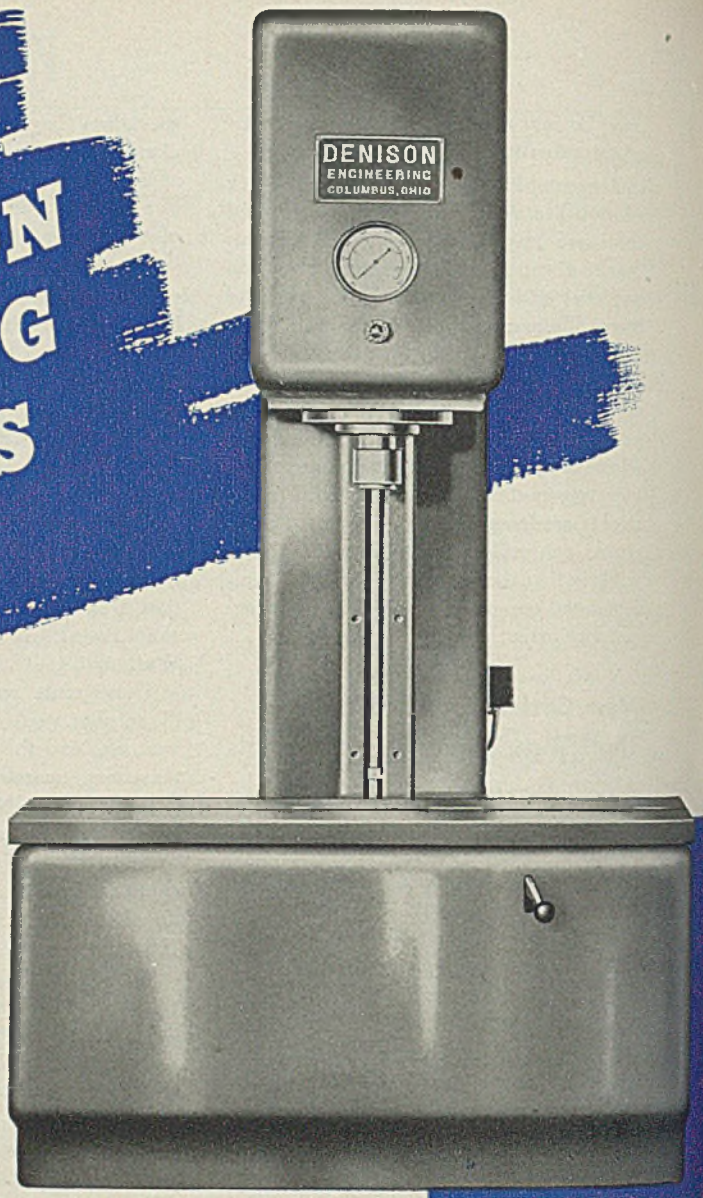
By the creation of this office Mr. Eastman brought under Mr. Holzborn's direction ODT's inland waterways, Great Lakes carriers, and coastwise and intercoastal transport divisions.

At the same time Charles F. Kellers, who has been serving as associate director to Mr. Holzborn, was named director of the coastwise and intercoastal transport division.

Glenn E. Taylor, who has been assistant director of the inland waterways division, was made deputy assistant director of ODT to aid Mr. Holzborn in the administration of the new office.

A. T. Wood, Cleveland, continues as director of the Great Lakes carriers division, and Edward Clemens, St. Louis, continues as director of the inland waterways division.

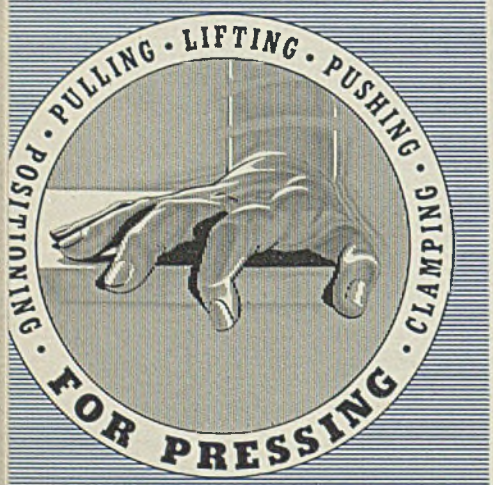
GET GREATER VERSATILITY ON STRAIGHTENING OPERATIONS



THE DLSC2 HydrOILic PRESS

in 25, 50 and 100-ton Capacities

INDUSTRY'S NEW RIGHT HAND



DENISON EQUIPMENT—APPLIED
HydrOILics

OPERATION

Operation is extremely simple. The ram is held in place HydrOILically when it reaches the upper stroke limit, and the pump and motor idle, using minimum HP. Down movement of the control lever causes the ram to move downward at rapid traverse speed exerting minimum tonnage, until it contacts the work. Further downward movement of the control lever increases the tonnage, and the tonnage increases in direct proportion to the pressure exerted on the lever. Release of the control lever moves the ram upward to the upper stroke limit. All principal moving parts operate in a bath of oil, reducing wear and maintenance costs.

Priorities still have first call on HydrOILic Press output. But since conditions may change rapidly — even if only temporarily — we suggest you submit your requirements to us without delay. We'll tell you promptly the delivery we can make in your particular case.

SPECIFICATIONS

	DLSC2 50
MAXIMUM WORKING CAPACITY – TONS	50
CYLINDER BORE INCHES	8
RAM SPEED, DOWN (RAPID TRAVERSE) F.P.M.	12
RAM SPEED, DOWN (HIGH PRESSURE) F.P.M.	1
RAM SPEED, UP F.P.M.	27
PUMP VOLUME GALLONS PER MIN.	30 5
MAXIMUM WORKING PRESSURE P.S.I.	2000
MOTOR H.P. 1200 R.P.M.	7½
RAM DIAMETER INCHES	6
RAM THREAD FEMALE, SIZE, PITCH	2-8
OIL RESERVOIR CAPACITY – GALS	50

WHEREVER YOU NEED POWER · SPEED · CONTROL

Check DENISON EQUIPMENT—APPLIED HydrOILics

You'll find new skilled help on your straightening jobs in this DLSC2 straightening press, with its extra flexibility and accuracy. Equally efficient on small-lot operations and production-line work, this press handles almost any type of straightening — round bars, flats, castings, finished parts, and structural shapes.

Denison design has built easy adaptability into the DLSC2 — tonnage is quickly adjustable from one-tenth to full capacity, and speed may be varied with either controlled-orifice valves or variable delivery pumps. Control is simple, direct, and easily accessible to the operator; movement of the hand-lever or foot-pedal is all that is required.

Compact and self-contained, with rounded corners and enclosed construction, it gives you double advantages of safety and space-saving.

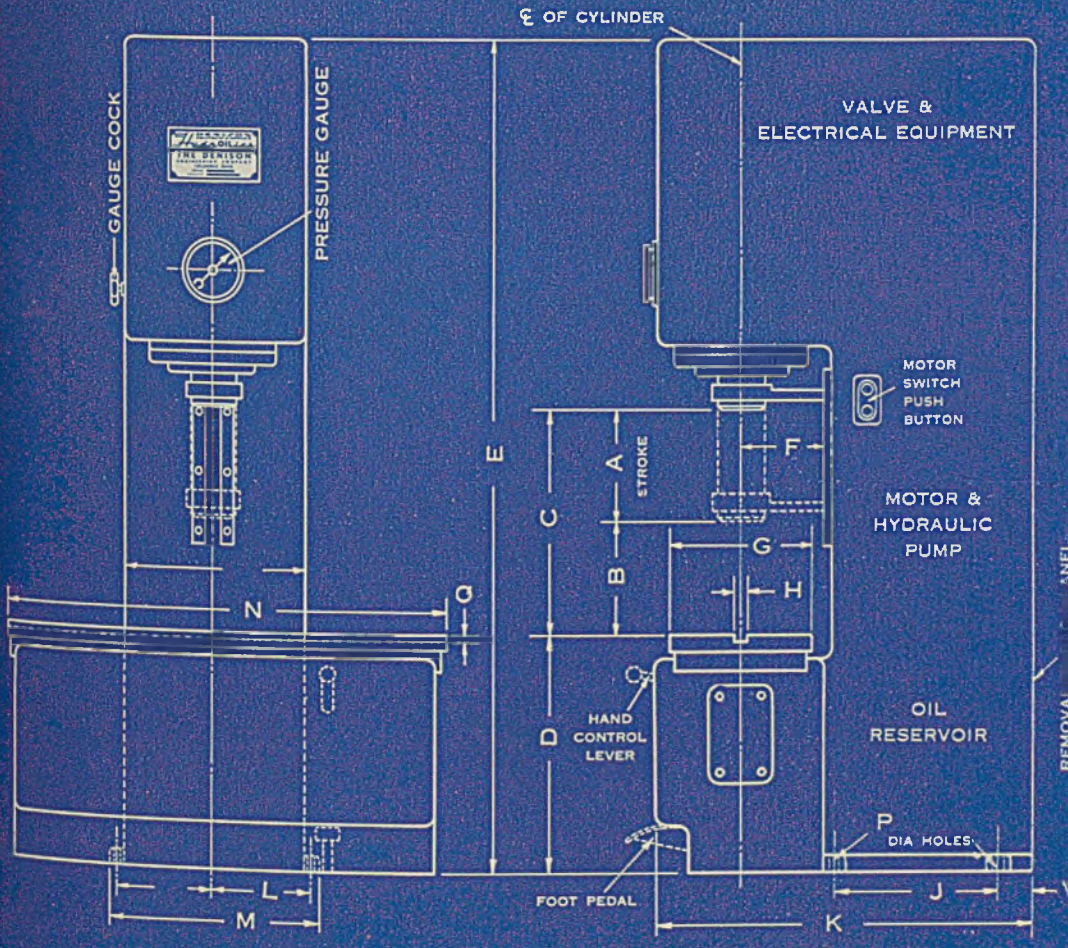
Improvements like these, in design, in performance, in versatility, have made Denison HydrOILics "Industry's New Right Hand" . . . and today this new right hand is right in the middle of the war effort, turning out the goods.

Even if your production problem is entirely new, you can profit by Denison's experience and full technical and research facilities. For help on any press problem — assembling, straightening, bending—write, wire or phone The Denison Engineering Company or your Denison representative.

COMPLETE DATA ON HydrOILic PRESSES!

You'll want this newest catalog on the full line of standard Denison HydrOILic presses. It may point the way to more efficient POWER, SPEED, AND CONTROL on your assembling, straightening, and bending.

EXTRA! Twelve full pages of indexed engineering tables for quick reference, are included in this catalog. Write for free copy.



DIMENSIONS

	DLSC2-50
A	18
B	12
C	30
D	30
E	106
F	12
G	18
H	1
J	21⅞
K	50
L	13¾
M	29
N	60
P	1⅞
Q	½
S	25
V	4
W	8000
X	8050
Y	8150
Z	231

HydrOILic STRAIGHTENIN PRESS

CAPACITIES: 25, 50, 100 TON

MANUAL CONTROLS

MAX. WORKIN PRESSURE 2000 P.S.I.

MAXIMUM STROKE: 18"

MAX. THROA OPENING: 20"

MAX. VERTICA OPENING 30"

THE DENISON ENGINEERING COMPANY

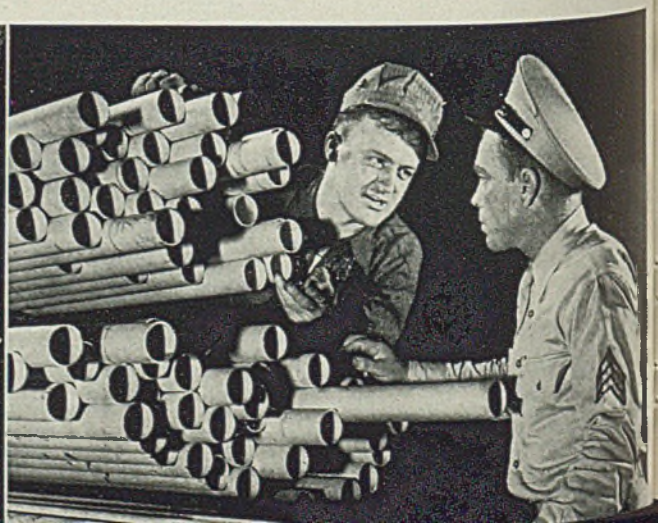
POSTER "COMES AS

At left is the poster that "came to life". Below, the welder, the soldier and the sailor meet for the first time at an eastern plant of Allegheny Ludlum Steel Corp.

On the bridge of the S. S. PRODUCTION, *the trio watches ladles of molten steel on the furnace floor below. In the Navy 12 years, Chief Evans said he had never had a view from a bridge like this before*

"K. P." was nothin' like this, according to Sergeant Vineyard, lower left, squinting against the scorching air which rises from the forging of a crane hook

"You may soon be eating something that comes through these pipes," Welder Woolslayer says as he shows the service men stainless steel tubing, right below, widely used in food processing machinery



TO LIFE"

SOLDIER, SAILOR AND WELDER MEET

"MEN WORKING TOGETHER", a poster showing a soldier, a sailor and a welder and designed to emphasize the united might of America, has been one of the most popular of the hundreds drawn to stimulate the war effort. They have been distributed to war plants, public buildings and posts of the armed services everywhere.

Recently the poster "came to life" in an eastern plant of the Allegheny Ludlum Steel Corp.

The story: George Woolslayer, the 32-year-old welder of the poster, is an Allegheny Ludlum employe. Seeing himself on the poster, flanked by the soldier and sailor of whom he knew nothing, piqued him. Who were these men who had been chosen to typify the strength and spirit of the armed forces as he had been chosen to typify the production man.

So he wrote a letter to the Office of War Information and asked for the names and addresses of his poster colleagues that he might write to them. "I feel I'd like to know them," he wrote.

There was something about that simple request that struck a responsive note with the OWI. So a meeting of the three was arranged. Furloughs were negotiated for Sergt. French L. Vineyard, (who was a corporal when the poster was made) and Radio Aviation Chief John Marshall Evans (radio man first class in the poster).

The service men arrived at the Allegheny Ludlum plant, soon forgot their self-consciousness in a genuine interest in each other.

Chief Evans, 32, has been in the Navy 12 years. Sergeant Vineyard, 27, is finishing his second enlistment.

The rest of the story of their meeting and tour of the plant, where they saw produced the steel of the weapons with which they fight, is told in the accompanying official OWI photos by Palmer.

Welder Woolslayer escorts the service men past the scrap charges ready for the furnaces in the company's mill yard

"This is what I call warm hospitality," says Chief John Evans as the three stood in the blast of 140-degree heat looking into an electric furnace

As the tour ended, the three posed before the poster that made their faces known to war workers, soldiers and sailors from coast to coast, symbolizing the "poster that came to life"

WHITING CORPORATION

SHEPARD NILES
CRANE & HOIST CORPORATION

Bedford Foundry & Machine Company

THE WELLMAN ENGINEERING CO.

THE EUCLID CRANE & HOIST CO.

NORTHERN ENGINEERING WORKS

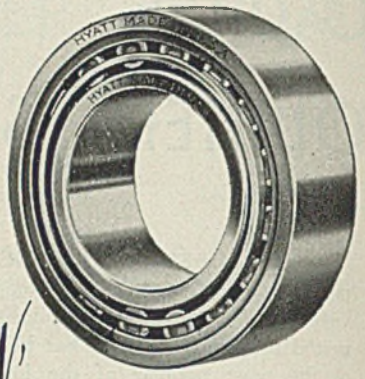
The Alliance Machine Company

THE CLEVELAND CRANE & ENGINEERING CO.

HARNISCHFEGER CORPORATION

THE MORGAN ENGINEERING COMPANY

SHAW-BOX CRANE & HOIST DIVISION
MANNING, MAXWELL & MOORE, INC.



ALL LOADS LEAD TO HYATT

All leading builders of cranes for steel mills, industrial plants, and shipyards have used Hyatt Roller Bearings for years and years. Wherever load meets load under the added burdens of wartime pressure, Hyatts are giving dependable performance with a minimum of care and maintenance. Our engineering department will be glad to consult with you on any related problem. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey.

THE 50TH YEAR OF **HYATT** ROLLER BEARINGS

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

MIRRORS of MOTORDOM

Meshing of war production to battle strategy keeps manufacturers in a dither. Tempo of changes accelerating. . . Mass ingenuity versus mass production. . . Streamlining combat vehicles

DETROIT

SHIFTING fortunes in the deadly game of war continue to make more definite imprint on plans for manufacturing various types of battle implements—new and old. Overnight it is sometimes necessary to relay a change in strategy to the production front, upsetting carefully drawn plans for tooling and equipment, as well as for employment.

A case in point concerns plans for moving into production on armored cars, battle wagons, tanks on wheels or whatever you choose to call them. Months ago in the Libyan campaign the erosive action of desert sand was found to be immobilizing some tanks after as little as 35 miles of combat travel. The fine grit, whipped by the wind, filtered into the pins of track links and simply ground them to pieces, converting the tank into nothing more than a pillbox which could be reduced easily by enemy fire. A change to armored combat cars seemed the answer, substituting rubber-tired wheels for the slow moving tank track, but retaining the armored hull, turret and firepower.

Several companies accelerated manufacturing programs for different types of such battle wagons. They found certain key pieces of machinery needed even to get a pilot line going. Washington dilly-dallied over requests for machinery, hemmed and hawed over just what type of firepower to mount on the vehicles. Some wanted a 37-millimeter gun, another group said this was too light and a 57-millimeter would be much better, another bunch of experts chimed in that nothing less than a 75-millimeter gun would be satisfactory. Then a suggestion was made that the basic structure be made suitable for mounting any of these guns. But still no machinery!

Libya's Loss Reduced Pressure

Meanwhile the British virtually lost Libya and holed in for a last ditch stand outside Alexandria. That took a lot of the pressure off the armored car program, but it is still going ahead, and deliveries are being made, though not in nearly the volume originally planned.

Antiaircraft guns were another item pushed around by vacillating strategy. First, the 75-millimeter gun was the thing to ward off enemy planes. Then the 90-millimeter was found to be much superior, especially for high-flying attackers. Next, the emphasis shifted to the 4.7-inch (about 119-millimeter) gun. The tooling problem to make any of these guns is not inconsiderable, particularly when you realize that you are dealing with gun barrels anywhere from 15 to 25 feet in length. Gun barrel lathes with 64-foot beds were set up to handle the machining of these large "tubes". Following the spectacular success of the German General Rommel with an 88-millimeter gun as an attack weapon, military experts began to wonder whether it might not be better to reconsider the 90-millimeter job and adapt it to field work. Rommel had no new weapon. He simply tipped an old antiaircraft gun down to a level position and started blasting away, against ambushed tanks, with disastrous effects.

In the Malay and Burma campaigns, the Japanese were reported to be making extensive use of small, light tanks or tankettes, weighing 5-7 tons and carrying two man crews. The Russians also reportedly have used tankettes, transporting them by air. With these examples, plus the increasing emphasis on air transport of both men and fighting equipment, the armed services now are understood to be contemplating a new manufacturing program for small tanks, capable of being moved in transport planes and presumably suitable for dropping behind enemy lines.

Tempo of Changes Quicker

The obviously light and limited firepower which such combat vehicles would carry makes them unsuited to service against heavy artillery, but they might be adapted to behind-the-line activity of a paralyzing nature, if they were capable of being reinforced and supplied. After all a tank in enemy territory is utterly useless without ammunition and gasoline.

The tempo of changes in equipment, introduction of new types, and shifting emphasis between different types of equipment is going to be stepped up, necessarily if we are to keep up with progress made by the enemy in this respect. The difficulties of effecting such hurried changes are a part of the penalty of mass production. Industries of this country have shouted to the world of their ability to turn out large quantities of products in unbelievably short time. Nearly everywhere the story is "200 per cent ahead of original schedules," "six months before original starting date," "five times the quantity originally specified at this time," etc. Admirable though these achievements may be, it is just possible they may not be sufficient to win war as it is now being fought.

In the first place, this widespread "beating" of original contract deadlines throws the material picture badly out of balance, a situation we are right in the midst of today. In the second place, mass production of anything is attended with a certain amount of inflexibility in the product, a definite freezing of design. In a mechanized war, design is changing daily and it is one whale of a job to keep the steady flow of changes moving out to the assembly line. In a situation like this, the smaller job shop, with its flexibility of manufacturing, has definite advantages over mass production and it may be that when the initial hump of war material production has been cleared it will be necessary to taper off on mass production and revert to the more flexible "job shop" technique.

"Matching the Enemy" Not Enough

Such philosophy is unthinkable to the experts in American mass production industry. But certainly they are realizing the difficulties of accommodating changes to steadily moving assembly lines and certainly they must realize that our military machine cannot come out on top if it is merely content to match every advance made by the enemy, to take a step forward only after the enemy has done so. We have got to do the stepping forward ourselves if we are to outmechanize the adversary. We have to perfect an antitank defense that is even better than a converted 88-millimeter. We have to design and produce some armored combat vehicles vastly superior to the 5-ton Japanese tin cans that splashed over the rice paddies of the Malay peninsula, to the consternation of the British who said it could not be done. We have to build some fighter planes that will run rings around a Focke-Wulff-190. We have to work out some bombers even tougher and better than the Flying Fortresses and the B-24s.

There is the very real danger of overtooling to produce a weapon which at the moment may look invincible, only to find that when it comes into production it is actually obsolete. This mistake, if you choose to call it that, has been made in the case of more than one product. But there is no use now in bemoaning past errors. The thing to do is to plan to avoid them again.

A case in point is ordnance. Believe it or not, industry is actually overtooled on ordnance. In the opinion of at least one leading industrialist, plant facilities for ordnance production now provide for

George W. Walker, Detroit industrial designer, has been employed by the Army to improve designs of jeeps and other combat vehicles. Mr. Walker is known for his advanced styling of automobiles. NEA photo

"too much too soon". So material has been diverted from other channels, machine tool building for example, into ordnance in order that production machinery can be kept supplied. Result will be an estimated decline in machine tool output from $111,000,000 in July to about $80,000,000 in August. And there are many companies literally crying for critical machine tools to fill out a machinery production line.

In laying out a production schedule for a certain military item, might it not be well to reason that, instead of shooting for 5000 a month P-99 fighter planes with 3000-horsepower engines, we decide to gear plants to produce one-tenth of that number, realizing that by the time production has started engineers will be ready to test the prototype of the P-100 fighter plane with a 3500-horsepower engine.

Elementary reasoning? Amateurish armchair generalship? Perhaps. But there are many who deplore the Hollywood aspects of our war production, the tendency to exploit and ballyhoo all forms of production achievement, even within the limits of censorship. These objectors cling to the belief that mass production and mass hero-worship will not win a war. They would prefer to substitute mass ingenuity for mass production, and a citation reading, "Thanks, well done" for medals and cross-country tours assigned to military heroes.

Brig. Gen. G. M. Barnes, chief of the technical division, Ordnance Department, announces through the medium of Public Relations Associates, Detroit, the appointment of George W. Walker, industrial designer, to tackle the job of "streamlining tanks and jeeps and gun carriers." He will assemble a staff of designers, with headquarters at Arlington, Va. Part of his assignment is to enlist the newer materials—molded plastic and the industrial products of the farm—wherever their use will increase productivity of plants turning out vehicles, and at the same time improve striking power without increasing vulnerability to attack.

Mr. Walker has made a name for himself in the styling of thousands of consumer products. Here his approach has been to captivate the buyer's eye by employment of new lines and new materials. The ordnance assignment would appear to be vastly different from restyling a mantel clock, but Walker brings to any job a refreshing zest and enthusiasm which, if mixed with the proper amount of technical information from the battlefront, the machine shop, the metallurgical laboratory and the assembly line, might be productive of more mobile and harder hitting combat vehicles. Three of Walker's concepts were published here June 22, p. 44.

One puzzling phase of the Army's buying policy in connection with spare parts for motor trucks is the practice of purchasing $36,000 worth of spare parts for every 100 trucks ordered. On the recent order placed with 41 manufacturers for 880,000 trucks, this would indicate a spare parts order of $316,800,000. Unconvinced of the soundness of this procedure, truck manufacturers have attempted to persuade Army buyers to adopt the "cannibal system" for replacement parts. Essence of this system is the purchase of 25 "spare" trucks for every 100 for service, stripping the spares of parts as they are needed in the field. This avoids building up excessive and possibly worthless stocks of parts in the field. The proposal has been rejected by the Army, however; truck producers conclude the idea was "too sensible" to be accepted. Reason advanced by the Army is that too much time is consumed in disassembling a truck in the field just to get at a spare part for one disabled in service. Against this is the fact that most trucks are shipped abroad in the knocked-down condition, and furthermore time is consumed in sending back to parts depots and combing through large banks of spare parts stores, resulting in almost as much delay as would be occasioned by taking the needed part off a "spare".

On one large shell contract for the armed forces, the established price was $20 per shell. This was later lowered to $17. Automotive plant bid $16.28 and was awarded contract for a couple million. After 250,000 had been produced the price was lowered to $11.25 and since then has been slashed again to $9.75, an overall price reduction of 51 per cent.

Storage-in-Transit Privileges To Be Extended by Railroads

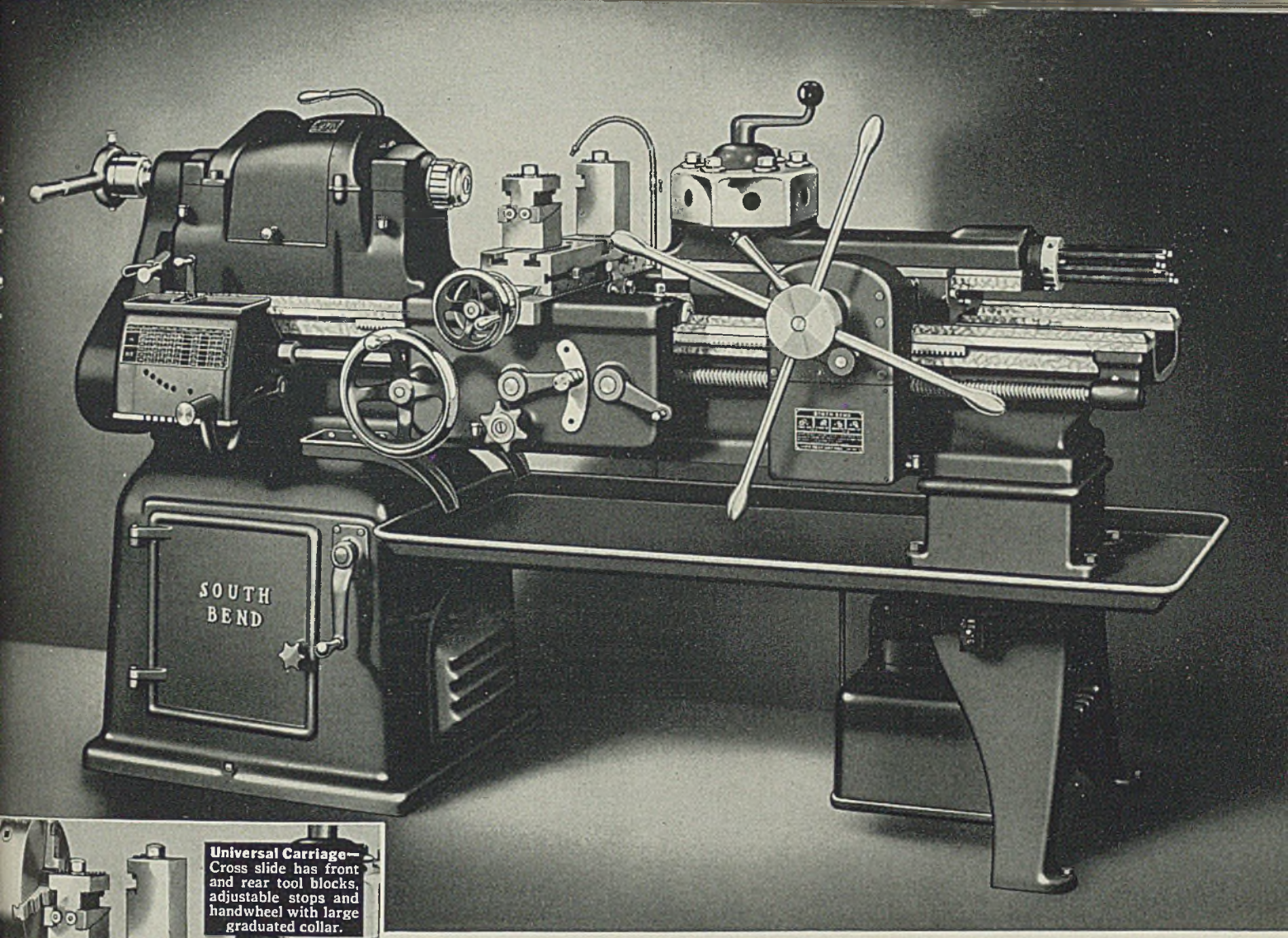
To facilitate movement of export traffic through ports by preventing the accumulation of freight, the railroads have agreed to place in effect storage-in-transit privileges on carload export freight at points intermediate to the ports.

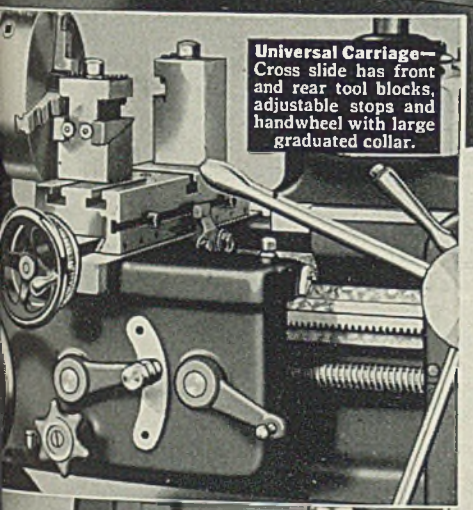
The storage-in-transit privilege was negotiated by Office of Defense Transportation division of rates at the request of the division of storage. It covers all commercial carload freight other than bulk traffic. Tariff provisions for the movement of freight under the agreement became effective on one day's notice.

New arrangements will permit flexibility by use of storage facilities strategically located within short running time to the principal Atlantic, Gulf, and Pacific ports and will greatly facilitate the prompt delivery of export traffic to the ports to meet vessels in which cargo space has been allocated.

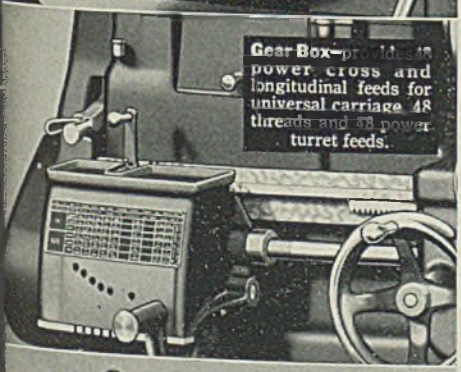
Additional covered and open storage facilities at interior storage points, if required, will be made available by ODT's Division of Storage.

In order to avail themselves of this storage-in-transit privilege, arrangements will have to be made by the shipper or agent for storage facilities in advance of shipment.

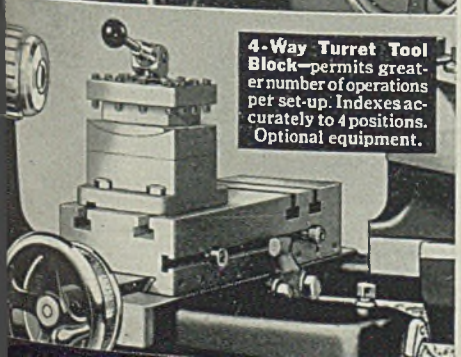




Universal Carriage—Cross slide has front and rear tool blocks, adjustable stops and handwheel with large graduated collar.



Gear Box—provides 48 power cross and longitudinal feeds for universal carriage 48 threads and 48 power turret feeds.



4-Way Turret Tool Block—permits greater number of operations per set-up. Indexes accurately to 4 positions. Optional equipment.

SOUTH BEND TURRET LATHES

DESIGNED for the efficient production of duplicate parts, the South Bend No. 2-H Turret Lathe has the precision for exacting, close-tolerance operations—smooth power for producing a fine finish—versatility that reduces set-up time to a minimum.

The universal carriage has 48 power cross feeds, 48 power longitudinal feeds, and 48 thread cutting feeds ranging from 4 to 224 per inch. All changes are made through the quick change gear box at the headstock end of the lathe. Front and back tool blocks are supplied on the screw feed cross slide. A 4-way turret tool block is available to order. A large diameter micrometer graduated collar on the cross slide handwheel permits adjusting the cutting tools with extreme accuracy.

The ram-type turret has both power feed and hand feed, with an adjustable feed trip and stop for each of the six turret faces. The turret head indexes automatically on the return stroke of the turret slide. The quick change gear box provides 48 changes for power turret feeds. Change gears in turret apron provide an additional change for turret power feed, independent of tool post carriage feeds in both rate and direction.

Full advantage can be taken of the higher cutting speeds possible with tungsten-carbide tools, as the result of the wide range of speeds and feeds available. The twelve spindle speeds range from 16 to 880 R.P.M. The use of a two-speed motor permits quick change from high to low speeds for reaming and tapping operations.

Investigate the possibilities of this new South Bend Turret Lathe—write for catalog and the name of our nearest dealer.

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WING TIPS

Subcontractors getting into high gear on B-26 medium bomber project after a year of intensive preparation. . . Engineering changes at rate of 500 a week. . . Co-operation a keynote

FLOWN for the first time late in 1940, the Martin B-26 medium bomber was dubbed by test pilots as the "hottest" thing they had ever handled in the air or on the ground. For its 26,625 pounds of gross weight it has terrific power—two Pratt & Whitney double wasps, each developing 1850 horsepower at takeoff and at 2600 r.p.m. Propellers are of the four-blade metal type, not usually seen on a multi-engine airplane. Landing gear is of the tricycle type, center wheel under the nose, and all fully retractable. The B-26 is easily recognizable by its all-plastic nose and flat, high wing.

The B-26 was unusual in that the first plane produced was not a prototype or test model but the start of a production run. That first model also marked the Army's initial use of power gun turrets, now standard on nearly all types of bombers to improve defense firepower. Extensive use of armor plate also was made on the B-26, in spite of which the ship proved faster than any pursuit planes in Europe. To set one of them down, particularly on a short runway, is said to be something of a trick.

Under the so-called Knudsen plan for bomber production, a Martin assembly plant was established at Omaha, Nebr., into which subassemblies are fed by various units of the automotive industry, including Chrysler Corp., Hudson Motor and Goodyear Aircraft.

First orders for the plane were received June 2, 1941. Chrysler was assigned to produce the center or bomb-bay section, including the central portion of the wing structure, plus the control and bombardier forward section, or nose. Tail cone sections were allotted to Hudson, while tail assembly, engine nacelle sections and wing tips were given to Goodyear. Motors are furnished by the airplane engine division of Ford Motor Co., leaving wings to be made by the Martin company itself.

Preparatory work on this widely scattered manufacturing plan was long and arduous. Thousands of drawings had to be carefully prepared to assure exact fits of the subassembled sections at the central assembly plant. Thousands of workmen had to be trained. Entirely new types of jigs and fixtures had to be built. New types of assembly lines had to be devised.

Last summer, Chrysler leased a portion of the Graham plant in Detroit for its part in the co-operative plan. After a complete renovation of the old building, the first of the personnel was moved in and a training school established. The thousands of parts going into the fuselage sections to be produced were mounted on display boards and studied carefully.

100 Schooled at Martin Plant

To run the school, Chrysler selected an official who had achieved considerable success in earlier years as head of a training program for young sons of employes. He himself knew little of aircraft manufacturing, so he took a course in aviation engineering and apprenticed himself to a tool builder in his spare (?) time. About 100 men from the Chrysler supervisory personnel were selected for the training program. They spent weeks in the shops, lofts and classrooms at the Martin plants in the East, then returned to the empty plant in Detroit to start work.

In equipping the plant for aircraft production, many puzzling problems were encountered. For example, one Friday night a large holding jig for part of the bomber fuselage was completed. Engineers checked it and pronounced it perfect. The following Monday morning it was checked again and was found to have warped out of shape, despite the fact it was a steel structure solidly anchored to a concrete foundation. That week, necessary adjustments were made and on Saturday the structure again was lined up perfectly. But on Monday morning it was once more askew.

All work on the jig then stopped while sleuths from the master mechanic's office descended on the scene. After much probing and investigating, the trouble was traced to the fact that, during each weekend, there was considerable switching of railroad cars onto a nearby siding. The vibration thus set up was transmitted through the earth to the factory foundations and into the new jig. The cure was to dismantle it entirely, build up new foundations insulated from the building itself and re-install the jig. All subsequent jigs were built the same way.

Layout plans adopted included four main assembly lines, each fed by its own subassembly lines. The latter, flowing across the plant at right angles to the main lines, originated at a long, enclosed loading dock, flanked by a railroad siding. This dock was converted into a materials warehouse. Subsidiary lines, starting near the warehouse doors, feed their products into the main lines which comprise a series of jigs and fixtures lined by connecting conveyors.

At the ends of the main lines the conveyors converge at the ends of two railroad spurs where the finished fuselage sections roll directly into the open ends of automobile freight cars for shipment to the final assembly plant.

Difficulties encountered in getting this unusual manufacturing operation under way are hinted at in a supervisory official's statement that "it took us almost a year to produce one nose section." Not the least of the difficulties was the fact

Military versions of the DC-4 commercial air transports, these Douglas C-54 four-motor army transports are in full production at Douglas Aircraft Co. plants in California. Cargo capacity equals that of a standard railroad boxcar.

WAR PRODUCTION- 33½ HOURS PER DAY!

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increased output 40%...stepped up tool life...improved finish

It takes bullets to win battles, and American ingenuity is finding ways to set amazing records in the race for arms production.

For example, in a plant turning out bullet-assembling machines, excess heat on tools and work, poor finish, and operators' skin complaints were restricting production. A Sun Oil Engineer — one of those capable Doctors of Industry — was called in to improve conditions. He recommended a change in cutting fluid . . . to Sunoco Emulsifying Cutting Oil. Now they're using Sunoco . . . and rate of production has increased 40% — equivalent to an extra 9½ hour shift every day! Finish has also improved, and skin trouble vanished.

Sun Doctors of Industry and Sunoco Emulsifying Cutting Oil stand ready . . . willing . . . and able to help you step up production in your shop. For helpful case histories of what they have accomplished for other leaders in the metal working industry, write for your free copy of "Helping Industry Help America."

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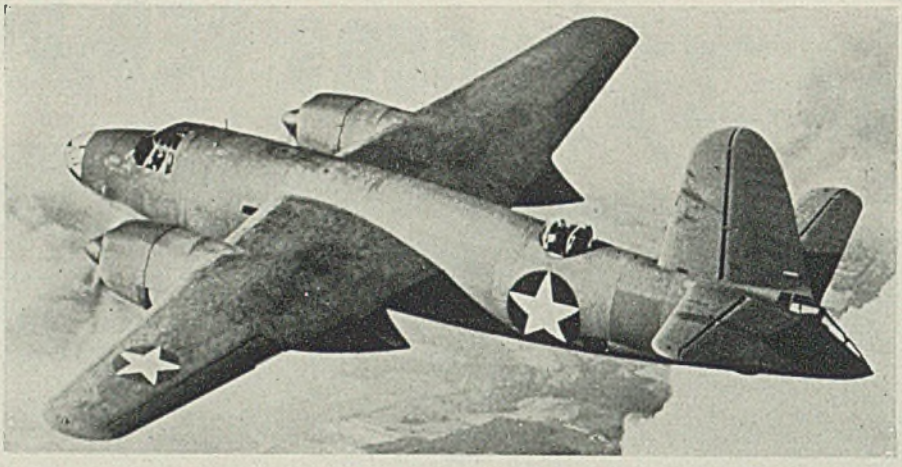

B-26 medium bomber in full war paint. Note power gun turret in rear fuselage and space for rear gunner in tail. Army Air Force photo courtesy Chrysler Corp.

that complete drawings of the fuselage sections were not available until February of this year. Moreover, while the preparatory work was in process, changes were being received from the prime contractor at a rate of more than 500 per week. In a year's time, this would amount to some 25,000 design changes. Such experience is typical of other companies starting out to do subcontracting work on aircraft.

However, Chrysler shipped its first complete sections on the 15th of May and a month later production had been stepped up to so lively a pace that several of the operations originally scheduled for final assembly lines had to be rearranged into additional subassembly layouts to make room for the unexpected increase in productivity. Production now is limited only by the speed at which the prime contractor can accommodate the fuselage sections, and the rate at Detroit has risen so rapidly that operations recently were reduced from two shifts to one, although the one-shift crew was appreciably expanded to avoid layoffs.

Acceleration of production was achieved by continuous refinement of productive techniques. The job was broken down into smaller and smaller subassemblies. New simplifications of operations were tried daily. Parts, once installed on main or tributary assembly lines, were shifted to newly created lines to avoid congestion. Ends of many subsidiary lines were provided with storage bays in which backlogs or floats of parts can be built up against the possibility of unforeseen breakdowns or temporary materials shortages.

Complexity and magnitude of the task can be realized when it is understood that the manufacture of just these two fuselage sections by Chrysler means bringing and fitting together about 14,000 individual parts, exclusive of standard items such as rivets, bolts, nuts and washers. Not only must precise fits be made, but extreme precautions also must be taken against the possibility that parts incorporated in the plane sections in the Detroit plant will not fit exactly the complementary parts installed in other sections of the plane built elsewhere.

A production official at Chrysler thrusts aside any laurels which might be bestowed on the performance of his engineers and workmen. He says, "The chief credit for our achievement, I think, should go to the people of the aviation industry. Without their co-operation this could not have been possible. They opened their plants to us when we decided to try to learn their business. As far as I know, no other industry has ever done anything quite like that before."

Alexander Kartveli

Vice president and chief engineer of Republic Aviation Corp., Farmingdale, N. Y., accredited with design of the new Republic P-47 Thunderbolt pursuit plane, now in quantity production. Though a foremost designer (WING TIPS, Aug. 17, p. 60), he is personally retiring to a degree which has made him an almost legendary figure. Russian born, his career has patterned closely that of Alexander de Seversky, head of the predecessor company to Republic Aviation. Kartveli is said to be the first designer to incorporate successfully the turbosupercharger in a modern pursuit ship

Three-Year Success Story

Well over three score manufacturers of aircraft in this country are using equipment for spot and seam welding of aluminum and light alloys developed by the Sciaky brothers, Mario and Maurice, Frenchmen who started their business virtually from scratch in the U. S. in April, 1939. First demonstration of their "stored-energy and variable-pressure cycle" principles of welding was made at the Douglas plant on the West coast. Tests during the summer of 1939 proved favorable and, with co-operation of the Pullman-Standard Car & Mfg. Co., Chicago, building of Sciaky machines was started immediately. Recently the company moved into a new plant near the municipal airport at Chicago, just two years from the date of the sale of their first machine. Their line of equipment has been greatly expanded.

Stored-energy principle as worked out by Sciaky involves excitation of the welding transformer secondary by direct current fed into the primary from a mercury arc rectifier. Interruption of the primary current discharges the "charged" secondary into the welding electrodes. This principle is combined with variable pressure of electrodes, a cycle being as follows:

1. Work pieces are gripped tightly between electrodes in order to establish good electrical contact.
2. Pressure is decreased automatically an instant before the peak welding current, in order to obtain maximum contact resistance during the peak welding current.
3. Immediately after the current peak, the pressure is increased to a value greater than the yield point of the metal being welded. (This mechanical working of the metal is said to compensate for structural changes caused by the temperature rise during welding)

Foundry Equipment Sales Index Higher in July

Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in July was 909.1, compared with 884.4 in June and 730.2 in May.

Total sales index was 800.8 in July, 774.0 in June and 653.6 in May. Index for repairs in July was 474.0, in June 441.5 and in May 423.3.

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

New Series Added To Conserve Critical Alloying Elements

EXAMINATION of latest NE steel lists, pages 75 and 76, shows that the 1300 series, carbon and manganese; the 9200 series, silico manganese and silico manganese chromium steels; and the 52100 series, carbon chromium steels, have been included in the new list; also that four manganese molybdenum steels (the 8020, 8022, 8339 and 8442) and the 8600 and 8700 NE steels were included at the request of WPB. The newer NE steels consist of the 9400 series, manganese, silicon, chromium, nickel and molybdenum combinations; the 9500 series of manganese and silicon with 60 per cent chromium and nickel and 25 per cent molybdenum combinations; and the 9600 series of manganese, silicon and chromium combinations.

In order to arrive at the most promising compositions, thus effecting greater conservation of chromium and nickel, as well as molybdenum, a survey was made of the large alloy steel producers to ascertain the average recovery of alloying elements in scrap. The survey revealed the following facts concerning residual elements existing in scrap *for those specifications where the elements investigated were not specified:*

	Average Residual O.H. Steels	Average Residual E.F. Steels
Cr	.17	.23
Ni	.22	.20
Mo	.06	.05

With this information available, it was determined that it was possible to prepare a list of steels containing 0.20 to 0.40 nickel, 0.20 to 0.40 chromium, and 0.08 to 0.15 molybdenum, using the least amount of virgin alloy, provided increases in silicon and manganese could be permitted to produce the proper equivalent hardenability of those steels to be replaced. Permission was granted by WPB for the increased use of silicon and manganese and arrangements for melting of experimental heats was started.

The combinations investigated involved a manganese, silicon and chromium combination of 0.40 to 0.60 silicon, 0.40 to 0.60 chromium, with manganese content ranging from 0.90 up to 1.60—the 9600 series; also, 0.40 to 0.60 silicon, 0.20 to 0.40 chromium, 0.20 to 0.40 nickel, 0.08 to 0.15 molybdenum, with manganese content ranging from 0.80 to 1.50—the 9400 series. One new composition investigated involved 0.40 to 0.60 silicon, 0.40 to 0.60 chromium, 0.40 to 0.60 nickel, and 0.15 to 0.25 molybdenum—the 9500 series—which was studied to provide a possible alternate for SAE 4340 steel or other steels of equal hardenability.

Because an excessive amount of time would have been consumed in making standard tensile and other physical property tests of all the alternate compositions set forth herein, the committee was of the opinion that for general applications a comparison of standard end-quench hardenability data would suffice as a guide to application of the alternate steels.

After the charts and tables on new NE steels on pages 75 and 76 had gone to press, the accompanying additional material was received. Refer to those tables where noted.

In the table on page 76 will be found a list of AISI or SAE steels and NE 8000 series steels within groupings of average hardenability brackets, along with the alternate or alternates having approximately the same hardenability. This information may assist the user of new steels in arriving at the proper alternate composition showing comparable hardenability with that of the present compositions.

The recommended composition range, in some cases, does not conform exactly with the alternate type tested. This fact exists, since in the study, it was necessary to adjust the composition slightly to allow for the difference found to exist between the steel type tested and the recommended alternate composition range. Such adjustments are quite necessary to present a composition similar in hardenability characteristics to the steel to be replaced and also to establish the least number of base compositions and the minimum number of steels to be manufactured.

Hardenability tests do not necessarily describe all the properties contained or desired in a steel. But in view of the time permitted to complete the study, it would have been impossible to investigate all types of physical property test results before presenting the list which is urgently needed for present melting schedules for those users who are satisfied with hardenability tests only. In the meantime, however, a physical property testing program has been started and as soon as results are available, the AISI will issue sheets bearing the results of the tests in the same procedure as is now followed out on the test results on the NE 8000 series steels.

Physical property tests carried out to date on the NE 8000 steels lead the committee to believe that the new NE (9400, 9500 and 9600 series) steels will also produce similar results.

A fact which also substantiates this contention is illustrated by the work of Baeyertz and Janitzky and the work of Boeghold of General Motors Research Laboratory and Dr. E. C. Bain wherein is shown the relationship of yield to ultimate strength, strength to hardness, strength to toughness of various different types of steels, and, particularly, that there is a reasonable spread of ductility to be expected on steels at different hardness levels, the spreads appearing sufficiently close enough for the average application. This is particularly true on alloy steels heat treated to hardness ranges of 225 to approximately 400 brinell, from about 110,000 pounds per square inch ultimate strength to approximately 200.0000 pounds per square inch which covers the major portion of alloy steel production on grades which are not carburized. In the carburizing grades or steels treated to strengths over 200,000 pounds per square inch the selection of alternates involves further problems, none of which would be affected to any great degree by the compositions proposed in the 8600-8700 or 9400 series steels.

Low Carbon Carburizing Grade Omitted

In the chemical compositions tables it will be noted that no low carbon carburizing grade of silicon-manganese-chromium steels have been listed which is due to the fact that, if the manganese and chromium combination were increased high enough to approximate the hardenability of the steels to be replaced, difficulties would be encountered in present manufacturing procedures and also the manufacture of such steels would require a large percentage of carbon-free ferromanganese and ferro-chromium. These products, used in large quantities, present complications of both reduction capacities and availability.

In line with discussions with WPB technical section representatives, the limitations with regard to the recommended use of alloying elements is as follows:

Manganese: When the carbon content required in the steel is 0.25 per cent

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or higher, no limitation is recommended for use; when the manganese content is over 1.30 but not over 1.60, the carbon should be limited to a minimum of 0.20 per cent; when the manganese is over 1.00 but not over 1.30, the carbon content should be limited to 0.18 per cent. These recommendations apply to steel containing no chromium. When chromium is present, the recommendations must be modified to higher carbon contents.

Silicon: Silicon contents for these new lists of steels was placed at 0.60 maximum, although the maximum permissible limit has been left open for other chemical compositions which might require higher silicon.

Nickel and Chromium: Both these elements for the new steels were recommended in the range of 0.20-0.40, although the 9500 series, the 8600 and 8700 series steels contain 0.40-0.60 Cr and Ni and were included in the list at the request of the WPB.

Molybdenum: This element for the new steels was recommended in the range of 0.08 to 0.15, except in case of the 9500 series steel which contains 0.15 to 0.25 molybdenum. The NE 8020 and 8022 steels containing 0.10 to 0.20 molybdenum, the NE 8339 containing 0.20 to 0.30 molybdenum and the NE 8442 containing 0.30 to 0.40 molybdenum steels were included in the new list at the request of WPB.

Vanadium and Tungsten: Since both these elements are already under restrictions in Order M-21A and subsequent modifications, no recommendations were considered necessary.

Possible alternates are confined to constructional alloy steels containing not more than the following percentages of the following elements: Nickel, 5.25; chromium, 3.99; manganese, 2.00; silicon, 2.25; vanadium, 0.25; and molybdenum, 1.00.

The alternate steels do not embrace the following types of steel: Low-alloy high-tensile steels which are furnished as flat rolled products and which require no heat treatment; stainless steels of irons such as the high chromium or chromium-nickel types; medium chromium (2 to 10 per cent chromium) steels which sometimes contain other elements and which are used to resist scaling at elevated temperatures; or, any class of tool steel.

The selection and application of a steel of a given composition is seldom dependent upon a single property or characteristic of the steel; it is usually the result of a compromise involving many factors. Size of section is of prime importance, the hardenability characteristics of the steel; the effect of various elements in large sections in the heat treated, normalized, or normalized and tempered condition; creep characteristics; resistance to mild corrosion; wear characteristics at low hardness values or when fully hardened; resistance to notch sensitivity or fatigue at room temperature or at low temperature; response to heat treatment, annealing, machining and many other similar properties and characteristics.

The use of alternate steels may make necessary changes in established methods of fabrication or heat treatment procedures or both, or may even make necessary changes in engineering design. Some types of steel are fabricated by torch cutting, bending, forming, dishing, drawing and other similar operations and the effect of these must be weighed carefully in selecting alternate steels.

For some uses a specific amount of a given element or group of elements is indispensable, while for other uses it may be more advantageous to make use of small quantities of several elements, thereby effecting conservation of all.

It is not the purpose of this report to present the most convenient alternates possible for one type of industry; rather, its purpose is to present certain types of steel which can serve the broadest possible field with the least technical complications.

Emergency Steel Equivalents

Standard Steel	Recommended NE Steel
A 2317, A 2320, A 3115, A 3120, A 4023, A 4024, A 4119, A 4615, A 4620, A 5120, A 6120, NE 8620	8020 or 9420
A 4027, A 4032, A 4119, NE 8124	8022 or 9422
A 4320	8720, 9422
A 4815	8715, 9420
A 4820	8720, 9426
A 2512	8715, 9415
A 2515	8720, 9420
NE 8720	9420
NE 8817	8720, 9420
A 2330	NE 1330
A 3130	NE 1330
A 4037	NE 1330
A 4042	NE 1330
A 4047	NE 1335
A 4130	NE 1330
A 5130	NE 1330
A 6130	NE 1330
NE 8233	NE 1330
NE 8339	NE 1335
NE 8630	NE 1330
	9630 or 9430
A 2335, A 3135, A 5135, A 5140, A 6135, A 6140, NE 8635, NE 8735	NE 1335 or 9635 or 9435
A 4137, A 4640, NE 8739	NE 1340 or 9637 or 9437
A 3045, A 3140, A 4140, A 4645, A 5145, A 6145	NE 1345 or 9640 or 9400
A 2340, A 3141, A 3240, A 4142, NE 8442, NE 8744	NE 1345 or 9642 or 9442
A *4337, A *4340, NE *8547	9537 or 9540
A 2345, A 3145, A 4145, A 5150, A 6150, A 8744, A 8749	NE 1350 or 9645 or 9445
A 2350, A 3150, A 3250, A 4150, NE *8949	9650 or 9450
A 4063, A 4065, A 4068	9255 or 9260 or 9262
E 52095	52100C
E 52098	52100B
E 52099, E 52100, E 52101, E 52107	52100A

*Recommended for Large Sections only.

Explains All Alloy Steels May Be Subject to Flakes

In a letter to manufacturers and fabricators of National Emergency steels recently, E. O. Dixon, chief metallurgist, Ladish Drop Forge Co., Cudahy, Wis., called attention to the fact the steels are subject to a defect of the type referred to as flakes, bursts, or shatter cracks. He also pointed out that standard steels, such as SAE 4820, 4620 and 4340, were subject to the same defect.

But apparently a number of persons to whom the letter was addressed overlooked this latter observation, with a result that the communication tended to discourage the use of NE steels among various fabricators, instead of increasing their use, which obviously was Mr. Dixon's intention.

Approached recently by STEEL on the question of this defect, the Technical Committee on Alloy Steel of the American Iron and Steel Institute declared that all alloy steels were subject to the same defect, but that it was curable by proper methods of slow cooling.

It is the opinion of the Committee that Mr. Dixon was unfortunate in receiving a heat of steel that had not been properly handled by the mill. Equipment for slow cooling alloy steels, it was pointed out, has been installed by all producers and all steels are so treated, unless through an unfortunate error the heat is mishandled.

Retroactive Wage Increase Directed For U. S. Steel Employes by NWLB

WASHINGTON

NATIONAL War Labor Board has decided to grant 250,000 employes of United States Steel Corp. subsidiaries the same 5½ cent per hour, 44 cents a day increase which had been granted "Little Steel" workers and made the increase retroactive to Feb. 15, in order to maintain the same wage relationship which has existed in the steel industry since 1921. The issue involved the United Steelworkers of America, CIO.

The board order also includes the same daily minimum wage guarantee, maintenance of membership and checkoff provisions contained in the "Little Steel" decision issued by the board July 16.

The board reached the decision by unanimous vote on the base wage increase and the daily minimum wage guarantee, and employer members dissented on the retroactive issue and union security.

Five subsidiaries are affected by the order: Carnegie-Illinois Steel Corp., Columbia Steel Co., American Steel & Wire Co., National Tube Co. and Tennessee Coal, Iron & Railroad Co.

Amount of the increase was not contested in hearings before the board. The retroactive feature was at issue as the wage contract with the unions was in effect until two weeks ago and the extension of the increase back to Feb. 15 was considered by the corporation as a violation of the agreement.

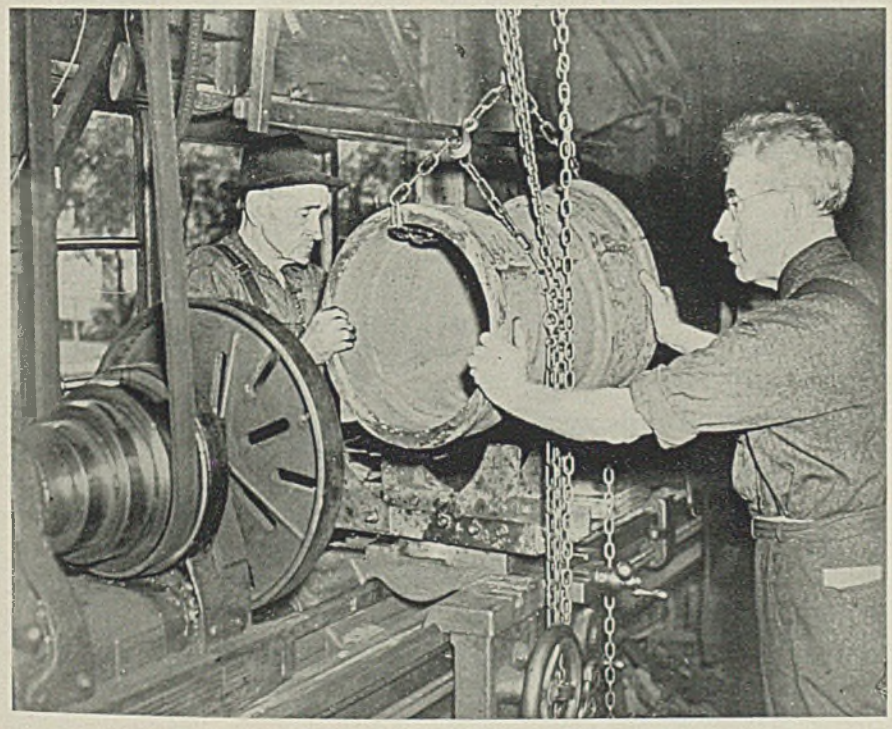
Wage contracts with United Steelworkers of America provided for reopening on ten days notice and cancellation on 20 days notice. The union argued that when the "Little Steel" dispute went to the board in February it believed the industry generally would accept the decision. It contended that for years wage increases and reductions were made effective industry-wide on the same date and for that reason sent no notice to the United States Steel Corp. until July 21, after the "Little Steel" decision.

The corporation contended that it had no notice from either the union or the board that it was to be made subject to the decision involving the four smaller steel companies. It also opposed the union security provisions.

The basic wage for common labor now is 78 cents an hour.

Members of the board participating were: William H. Davis, chairman; George W. Taylor, vice chairman; Wayne L. Morris and Frank Graham, representing the public; Roger D. Lapham, Cyrus Ching, Robert Black and George Mead, representing industry; and Emil Rieze, Thomas Kennedy, Robert Watt, and Fred Hewitt, representing labor.

TWO-MAN PLANT HEADS LIST OF 1300



The only two-man labor-management production drive committee in the nation, consisting of ". . . the old gent and myself," has won recognition and the pennant it sought, via the White House. Sparling Pulley Mfg. Co., Bay City, Mich., is headed by Jake Sparling, 60, shown at right, who wrote to the White House that he and his assistant, Percy Fogelsonger, 79, left, former lumberjack, have been working the past 18 months, 15 hours a day, seven days a week and have produced 18,000 steel flanges for war machinery.

He said they were glad to help in defense work as it gives them money to buy war bonds and stamps. "We feel that, owing to our age and the amount of work we do we are entitled to a pennant. I am 60 years old and my assistant is 79 years old. He handles all the flanges from 12 inches down and I take them from 14 to 30 inches. Some of the castings weigh 365 pounds."

The President referred the letter to Donald M. Nelson, chairman of the War Production Board, who ordered a large American flag poster sent to them and also authorized them to be recognized as a labor-management war production drive committee to head the list of 1300 other plants enrolled in the drive, some of which have over 60,000 employed in multiple buildings covering miles.

Essential War Production To Continue Over Labor Day

Pointing out that the battle of production is not yet won, WPB Chairman Donald M. Nelson last week called on American labor to arrange its annual Labor Day observance this year in a way to allow continued operation of all industries where a shutdown would be injurious to the war effort.

In a letter to the heads of the American Federation of Labor and the Congress of Industrial Organizations Mr. Nelson recognized the special significance of the day and suggested that in many plants schedules can be rearranged to allow the observance. These letters were sent after a number of labor leaders and local unions had written Mr. Nelson asking if celebrations should be omitted in favor of continued production.

In the Pittsburgh district steelworkers will work over Labor Day at time and a half, in most cases. Exception to this plan will be in departments whose operation is not essential. All steelmaking processes will go on as usual and major finishing lines will continue to roll.

Expands 400 Per Cent Since War Started; Many Vessels Converted

UNPRECEDENTED demands on the ship repairing industry since mid-year 1940 have been met effectively by the yards, according to H. Gerrish Smith, president, National Council of American Shipbuilders, New York.

Since the government started taking over merchant vessels for conversion into troop transports and other types of naval auxiliaries, the repair yards have been working night and day, Mr. Smith stated. To this large volume there was also added the repair work done on British ships under lend-lease arrangements, as well as the repair necessary because of sabotage on foreign vessels of enemy nations seized by the United States.

Thus the yards were called from a state of sporadic peacetime activity to full-blown expansion paralleling that of the shipbuilding industry and an increase in workers of over 400 per cent since 1940.

During the year ended April 1, 1942, hundreds of vessels have been armed with antisubmarine and antiaircraft guns and provided with quarters for gun crews. The 31 sabotaged Italian and German vessels were repaired and equipped for war operation at a cost of about $10,000,000. Sixty-five foreign-flag vessels requisitioned by the government were also armed and placed in good operating condition, in addition to many of the 198 ships of the old laid-up fleet of World War I.

In nearly all of the larger ship repair yards vessels of the United Nations that have suffered torpedo and other war damage have been quickly repaired and returned to sea service. Up to May 1, there have been acquired for the Army and Navy a total of 285 merchant vessels aggregating more than 3,000,000 tons. All of these vessels had to be converted in the ship repair yards for war use. Over 800 small craft, including many of the nation's private yachts, have been armed and converted into naval craft.

Citing J. E. Otterson, Co-ordinator for Ship Repair and Conversion for the government, as authority for the figures, Mr. Smith disclosed that in the last 12 months United States shipyards have completed repairs on 5500 ocean-going vessels in excess of 2000 tons each, representing a tonnage of more than one-half of the merchant ocean tonnage of the world.

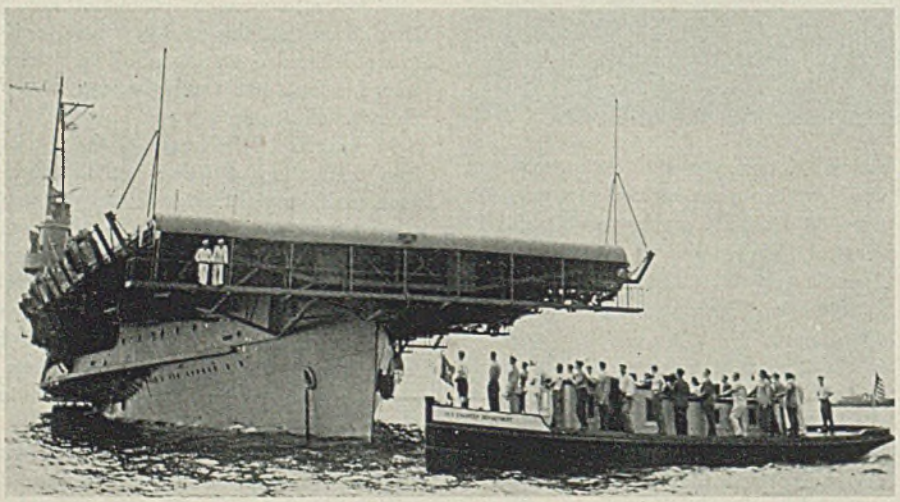
Mr. Otterson had recently paid tribute to the industry's record, observing that "the work performed in repair yards requires management and workmen of the highest order of skill in view of its variety, complexity and non-repetitive character. Shipyard management and workers have risen to the demands of their task, the ships have been promptly and efficiently repaired, and valuable 'ship days' have been saved."

University To Dedicate New Minerals Building

New million-dollar Mineral Industries Building of West Virginia University, Morgantown, W. Va., will be dedicated Oct. 16-17.

Begun in 1940, the six-story structure is now fully equipped. It houses the university's School of Mines, the West Virginia Geological Survey, Department of Geology and Department of Chemical, Metallurgical and Ceramic Engineering.

In addition to many specialized laboratories and a general analytical laboratory for routine analysis of a wide variety of materials, the building contains a complete model coal mine for the study of ventilation and standard coal processing equipment. In the basement laboratory there is also a continuous flow unit and numerous batch machines for testing ore.



Typical of the work imposed on ship repair yards as result of the war was the conversion of the former Great Lakes pleasure steamer SEEANDBEE *into the aircraft carrier U. S. S.* WOLVERINE. *To be used as a training ship, the carrier has just been commissioned at Chicago. NEA photo*

New Aluminum Plant Opens in Northwest

Fifth aluminum reduction plant in the Pacific Northwest went into preliminary operation last week, increasing power deliveries from the Bonneville-Grand Coulee power system to aluminum operations in the district to slightly under 400,000 kilowatts, Paul J. Raver, Bonneville Power Administrator, announced.

The new plant was built for the Defense Plant Corp. by the Olin Corp. and is operated by the latter under a management contract. With four other aluminum reduction plants, designed to convert alumina into metal pig, already producing in Oregon and Washington, and a new aluminum rolling mill nearing completion in the area east of the Cascade Mountains, the northwest now has a total of six aluminum plants with an ultimate combined investment of about $116,000,000, Mr. Raver said. He estimated they were capable of producing over $100,000,000 worth of products annually. Combined power demand at top capacity was estimated at 600,000 kilowatts of Bonneville-Grand Coulee power.

C. W. Hoelscher New Head Of Illinois Industrial Council

G. W. Hoelscher, secretary, East Side Manufacturers' Association, Granite City, Ill., was elected president of the Illinois Industrial Council, which conducted a two-day conference in Chicago Heights, Ill., Aug. 20-21. T. W. Butler, secretary, Alton District Manufacturers' Association, Alton, Ill., was named vice president, and James L. Donnelly, executive vice president, Illinois Manufacturers' Association, Chicago, was re-elected secretary and treasurer.

The conference was devoted to "War Problems Confronting Illinois Industry."

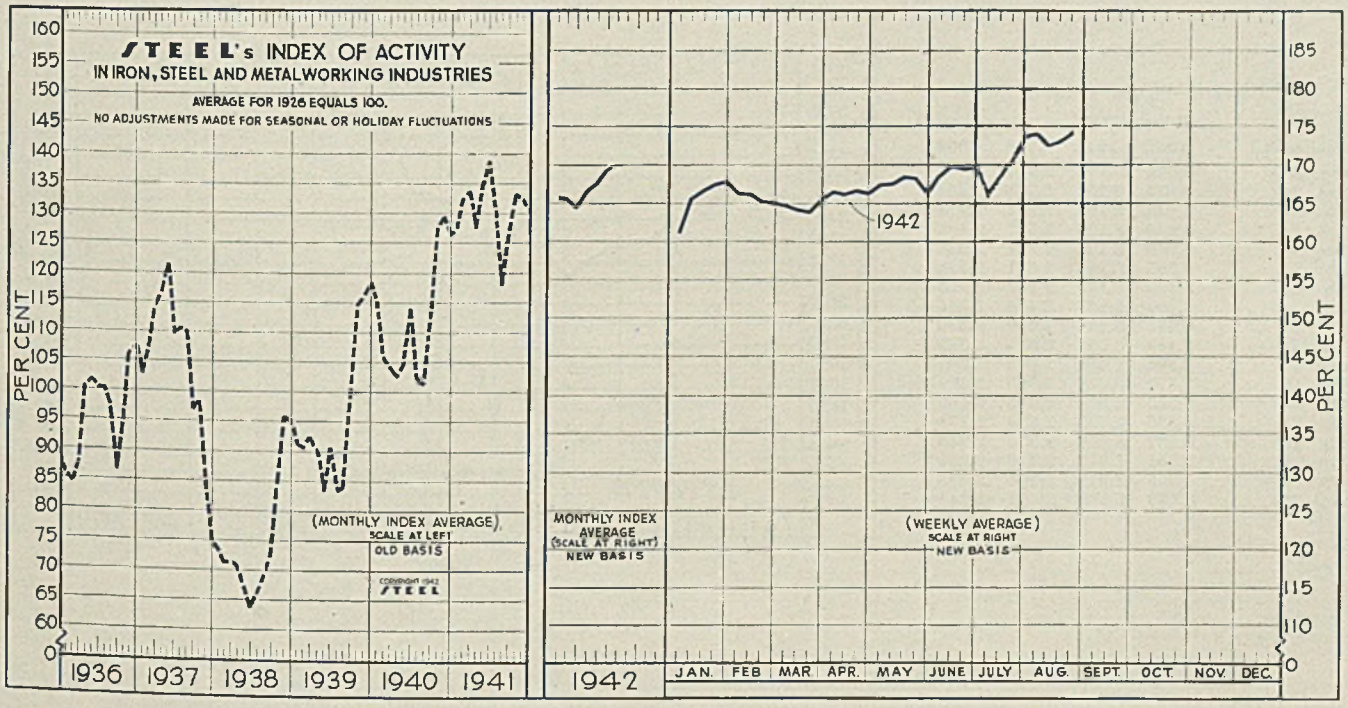
Index of Activity at New Peak Level

STEEL's index of activity climbed to a new peak level of 174.1 during the week ended Aug. 22. This represents an increase of 0.8 point over the preceding week's index figure. The gain during the latest period reflected a moderate upturn in steel production and a further increase in electric power consumption and revenue freight carloadings.

Steel ingot production during the week ended Aug. 22 advanced one-half point to 97.5 per cent of capacity. Little change is noted in the volume of incoming steel scrap. Current scrap collections are sufficient to sustain present level of ingot operations, but steel interests are unable to build up depleted stocks. Indicative of the all-out effort to increase steel production, one plant in the midwest is expected to exceed its theoretical open-hearth capacity output by 17 per cent this month.

Electric power consumption rose to a new peak of 3,673,717,000 kilowatts during the week ended Aug. 22. This compares with 3,654,795,000 kilowatts consumed in the preceding week and represents a gain of 13.7 per cent over that recorded during the like 1941 period.

Extent of raw material shortages is further illustrated in a recent survey of the National Industrial Conference Board. The board reports material shortages are handicapping war production of three-fifths of the firms consulted; about 25 per cent reported labor scarcities.



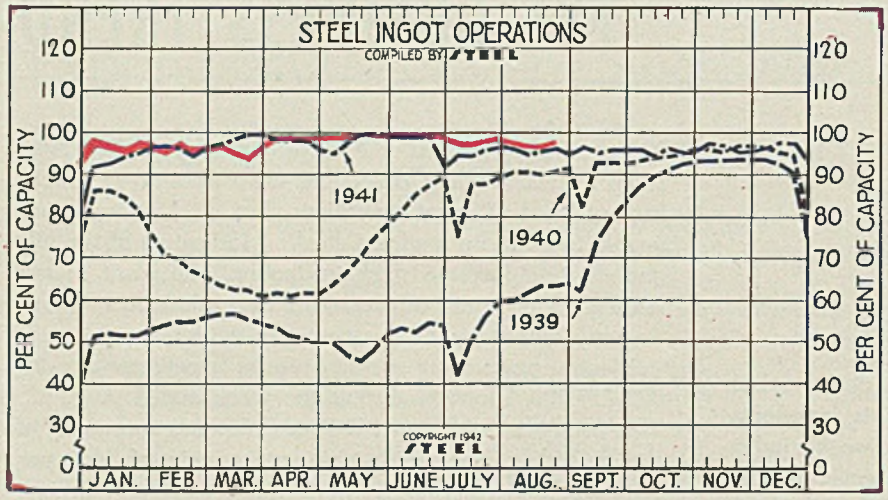
STEEL'S index of activity advanced 0.8 point to 174.1 in the week ending Aug. 22:

Week Ended	1942	1941
June 20	169.5	138.7
June 27	169.8	138.8
July 4	166.5	120.9
July 11	168.9	133.4
July 18	172.1	133.2
July 25	173.6	132.9
Aug. 1	173.8	123.3
Aug. 8	172.8	117.5
Aug. 15	173.3	118.2
Aug. 22	174.1†	118.5

† 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	102.3	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	55.8	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	88.6	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	67.8
Aug.		118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.		126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.		133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.		132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.		130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

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

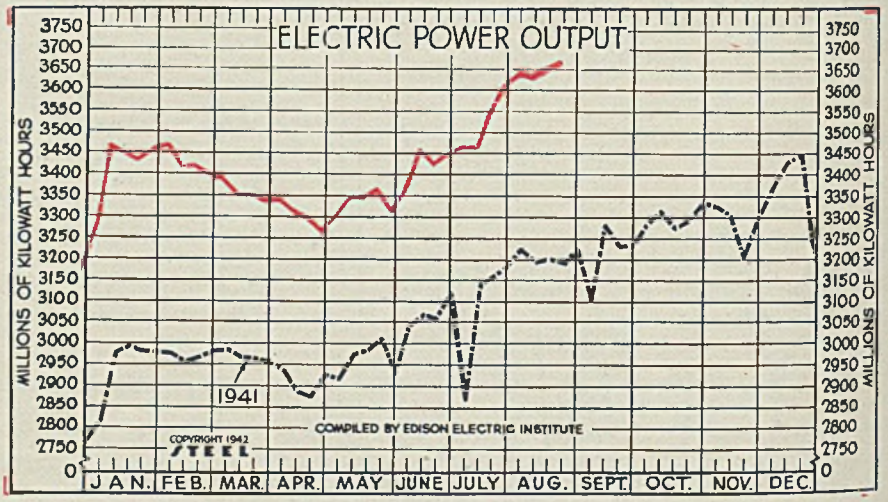
(Per Cent)

Week ended	1942	1941	1940	1939
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
June 13	99.0	99.0	86.0	52.5
June 6	99.0	99.0	81.5	53.5
May 30	99.0	99.0	78.5	52.0
May 23	99.0	100.0	75.0	48.0
May 16	99.5	99.5	70.0	45.5
May 9	99.0	97.5	66.5	47.0
May 2	99.0	95.0	63.5	49.0
April 25	98.5	96.0	61.5	49.0

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
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	3,183	2,681	2,378
July 11	3,429	3,141	2,652	2,403
July 4	3,424	2,867	2,425	2,145
June 27	3,457	3,121	2,660	2,396
June 20	3,434	3,056	2,654	2,362
June 13	3,464	3,066	2,665	2,341
June 6	3,372	3,042	2,599	2,329
May 30	3,323	2,924	2,478	2,186
May 23	3,380	3,012	2,589	2,778
May 16	3,357	2,983	2,550	2,235
May 9	3,351	2,975	2,516	2,239
May 2	3,305	2,915	2,504	2,225
April 25	3,299	2,926	2,499	2,244

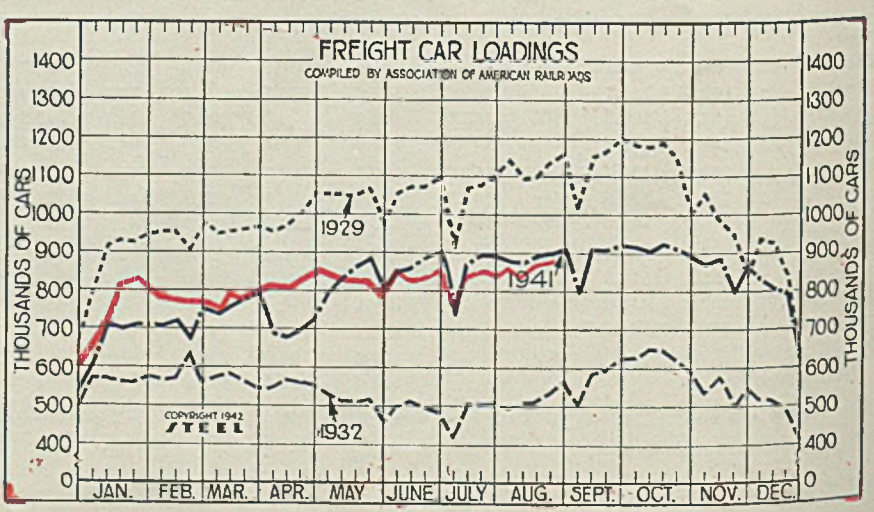


Freight Car Loadings

(1000 Cars)

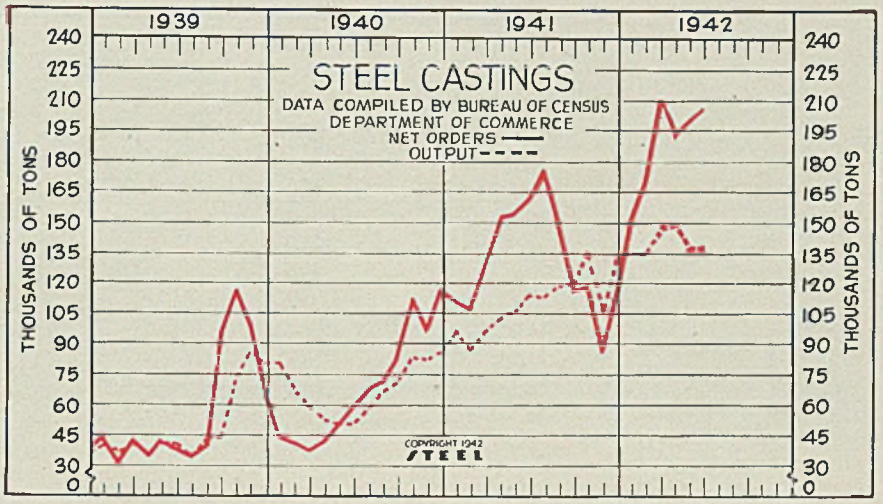
Week ended	1942	1941	1940	1939
Aug. 22	875†	900	761	689
Aug. 15	869	890	743	674
Aug. 8	850	879	727	665
Aug. 1	864	883	718	661
July 25	856	897	718	660
July 18	857	899	730	656
July 11	855	876	740	674
July 4	759	741	637	559
June 27	853	909	752	660
June 20	840	886	728	643
June 13	833	863	712	638
June 6	855	853	703	635
May 30	796	802	639	568
May 23	838	866	687	628

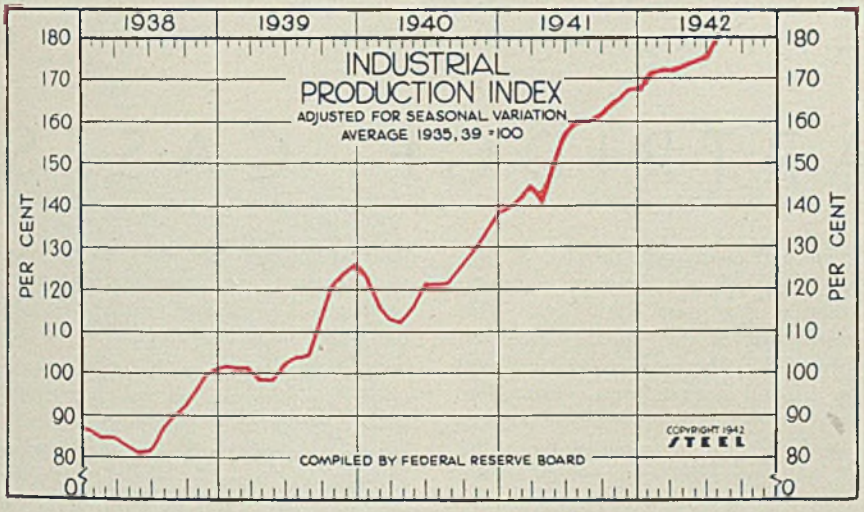
†Preliminary.



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	.....	175,892	.....	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





Industrial Production

Federal Reserve Board's Index

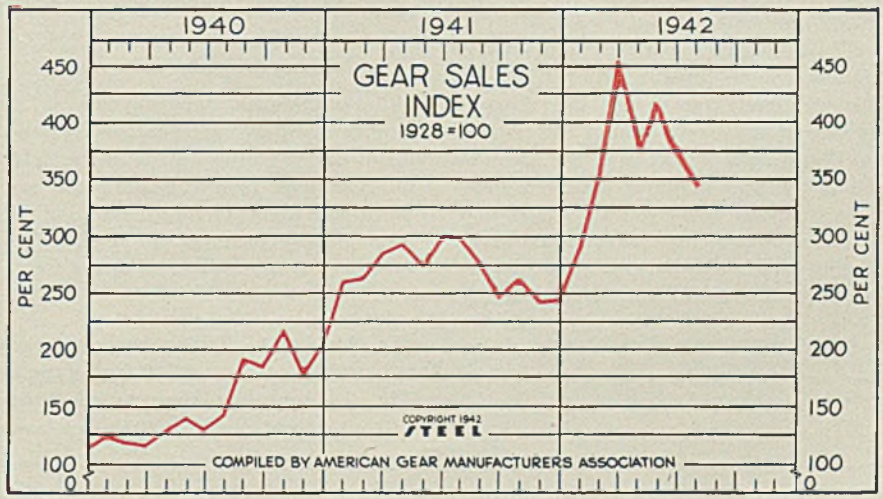
(1935-39 = 100)

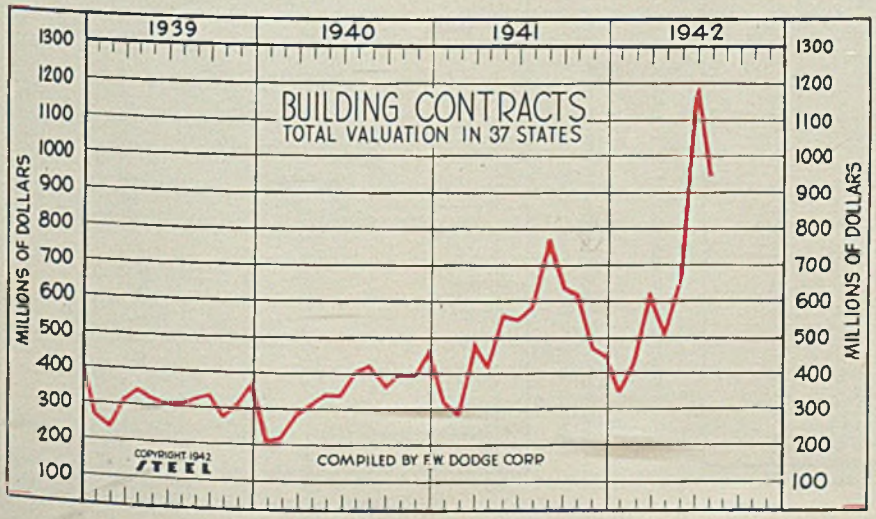
	1942	1941	1940	1939	1938
Jan.	171	139	122	102	86
Feb.	172	141	116	101	84
March	172	143	112	101	84
April	173	140	111	97	82
May	174	150	115	97	80
June	176	157	121	102	81
July	180	160	121	104	86
Aug.	...	160	121	104	90
Oct.	...	163	129	121	95
Nov.	...	168	133	124	100
Dec.	...	167	138	129	101
Year Ave.		154	122	108	88

Gear Sales Index

(1928 = 100)

	1942	1941	1940	1939	1938
Jan.	288	259	123	91.0	93.0
Feb.	353	262	116	86.0	77.0
Mar.	455	288	114	104.0	91.0
April	378	292	128	88.0	74.0
May	421	273	133	93.0	70.0
June	373	299	129	90.0	58.0
July	344	298	141	89.0	67.0
Aug.	...	276	191	96.0	76.5
Sept.	...	243	183	126.0	80.5
Oct.	...	261	216	141.0	72.5
Nov.	...	241	173	126.0	72.0
Dec.	...	243	208	111.0	81.0
Ave.	...	269.6	155.0	103.0	76.0





Construction Total Valuation

In 37 States

(Unit: $1,000,000)

	1942	1941	1940	1939	1938
Jan.	$316.8	$305.2	$196.2	$251.7	$192.2
Feb.	433.6	270.4	200.6	220.2	118.9
Mar.	610.8	479.9	272.2	300.7	226.6
April	498.7	406.7	300.5	330.0	222.0
May	673.5	548.7	328.9	308.5	283.2
June	1190.3	539.1	324.7	288.3	251.0
July	943.8	577.4	398.7	299.9	239.8
Aug.	.....	760.3	414.9	312.3	313.1
Sept.	.....	623.3	347.7	323.2	300.9
Oct.	.....	606.3	383.1	261.8	357.7
Nov.	.....	458.6	380.3	299.8	301.7
Dec.	.....	431.6	456.2	354.1	389.4
Ave.	.....	$500.6	$333.7	$295.9	$266.4

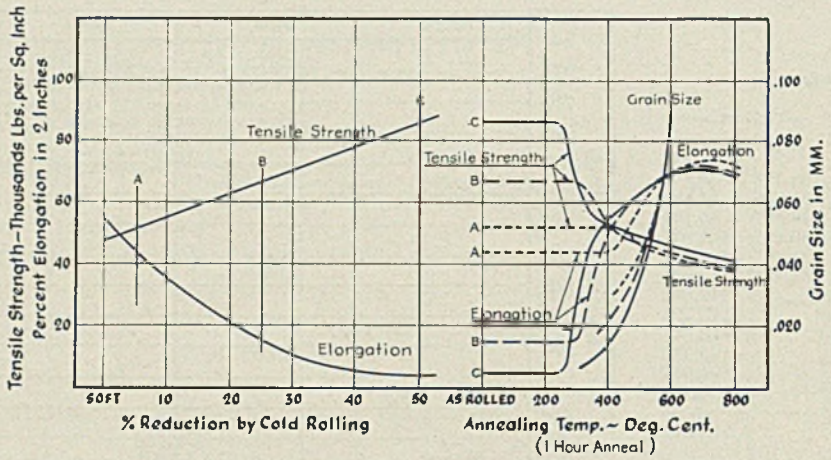


Fig. 1 — Schematic diagram to illustrate effect or amount of cold work on annealing characteristics of sheet cartridge brass

By R. S. PRATT
Metallurgist
Bridgeport Brass Co.
Bridgeport, Conn.

Heat Treating . . . .

BRASS CARTRIDGE CASES

MODERN practice in the production of cartridge brass starts with the casting of bars 500 to 1000 pounds in weight which are broken down by hot rolling. In some cases the rolled bar will be machined to size; in others, a cold-rolling operation will be made, followed by annealing to produce the specified grain size for cupping. The rolled bars are then blanked to produce disks of the proper diameter.

The disks are cupped by forcing the circular blanks through a die of smaller diameter and constricting the circumference of the blank around the punch. In World War I the case for the 75-millimeter field gun was made by cupping a circular blank and a series of five or six redrawing operations. The same case is made today in only three draws, which results in a considerable saving of time and consequent increase in production as well as a decrease in capital investment for press equipment. This improvement is due to the improved purity of the alloy used as well as more powerful and accurate press construction. The same factors have made it possible to produce cases for some of the larger and more powerful guns which would not have been economically possible 20 years ago.

Finishing Operations Improved

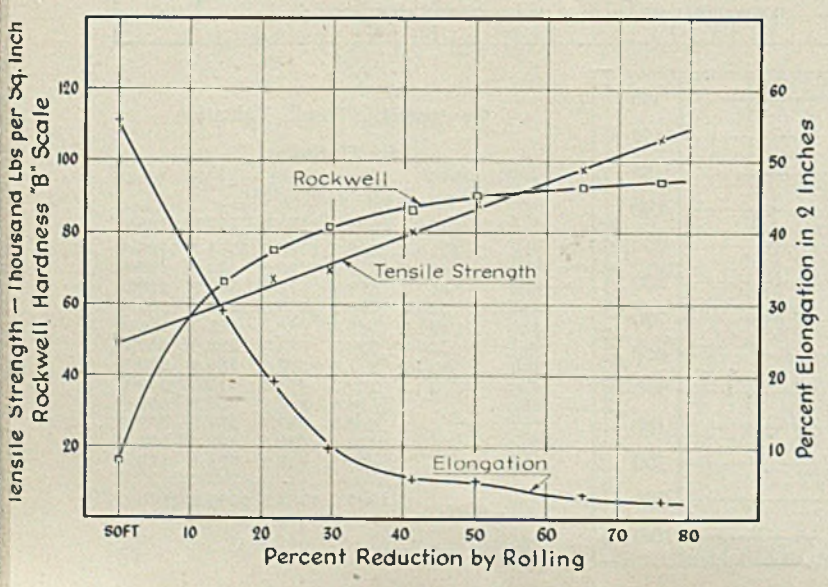
In addition to the reduction in the number of redrawing operations, improvements have also been made in the finishing operations such as heading the base, finish-machining of the base, and the local mouth-annealing and relief-annealing operations. The improvement in heading has been due largely to increased press capacity and improved die steel, so that full advantage may be taken of the plasticity of the brass.

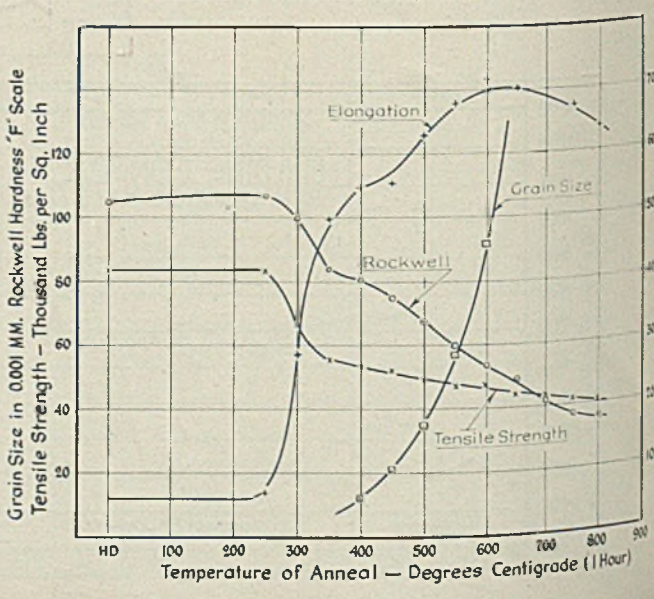
Machining operations have been speeded up by more modern machine equipment, cutting tools and lubricants. To take advantage of the improved equipment it has been necessary to provide annealing equipment in which the properties of the annealed brass may be exactly controlled. Pyrometric control of annealing equipment is taken as a matter of course today, whereas 25 years ago it was hardly beyond the experimental state. Taper and mouth annealing are almost entirely done by automatically controlled salt-bath anneals. Relief annealing, which is an extremely sensitive anneal at temperatures in which heat

From a paper presented at the annual meeting of the American Society of Mechanical Engineers, Dec. 1-5, 1941, at New York, and published in *Mechanical Engineering*.

Fig. 2. (Left)—Rolling characteristic curves for sheet cartridge brass, annealed at 0.100-inch gage, grain size 0.058-millimeter

Fig. 3—Annealing characteristic curves for sheet cartridge brass, rolled 50 per cent hard to 0.050-inch and annealed at indicated temperatures





SECTION A

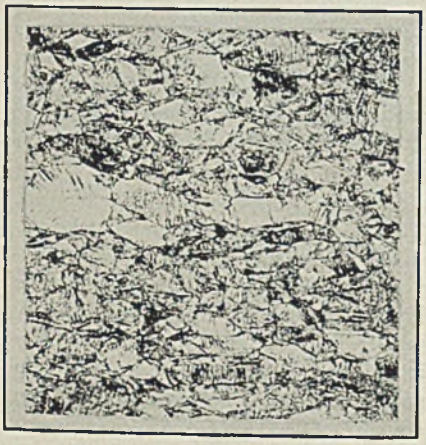
T. S.—
52000 Lbs./Sq. In.
Elong.—
51.6% In 2 In.

SECTION B

T. S.—
53950 Lbs./Sq. In.
Elong.—
48.5% In 2 In.

SECTION C

T. S.—
96800 Lbs./Sq. In.
Elong.—
7.0% In 2 In.

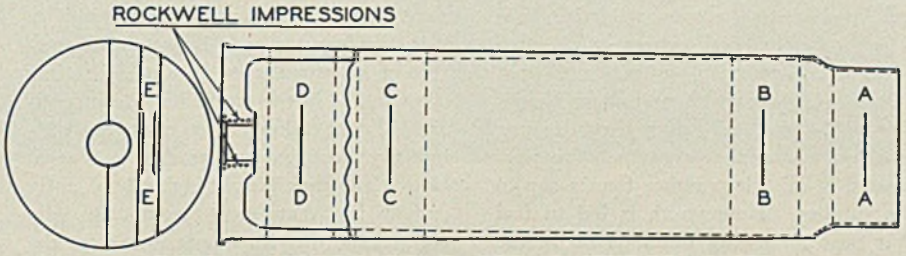


SECTION D

T. S.—
101900 Lbs./Sq. In.
Elong.—
5.0% In 2 In.

SECTION E

T. S.—
62100 Lbs./Sq. In.
Elong.—
30% In 1 In.
Mag. 75 x—Etch—$NH_4OH + H_2O_2$



TYPICAL SPECIFICATIONS FOR CARTRIDGE CASES

75 MM-M18

PHYSICAL PROPERTIES

Position	Min. Tensile Strength Lbs./Sq. In.
A	45,000
B	45,000
C	65,000
D	65,000
E	60,000

PRIMER HOLE HARDNESS—
Rockwell—B65 (1/16" Ball 100 KG Load)

Fig. 4. (Top and left)—Test sample location is shown in line drawing with characteristic structure and properties for five points

Fig. 5 (Above)—Sketch of a typical cartridge case with its specifications tabulated

transfer is rather slow, is now done in forced-convection furnaces or salt baths in which the time of exposure can be appreciably reduced and the results more accurately controlled.

Not the least of the steps taken to increase production has been the application of modern production methods for the inspection of finished cases. All the dimensions of every cartridge case must be controlled within extremely narrow tolerances, and the checking of each dimension is a lengthy process.

Fig. 5 shows a typical cartridge case. Physical properties and temper of various parts will vary slightly, depending on the gun and the explosive charge it must contain.

Cases are also divided roughly into fixed and semifixed ammunition. Fixed ammunition contains a fixed quantity of explosives and the projectiles are tightly fitted into the mouth of the case. In semifixed ammunition the charge is varied and the projectile is not held in the mouth of the case. This difference controls the desired characteristics of the mouth of the case. Fig. 5 also lists the tensile strength and hardness requirements for the 75-millimeter M18 fixed-ammunition case.

From the physical properties specified it is apparent that the various portions of the case should be processed differently in order to meet the requirements. The types of microstructure necessary to produce these conditions are shown in Fig. 4, together with the tensile-strength and rockwell-hardness values at these points. The point A represents a structure annealed to a fairly fine grain as a result of the mouth anneal. The point B shows a very fine-grained structure resulting from the taper-annealing operation. A slight amount of cold work may

(*Please turn to Page 58*)

Technical High School Performs Real Service in War Production TRAINING

By GERALD E. STEDMAN

ANYONE closely observing the round-the-clock talent training schedule of Detroit's Wilbur Wright high school will readily come to the conclusion that here is a progressive and extremely effective educational program—a program that unites intelligence with usefulness, that is thoroughly practical rather than dreamy, progressive more than argumentative, purposeful in all things rather than a sop to the vanities. Here youth is led to feel that next to getting one's hands in the good earth, nothing is so productive as to be willing to "get your hands in the grease."

Certain academicians have at times tended to belittle the value of vocational education, but war makes us view everything more clearly. One cannot win a battle with any bludgeon of liberal arts, but he who has learned to fashion machines from steel can produce powerful engines of destruction possessing terrific striking force. All the so-called higher educations become irrelevant in a war of survival.

The term "vocational education" has had its worth concealed by too much camouflage. In reality it is *talent training*. It is therefore, the most honest and honorable of all pursuits, and probably at few other points in the world has the procedure of talent training in co-operation with industry been so well worked out as at Detroit's Wilbur Wright high school, aptly named for that great technician who pointed the way for power to explore the third dimension of space. The fate of the world rests now upon aviation progress. Nothing is more vital than the type of talent training so ably presented by the teachers and metal-working facilities found in this leading high school.

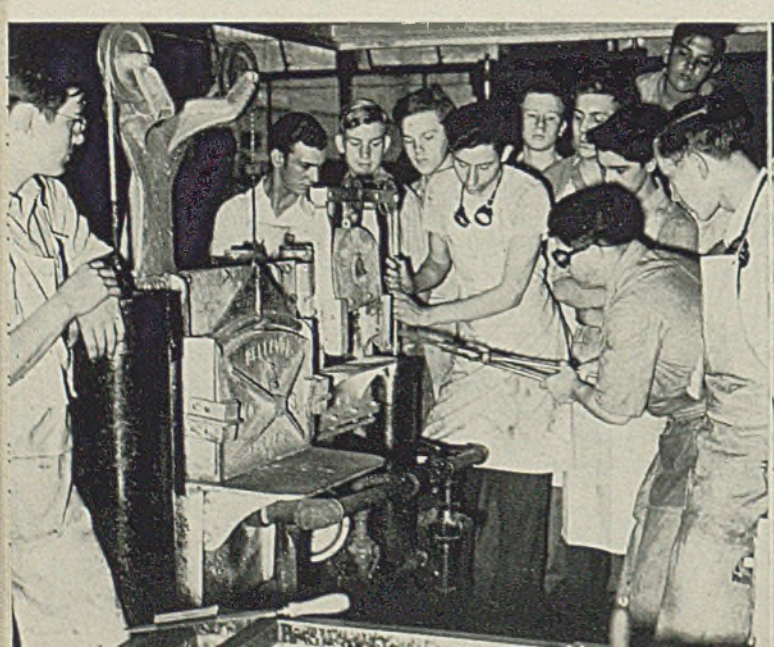
Wilbur Wright high school was conceived with the healthy idea that there actually was a great body of earnest youngsters who believed that there could be no higher calling or culture than to go to work in industry at the close of an accredited high school graduation. It is maintained to help youth take its proper place in industry as apprentices with good habits formed as to the theory and practice of progressively applying skills in such manner as to become journeymen tool, die and gage technicians. Wilbur Wright is no place for drones or for the bountifully endowed who can afford to spend four more years before taking their place in industry.

Wilbur Wright boys mean business. They gain sufficient academics to be culturally sound. If they desire further engineering training at some university, their high school credits are honored. If they want a job, the mere mention that they are Wilbur Wright graduates places them on the preferred list of any state or private employment service. *And 74 alert manufacturers regard this school so highly that they co-operate in an unexampled apprenticeship training program—one of the distinctive features of the school.*

Facilities at Wilbur Wright are making a vital contribution to our war effort, seemingly unnoticed. But take their impulse away and the dynamics of Detroit and practice in the three divisions of training—manufacturing, maintenance and

Fig. 1. (Left, below)—Instructor Emil Schnier demonstrates procedure to a heat-treating class

Fig. 2. (Right)—Helical gear cutting on a No. 2 B & S miller is explained by instructor Willard Bateson



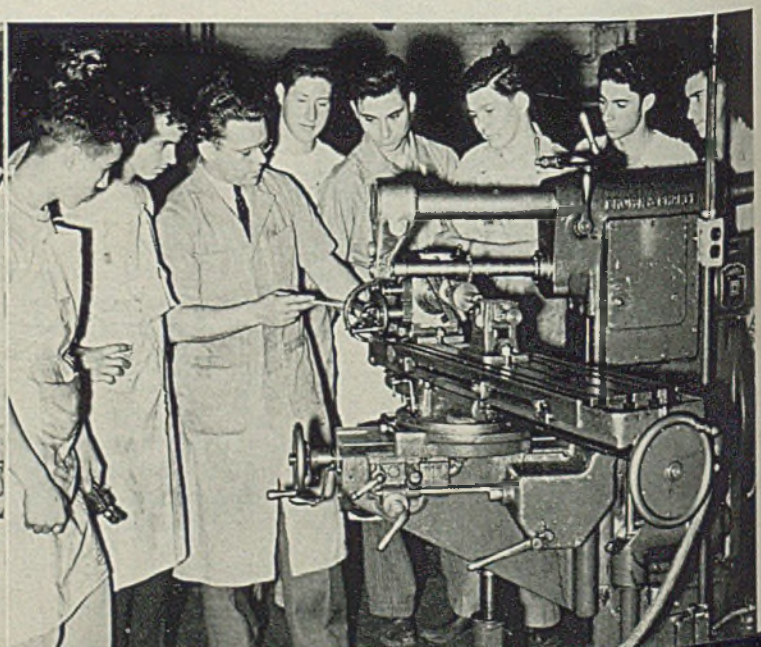


Fig. 3—General view of machine shop at Wilbur Wright high school. Group at center left is D. V. Duryee, department head (holding partially finished plug gage); Lyle Ritchie, apprentice co-ordinator (center); and J. R. Hendrickson, assistant principal. Instructor M. A. Taylor is at lathe, center right

will be seriously damaged, both as democracy's arsenal of war production, and in the retooling for that largesse of progress we have every right to expect with the return of peacetime pursuits.

Wilbur Wright activities shape up this way. From 8 a.m. until 5 p.m. each day, high school students pour into its doors to go through their paces in both theory business. These are the journeymen, supervisors, foremen and junior executives of tomorrow's industry. During these hours, too, come special apprenticeship classes from varied Detroit industries. If over 16 years old, many are indentured apprentices who team with partners cooperatively to spend half their time at school, half at work on the job. Too, special apprenticeship classes are held, the particular company's supervisor checking each class.

From 7 to 10 p.m. there flows into Wilbur Wright that older group of men who want to upgrade themselves in mathematics, physics, chemistry as well as theory and practice in metal working procedures. Here they can find ample assistance for the fulfillment of their further ambitions.

Finally, from 10 p.m. until 7 a.m. there pour again into this beehive of talent-training war production workers seeking compressed instruction on how to do a better job. When the 24-hour cycle is concluded, more than 2500 people have obtained additional talent training at Wilbur Wright.

Fig. 4—Students do actual production work. Here instructors Henry I. Doliber (seated) and James L. Turner (right) inspect templets. More than 2000 templets were made by selected Wilbur Wright students for one war production project

The history of how the school came to be is less important than that it is, now, the flowering of a seed sown by O. Frank Carpenter, principal in 1928. He had to struggle to gain the chance to sow it in a rickety, condemned building which fortunately burned. Thus destruction made way for the often enlarged Wilbur Wright high school with its present excellent equipment.

Above Mr. Carpenter's desk is a plaque "Co-operating with industry." That plaque quotation is the germ of the seed that has flowered. On the north wall of the first floor corridors is another sign, "Keep Out of the Suction of Those Who Drift Backward." This is the individual driving motive of the school. No Wilbur Wright student drifts backward. He is

blown forward by the closest personal guidance. He actually receives custom-selected hand-tailored instruction fitted to his aptitudes, attitudes and skills. The school's personnel director knows his traits, problems, home conditions, aspirations. He is placed in industry. He continues his training as an indentured apprentice. His eventual journeyman's card tokens talents as worthy of professional acclaim as any degree.

Along with other worthwhile programs, apprenticeship training suffered greatly during the depression. Developing talents was regarded as too costly, so there was a tendency to pirate or steal skilled workmen. Mr. Carpenter's "Co-operation with Industry" plan was in 1928 the shrewdest of war preparedness programs, for even then this war could have been discerned as a war of machines. Mr. Carpenter as co-director of WPB's Training Within Industry program for Michigan and Ohio devotes exhaustive attention to the swift training of essential war workers. Thus there is an extremely close connection between this excellent and highly effective program for the recovery of neglected skills in training for war production and the progressive evolution of talent training at Wilbur Wright.

Before the war, the Detroit Manufacturers' Committee on Apprenticeship Training, which Mr. Carpenter encouraged in connection with Wilbur Wright purposes, surveyed many facts to spotlight the problem. Among other things, they found the annual loss of skilled craftsmen required 3500 new men each year for replacement. Even with the efficiency and energy with which the Wilbur Wright ideology has been applied, its graduations have been able to fill only 18 per cent of normal talent-training needs. This indicates that this training system must be extended at least five times. Since it is a proved answer to the problem, other industrial centers are finding it worth copying.

Wilbur Wright has 46 capable educators, possessing balanced industry-academic experience. They direct talent training under eleven groupings: Manufacturing, business, automotive, power, English and social studies, mathematics and sciences, drafting and design, music, athletics, library and co-ordination. Regular school enrollment is 1207 high school students, of which 70 per cent are in the manufacturing division. High school spirit is high; its activities include forensics, an excellent band, and a broad athletic program.

Equipment is individualized. An instance: Each student in the physical and chemical laboratories has personal equipment for doing experiments and so is not limited to watching them being performed. Instructors are under the able administration of James R. Hendrickson, assistant principal, long associated with Mr. Carpenter. Excellently balanced with industry experience, Mr. Hendrickson is a keenly alert humanitarian to whom the progress of "his boys" is both work and hobby.

Wilbur Wright co-ordinator is Lyle Ritchie, who has long been in charge of the manufacturing division. He silently performs one of Detroit's most important educational tasks in his "Co-operating With Industry" responsibilities, for he maintains contact with 27 major Detroit manufacturers under this co-operative upgrading plan. Still further, he co-ordinates activities with another 21 major companies on a regular apprentice-training program. Finally, he works closely with 38 other crucial tool-making establishments on a third program for ap-

CLEANING INCREASES LIGHT OUTPUT 30 PER CENT

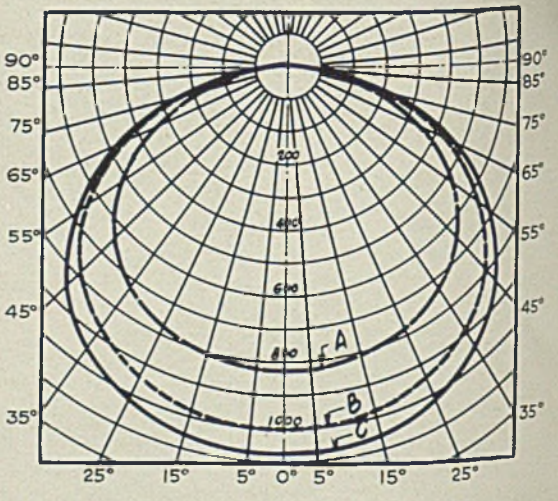
BETTER performance and greater efficiency at lower operating costs are the direct benefits of a complete inspection and well-organized maintenance program for industrial fluorescent and incandescent lighting, according to engineers at the Westinghouse Lighting Division, Edgewater Park, Cleveland. In addition, critical materials such as aluminum, copper, bronze and nickel are conserved, for the normal life of the fixtures are substantially increased.

Cleaning accumulations of dirt from reflecting surfaces and lamps can easily increase illumination about 30 to 50 per cent.

For maximum efficiency, reflectors must be carefully cleaned with non-abrasive soap and water. While wiping with a dry cloth will help, as shown in accompanying chart, the maximum benefits are only obtained from thorough cleaning.

When concentrating high-bay reflectors are used, dirt not only reduces total light output but also alters the light distribution. For example, the efficiency of an aluminum high-bay reflector was reduced 42 per cent by dirt, and the candle-power was reduced 60 per cent because the distribution was changed.

Simply cleaning lighting fixtures, reflectors and lamps affords a great increase in light on the working plane. The chart shows light distribution from a typical fixture, a fluorescent luminaire, before being cleaned as represented by curve A, after being dry wiped at B and after thorough cleaning at C Note light output rises from 61 per cent to 74 per cent when dry wiped and to 79 per cent when thoroughly cleaned. Westinghouse Electric & Mfg. Co. illustrations



SPEED THE CARRIERS

Scrap is urgently needed for the naval expansion program. You, in your plant, can help speed the aircraft carriers. The job is much more than collecting scrap metal about the plant. It is a job of wrecking obsolete equipment, cleaning out unusable stocks, obsolete tools, dies and fixtures. Don't think that a few hundred pounds of scrap isn't important. Get it all back into the market—by the pound, the ton or the carload. Assign a competent executive to do this job. Get in the scrap.

ALAN WOOD STEEL COMPANY, Conshohocken, Pa.

prentice training. These are the men who make the tools—that make the production—that will win the war and the peace afterwards. These companies are a blue book of Detroit industry. In addition to all that responsibility, Mr. Ritchie goes among labor leaders and company managements, arranging further extensions of the co-operative program.

Narrowing the focus to the manufacturing division under the acting direction of D. V. Duryee and eleven educators on his staff, let's examine facilities and procedure. Understand that all talent-training activities are available alike to the regular high school student and to the indentured apprentice. These facilities are also available to serve the upgrading desires of any night student, irrespective of age, and of any war worker who desires to learn how to do his production job better.

Mr. Duryee, as a result of his journeyman experience and academic achievements, emphasizes the importance of producing a talent-training atmosphere in the high school as similar as possible to shop conditions in industry.

Teach Differences in Machines

One of the Wilbur Wright policies is to provide life-like training with industrial equipment, machines identical to those the student will probably use later in actual shop production. The school's big machine shop, for example, is equipped with a number of milling machines, including one Milwaukee, two Ohio's and a Brown and Sharpe unit. These are selected to afford the best opportunity to become familiar with individual differences of as many machines as possible, including lever arrangements, feed mechanisms, potential capacities, etc. They are chosen to accustom the student both to rough machining or "hogging" operations to remove maximum amount of metal as well as to those highly precise finishing operations where practically no metal is removed.

The shop has 18 lathes of various sizes with from a 12 to 18-inch swing, 5 to 6-foot bed length; two turret lathes; three shapers with length of stroke from 16 to 24 inches; cutter grinders, a B & S No. 13 universal grinder, and a No. 2 surface grinder; seven drill presses, ranging from sensitive to heavy duty needs; four off-hand tool-bit floor grinders; over 100 vises for bench work and 25 bench-vise job stations.

The school is thoroughly equipped for heat-treating work. There are automatically controlled preheat and high heat furnaces for carbon and high speed steels, potentiometers, pyrometers, a rockwell hardness tester, forging furnaces, electric salt baths for tempering, etc. Tool cribs are complete with such appurtenances as Johansson gage blocks and accessories, micrometers, vernier protractors, thread tool calipers, sine bar and all the other conventional small tools that go with a well equipped tool shop. This equipment represents an investment close to $250,000.

A second policy of Wilbur Wright is to provide the student with real production work rather than an exercise in shop training. He develops skill by repetitive operations in an atmosphere little different from that in a regular shop.

Work at Many Jobs

Students work at all manner of jobs. such as scraping and machining surface plates, making tap wrenches, lathe centers. Right now, all classes have united in making templets for scale models of the many types of fighting aircraft such as the Heinkel, Messerschmidt and Zero in addition to all aircraft of the United Nations. These templets are closely precisioned to undimensioned scale drawings furnished by the War Department. Wilbur Wright distributes these to all Detroit vocational schools; each of which turns out its assignment of parts.

Parts produced are brought together at one point where jigs have been arranged to assemble large quantities of such models in complete fidelity of detail. These models then are suspended in blackout tunnels at specified distances from flash-illuminated peep holes to teach air pilots to recognize any type of fighting plane in any position by flash-recognition of its contour.

I talked with many students. They are healthy-minded, ambitious, serious natured youngsters who reflect the settled purpose of becoming skillful craftsmen. They evidence high pride in their work, a sound social viewpoint, a yearning to be accomplished artists in the business of building new orders of progress.

R. C. Crawford, one of the thousand-odd students, sums up the general attitude by saying, "We haven't time for anything else than to learn to become skilled. We are working with our minds, our hearts and our hands, and we like it . . . . so there isn't much danger that we'll become batty. We are planning on working rather than loafing during life. We aren't trying to figure how to get by. We must contribute every bit of skill and talent we have to the job ahead, for the families we want and for the country we love."

Faculty members are not just theorists, for they have practised what they preach. There is not any one of them but who could go into industry at a greater income, but they have fidelity to the greatest of educational motives—talent training to multiply as quickly as possible the skills required to win the war and the peace thereafter.

Their spirit is reflected in the statement of J. L. Turner, who, bending over a bench to help out a young lad of 17 years, not yet 5 feet tall, said: "Stedmand, Earl, here, houses a great brain, small as his body is. He can operate skillfully the most difficult of all these machines. Right now, he has outstanding talents in almost every type of tool and die making, and he isn't yet old enough to become an apprentice. In fact, he is worthy of a journeyman's card before he has become indentured as an apprentice.

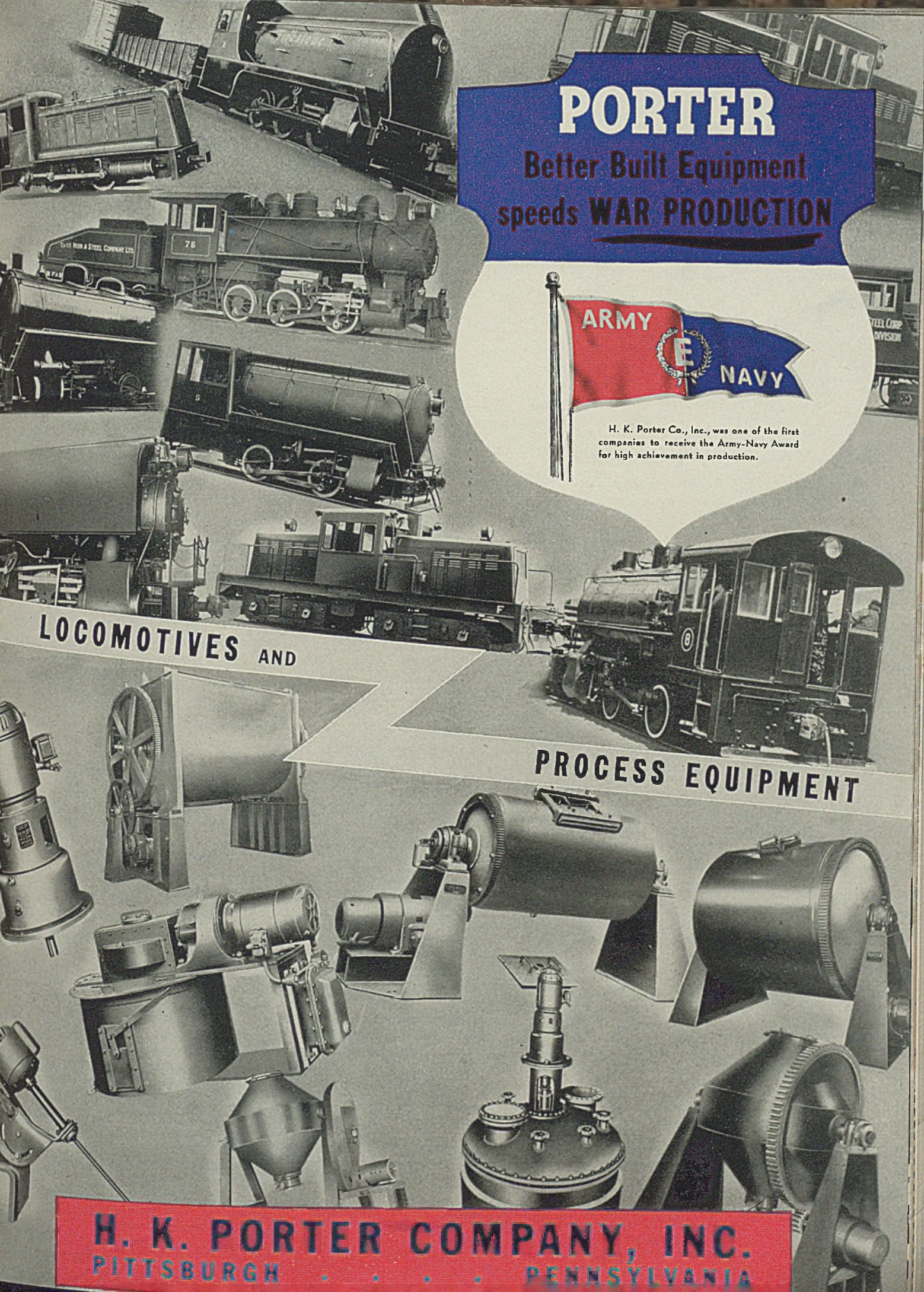
"We are in the business of building as many such 'Earls' as we can. We are developing their talents to help save the world. Whatsoever new must be added to make our living better, happier, worthier in the future can be found among the skills being developed at these benches, among these students learning to fashion a new civilization founded upon talent and willingness to work. I'll drive myself to any length to do my part to produce oncoming citizens such as Earl. I have no greater desire than to keep my hands in the grease of showing 'em how."

Learn the Joys of Work

Confusion, complication, politics, red tape, social quandary, and all the fears of these days and morrows fade away in the drive of this spirit. Wilbur Wright high school demonstrates the dignity of skilled work. There, the solid verities of honest achievement endure. It is the place where everyone learns the sheer joy of working usefully with none of the claptrap of surface thinking, intolerance, bigotry and vanity that tends to unbalance youth emotionally.

No manufacturer in the Detroit area should have an upgrading, job training or apprenticeship problem. All any industry need do is to make use of Wilbur Wright facilities and its procedure to the extent required. Its skilled faculty is eager to help solve any production-training problem. The same flexibility that gives such individual attention to each student, no matter what his type or condition is likewise available to any talent training problem presented by either management or labor, at any time.

Thus, from metal working that teaches the talents of putting steel to work, there comes the further attainment of demonstrating the only solution to the problem of living, of government and of society . . . the value of honest labor, the thrill of increasing craftsmanship and *the security of possessing talents that can be actually applied to the good of humanity.* These are the great products of Wilbur Wright high school. We need little more to win . . . either the war or the enduring peace thereafter.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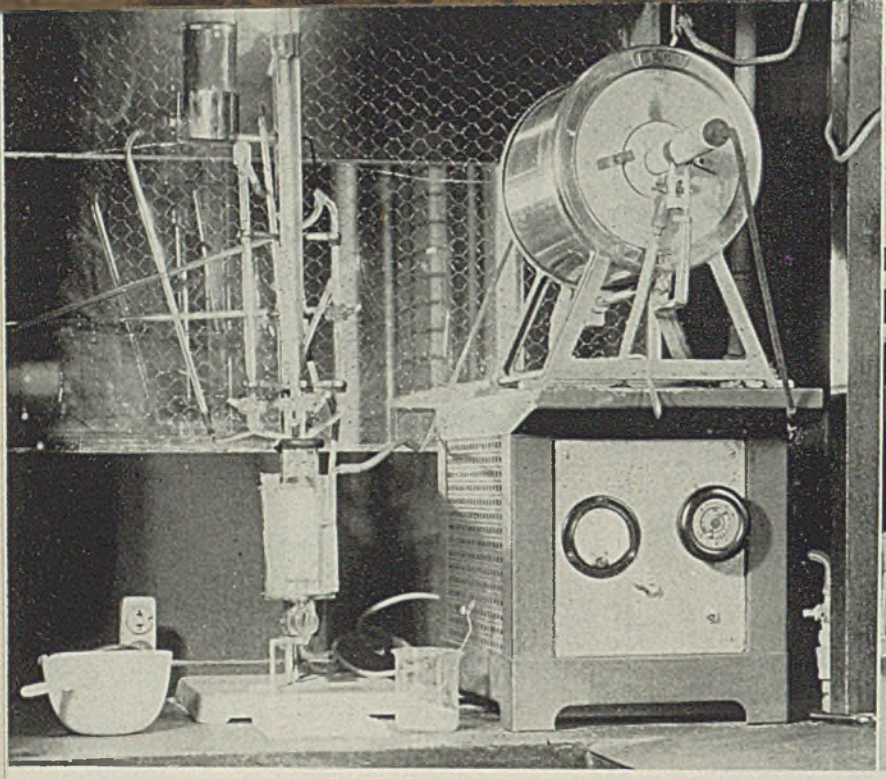

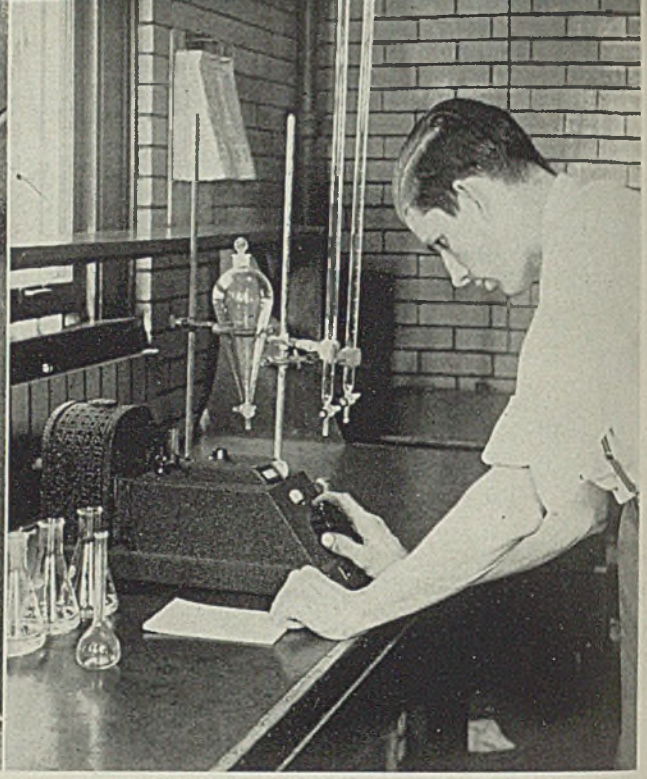

Left, above, this is the equipment used in the sulphur determination described here. Right, photoelectric colorimeter used in the quick molybdenum determination

SHORTCUTS

....for determining sulphur and molybdenum in alloy steels

By E. R. VANCE
Chief Chemist
Timken Roller Bearing Co.
Canton, O.

STEEL MILLS of this country are being called upon to supply larger tonnages of steels than ever before for our wartime use. Plants that formerly produced enormous quantities of plain carbon steels are being revamped to furnish even larger amounts of the alloy steels of which tanks, destroyers and bombers are made.

The chemical laboratory is doing its bit for the program by furnishing faster, more accurate control analyses of these grades of steel. With recently developed chemical procedures which are less time consuming, an analyst has a greater capacity for work and has more time for extra duties which are appearing every day. These methods for the determination of sulphur and molybdenum have been in use for the past several years in the chemical laboratory of the Timken Roller Bearing Co. on all types of plain and alloy steels. They have proved their merit, checking accurately the results obtained by standard gravimetric procedures, in addition to being far less time consuming.

While no claim is made for originality in the following methods, some of the modifications and the manner of applying these procedures to the control chemical laboratory may be of special interest.

Sulphur in Steel: The combustion-oxidation method for determining sulphur in steel employs a combustion furnace and titration assembly known as the Leco Sulphur Determinator distributed by the Laboratory Equipment Co., Benton Harbor, Mich. It is the fastest method known to this laboratory for the determination of sulphur in all types of steel, the result being obtained within 2 minutes after the steel has been weighed. The sulphur dioxide gas formed by the fusion of the steel sample in a stream of oxygen at 2100 degrees Fahr. is absorbed in a weak starch solution with potassium iodate solution.

Because considerable material had to be reset quickly to get out the first issue of STEEL *with the new type face, a number of serious typographical errors occurred in the original printing of the accompanying article in the August 10 issue. For that reason, the material is being reprinted here with all corrections.*

Solutions: No. 1 is hydrochloric acid solution of one part concentrated hydrochloric acid to one part water. No. 2 is a starch solution consisting of 0.3-gram of wheat starch, 8.0 grams of potassium iodide in 1000 mil-liters of water. Make a thin paste of the wheat starch and a little water and stir into approximately 600 mil-liters of boiling water. Cool, add the potassium iodide and dilute to 1000 mil-liters and shake well.

Solution No. 3, the titrating solution, consists of 0.2-gram of potassium iodate, 1.2 grams of potassium iodide, 0.2-gram of potassium hydroxide, in 1000 mil-liters of water.

Procedure: A 1.0-gram sample of steel is weighed into a porcelain combustion boat, after which 0.1-gram of 30-mesh tin metal is sprinkled over the sample and the boat covered with a porcelain shield. The titration vessel is filled to the 75 mil-liter mark with the starch solution, to which is added 1 mil-liter of hydrochloric acid (1 to 1) and a few drops of the potassium iodate titration solution to produce a blue color.

The boat containing the sample is then placed in a combination furnace which is maintained at a temperature of 2100 degrees Fahr. and an oxygen flow of 2000 mil-liters per minute is introduced in to the combustion tube. The oxygen and sulphur dioxide gas formed are led through a plug of glass wool to remove iron oxide and then through a bubbling apparatus in the lower part of the starch-filled titration vessel where the gas stream

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is broken into minute bubbles for better absorption.

As the sulphur dioxide gas is bubbled through the titration vessel, the blue color will fade and an additional amount of titration solution must be added to maintain the blue end point. When no further fading is noticed and the blue end point is permanent, a reading is taken from the burette and converted directly to sulphur, 1 mil-liter being equal to 0.010 per cent sulphur.

Molybdenum in Steel: The increasing demand for molybdenum steels, as well as the popularity of recently simplified photoelectric colorimeters was responsible for an investigation to establish a method which would be less time consuming, could maintain the close accuracy necessary in this type of control work and would eliminate human error in the use of a photoelectric colorimeter to determine the amount of molybdenum present.

Numerous modifications of the better known methods for molybdenum determination were investigated and a new modified procedure developed. This method has been in use for the past two years and is far the most rapid known, consuming from 10 to 12 minutes for a complete determination. The cost per determination is comparatively low since the chemicals used are of the ordinary type commonly found in the average laboratory.

This procedure may easily be adopted by any control laboratory and should be particularly popular with the older type laboratory employing the wooden hoods, since the fire and explosion hazards encountered in the use of perchloric acid are removed by the use of ordinary acids.

Solutions: No. 1 is a nitric-sulphuric acid mixture consisting of 6000 mil-liters of water, 1800 mil-liters of concentrated sulphuric acid, and 2800 mil-liters of concentrated nitric acid.

No. 2 is a 1 to 5 hydrochloric acid solution consisting of 5000 mil-liters of water and 1000 mil-liters of concentrated hydrochloric acid. The third, a 5 per cent potassium-thiocyanate solution consists of 1000 mil-liters of water and 50 grams of potassium-thiocyanate.

No. 4 is a stannous chloride solution made of 500 grams of stannous chloride, 400 mil-liters of concentrated hydrochloric acid. Dissolve the stannous chloride in the concentrated hydrochloric acid and then add 1600 mil-liters of water.

Procedure: A 0.1-gram sample is weighed and transferred to a 200 mil-liter Erlenmeyer flask. Then 6 mil-liters of nitric acid and sulphuric acid mixture is used to dissolve it. After action ceases and the sample is in solution, the sides of the flask should be rinsed with approximately 5 mil-liters of water from a wash-bottle. The contents of the flask are boiled for 1 minute. Then 30 mil-liters of 1 to 5 hydrochloric acid is added and the mixture brought to a boil, after which it is removed from the hot plate and placed in running water until cold.

When cold, add 5 mil-liters of the potassium-thiocyanate solution and shake. Then 50 mil-liters of ether is added, followed by the addition of 10 mil-liters of the stannous-chloride solution, which will reduce the iron to a colorless solution, leaving the reduced molybdenum as an orange-red color, the intensity depending upon the amount present.

The solution is immediately transferred to a separatory funnel which is stoppered and shaken vigorously, then allowed to settle until the ether and acid layers have separated. The lower acid layer should be drained and discarded and the remaining ether layer, containing the extracted molybdenum color, is transferred into a 50 mil-liter graduate. The ether solution is now transferred to a 50 mil-liter volumetric flask. Care should be taken that a few drops of acid solution which might have entered the graduate are not poured into the volumetric flask.

The solution should be diluted with ether to the 50 mil-liter mark and then returned to the original 200 mil-liter flask, which has previously been rinsed with ether and drained. The flask at this point should be shaken to insure uniform mixing.

The matching cell from the photoelectric colorimeter should be filled with a portion of the ether solution which is used to rinse the cell, after which it should be discarded. The cell is now filled with the ether solution, placed in the colorimeter, a reading taken and converted to per cent molybdenum from a chart previously prepared.

Notes: The above procedure is commonly used to analyze samples containing up to 0.50 to 0.60 per cent molybdenum. Where the molybdenum present is in excess of this amount, a double portion of potassium thiocyanate and stannous chloride is used and the ether extract transferred to a 100 mil-liter volumetric flask and diluted to the mark, the result being multiplied by 2.

In heats with higher percentages of molybdenum present a smaller sample may be used.

The ether used to extract the molybdenum color should be "U. S. P." or "Purified" brands which require no special treatment before use.

The Timken Laboratories use a Klett-Summerson photoelectric colorimeter, "Industrial Model," which is manufactured by the Klett Mfg. Co., 179 East Eighty-seventh street, New York. This instrument employs a balanced circuit and is plugged directly into a 110-volt alternating-current line.

Brass Cartridge Cases

(*Continued from Page* 49)

be left from the tapering operation, although this is not apparent from the structure.

Points C and D are in the severely cold-worked condition resulting from the final drawing operation, and the point E in the base is also in the cold-worked condition as a result of the heading operation. The latter point is notably less severely cold worked than the points C and D. These structures are in accordance with the specifications.

Another requirement involves satisfactory storage of the cases either loaded or unloaded for indefinite lengths of time. Although brass is a relatively noncorrosive metal, there is danger failure by season cracking, due to the combined action of stress and corrosion. The stress may be the result of the cold-working—that is, internal stress, or, in the case of fixed ammunition, the result of the insertion of the rigid projectile into the mouth.

The specifications are set up to prevent the possibility of the production of cases containing internal stresses. Internal stresses can be detected by immersion of the case in a mercurous-nitrate solution. By a simple displacement action, copper and zinc are removed from the case surface and mercury deposited in their place. Liquid mercury acts very much like the ammonia, moisture and oxygen combination in attacking the grain boundaries under stress. Army specifications require a 30-minute immersion in a 1 per cent solution of mercurous nitrate after the cases have been cleaned in a 40 per cent nitric-acid solution.

Cases for fixed ammunition are required to be tested after plugs the same size as the maximum projectile have been inserted in the mouth of the case. This is done to make certain that the deformation caused by the insertion of the projectile will not cause stresses in the wall of the mouth sufficient to produce season cracking of the case.

In order to withstand the bursting effect of the explosive charge, cases are made with a heavy base and with a side wall, which is heaviest at the base, tapering in thickness as well as diameter toward the mouth. The tapering of the wall thickness would normally result in lesser cold working of the wall at the base. Actually, the opposite is required, and the tapering of the wall from the inside is carried through the entire series of draws.

In order for the bottom to have the necessary strength it must be cold headed to its approximate final shape. After heading the case cannot be annealed in entirety, and such other anneals as are

(*Please turn to Page* 84)

DIE CAST BOUCHONS FOR HAND GRENADES

The bouchon is "the business end" of a grenade.

The well-known fragmentation "pineapples" which served our fighting men so well in World War I are equipped, in this war, with ZINC Alloy Die Cast bouchons. This part is particularly well adapted to die casting production because in its detail it constitutes a rather tricky design and, as a die casting, it can be turned out at high speed with practically no machining.

The three steps in the above illustration show (1) the die cast bouchon (2) the bouchon with the booster assembled at the bottom and with the spring firing cap at the top (3) a complete grenade with the release handle and the release ring-pin assembled to the bouchon.

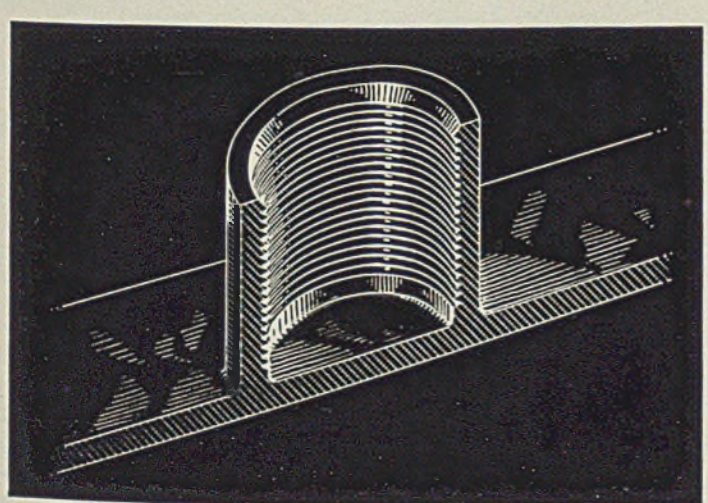
As shown in the inset, the soldier first removes the pin by pulling the ring (in this case with his teeth). This permits the release handle to fly off when the grenade is thrown, springing the firing cap to its charge in the bouchon and thence through the booster to the deadly T.N.T.

TAPPED BOSSES PROVIDE STRENGTH

In designing a part for production by die casting it should be remembered that tapped bosses are stronger than threaded studs (because external threads cause a notch effect in case of shock loads).

With tapped bosses, however, the precaution must be taken to allow 1/8" at the bottom for chip clearance (see drawing). Failure to provide this clearance in any one boss may add as much as 5% to the cost of the casting, through frequent tap breakage. In addition, a tapped hole should be counter sunk 1/32" larger than the thread for ease of tapping an assembly.

For other hints on good die casting design practice, write to us—on your company letterhead—for a copy of the booklet "Designing for Die Casting."

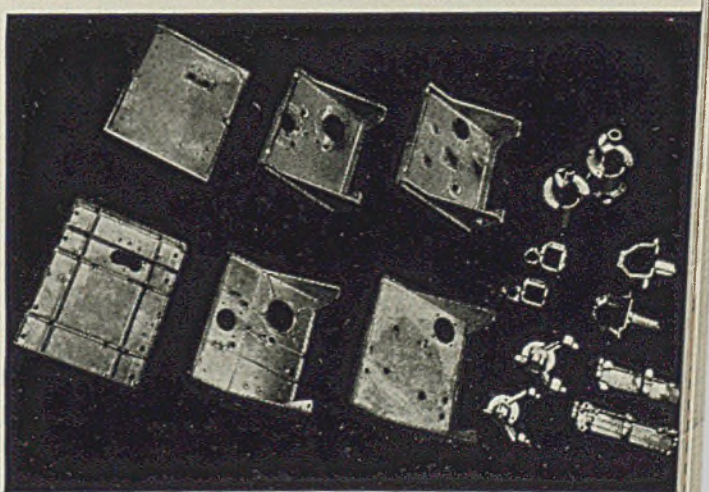


Tapped bosses are always preferable, and often as economical as threaded studs.

ZINC ALLOY DIE CASTINGS VS. SAND CASTINGS

In the redesigning of many products, die castings have been adopted to serve where sand castings were previously employed. The reason for this conversion is usually one of simple arithmetic.

Shown below are eight sand-casting-to-die-casting conversions of parts for a navigation training device used in the aviation field. The sand castings, at the background in each case, cost $8.44 for a set of eight. The ZINC Alloy Die Castings, foreground, cost $3.43 a set. In addition, it cost $33.64 to machine the sand castings and only $14.15 to machine the die castings. Thus the total saving on the redesign of the eight castings effected a total saving o $24.50 a set.



Design complexity was achieved by die casting, largely eliminating machi

THE New Jersey zinc ALLOY POT

A publication issued for many years by The New Jersey Zinc Company to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

STEEL MAGAZINE EDITION

FOR VICTORY BUY UNITED STATES WAR SAVINGS BONDS STAMPS

THE NEW JERSEY ZINC COMPANY 160 FRONT ST., NEW YORK CI

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WELDING SUBSTITUTE STEELS

By HAROLD LAWRENCE
Metallurgist and Welding Engineer

AS HISTORY has proved many times in the past, the pressure of war changes our ideas as to what can and what cannot be done. In arc welding, as in many other industries contributing to the war effort, this is quite true. The greatest observable influence of the war on welding practice is closely connected with the types of base metal currently popular for use in welded ordnance items. As the supply of available alloys continues to contract, greater reliance must be placed upon the strengthening properties of carbon and manganese.

Both carbon and manganese contribute to the hardenability of the base metal. In bygone days a carbon content of 0.35 per cent was established as the upper limit for weldability. Any effort to exceed this rigid figure was bound to result in certain weld failure. Many studies were conducted to show the influence of both carbon and manganese on base metal hardness and crack susceptibility. From this work evolved a wholesome and well established respect for the maximum amounts of carbon and manganese that were to be countenanced in any steels selected for fabrication by arc welding.

Fortunately there was an abundance of alloys prior to the war. Generous use of nickel, copper, chromium, molybdenum and vanadium permitted the designer to select steels with good tensile properties while keeping the carbon and manganese levels well below the ceilings set for good weldability.

In Fig. 1 is shown the relative hardening effect of common elements found in steel. From the empirical equation suggested by A. Edson, it may be concluded that within the limits of his investigation copper, nickel, chromium, vanadium, manganese, molybdenum and carbon increase base metal hardenability in the order listed with carbon actually having a greater influence than all of the other elements listed combined. The limits for which this relationship is true are:

	Per Cent
Carbon	0.50
Manganese	1.75
Silicon	0.40
Nickel	3.75
Chromium	1.25
Molybdenum	0.40
Vanadium	0.30
Copper	2.00
Aluminum	0.05

One by one the alloying elements that had contributed so much to ease of welding high tensile steels vanished from the scene as the War Production Board was forced to husband our strategic materials. Even the Army and Navy were forced to write new specifications for their materiel.

The need for high strength in many products had been established. For mobile units the effective distribution of section allowed the design of lightweight structures of ample rigidity. In projectiles and bombs high-strength steel meant less dead weight of casing with superior charges.

With the alloys out of the picture, carbon and manganese could serve as acceptable substitutes, as can be seen from Fig. 2. Of course welding problems are increased many fold. Heat treating is made more difficult. But the application of sufficient ingenuity is solving the problems in a satisfactory fashion, using a careful seasoning of alloys in place of the prodigal adjustments that had been possible in prewar construction.

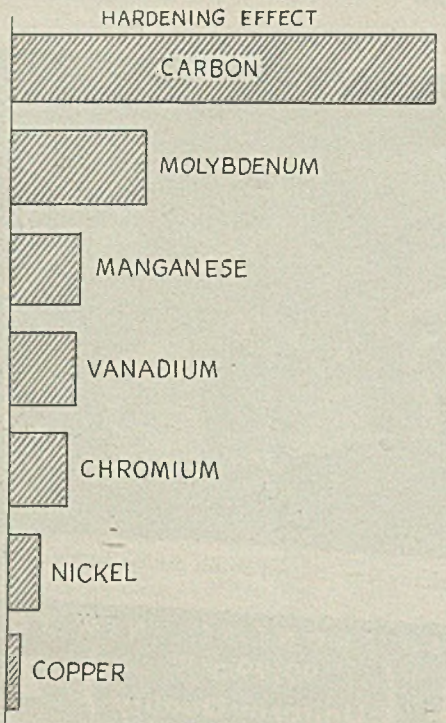
Fortunately welding metallurgists had been working on the question of weldability for some years before the war. Likewise heat-treating metallurgists had been studying the question of hardenability during the same period. And both of these matters are closely related. Thus a wealth of information is at hand with which to lead an intelligent attack on the point of welding carbon steels with a minimum of help from alloys.

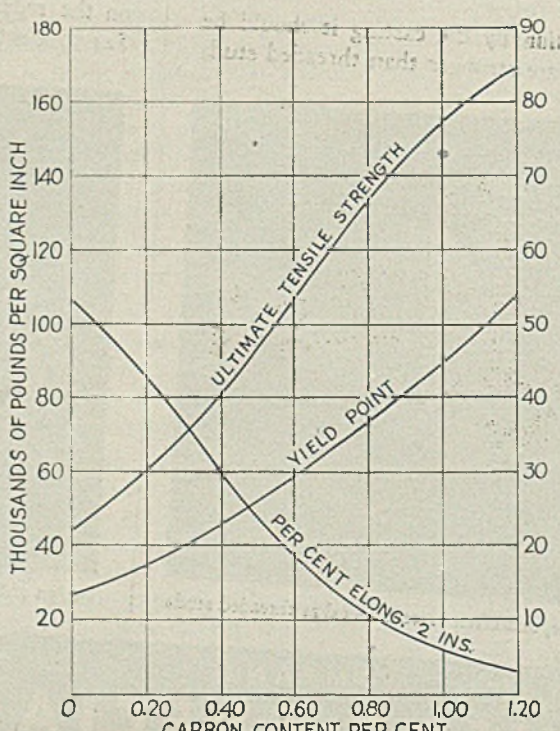
Preheating, a practice which had long been frowned upon as practical for mass production, has been pressed into service. High temperatures of 400 to 600 degrees Fahr. have become commonplace. Special burners have been designed to bring the weldments up to heat quickly. Crayons with a definite melting point are used to

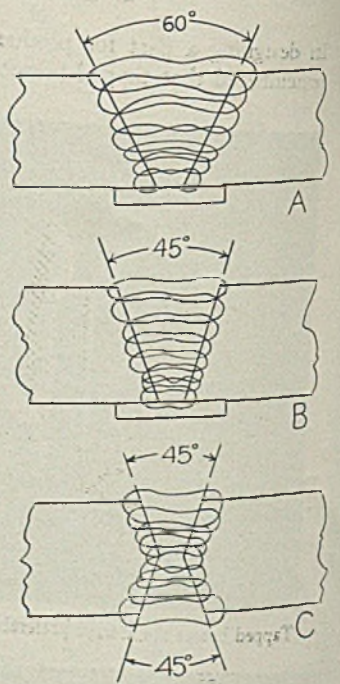
(From left to right)—Fig. 1—Influence of the common alloying elements on the hardenability of the heat affected weld zone in low alloy steels

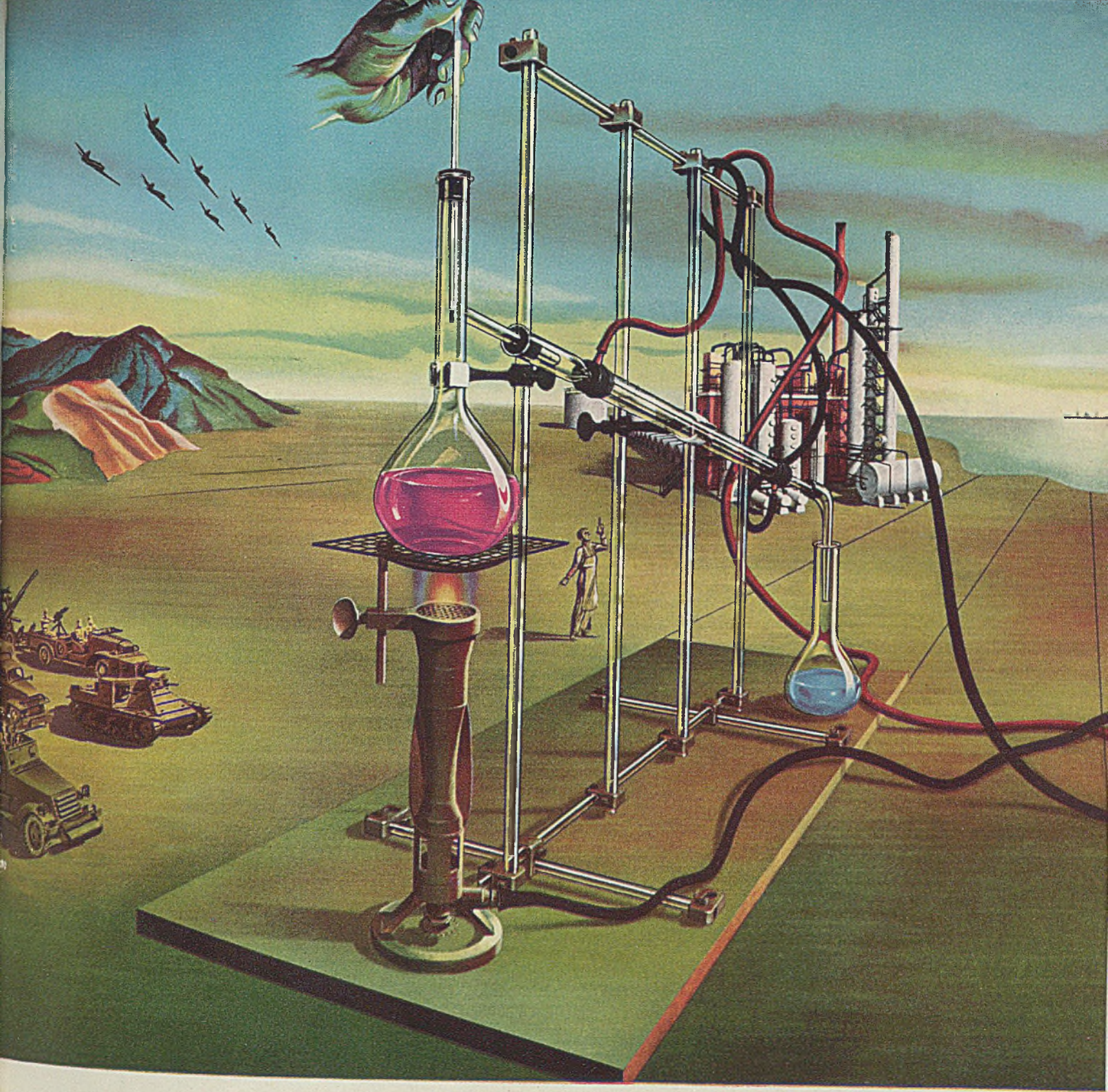
Fig. 2—Approximate influence of carbon content on the tensile properties of carbon steels in the as-rolled condition for sections in the vicinity of ½ to ¾-inch thickness (after Bain)

Fig. 3—Joint design as it influences physical properties









Chemistry is putting miracles on a mass production basis

If ever a "secret weapon" does emerge from all this welter of war, it will most likely be a chemical development. And the American chemical industry has as good a chance of discovering it as any other, for America now has the greatest synthetic organic chemical industry in the world.

This industry looks to coal tar chemicals for almost half the raw materials it uses. Koppers is at the very roots of these chemicals.

Koppers toluene goes into TNT, the principal military bursting charge. Koppers benzene is used in the manufacture of explosive stabilizers, and "boosters" for primers. Koppers naphthalene helps minimize the flash in powders.

Most explosives are made using combinations of nitric and sulfuric acids. Koppers coke ovens produce ammonia and this helps meet the extraordinary demand for fixed nitrogen and increases the amount of nitric acid available for the war effort.

The Koppers Phenolate Process helps the petroleum and the coking industries recover more sulfur which is converted into sulfuric acid.

Koppers tar acids and naphthalene find use in synthetic plastics for airplanes, tanks, etc.; naphthalene is used in chemicals for synthetic and natural rubber. Pyridine is an ingredient in the new process for waterproofing military fabrics for jeep tops, tents, etc. Flotation sulfur is one of the principal spray materials for fruit crops.

Koppers serves the chemical industry in peace as well as war. Of the hundreds of coal tar intermediates, dyes and medicinals, about 87% are produced in greater or less degree from benzene, toluene, naphthalene, and phenol. Koppers is one of the principal sources of these and other basic materials. —Koppers Company, Pittsburgh, Pa.

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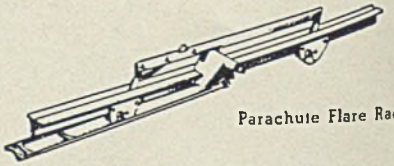


Parachute Flare Rack.

Spriesch

Established 1923

TOOL & MANUFACTURING CO.

JOSEPH J. CHENEY, PRESIDENT

10 HOWARD ST. BUFFALO, N. Y.

check the distribution of the preheat. A greasy streak indicates a sufficiently high temperature, while a hard mark resembling a chalk mark denotes the need for additional heat.

Production lines are arranged to incorporate burners of unique design to produce the type of preheat needed at the proper part of the weldment. Shields are devised to keep as much of the heat as possible away from the welder. And the cleaner or chipper has a crayon with which to check the interpass temperature of the joint as the weld progresses, for an undiscovered lowering of the temperature might introduce costly cracks that impede production and that lead to waste through rejections.

Newly trained welders, temperamental steel compositions and rigid specifications which include X-ray examination combine to place a premium on intelligent supervision and painstaking planning. The establishment of assembly lines permits the assignment of welders to specific joints where the repetition of a simple welding operation leads to results that are consistently good. Promotion is from the easier to the more difficult joints encountered on the line.

Emergency steels have not waived the requirement that the completed weld match the base metal in physical properties. Thus a new importance is attached to the proper selection of electrodes and to the technique of their application. Usually trial and error test methods are the best for discovering a workable combination of technique and the desired results. Very often identical results have been reached for the same weld with widely differing welding procedures employing distinctly different types of electrodes.

The fast pace of development work has left little time for standardization among the several plants working on the same articles. However, this situation has not been as wasteful as might be feared as the more ingenious welding engineers have devised welding methods that have squeezed the last pound of strength and the last per cent of elongation out of both electrodes and steel.

Alloyed weld metal owes much of its popularity to an improvement in strength properties without a corresponding loss in ductility. The same relationship has been true of alloyed base metals. With the return to carbon and manganese for strengtheners, a greater emphasis is directed to welding routines that give adequate but not too much strength with sufficient ductility. Base metal pickup must be controlled. With the base metal ordinarily much higher in carbon than the weld deposit, the influence of deposit analysis as affected by sidewall penetration is quite pronounced.

Too much penetration may well put the tensile strength far over the specification minimum while causing a failure because of insufficient ductility. Or too little penetration may cause the weld to fall short of the strength requirements while passing the ductility test with flying colors.

Some attention to joint design is essential to the best results. As a rule the bevel should be as narrow as is consistent with good application of weld metal and with easy access for cleaning. The joint shown at A, Fig. 3, requires more weld metal than either B or C. Ductility and cost will decrease as the design changes from A to B to C. Tensile strength is greatest with C, less with B and least with A.

Depending upon the type of work, heat treatments vary considerably. Some work is left in the as-welded condition where the normal cooling rate of the weld determines the final physical properties in the joint. In these constructions the tensile strength of the final weld depends upon preheating temperature and mass of the joint. The higher the preheating temperature and the smaller the mass influence, the lower will be the ductility because of greater pickup and more rapid cooling.

Where stress relieving is practiced, no change in crystal structure is involved. Simple relieving of the locked-up stresses lowers the strength and improves the ductility. However, some alloys, molybdenum especially, show little or no decline in strength with improved ductility after stress relieving. Controlled stress relieving with accurate temperature recording and controlling instruments pays dividends in the way of uniform results.

Normalizing to achieve grain refinement and suitable physical properties may be specified in some instances, while full annealing may be chosen in others. In either case the rate of cooling will have the usual tendency to change the balance between strength and ductility. *Rapid cooling is deliberately selected to raise the strength at some sacrifice of ductility, while slow cooling is applied to improve the ductility when the weld strength is high enough to withstand such a treatment.*

In establishing welding conditions, careful attention to the method of conducting the physical tests is important. Calibrated testing machines of known accuracy must be used. A thorough understanding of the applicable specification including all of the rules for checking each type of specimen is most necessary. Nor must too much reliance be placed in the government inspector as the final responsibility rests with the fabricator.

Unfortunately, some welding procedures have been worked out without paying sufficient attention to testing methods with sad results in the way of delays and rejections. A qualified testing laboratory familiar with government testing methods represents a good investment in the early stages of procedure development, even though the independent laboratory is used only for checking purposes. Any discrepancies in results should be a matter for immediate and thorough investigation.

The rapidity with which welding has taken its place in the war effort, notwithstanding the shackles of steel compositions that are difficult to weld, is a tribute to the research work of the past ten years. Preheating and postheating under precise control have extended the horizon of weldability with benefits that will last after the war is ended. Rigid inspection has not proved a barrier to fast-moving production lines. Instead, they have found a place in the assembly line.

HOW TO IMPROVE YOUR WELDING

STEEL's latest wartime handbook is now ready. Arranged in eleven sections, the seventy-two chapters contain two hundred pages—a selection of STEEL's outstanding material of the past two years, including E. W. P. Smith's excellent series of fourteen articles "How To Get The Most From Arc Welding"; plus "Weldability"; "How To Keep Welding Machines Welding"; "Conserving Electrodes", and over 50 others.

"How To Improve Your Welding" is available at once at $2.00 per copy. Please send your order to STEEL, Readers Service department, Penton building, Cleveland. On orders originating in Ohio please include 3% sales tax.

References

"Weld Hardening and Steel Composition," by A. Edson, *Metals and Alloys*, June, 1942.

The Alloying Elements in Steel, by Edgar C. Bain.

Foremen To Witness Work of New Tool Steel

A drilling demonstration of a comparatively new material—Hardsteel—now available in drills, reamers and tool bits, will be presented by Black Drill Co., Cleveland, at the foremen's national convention at Hotel Sherman, Chicago, Sept. 25-26.

Foremen are invited to bring to the convention actual shop samples of hardened steels which they had trouble drilling with convention drills—or that they have found impossible to drill in the hardened state.

According to the manufacturer, drills of the new steel will drill materials having a rockwell C hardness of 40 or higher on an ordinary drill press.

ENGINEERED CONTAINERS

. . . . help "streamline" packing and shipping methods

THE DESIRE to improve its packing and handling procedure led the Geo. K. Garrett Co. of Philadelphia to adopt a General All-Bound box engineered to the purpose. The new containers provide important materials handling advantages all the way from the time the lock washers leave the manufacturing department until they are stored in warehouses or loaded into cars.

Previously the Garrett company packed its lock washers in 200-pound kegs. However, while this form of packing met some of the requirements, it took up much valuable storage space, was harder to handle, weighed more, took a long time to pack and close, and the initial cost was greater than that of the new engineered containers.

The result is that production is speeded all along the packing line. A one-piece shook, the box is packed flat when shipped from the box factory. Thus it is two-thirds assembled as is shown in Fig. 1 when it arrives at the Garrett plant. Consequently assembly is easy and fast. And because they are packed flat, the new containers require less storage space than the kegs formerly used. Too, they are easier to handle, weigh less, require less time to pack and the cost is lower.

The first step in the packing operation at the Garrett company consists in placing the assembled box under the hopper containing lock washers. This hopper extends through the wall where it is loaded from the opposite side. After the final manufacturing operation and cooling, the washers are delivered to the top of this chute by means of an overhead hoist and special dump container that slides vertically on steel guides.

While the box is being filled, Fig. 4, it is shaken automatically so it is filled without lost space. After the box is filled under the hopper, it is moved along on a roller conveyor line to the scale shown at the left in Fig. 4 and in Fig. 5. The necessary adjustment of the net weight is made by adding or removing washers with a hand scoop.

After packing, the wire-bound box is firmly closed and sealed fast by slipping one wire loop closure through another and bending it down flush with a simple movement of the closing tool. See Fig. 2. This is done while the box is still on the conveyor. With the strength of steel on all six sides, the wire-bound box assures safe travel for the Garrett shipments. It is well able to stand punishment during transportation and on the conveyor lines.

Another advantage shown in Fig. 3 is the easy, quick stacking afforded by this package. Its ability to support heavy weights is shown here, also, for the lowest package in each of the 7-high stacks is supporting a weight of 1200 pounds—the weight of the six boxes above it.

Although not shown in the illustrations, a job that is equally important is marking the box to indicate its contents. This is done while the box is still on the conveyor. Note in Fig. 2 that each box moves on a steel pallet while on the conveyor. Top of each box is printed in the General Box Co.'s plant with the

(*Please turn to Page* 84)

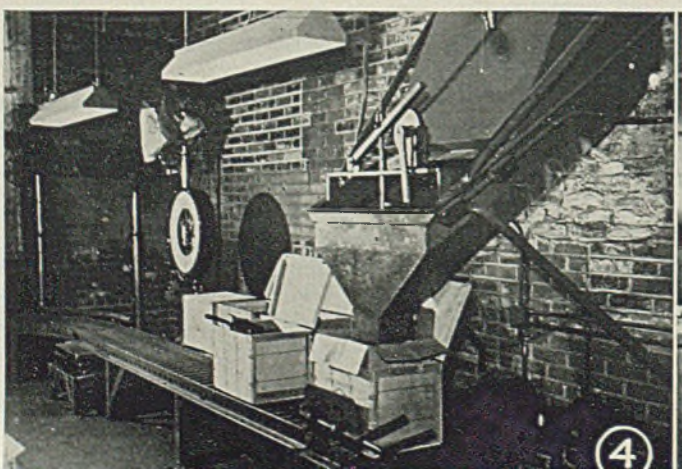
Fig. 1—The boxes come from the box maker in the form of one-piece shooks, three of them being tied together to facilitate shipping as shown here. The top, bottom, and sides are held together by the wire reinforcing used. It is merely necessary to assemble the ends to form the box ready for use

Fig. 2—Box is now closed by use of a simple tool that locks the wire loops. Note that a flat steel pallet is used underneath the box while it is on the conveyor line. This protects the box bottom, makes the box roll smoothly on the conveyor

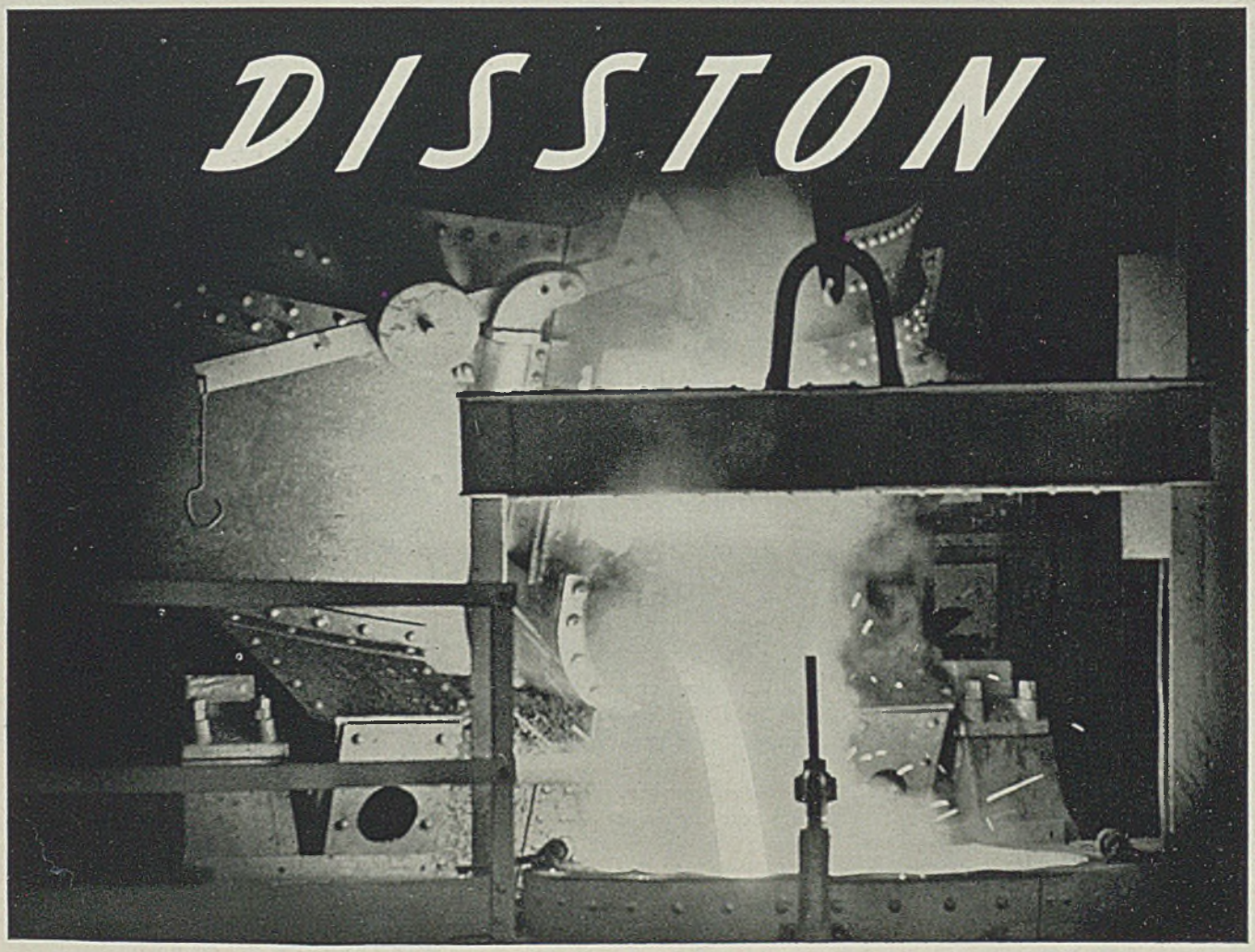
Fig. 3—Evidence of the sturdy package produced is shown here where the bottom box in the 7-high stacks is supporting a weight of 1200 pounds. This enables warehouse floor space to be utilized most effectively

Fig. 4—This loading chute is filled from the other side of the wall. The conveyor section immediately below the hopper contains a mechanism to vibrate the box as it is being filled, thus packing the washers tightly

Fig. 5—Now box is moved down the conveyor line to a point where a built-in scale precisely measures the weight. Here a workman with a hand scoop removes or adds washers to produce the exact weight desired in the package



Remember this famous name in Fine Tool Steels

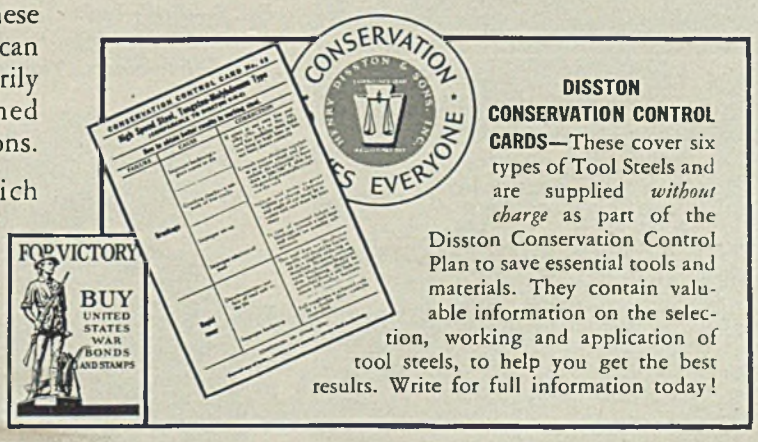


Disston is a name renowned in fine tool steel manufacture for 87 years. In 1855 Henry Disston began melting and rolling the first crucible saw steel ever made in America. In 1906 the first commercial heat of electric saw steel made in this country was cast in the Disston plant.

Years of pioneering and progress have established the standards to which fine Disston Tool Steels are made today. Experienced personnel—electric furnaces—selected materials—modern equipment—accurate chemical and metallurgical supervision... these produce Disston steels with characteristics which can be controlled within very close limits. Extraordinarily sound and clean tool steels with predetermined grain size can be made to precise specifications.

One of the outstanding tool steels which Disston has produced is CROLOY—a high chromium-molybdenum alloy steel with high resistance to both sliding and impinging wear, and with good air hardening qualities. Croloy is an excellent steel for dies, punches, swaging mandrels, gauges, shear blades, slitting cutters, planer knives and many high production tools.

Selecting the proper tool steel: Disston engineers and metallurgists will be glad to help you choose the tool steels which will do the best work on the job to be done—and give you the longest tool life . . . If you do not have a copy of the illustrated 73-page book, "Disston Tool Steels," write today to Henry Disston & Sons, Inc., 826 Tacony, Philadelphia, Pa., U. S. A.



DISSTON CONSERVATION CONTROL CARDS—These cover six types of Tool Steels and are supplied *without charge* as part of the Disston Conservation Control Plan to save essential tools and materials. They contain valuable information on the selection, working and application of tool steels, to help you get the best results. Write for full information today!

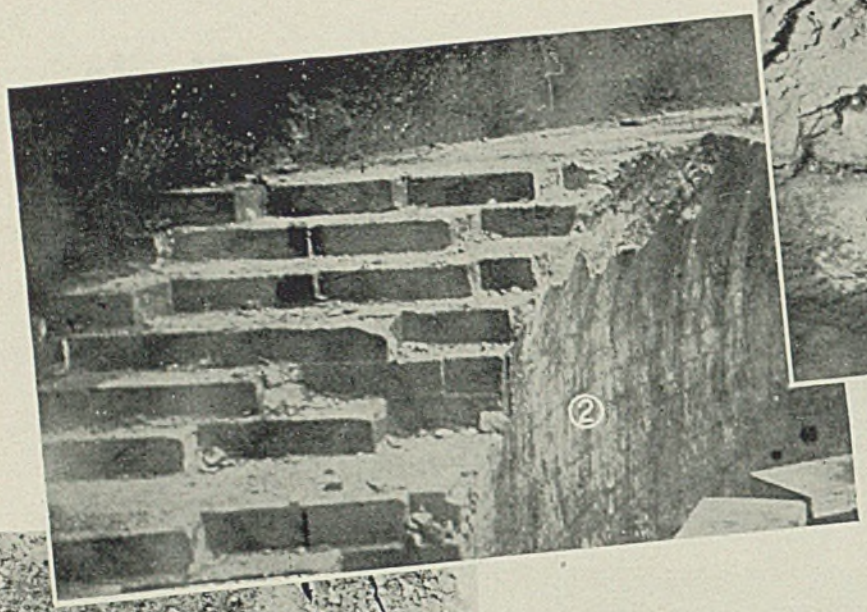
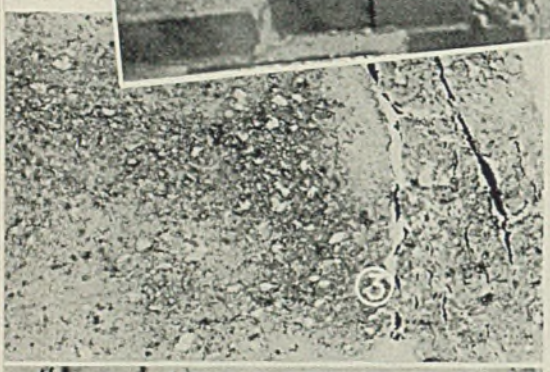


Fig. 1—Bronze bosh cooler protruding through scab. Water cooling of bosh is sufficient to maintain refractories

Fig. 2—Brickwork in upper part of stack where the wear has not been severe



Mechanism of Wear of Blast Furnace Linings

By HOBART M. KRANER
Ceramic Engineer
Development and Research Department
Bethlehem Steel Co.
Bethlehem, Pa.

Blast furnace linings with a campaign of 2,000,000 tons are not sufficiently common to warrant the assumption that a great proportion of our present installations will produce such tonnages. Linings with far shorter life than this appear to be the general rule. Between 1935 and 1940 the steel industry spent about $1,000,000 annually on blast furnace refractories, and the figures for 1940 and 1941 will greatly exceed this amount. The industry would like to reduce this expense, as well as the far greater cost of installation. Two schools of thought

Presented at the Refractories Division meeting, American Ceramic Society, Uniontown, Pa., Sept. 6, 1940.

Fig. 3—Brick taken from between shell and disintegrated zone. Right end which extended into disintegrated zone evidences a breakdown by CO disintegration

Fig. 4—Section of work lining in wall where bellying begins. Here disintegrated zone is closer to shell and is thin. Alkali attack has reduced the face to only 4 inches thick. Disintegrated zone is closer to shell than that shown in Fig. 5

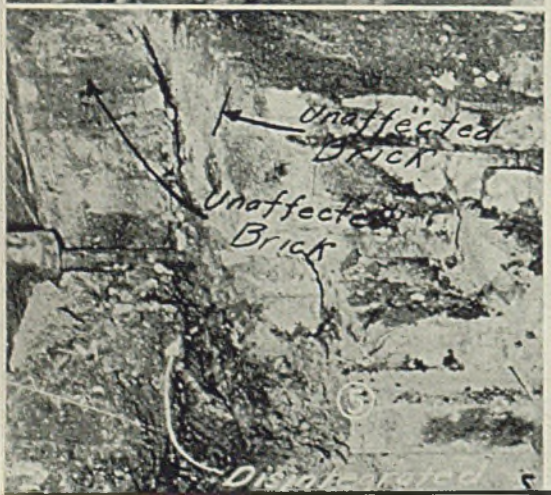
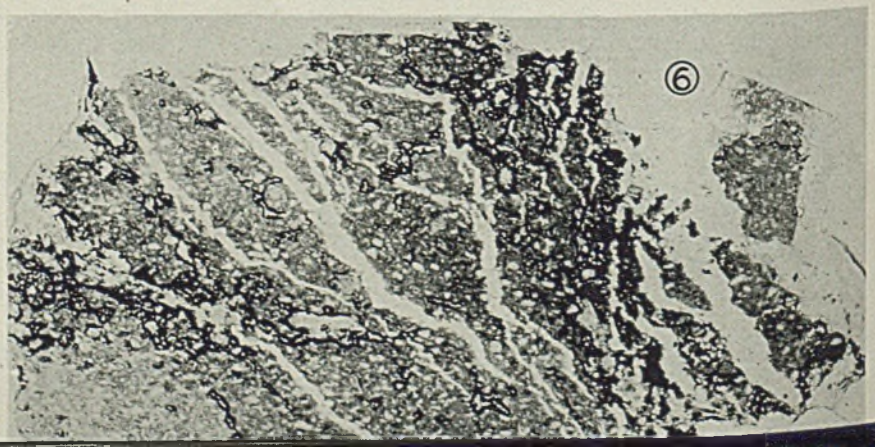


Fig. 5—Brickwork below Fig. 2 where disintegrated zone begins to appear. Unaffected section to left was peeled off easily with crowbar. Heavy wall of unaffected brickwork between disintegrated zone and shell

Fig. 6—Brick broken down by carbon disintegration and into which lead has penetrated. This indicates breakdown occurred at low temperature where lead was flowing into cracks. The latter may have been assisted by shifting of wall load



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B&W Refractories Engineers are qualified specification writers.

R-156

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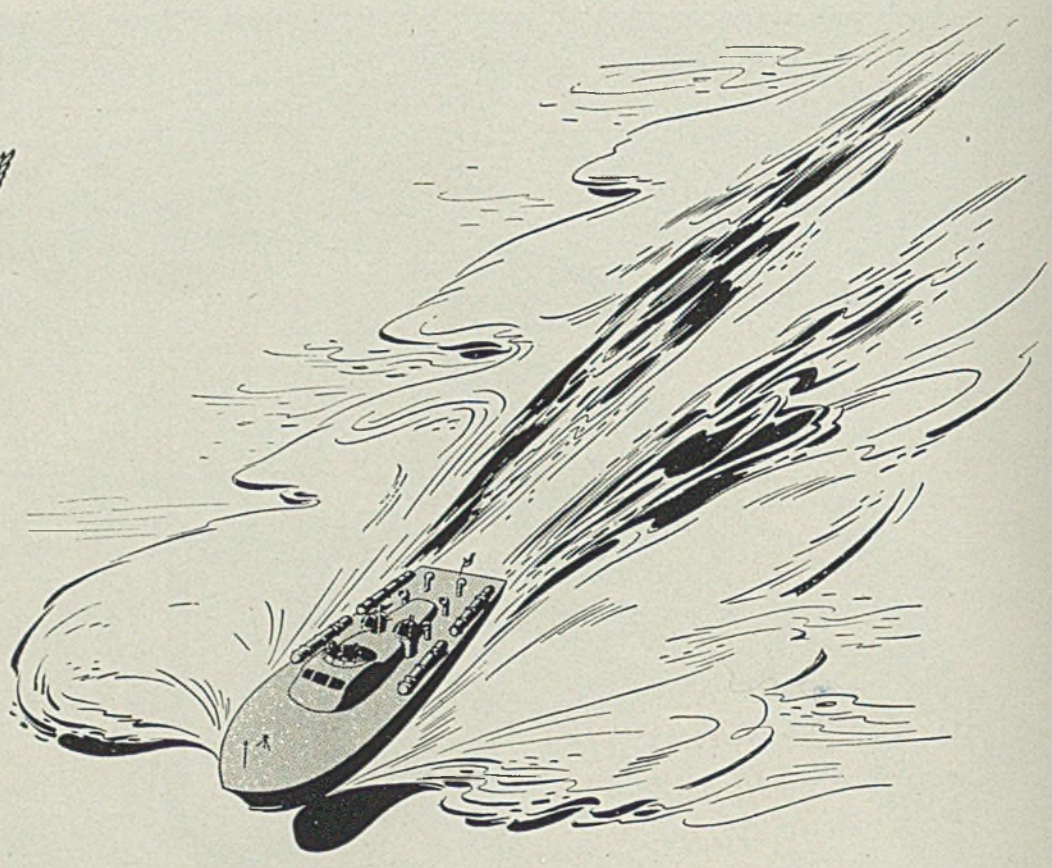

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Fig. 7—Cross section of bosh wall, with coolers removed. Temperature contours in brickwork are apparent. Attacked zone is thicker midway between coolers than in immediate vicinity of coolers

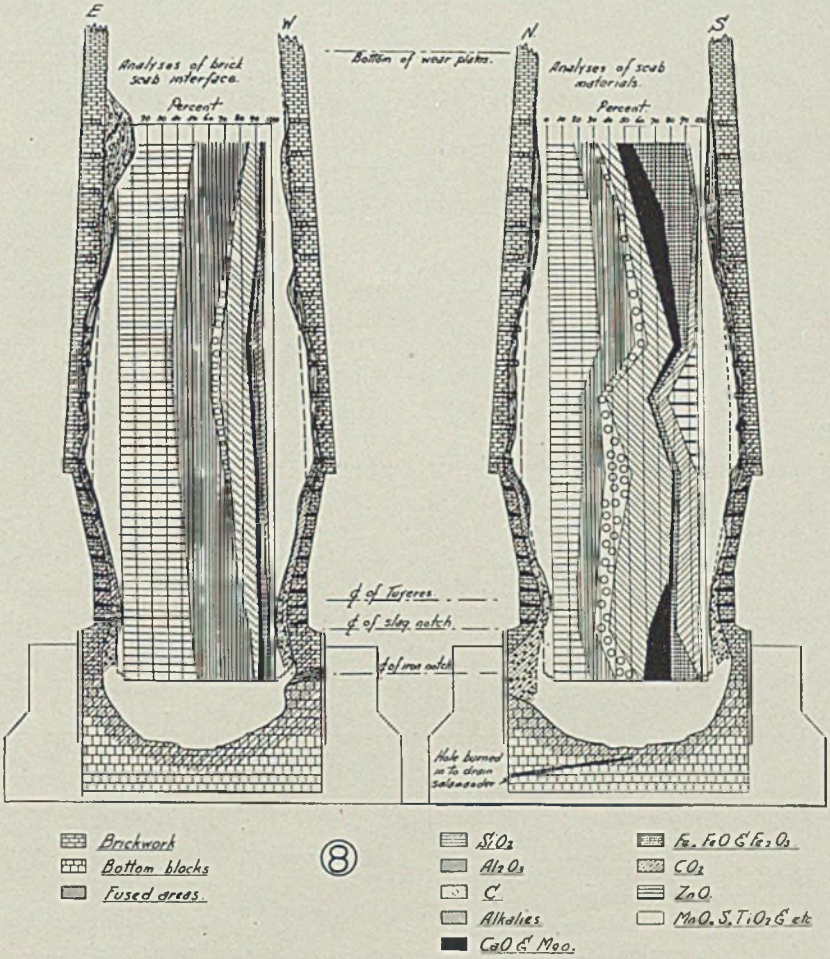


Fig. 8—Chemical analyses of scab-brick interface of blast furnace lining

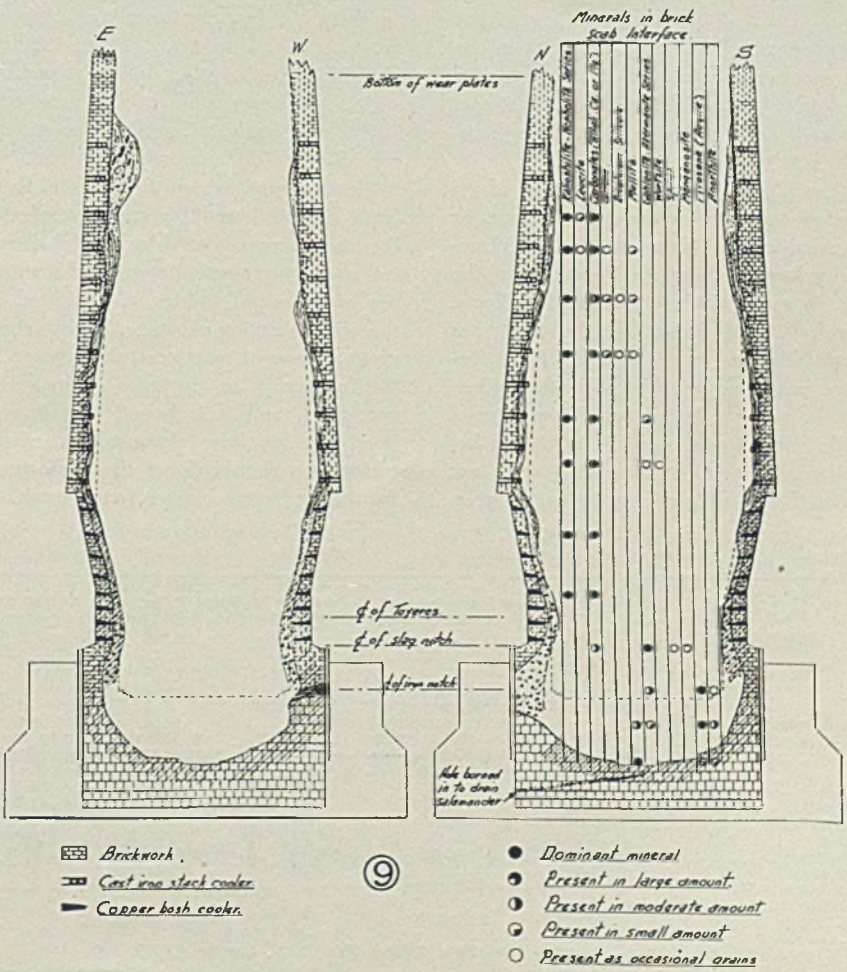


Fig. 9—Minerals found in brick-scab interface of blast furnace lining

exist on the question of increased blast furnace campaigns. A minority is of the opinion that after what may now be considered a fair lining life, the mechanical equipment is in need of repairs and must be taken care of anyway, hence longer lining life is not of any primary importance. This does not seem to be a tenable view, as the condition of the lining is generally the deciding factor in the termination of a campaign. It is also possible to redesign the mechanical equipment to keep in step with the longer lining life if this can be achieved. Needless to say, operating time lost in relining a furnace, and the cost of the equipment, have an important bearing upon the cost of the general plant operation.

Present campaigns are unquestionably longer than those of 20 years ago, but those who believe there are greater possibilities ahead are of the opinion that more must be known about the mechanism of lining wear before they can proceed beyond the present status. A full knowledge of these facts is imperative to intelligent testing of the suitability of refractories for this purpose, and the ultimate specification of the proper brick for the future.

Judging from the appended bibliog-

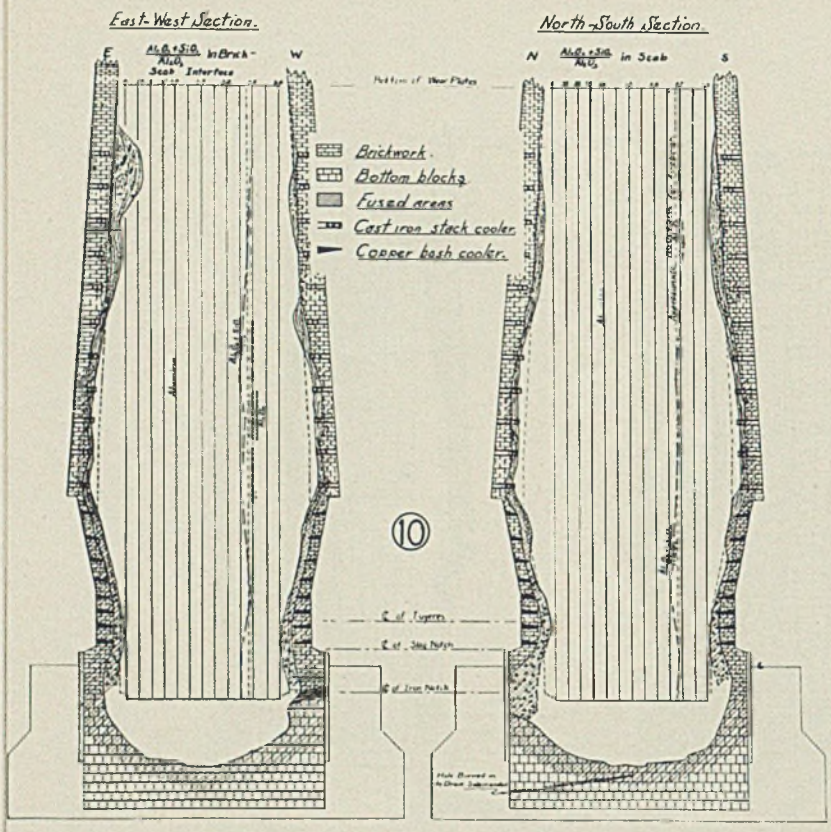


Fig. 10—SiO_2 ratio of samples from brick-scab interface showing that refractory has been penetrated but not leached

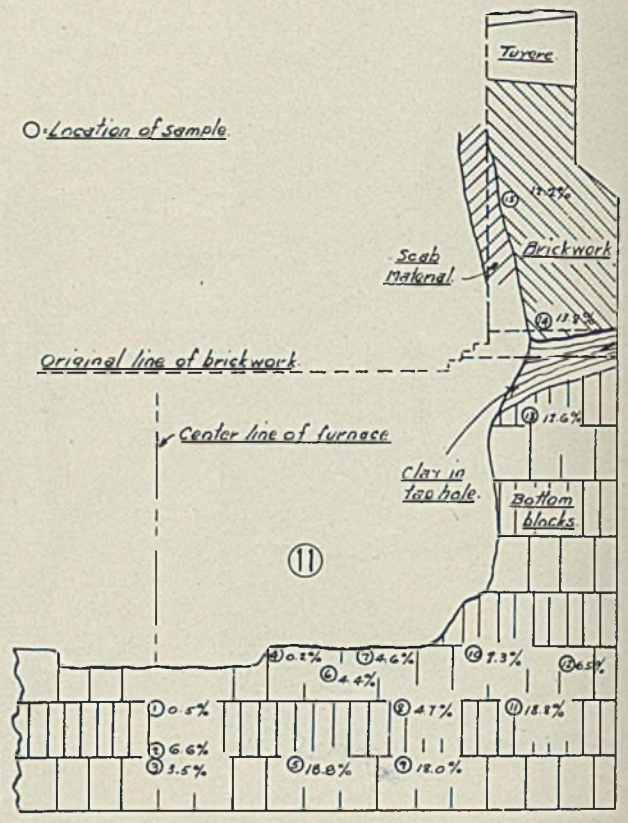


Fig. 11—Hearth lines and per cent porosity of hearth refractories

raphy and the results of recent critical studies of worn-out linings, present day linings are being worn out by the same processes reported for over 40 years. Included among these are carbon deposition and disintegration, and alkali and slag attack. This does not imply that improvements have not been made in the refractories furnished. It only stresses the point, that all the ills of the past are still with us and are making themselves felt.

The literature is not clear as to which one of these ills is the most serious, or to what extent improvements in refractories have changed their ranking of the ills, in order of their detrimental effects. Neither is it stated clearly what has been done to cure the ills. Blast furnace men frequently express their ideas on the subject, but some of these are of little value to the ceramic engineer, because the blast furnace man does not have the ceramic viewpoint or training.

Refractories men, on the other hand, lack the blast furnace man's viewpoint and the frequent opportunity to inspect worn linings, which aid in the diagnosing the ills. They are therefore not in as good a position to present a critical analysis. For a real analysis both groups should get together on a common ground.

The analysis which follows is, to a large extent, based on searches of the literature supplemented by careful chemical and mineralogical studies of a number of worn-out linings as indicated in the accompanying charts. A rather complete picture of reactions taking place in the furnace lining during a campaign is presented, and it is hoped that it will point out the lines along which refractories men should direct their efforts in furnishing better blast furnace brick.

Up to the present time the greatest attention has apparently been centered upon disintegration of the refractory caused by a deposition of carbon and swelling of this carbon in its pores.

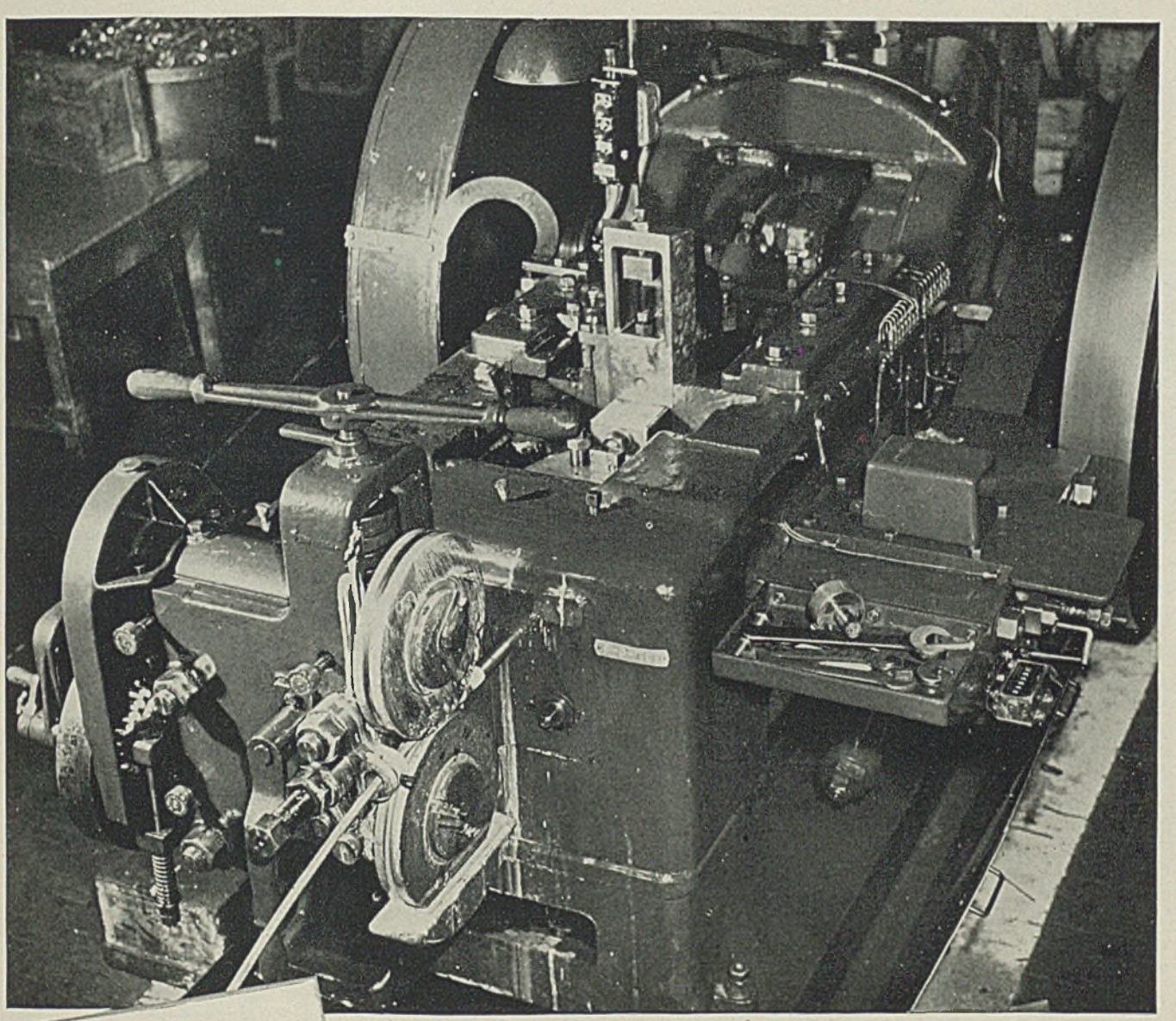
Some men do not agree that this is a serious matter, based on present furnace lining life. However, a critical study of the problem cannot fail to reveal that this is a problem of complex nature which must be corrected if the life of the lining is to be extended.

Failures, which are due to this cause, at an early stage in a campaign may be explained by unfavorable temperature and atmospheric conditions. Two furnace failures coming under the author's personal observation could be thus explained and the situation was

Table I—Comparison of Refractory Material Practice in United States and Great Britain*
(Locality from Which Fire Clay Is Obtained and Details of Strata)

Analysis of finished brick	Harbison-Walker Refractories Co., Pittsburgh 1. Kentucky-sandstone measures 2. Penna. coal measures			General Refractories Co. Philadelphia 1. Kentucky-sandstone measures 2. Penna. coal measures		Ashland Fire Brick Co. Ashland, Ky. Kentucky sandstone measures	Henry Foster & Co., Ltd. Newcastle-on-Tyne North Tyne area coal measures	King Bros. (Stourbridge) Ltd. Stourbridge Stourbridge dist. coal measures
	Woodland			"Olive Hill" Ky.	Green County, Pa.			
	Hearth and bosh	Inwall	Top					
Silica	53.1	53.8	55.1	51.5	52.12	57.28	54.40	65.31
Alumina	42.5	41.5	39.6	42.09	41.69	38.50	38.14	29.82
Ferric oxide	2.4	2.5	2.6	2.14	2.42	2.80	2.87	1.64
Lime	0.34	0.39	0.52	0.47	0.38	0.42	0.66	0.33
Magnesia	0.38	0.42	0.46	0.49	0.29	0.32	0.97	0.26
Alkalies	1.55	1.75	2.08	0.80	1.71	1.10	1.52	1.54
Titanium oxide	Not given			1.80	2.18	Not given	0.58	1.22
Fusing temp. of brick, deg. Fahr.	3100-3130	3070-3100	3040	App. 3270		3100	3110-3180	3000

*Fred Clements, "Blast Furnace Practice", Ernest Benn Ltd., London, 1929.



The illustration shows a typical header on which R B & W bolts are "upset" — the best method for insuring strength. Bolts headed by this method require the use of better and more uniform raw material — thus a double reason for stronger heads. Photomicrographs show perfect continuous flow lines and grain structure.

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remedied in subsequent lining installations. The process by which this disintegration takes place was an early discovery, recognized by Gruner[1] in 1870-73. It is generally understood that metallic iron, Fe_2O_3, Fe_3O_4, carbides, and zinc are the principal catalysts accelerating the reaction which precipitates carbon within the pores of the refractory, as follows:

$$2CO \rightleftarrows C + CO_2$$

With all that has been written on this subject, there is still little quantitative information available about the relative importance of each of these catalysts. This is also the reason why the iron oxide content of a refractory cannot be used as a means of determining quantitatively its ability to withstand disintegration by carbon deposition.

Much is to be learned regarding the fundamentals of the entire reaction, the effects of atmospheric pressure, alkalies, and other compounds not previously mentioned. The subject is open to and worthy of considerable chemical research by the refractory manufacturer if he is to improve his products in this respect. The procedure of the test is relatively simple.

Alkali attack is next in importance, or possibly nearly as important as carbon deposition. This action has been found to take place in the upper part of the bosh and the lower part of the stack. Small amounts of alkalies in the constituents of the furnace burden volatilize and penetrate into the refractories. The large amounts of alkalies found are accumulations from this source. These alkalies react with the brickwork to form nephelite ($Na_2O - Al_2O_3 - 2SiO_2$). Microsections show the plastic fire clay to have been almost entirely dissolved. As the bricks have the approximate composition Al_2O_3-$2SiO_2$, the formation of nephelite is relatively simple, if conditions are otherwise favorable. The presence of large amounts of nephelite in the brick-scab interface shows that the bricks have been fluxed and that the high alkali content of samples collected from this zone of the furnace is not simply impregnation as would be suspected if only chemical analyses had been obtained. The nephelite is really a reaction product which also gives an indication of the course of the reaction. This alkali naturally lowers the fusion temperature of the bricks.

The term "slag attack" as applied to blast furnace refractories has been used rather carelessly. Blast furnace slag is not guilty of much refractory attack, except in the bosh and upper hearth sections. As the coke is not burned and the ash is not available until it reaches the bosh, the slag exists only in the lower bosh section. The hearth is water-jacketed and the bosh is extensively water-cooled by copper bosh cooling plates extending through the lining. Otherwise, the bosh refractories would last only a short time due to the high temperature and corrosive action of the basic slag-forming constituents.

Little slag action occurs above the mantle inasmuch as there is little coke ash available to form slag above that point. Lime and iron oxide might be expected to flux refractories above the mantle, but there is not much evidence of this being the case. Only minor quantities of lime-bearing minerals are present in the brick-scab interface, and the amount of lime and magnesia found by chemical analysis is also small.

Much is said about the serious effect of abrasion on blast furnace linings. Some operators place particular stress on the severity of this condition in their individual cases, due to certain ores or sinters in their burden. Judging from what has been seen in blown-out furnaces, it is believed that abrasion as such is only a secondary cause of lining wear. The top section of the lining undergoes direct abrasion from the impingement of the charge as it falls from the bell, but this is alleviated by metal wearing plates anchored in the lining in this section. Further down, the blown-out lines of a furnace usually show considerable scab upon which the real abrasion actually takes place. Wear in this section probably is due directly to a breaking off of relatively large pieces of scab which carry with them loose, weak pieces of disintegrated or fused refractory. The breakdown and weakening of the refractory responsible for this condition is caused by carbon disintegration or alkali reaction, or both.

In the zone about one-third of the way down from the top to the mantle the disintegrated area is fairly close to the working face. Here it appears that disintegration contributes heavily toward breaking away of thin layers of good refractory. Scabs form and break off through zones of the brick which were weakened by carbon disintegration.

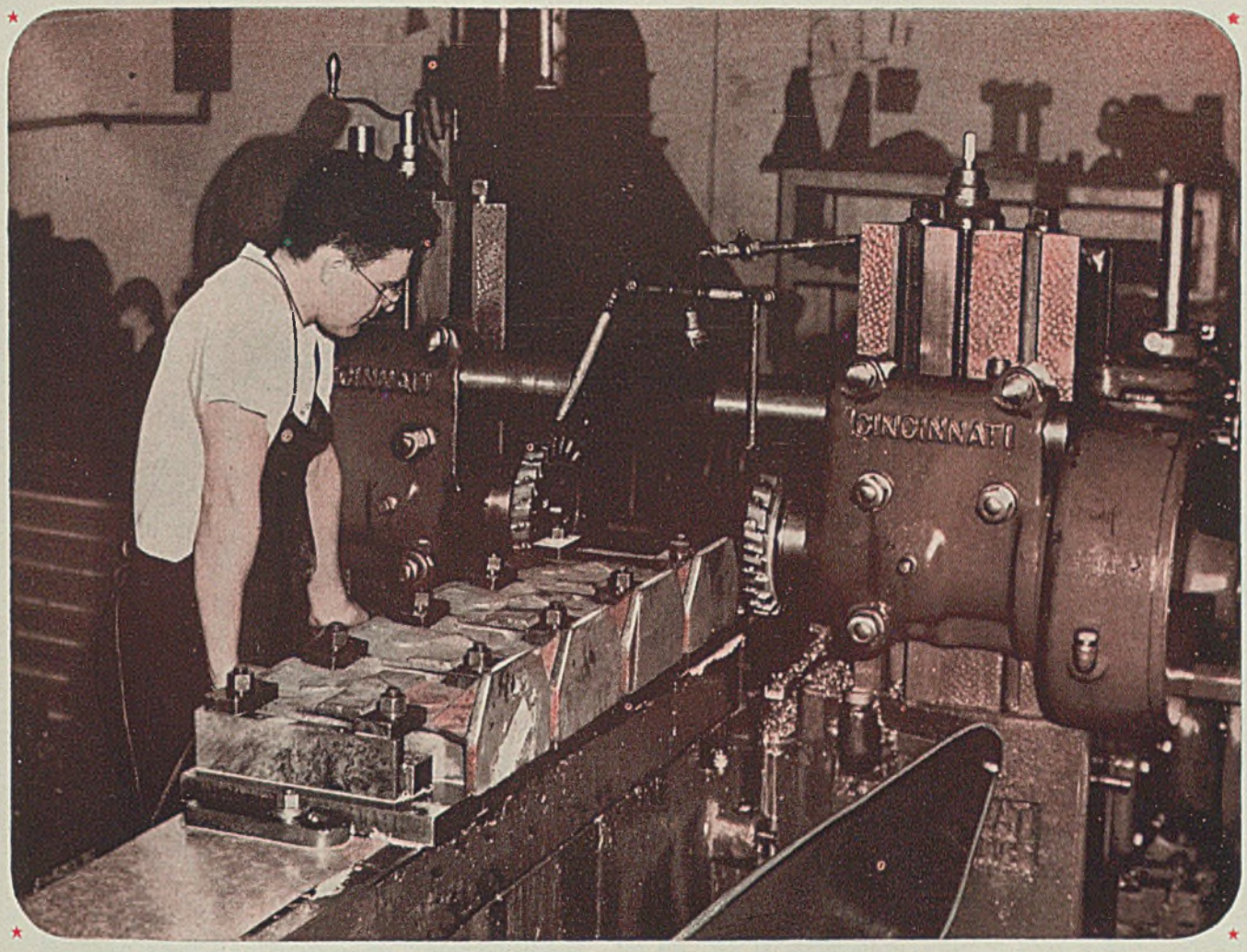
The scabs which form on the lining further down take the brunt of the descending charge. Only a small part of this scab is brickwork. It is generally a consolidation of stock, alkalies and small lumps of bricks finding their way into the descending burden. The zone between the scab and the solid bricks contains lumps of bricks which have disintegrated, but which have not been consolidated. From these observations it would appear, that the effects of the so-called abrasion should be properly assigned to the pressure of the decending charge which breaks the scab from the brick face. Due to the altered condition of a brick face weakened by carbon deposition and alkali attack large sections of scab may be removed in this manner.

The combined action of carbon disintegration and alkali attack is responsible for the bellied lines a short distance above the mantle and operates somewhat as follows:

The intense zone of carbon disintegration develops where the temperature is 450 to 550 degrees Cent. (842 to 932 degrees Fahr.). At the top, this zone is wider than at the mantle. It is near the inner face at the top and closer to the shell at the mantle. At the latter point high temperatures and severe alkali attack also are encountered. As the alkali reaction removes brick face the temperature gradient between working face and shell changes, and the disintegrating zone advances toward the shell. Alkali attack and the advancing disintegrating action therefore proceed simultaneously. *By the time alkali attack has removed the part of the brickwork, the temperature of which was always above*

Table II—Typical Refractories for Blast Furnace Linings—1940

	A H & B	B Inwall	C Inwall	D Inwall	E Inwall	F H & B	G Inwall	H Inwall	I H & B	J Inwall	K Top
SiO_2	51.2	51.80	51.4	52.2	53.3	53.80	53.5	54.40	52.3	51.78	53.8
FeO	0.3	0.36	0.2	0.2	0.1	0.24	0.2	0.28	0.2	0.36	0.2
Fe_2O_3	2.6	2.26	3.1	2.1	2.1	2.17	1.7	1.60	1.6	2.14	2.4
Al_2O_3	39.5	39.96	39.6	40.6	39.4	38.40	39.6	38.45	41.0	40.83	38.2
CaO	0.2	0.52	0.3	0.1	0.1	0.32	0.1	0.44	0.2	0.24	0.2
MgO	0.5	0.36	0.5	0.3	0.3	0.68	0.3	0.72	0.4	0.46	0.4
TiO_2	2.7	2.77	2.6	2.4	2.3	2.23	2.4	2.15	2.4	2.70	2.17
Total alkalies	2.5	1.22	1.7	1.7	1.8	1.83	1.6	1.61	1.4	1.25	1.6
True sp. gr.	2.639	2.732	2.724	2.685	2.726	2.723	2.734	2.712	2.720	2.73	2.706
Bulk sp. gr.	2.131	2.218	2.157	2.170	2.311	2.348	2.278	2.287	2.290	2.236	2.280
Pyrometric cone equiv.	32½ 33	32½	31 32½ 33	32½	33	33	32½	32	32½	32½	32½ 33
Temperature deg. Fahr.	3137 3173	3137	3056 3137 3173	3137	3173	3173	3137	3092	3137	3137	3137 3173
True porosity, %	19.2	18.9	20.8	19.1	15.0	13.7	16.7	15.7	15.4	18.0	15.7



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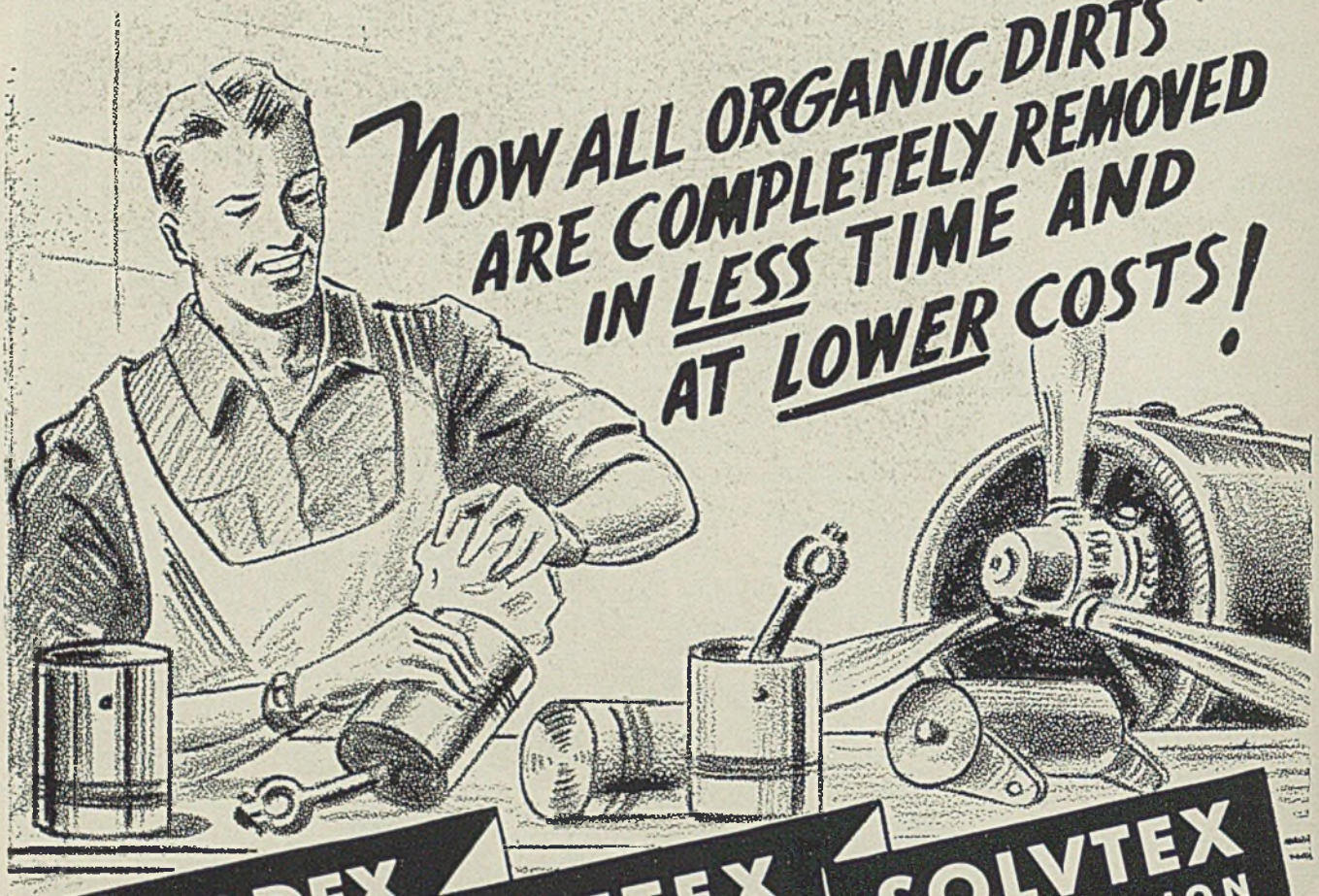

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Table III—Analysis of the Hearth Bricks Shown in Fig. 11

Sample No.	Porosity	Metal Fe	FeO	Fe_2O_3	SiO_2	Al_2O_3	CaO	MgO	K_2O	Na_2O	MnO	TiO_2	C	S	CO_2	Total
1.....	0.5	0.53	2.53	0.57	53.30	37.43	0.40	0.54	2.38	*	0.09	1.63	0.10	0.05	0.13	99.68
2.....	6.6	8.26	0.64	0.14	47.90	36.09	0.40	0.51	1.82	*	0.26	1.60	1.78	0.06	0.05	99.51
3.....	3.5															
4.....	0.2	6.66	5.76	0.29	48.20	32.99	0.30	0.20	1.70	*	0.61	1.88	0.45	0.10	0.18	99.32
5.....	10.6	0.44	1.65	0.63	54.12	35.79	0.80	0.50	2.77	*	0.06	1.73	0.11	0.09	0.14	98.83
6.....	4.4	0.60	1.24	1.43	54.06	38.26	0.30	0.15	1.26	*	0.06	2.08	0.12	0.06	0.08	99.70
7.....	4.6	1.60	1.03	0.23	54.40	37.04	0.64	0.23	1.22	*	0.81	2.10	0.26	0.08	0.07	99.71
8.....	4.7	0.96	1.98	1.03	53.40	36.25	0.20	0.43	2.69	*	0.08	2.22	0.09	0.14	0.20	99.67
9.....	18.0	0.44	2.55	0.20	50.50	34.68	0.40	0.93	3.38	*	0.05	2.08	0.59	0.08	0.27	96.15
10.....	2.3	0.44	1.85	2.23	54.90	34.96	0.60	0.29	1.80	*	0.05	2.23	0.26	0.07	0.06	99.74
11.....	18.8	0.32	1.34	0.57	53.70	38.41	0.20	0.36	2.23	*	0.05	2.08	0.10	0.05	0.17	99.58
12.....	6.5	0.92	1.24	0.86	53.70	36.68	0.68	0.93	2.12	*	0.08	2.08	0.20	0.10	0.07	99.66
13.....	12.6	2.56	2.73	0.29	50.90	36.48	0.80	0.51	2.02	*	0.17	2.35	0.42	0.14	0.21	99.58
14.....	13.8	1.76	0.82	1.26	49.60	36.93	2.40	1.18	2.63	*	0.13	2.08	0.42	0.10	0.20	99.51
15.....	12.2	2.72	1.13	0.57	46.50	37.00	0.20	0.57	6.07	1.01	0.04	2.08	0.36	0.14	0.54	98.93

*Included in K_2O.

550 *degrees Cent.* (932 *degrees Fahr.*) *carbon disintegration has been so effective near the shell, that practically nothing remains to support the upper brickwork.* Irregular slag analyses, especially in respect to the alumina content, frequently are observed, and these are generally considered to be due to sloughing off of such unsupported slabs inside the weak, disintegrated zone.

Those who belittle the effects of carbon disintegration have apparently not studied the combined effect of carbon and alkali immediately above the mantle, the sloughing off of large slabs of refractory during the removal of old linings, the irregular operation of the furnace, and many other tell-tale indications of the loose structure which results from these causes.

The extensive water-cooling system in the bosh is effective in reducing the rate of chemical attack and carbon disintegration. Without this water-cooling the refractories in the bosh would last only a few days.

In the hearth the ferrostatic pressure and the high temperature are sufficient to vitrify the brick face (See Fig. 11 and Table III). Before the vitrification is completed the bricks are frequently so porous that the molten metal may penetrate into the pores. Vitrification causes shrinkage which may be heavy enough to allow the bricks to float out. Bricks 4½ inches thick often shrink to 4 inches thick in this zone. Volume stability is therefore essential here.

Chemical attack by the metal in the hearth would be expected to be low. Iron sulfide dissolved in the metal might be corrosive, but actually lime and magnesia seem to be the fluxes here, as the principal minerals found on the face of bricks under the metal bath are lime-magnesia compounds and anorthite ($CaO.Al_2O_3.2SiO_2$).

It is not clear just how the lime and magnesia get down into the metal bath in the hearth, but it is probably carried under by agitation of the liquid metal. Some doubt might be cast upon the lime attack theory on the basis that these minerals may have been formed when slag was spread over the brick face as the salamander was drained. If the lime-magnesia attack theory is discarded, only the actual fusion and shrinkage of the brickwork remain to explain the wear in the hearth.

Evidence in support of the foregoing conclusion was to a large extent found in the following analysis of a furnace lining as it was being removed. The concentration of various chemical constituents in the brick-scab interface and in the scab at various levels of the furnace are presented in Fig. 8. The low lime and magnesia content of the brick-scab interface and the high alkali content are shown in this illustration.

The scab above the mantle has a high alkali content. As might be expected the carbon, the lime and magnesia contents are higher in this scab than in the brick-scab interface.

In order to differentiate between simple penetration and contamination, a petrographic study was made of the mineral distribution on the exposed face (scab) and on the brick-scab interface. The brick-scab interface is that portion of the wall in which brick could be definitely distinguished and is illustrated by Fig. 9. From the occurence of the various chemical constituents, as shown, it is also possible to deduct what reactions actually have taken place. Presence of large quantities of nephelite shows that the alumina and silica, presumably from the refractories, have combined with the alkali. The amount of lime-bearing minerals in this zone is low, indicating that lime is not an important factor in lining attack above the mantle.

Olivene is present to a larger extent in the scab. Considerable quantities of nephelite also are found, but this is not so important to our deductions, as is the presence of such large amounts of nephelite in the brick-scab interface.

Fig. 10 shows the (alumina + silica) — (silica) ratio for all the foregoing specimens, indicating that this ratio in the brick-scab interface is the same as in the original brick. Thus the penetration of the alkali apparently was followed by a reaction with the brick in place.

The operator of a blast furnace is rightfully conservative with respect to his choice of refractories. He is hesitant to adopt new types of linings unless he has been thoroughly convinced of their merits. He is not always "ceramic" minded and must take the advice of others, frequently outsiders, to guide him in his decision. Technical information resulting from thorough studies of the chemistry involved and from reliable tests will go a long way toward demonstrating the merits of new proposals and eliminating his fears.

Results of refractory service tests in many large pieces of metallurgical equipment frequently are obscured by operating variables. This makes interpretation difficult. Systematic studies of the causes of refractory wear, such as described, make it possible to separate the various contributing factors so that the effects of each can be studied separately under controlled conditions in the laboratory. This yields positive and immediate results in aligning refractories according to their merits.

The author acknowledges the valued assistance of M. A. Fay and J. Deegan in gathering and preparing samples, W. E. Steiner for personal attention in the analytical work and D. M. Fraser for petrographic analyses.

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Note: The remainder of the bibliography will be presented in next week's issue.

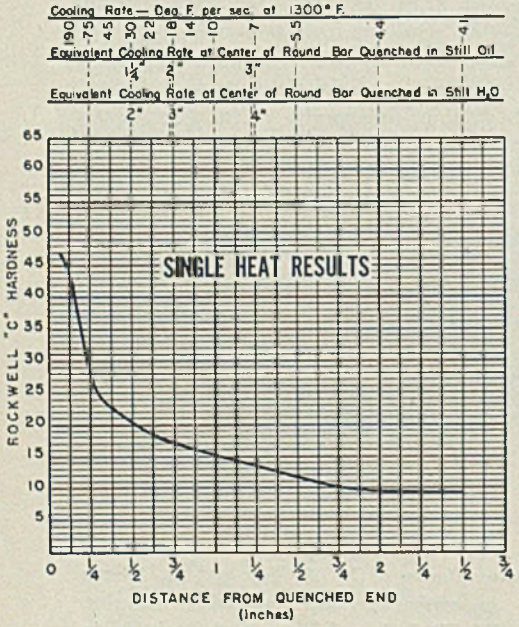
NE (National Emergency) ALLOY STEELS

Here is the latest group of single-heat test results to be released by the American Iron and Steel Institute. These eight charts give results of end-quench hardenability tests on NE 8024, NE 8124, NE 8245, NE 8339, NE 8547 and NE 8720.

This material should be added to the other material published by STEEL on the new NE steels, including the following articles: "Properties of the New NE (National Emergency) Alloy Steels", Section I, June 8, p. 66; Section II, June 15, p. 66; Section III, July 13, p. 80; "NE Alloy Steel Applications", July 20, p. 86; "NE Alloy Steels", Aug. 3, p. 70.

The tables show that latest NE steels as well as certain standard steel compositions which do not require the use of excessive quantities of strategic alloying elements. For convenience of reference and immediate identification, these standard steel compositions have been given the NE prefix.

The NE 9400 series was announced recently, now supplemented by two new series—the NE 9500 and NE 9600 series shown in the tables. Another new series is the NE 52100, carbon-chromium steels. See p. 41 for details and additional data on development of these newest NE steels.



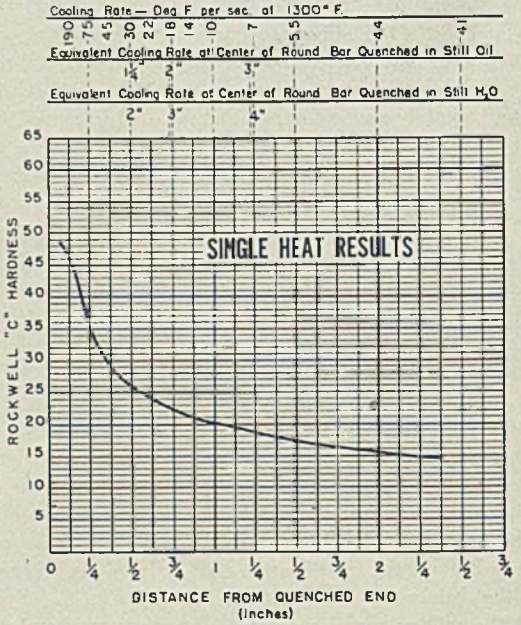
END-QUENCH HARDENABILITY TEST

N.E. 8024
(Type of Steel)

ANALYSIS	
C 0.23	Cr 0.07
Mn 1.12	Ni 0.10
Si 0.17	Mo 0.18
P	
S	

Grain Size 8
Quenching Temp. 1600 °F

Remarks
Held 1 Hr. at 1600



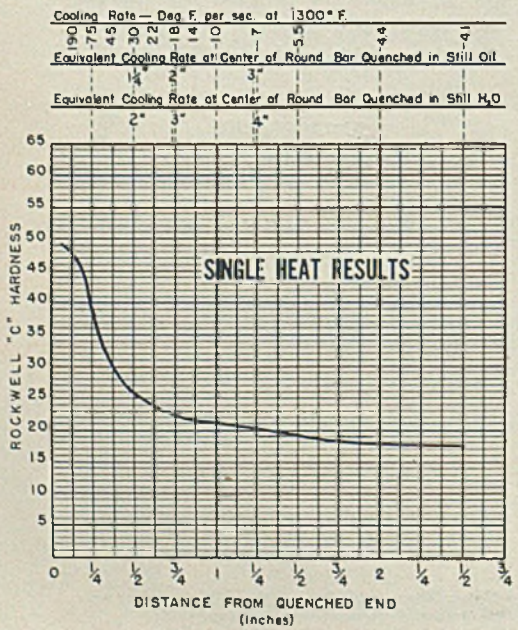
END-QUENCH HARDENABILITY TEST

N.E. 8024
(Type of Steel)

ANALYSIS	
C 0.25	Cr 0.04
Mn 1.26	Ni 0.04
Si 0.19	Mo 0.18
P	
S	

Grain Size 6
Quenching Temp. 1600 °F

Remarks
Held 1 Hr. at 1600



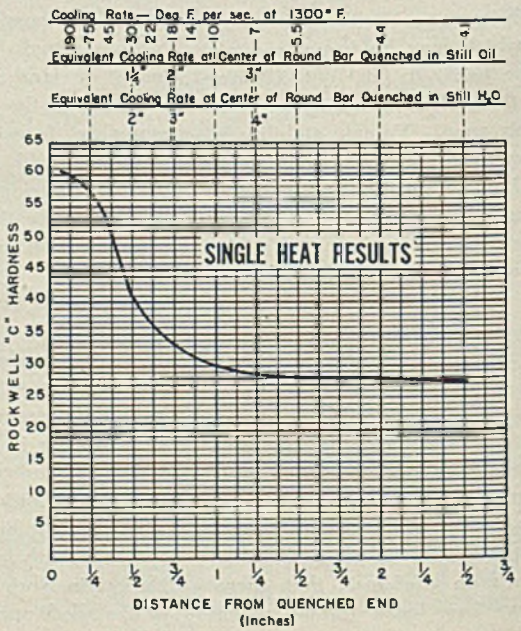
END-QUENCH HARDENABILITY TEST

N.E. 8124 (Modified)
(Type of Steel)

ANALYSIS	
C 0.27	Cr 0.07
Mn 1.17	Ni 0.06
Si 0.19	Mo 0.28
P	
S	

Grain Size 7
Quenching Temp. 1600 °F

Remarks



END-QUENCH HARDENABILITY TEST

N.E. 8245
(Type of Steel)

ANALYSIS	
C 0.47	Cr 0.09
Mn 1.42	Ni 0.22
Si 0.25	Mo 0.15
P	
S	

Grain Size 8
Quenching Temp. 1550 °F

Remarks
Held 1 Hr. at 1550

NATIONAL METAL SHOW ISSUE

OCTOBER 5, 1942

SPECTACULAR—no—just a thorough job. It will carry a combination editorial and advertising insert section devoted to metals, fabrication and treatment during wartime.

STUPENDOUS—not at all. Large enough to be complete, yet concise enough to be helpful with a minimum of reading time.

UNUSUAL—yes. Plan on spending more than your usual time with this important issue. It will bring you up-to-date on metals and substitutions, heat treating, welding, testing, fabricating and cleaning. It will inform you of new processes and materials. *It will give you new ideas.*

VALUABLE—yes. Both reader and advertiser will find many extra values in this issue. Companies selling to the metal producing and metal working industries may well consider advertising in this issue. Its direct line appeal to their customers and prospects makes it possible for them to pass along their newest developments and helpful advice directly and forcefully. It pays dividends. Write for details.

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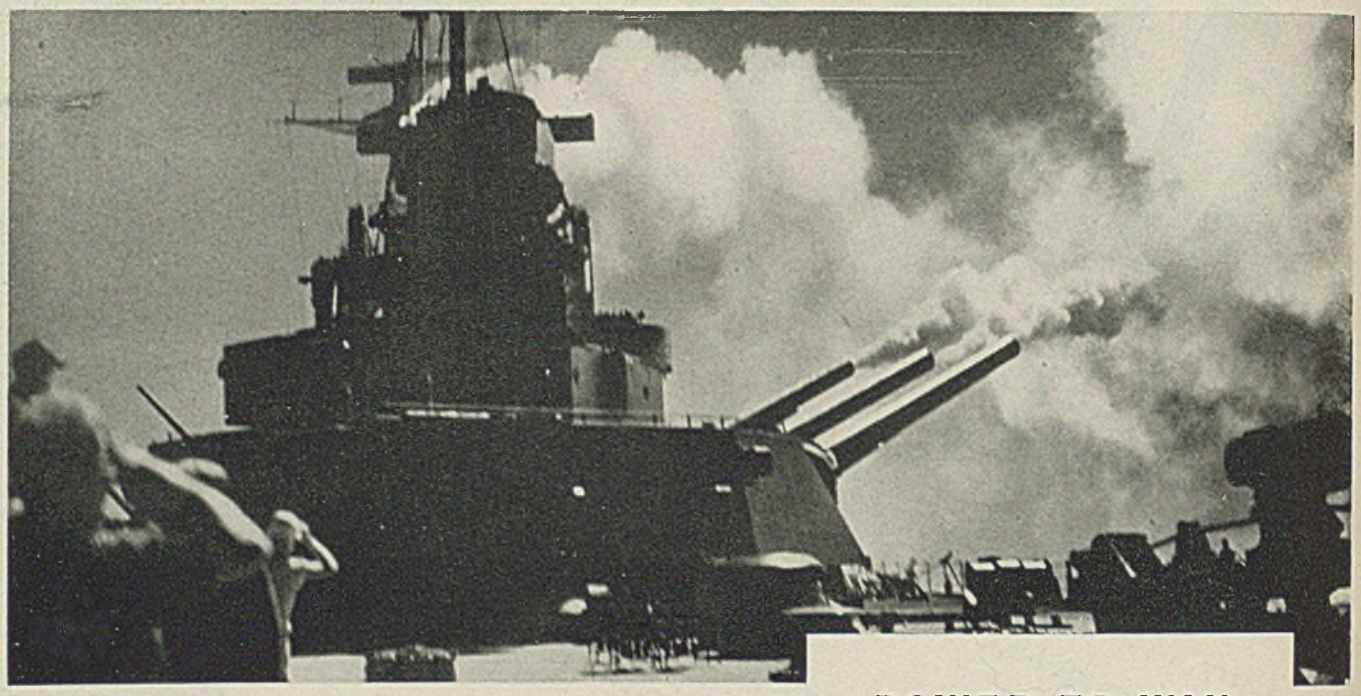
METAL SHOW ISSUE

OCT. 5th 1942



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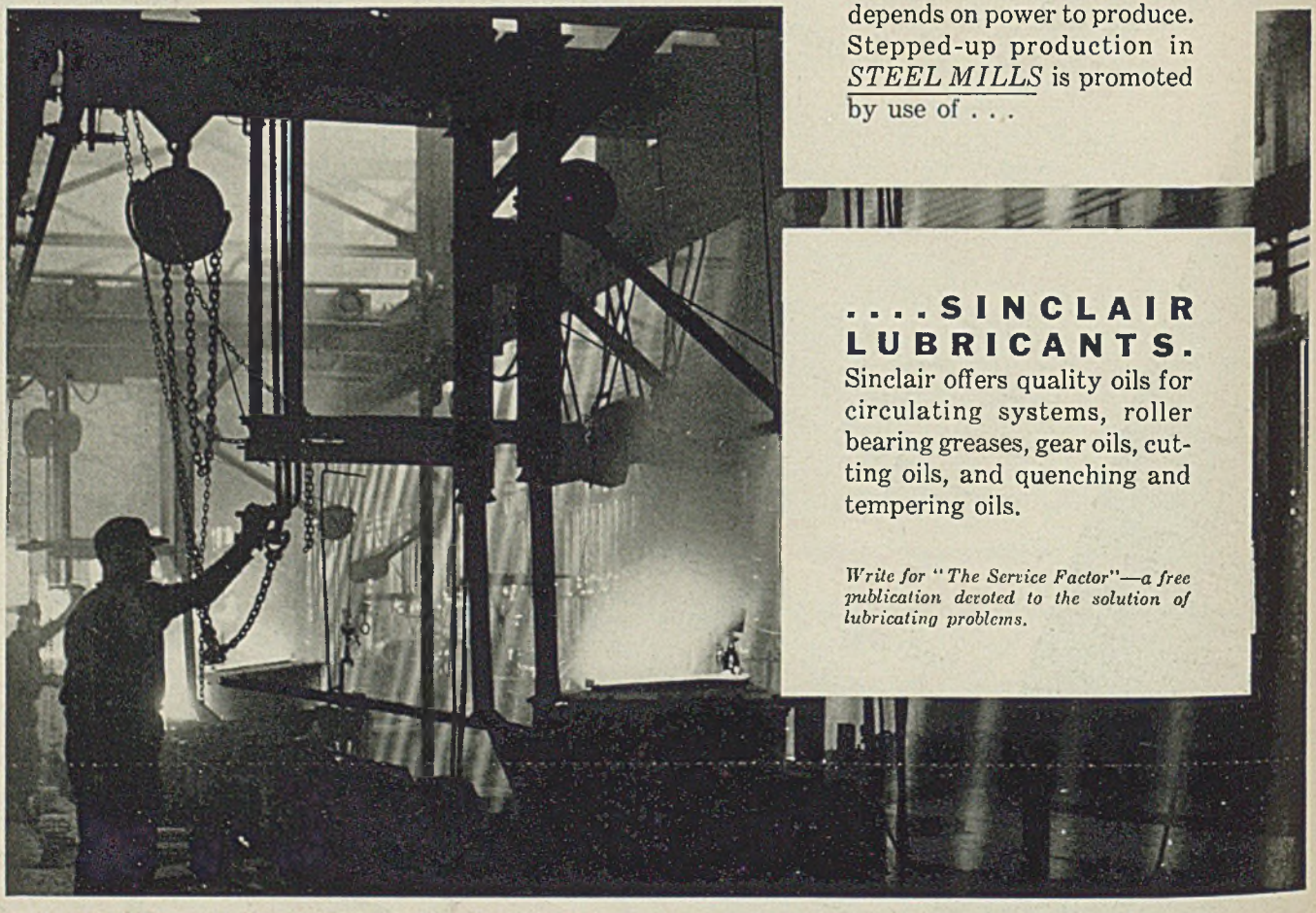

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Helpful Literature

1. Industrial Lighting

Benjamin Electric Manufacturing Co.—32-page illustrated bulletin, "Specifications for Productive Lighting in War Plants," is manual on use of lighting as tool in solving production, reject, employee fatigue, accidents, morale, plant utilization and similar problems. Fluorescent and incandescent lighting are covered.

2. Priority Information

Manning, Maxwell & Moore, Inc.—16-page booklet explaining priorities and how to understand them. It has been prepared by company in effort to assist jobbers and customers. Booklet covers such topics as principles of priority system, securement of materials for manufacture, acceptance of orders, securing and extending of priority ratings, scheduling production and delivery and adjusting inventory.

3. Spray Equipment

Eclipse Air Brush Co., Inc.—32-page illustrated catalog No. 80 covers complete line of spray equipment for both manual and automatic operation. Introductory section of catalog outlines reasons for use of low pressure principle under which this line of spray equipment operates.

4. Photo-Electric Cells

Emby Products Co.—8-page illustrated bulletin No. 10 is comprised of technical data and electrical characteristics of photoelectric cells. Included are principle of operation, diagrammatic assembly, temperature influence, resistance, spectral sensitivity and amplification. Table showing standard sizes of photoelectric cells is provided.

5. Lathe

South Bend Lathe Works—8-page illustrated bulletin No. 16 describes "South Bend" 16-inch precision lathes in toolroom and quick change gear types. Attachments, accessories and tools are listed. Full specifications are given.

6. Seam Welders

Progressive Welder Co.—4-page illustrated bulletin No. 801 discusses design and operating features of standard seam welders in light, medium and heavy duty models. Applications are shown for these machines which are designed for either interrupted or continuous seam welding.

7. Steel Strapping

Acme Steel Co.—8-page illustrated bulletin, "Steel Strapping Shipments," gives tables of sizes, weights and footages for both nailed and nailess type of strapping, and recommended sizes of strap for given weight packages. Series of 59 sketches show how shipments of various types should be reinforced.

8. Conveyor Pulleys

American Pulley Co.—4-page illustrated bulletin No. CP-42 describes design, construction and applications of solid and split types of steel conveyor pulleys in diameters ranging from 6 to 36 inches and face widths up to 50 inches. Pulley lagging specifications are included.

9. Dust Control

American Air Filter Co.—4-page illustrated bulletin No. 273 is descriptive of type F "Roto-Clone Dynamic Precipitator" which combines functions of exhauster and dust collector in single unit for application in field of process dust control.

10. Switching Locomotives

General Electric Co.—16-page illustrated bulletin No. GEA-3598 is entitled, "Diesel-Electric for Industrial Switching." Full details are given on 65-ton locomotive which has starting tractive effort of 39,000 pounds and is driven by two Cummins diesel engines connected to G-E generators furnishing current to four railway-type motors on axles.

11. Rubber Conservation

Goodyear Tire & Rubber Co. Inc.—38-page illustrated catalog, "Industrial Rubber Products Conservation," intended to give industrial plants vital information on conservation of mechanical installations which contain rubber, such as transmission and conveyor belts, hose, V-belts and similar items.

12. Self-Locking Nuts

Palnut Co.—12-page illustrated catalog, "Palnuts For Light Assemblies," includes description of complete line of self-locking nuts. All types of nuts such as acorn, washer, inverted, regular are all given. Typical assemblies and suggestions for applications are given. Specifications are included.

13. Bronze Alloys

Ampco Metal, Inc.—8-page illustrated bulletin, "How Aircraft Designing Engineers Use Ampco Metal," describes pictorially, use of this bronze alloy by airplane industry. Engine, landing gear, propeller and other parts made of this non-magnetic, non-corrosive material are described.

14. Welding Electrodes

Metal & Thermit Corp.—30-page illustrated "Wartime Catalog" No. 4C gives description, applications, physical properties, procedure and other data on electrodes for welding mild steel, low alloy steels, stainless and other alloy steels, and for building up and hard surfacing operations. Sizes, packaging and other data are included.

15. Thread Grinding

Macklin Co.—4-page bulletin on thread grinding discusses some phases of problems encountered, and shows how proper engineering and grade selection of wheels aided in their solution.

16. Flood Lights

Pittsburgh Reflector Co.—4-page illustrated bulletin on "Permaflector" enclosed floodlights describes and shows applications of these units which feature weatherproof construction, corrosion-resistant finish and wide range of light distribution patterns.

17. Manganese Steel

American Manganese Steel division—24-page illustrated bulletin No. 642-C describes use of manganese steel for crusher, grinding mill and pulverizer parts. Typical parts are shown. Analysis, mechanical properties and applications of materials are given.

18. Visible Records

Visible Index Corp.—14-page illustrated bulletin, "Visirecord," includes benefit features found in this type of record control. Description of all equipment is included.

19. High Speed Steel

Jessop Steel Co.—12-page illustrated booklet No. 242 describes "TCM" high speed steel. Information is given regarding product's advantages and performance as compared with 18-4-1. Analysis, typical applications and heat treating procedure are covered in detail.

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20. Vertical Pumps

Watson-Stillman Co. — 8-page illustrated bulletin No. 260-A presents details of complete line of vertical pumps, including simplex, duplex and triplex types. Recommendations and applications of these units are given. Discussion and explanations cover workings and specifications.

21. Conveyors

Lamson Corp. — 8-page illustrated bulletin No. 542 discusses advantages and features of line of conveyors and dispatch tubes which speed up materials handling and order dispatching in war plants. Typical layouts are shown.

22. Tools and Blanks

McKenna Metals Co.—40-page illustrated catalog No. 42V presents full details and specifications on line of standard "Kennametal" steel and metal cutting tools and blanks. General information is given on grinding and applying these tools.

23. Tool Conservation

Henry Disston & Sons, Inc.—80-page illustrated booklet on "Disston Conservation Control Plan" explains in detail how this plan to reduce tool breakage, conserve raw materials, increase efficiency and expand production can be applied in industrial plants. Conservation control cards are shown which discuss various tool failures, causes and corrections.

24. Terminals

Shakeproof, Inc.—Two illustrated catalog sheets, Nos. 82-83 and 84-85, describe locking and plain terminals. Price list No. 1 on stamped products gives latest revised prices on lock washers, terminals, spring washers and stamped products.

25. Tool Steels

Crucible Steel Co.—30-page illustrated catalog, "Tool Steel for the Non-Metallurgist," is reprint of technical article. Discussion includes water-hardening tool steels, oil-hardening tool steels and air-hardening tool steels. Explanations cover different types of tool steels and purpose for which each is best adapted.

26. Heat Transfer

International Nickel Co.—16-page illustrated bulletin, "Heat Transfer Through Metallic Walls," includes information and formulas for determining overall heat transfer rates, various factors influencing heat transfer and thermal activities of metals and alloys commonly used in construction of process equipment.

27. Hand Screw Machine

Oster Manufacturing Co.—8-page illustrated bulletin No. 27-A is descriptive of No. 601 "Rapiduction" hand operated screw machine which is capable of handling wide variety of turret lathe work. Features are covered and complete specifications of machine are given.

28. Impact Tester

Tinius Olsen Testing Machine Co.—8-page illustrated bulletin No. 22 discusses features of impact testing machine having "Change-O-Matic" head which permits Izod, Charpy and tension impact tests to be conducted on single machine. Changes are effected with wrench.

29. Pumps

Layne & Bowler, Inc.—6-page illustrated folder No. WB-42 is entitled, "Water to Help Win Victory," describes line of pumps and well water systems. Representative installations are listed and features of units are explained.

30. Lighting Equipment

Curtis Lighting, Inc.—88-page illustrated catalog No. 42 presents information on lighting equipment for offices, industrial plants and show windows. All types, including fluorescent, mercury and incandescent, are explained for each individual application. Price sheet is included.

31. Manufacturing Facilities

Lyon Metal Products, Inc.—16-page illustrated bulletin, "Craftsmen in War Production," describes facilities of this firm's plants which are available for steel fabrication on war work. Shearing, blanking, forming, assembling and finishing departments are described. Machinery is listed.

32. Rubber Conservation

United States Rubber Co.—46-page illustrated catalog, "First Aid To Industry," offers suggestions on care and preservation of industrial products made of rubber. Conservation facts include topics from garden hose to conveyor belts in industrial plants.

33. Bronze Ingots

American Brass Co.—8-page illustrated bulletin, "General Properties, Foundry Practice and Procedure," presents detailed information concerning "Everdur" bronze alloys. Tensile strength, yield strength, melting point, specific gravity are included in general listing of properties and descriptions.

34. Ventilating Fans

B. F. Sturtevant Co.—8-page illustrated catalog No. 460 describes "Victory Axiflo Fans" which are designed for heating, ventilating, air conditioning, forced draft and similar services. Pressures in various sizes range from ½ to 60 inches with air deliveries up to 12,000 cubic feet per minute. Fans are direct-connected to motors.

35. Drill Presses

Walker Turner Co., Inc.—4-page illustrated folder, "1100 Series 20-Inch Drill Presses," gives construction details and specifications for this model drill press. Power, feed, capacity and drives are explained. Illustration gives working details.

36. Grinder

Lempco Products, Inc.—4-page illustrated bulletin explains features and design of model AC multi-purpose grinder for internal, external, face and taper grinding operations. Machine also has built-in turning attachment.

37. Electric Hoists

Reading Chain & Block Corp.—12-page illustrated bulletin No. 1004 is entitled, "144 Answers to Your Hoisting Problems." Features of unit-constructed electric hoists with various types of control are discussed.

38. Duplicating Equipment

O'Neil-Irwin Manufacturing Co.—32-page illustrated catalog No. 42-2 reveals manufacturing method of metal duplicating without dies. Precision shear, brake and bender have greater capacity range than previous models. Applications and specifications are given. Question and answer section of catalog presents vital information.

39. Pumping Equipment

Worthington Pump & Machinery Corp. —4-page illustrated folder, "Horizontal Single Piston Pumps," outlines complete workings of type AC horizontal single piston pumps. Specifications and drawings accompany explanations. Standard fittings and extras are listed.

40. Transformers

Westinghouse Electric and Manufacturing Co.—22-page illustrated bulletin, "Hipersil Transformers," describes transformers up to 500 kilovolt-ampere capacity, made of Hipersil, newly developed silicon steel. Better regulation and increased flux are explained. Description of magnetostriction tests is included.

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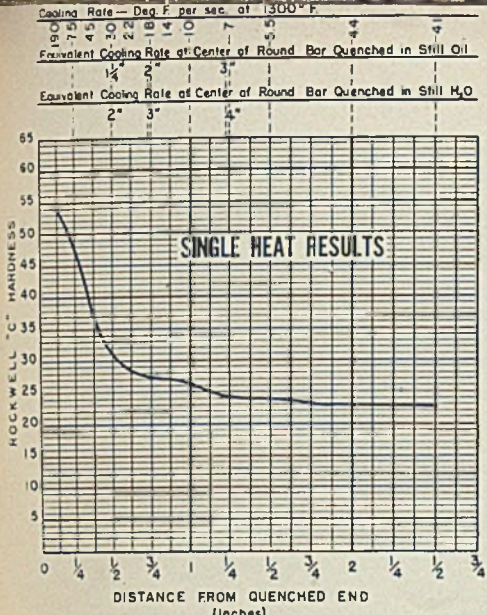


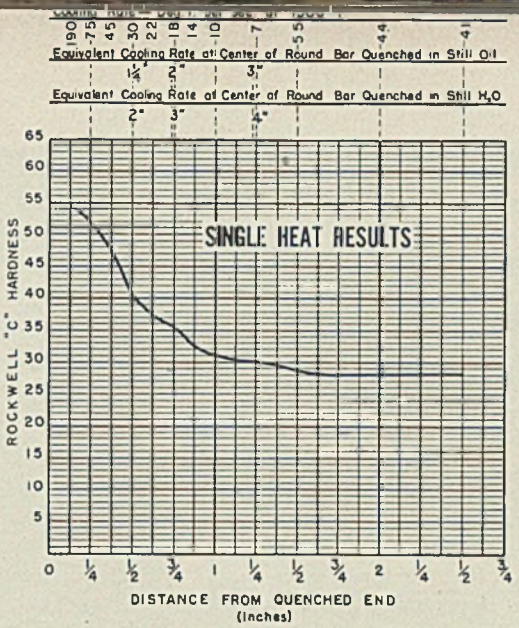
END-QUENCH HARDENABILITY TEST

N.E. 8339
(Type of Steel)

ANALYSIS	
C 0.34	Cr 0.06
Mn 1.28	Ni 0.05
Si 0.18	Mo 0.24
P	
S	

Grain Size 7
Quenching Temp. 1550 °F

Remarks
Held 1 Hr. at 1550



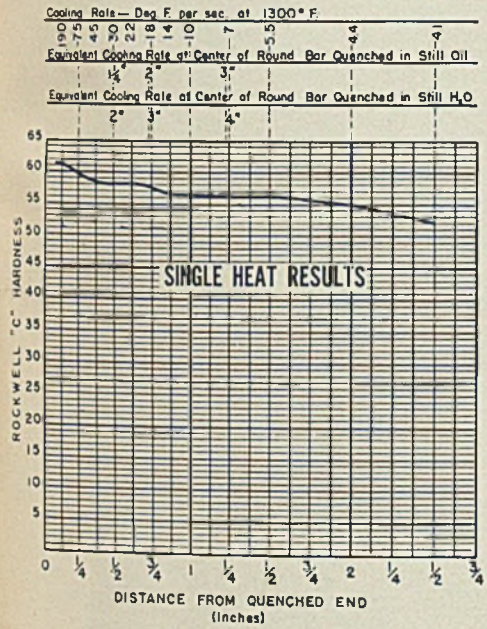
END-QUENCH HARDENABILITY TEST

N.E 8339
(Type of Steel)

ANALYSIS	
C 0.36	Cr 0.13
Mn 1.47	Ni 0.23
Si 0.17	Mo 0.24
P	
S	

Grain Size 8
Quenching Temp. 1550 °F

Remarks
Held 1 Hr. at 1550



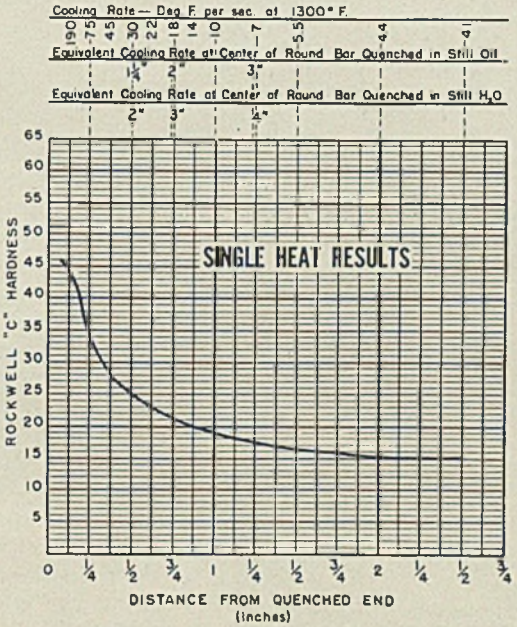
END-QUENCH HARDENABILITY TEST

N.E. 8547
(Type of Steel)

ANALYSIS	
C 0.47	Cr 0.14
Mn 1.48	Ni 0.22
Si 0.19	Mo 0.47
P	
S	

Grain Size 8
Quenching Temp. 1550 °F

Remarks
Held 1 Hr. at 1550



END-QUENCH HARDENABILITY TEST

N.E. 8720
(Type of Steel)

ANALYSIS	
C 0.19	Cr 0.45
Mn 0.73	Ni 0.60
Si	Mo 0.22
P	
S	

Grain Size 8
Quenching Temp. 1600 °F

Remarks
Held 1 Hr. at 1600

Carbon-Manganese Steels

	C	Mn	Si
NE 1330	0.28/0.33	1.60/1.90	0.20/0.35
NE 1335	0.33/0.38	1.60/1.90	0.20/0.35
NE 1340	0.38/0.43	1.60/1.90	0.20/0.35
NE 1345	0.43/0.48	1.60/1.90	0.20/0.35
NE 1350	0.48/0.53	1.60/1.90	0.20/0.35

Manganese-Molybdenum Steels

	C	Mn	Si	Mo
NE 8020	0.18/0.23	1.00/1.30	0.20/0.35	0.10/0.20
NE 8022	0.20/0.25	1.00/1.30	0.20/0.35	0.10/0.20
NE 8339	0.35/0.42	1.30/1.60	0.20/0.35	0.20/0.30
NE 8442*	0.40/0.45	1.30/1.60	0.20/0.35	0.30/0.40

Silicon-Manganese and Silicon-Manganese-Chromium Steels

	C	Mn	Si	Cr
NE 9255	0.50/0.60	0.70/0.95	1.80/2.20	.....
NE 9260	0.55/0.65	0.75/1.00	1.80/2.20	.....
NE 9262	0.55/0.65	0.75/1.00	1.80/2.20	0.20/0.40

Manganese-Silicon-Chromium Steels

	C	Mn	Si	Cr
NE 9630	0.28/0.33	1.20/1.50	0.40/0.60	0.40/0.60
NE 9635	0.33/0.38	1.20/1.50	0.40/0.60	0.40/0.60
NE 9637	0.35/0.40	1.20/1.50	0.40/0.60	0.40/0.60
NE 9640	0.38/0.43	1.20/1.50	0.40/0.60	0.40/0.60
NE 9642	0.40/0.45	1.30/1.60	0.40/0.60	0.40/0.60
NE 9645	0.43/0.48	1.30/1.60	0.40/0.60	0.40/0.60
NE 9650	0.48/0.53	1.30/1.60	0.40/0.60	0.40/0.60

Carbon-Chromium Steels

	C	Mn	Si	Cr	Ni	Mo
NE 52100A	0.95/1.10	0.25/0.45	0.20/0.35	0.40/0.60	0.35 Mx.	0.08 Mx.
NE 52100B	0.95/1.10	0.25/0.45	0.20/0.35	0.90/1.15	0.35 Mx.	0.08 Mx.
NE 52100C	0.95/1.10	0.25/0.45	0.20/0.35	1.30/1.60	0.35 Mx.	0.08 Mx.

*Recommended for large sections only.

Nickel-Chromium-Molybdenum Steels

	C	Mn	Si	Cr	Ni	Mo
NE 8613	0.12/0.17	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25
NE 8615	0.13/0.18	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25
NE 8617	0.15/0.20	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25
NE 8620	0.18/0.23	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25
NE 8630	0.28/0.33	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.15/0.25
NE 8715	0.13/0.18	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8720	0.18/0.23	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8722	0.20/0.25	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8735	0.33/0.38	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8739	0.35/0.40	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8744	0.40/0.45	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8749	0.45/0.50	0.70/0.90	0.20/0.35	0.40/0.60	0.40/0.60	0.20/0.30
NE 8949*	0.45/0.50	1.00/1.30	0.20/0.35	0.40/0.60	0.40/0.60	0.30/0.40

Manganese-Silicon-Chromium-Nickel-Molybdenum Steels

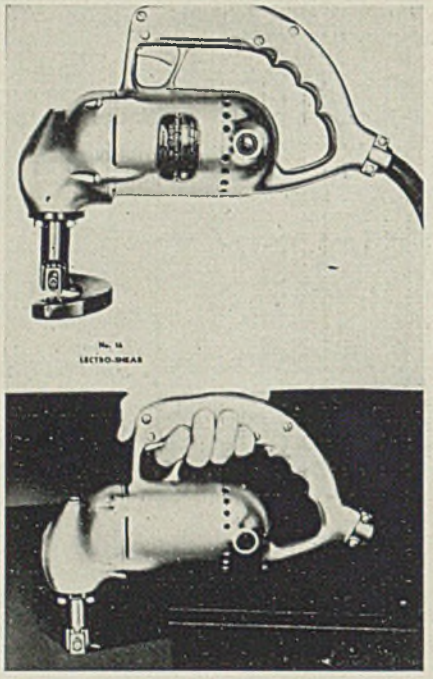
	C	Mn	Si	Cr	Ni	Mo
NE 9415	0.13/0.18	0.80/1.10	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9420	0.18/0.23	0.80/1.10	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9422	0.20/0.25	0.80/1.10	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9430	0.28/0.33	0.90/1.20	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9435	0.33/0.38	0.90/1.20	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9437	0.35/0.40	0.90/1.20	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9440	0.38/0.43	0.90/1.20	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9442	0.40/0.45	1.00/1.30	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9445	0.43/0.48	1.00/1.30	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9450	0.48/0.53	1.20/1.50	0.40/0.60	0.20/0.40	0.20/0.40	0.08/0.15
NE 9537*	0.35/0.40	1.20/1.50	0.40/0.60	0.40/0.60	0.40/0.60	0.15/0.25
NE 9540*	0.38/0.43	1.20/1.50	0.40/0.60	0.40/0.60	0.40/0.60	0.15/0.25
NE 9542*	0.40/0.45	1.20/1.50	0.40/0.60	0.40/0.60	0.40/0.60	0.15/0.25
NE 9550*	0.48/0.53	1.20/1.50	0.40/0.60	0.40/0.60	0.40/0.60	0.15/0.25

INDUSTRIAL EQUIPMENT

Power Shears

Black & Decker Mfg. Co., Towson, Md., announces that both its 16 and 18-gage Letro-Shear have been redesigned to improve ease of handling and operation. The larger unit, No. 16, illustrated, now is equipped with an improved operating handle which gives it better balance and easy control on curved and irregular lines. It is equipped with an instant release trigger switch, with locking pin for continuous operation.

Handle is so shaped that it can be



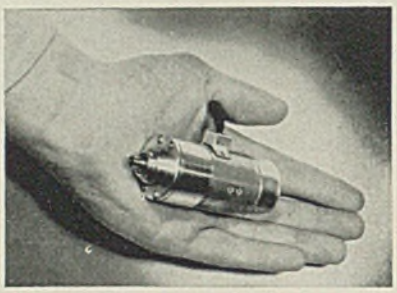
used over the tool or at the rear. Both power and capacity of this tool are the same as in previous models, cutting up to No. 16 gage sheet steel.

Outer dimensions of the No. 18 shear is reduced so that the motor housing now forms a comfortable operating handle. This also reduces the length and weight of this tool, and improves the operating balance and control considerably. Both power and capacity of the tool also are the same as in previous models, cutting up to No. 18-gage sheet steel.

Small Motor

General Electric Co., Schenectady, N. Y., has introduced a new small fractional-horsepower frame motor for aircraft for specific applications. Designated BA-10, it is designed for use with control and protective devices.

The motor weighs about 8 ounces, is 3 9/16 inches long, 1⅜ inches in diameter, and includes a gear reduction to a speed of approximately 125 revolutions per minute. It also is available without



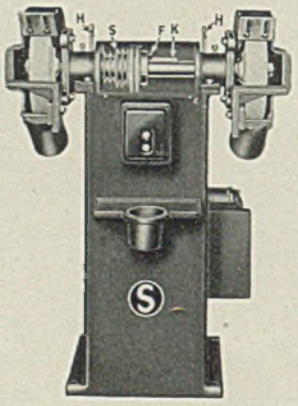
gears, or with additional lightweight gears to give an output speed as low as 1 to 2 revolutions per minute.

Grinder

Standard Electrical Tool Co., 1938 West Eighth street, Cincinnati, announces a new multi-speed grinder which features besides speed-change construction the added advantage of being able to receive wheel stubs from larger machines which were formerly discarded. As shown, it permits wear of a 12-inch diameter wheel to a 5-inch diameter maintaining the peripheral speed throughout the life of the wheel.

Unit's ball-bearing, enclosed motor is mounted on an adjustable plate on back of the pedestal with power being transmitted to the grinding spindle through a multiple V-belt drive. A push-button safety starter is embodied on the front of the machine.

Safety guards of the grinder are of the hinge door type, each with an ex-



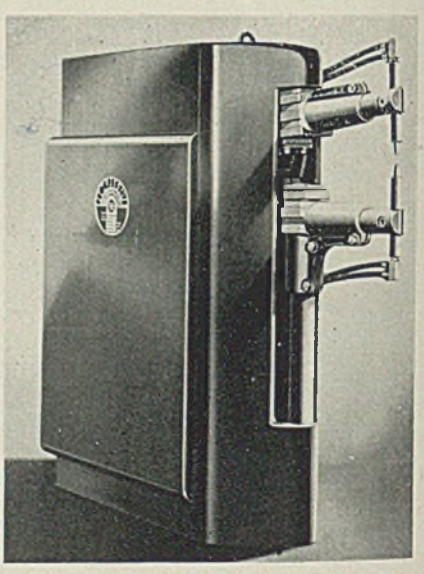
haust outlet, adjustable spark breaker and work rest. To prevent overspeeding of grinding wheels the machine is equipped with an interlocking arrangement.

Rocker-Arm Welder

Progressive Welder Co., 3050 East Outer drive, Detroit, announces a new line of rocker-arm welding machines, consisting of 48 models. Welders in the line, according to the company, are available in four capacities with three types of drive and a full range of throat depths from 12 to 36 inches.

The standard capacities are 20, 30, 40 and 50 kilovolt amperes and 50/60 cycle supply. Machines may be equipped for foot, air or motor operation. In the foot-operated type, the pressure to close the electrodes is obtained through pressure on a foot pedal connected to the rocker arm by mechanical links.

A single-acting cylinder with piston



rod connected to the rocker arm provides the pressure for the air-operated types, with a spring pressure returning the points after completion of weld. Motor-driven units are provided with a ½-horsepower motor, operating the rocker arm through a variable speed drive and worm reduction gear and cam. Control switch in these units is foot-operated.

Lower arms of the welders are designed to provide a range of vertical adjustment giving a throat opening of 8 to 16 inches, with electrodes together. Standard point opening for a 12-inch throat depth is 13½ inches. A slight in-and-out lower arm adjustment also is available to align electrodes. The lower arm also may be rotated in the holder so that welding can be performed with the electrodes at an angle.

All rocker-arm welders have heavy-duty transformers with water-cooled secondaries and steel cores with pancake coils. On the back of each transformer is an 8-stage heat regulator adjustable from rear of machine.

Son, Your Billet Grinding Job Will Be Easy With These STERLING WHEELS

STERLING Billet Grinding Wheels help inexperienced men turn out jobs rapidly . . expertly! Foremen like these "Wheels of Industry" because they lower operating costs. Workmen choose them because they cut faster. Sterling Wheels stand up longer . . handle easier.

In steel mills, where production standards are highest, you will find Sterling Billet Grinding Wheels satisfying all demands . . helping to break records.

If your billet grinding department does not seem to be turning out the work fast enough, it may be that you need a wheel survey to speed up your jobs. Sterling engineers, skilled by years of experience in steel mill grinding, will gladly assist you at no obligation. They will check your present grinding speeds, and show your new men how to get the most out of the wheels they are now using. If new wheels are indicated, they will suggest the less costly way to get the billets moving through your plant. Ask for Sterling engineering service today!

HOW TO MAKE WHEELS LAST LONGER AND DO BETTER WORK!

- ★ Remember excessive pressure by operator wears out wheel prematurely.
- ★ Run billet grinding wheel at recommended speed--no faster, no slower.
- ★ Store wheels in original containers until ready for use.
- ★ Be sure bearings on swing frame grinders are in repair--this greatly affects wheel life.

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Brass Cartridge Cases

(*Concluded from Page* 58)

necessary must be local anneals to prevent softening of the base and lower side wall.

While the case shell as drawn tapers in the side wall, it is not possible to produce the general taper and the reduced mouth-diameter characteristic of most cases. In order to perform the tapering and reducing operation it is necessary in most cases to anneal the open end.

Some consideration of the effect of these various cold-working and annealing operations may be helpful. Figs. 2 and 3 are characteristic curves which illustrate the properties of cartridge brass as they are affected by these processes. The curves in Fig. 2 are produced from experimental data obtained by cold rolling a strip of cartridge brass various amounts and selecting samples for test after each pass through the rolls. The samples selected are tested for tensile strength, hardness, and per cent elongation. These data are then plotted against the percentage of reduction in thickness by cold rolling. These curves show clearly the increase in tensile strength and rockwell hardness which results from cold rolling. The sharp decrease in ductility shown by the drop in the elongation values between 0 and 20 per cent reduction indicates reason for annealing. Effect of annealing is shown in Fig. 3.

It is to be noted that temperatures below about 250 degrees Cent. do not produce any change in properties except perhaps a slight increase in hardness. At about 300 degrees Cent. the brass softens rapidly and recrystallization occurs. These changes are indicated by the rapid increase in elongation or ductility and the decrease in hardness and tensile strength. Further increases in annealing temperature produce a somewhat further decrease in hardness and tensile strength and a very considerable increase in elongation. With the particular cold-worked material used in these tests, recrystallization is about complete at 350 degrees Cent. and the metal structure consists of a fine equiaxed grain, solid-solution structure. As the temperature is increased the size of the grains increases rapidly, and this increase in grain size accounts for increased elongation.

The point at which recrystallization occurs, the initial recrystallized grain size and other details of the annealed properties are affected by the amount of cold work which the brass has received. An attempt has been made to illustrate this in the curves shown in Fig. 1.

The curves to the left are illustrative of the characteristic effects of cold working. To the right are shown together the annealing curves of samples A, B and C which were annealed at various temperatures after 5, 25 and 50 per cent reductions by cold working. It may be seen that as the amount of cold working is reduced the temperature of recrystallization is increased and the initial grain size after recrystallization is also increased. It may also be seen that the less severely cold-worked brass is also slightly softer after recrystallization is complete. These characteristics are of interest in reference to the development of the structures shown in Fig. 4.

Considering first the structure of the base as shown in section E, a rather moderate amount of cold work is apparent. This section is taken from the tensile test piece cut from the base of a 75-millimeter case at a point about half way radially between the primer hole and the circumference of the base. This section shows a moderate amount of cold working, which is perhaps surprising in view of the amount of metal displaced in the heading operation. It must be remembered, however, that cold-working is due to the extent or distance through which a metal is moved rather than the volume of metal moved. There are portions of the heads of cartridge cases, however, which are more severely cold-worked than the section photographed, such as the primer-hole indentation and the section at the junction of the side wall and head.

The structures in sections C and D are those resulting from the last drawing operation. The amount of cold working is considerably greater than that shown by the structure E, and this is confirmed by the higher tensile strengths at these points. No evidence of recrystallization due to taper or mouth annealing is apparent in either section, although C is only an inch or two from the point of immersion for tapering annealing. This is characteristic of the control necessary in these local annealing operations.

The structure in section B shows the effect of the taper annealing in a fine-grained recrystallized structure from the taper anneal. There is a small amount of cold work in this structure because of the small diametral taper at this point.

The structure in section A is particularly interesting. This is the only portion of the case which is completely without cold work. It is to be noted that the grain size at this point is slightly larger and more varied than at B. The amount of cold work resulting from the tapering operation is, in this particular case, very slight. As shown in Fig. 3 such cold-worked brass shows a less distinct change in physical properties on recrystallization than is normal. Therefore, in order to be sure that the hardening from cold work is entirely removed it is necessary that the mouth anneal produce a visible change in grain size which carries with it a definite decrease in hardness and tensile strength.

Because the mouth of the case is the only portion that is entirely free from internal stress as produced, it is necessary that the entire case be relief-annealed. Experience with season cracking of cartridge cases in World War I clearly demonstrated the danger from internal stresses.

The best relief-annealing temperature is one just below the temperature at which softening begins. It is apparent from the data in Fig. 3, however, that this temperature will not be the same for all parts of the case, and in order to be safe from softening a temperature is selected which will relief-anneal the most severely cold-worked portion without softening. The mercury-test results then indicate whether the temperature-time cycle selected has been sufficient to reduce the internal stress below the danger point. The results of tensile tests or hardness tests together with micro examination will indicate whether softening has taken place.

The success of the relief-annealing operation depends very greatly on the type of furnace used. At relief-annealing temperatures of 250 to 275 degrees Cent., heat transfer by radiation is slow and there is great likelihood of overheating portions of the charge in an ordinary muffle furnace. Most recent practice has been to use convection heating methods, which are ideally suited for anneals of this type. Salt-bath anneals are also very satisfactory for relief annealing except for the difficulties in removing salt, which might be left to solidify on the case. Care in washing will remove such frozen salt, however, so anneals of this type are definitely practicable and may save considerable time.

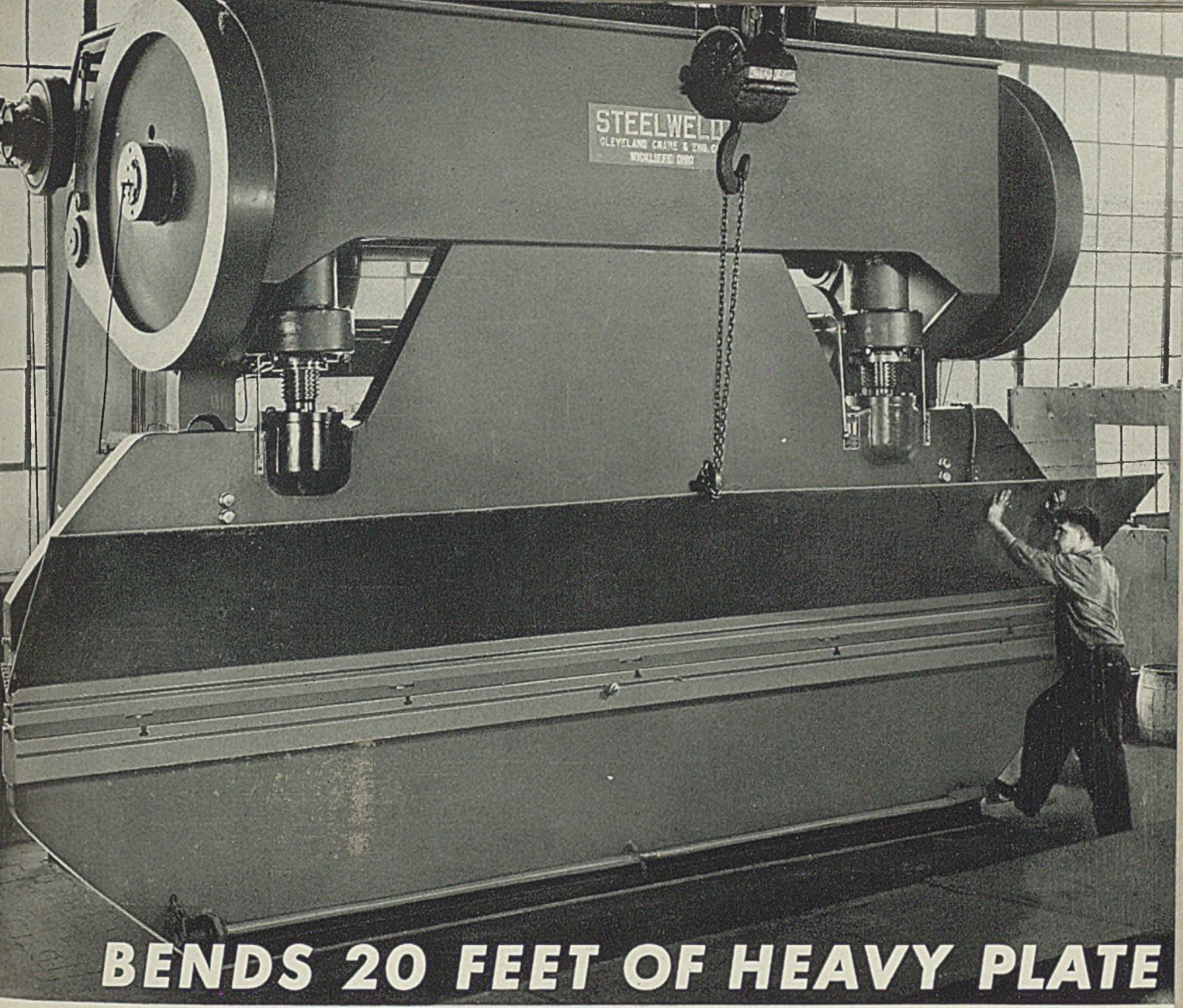
In order to insure freedom from corrosion of the case or attack of the powder stored within the case in fixed ammunition, considerable care is given to clean the case from all acids or alkalies.

Engineered Containers

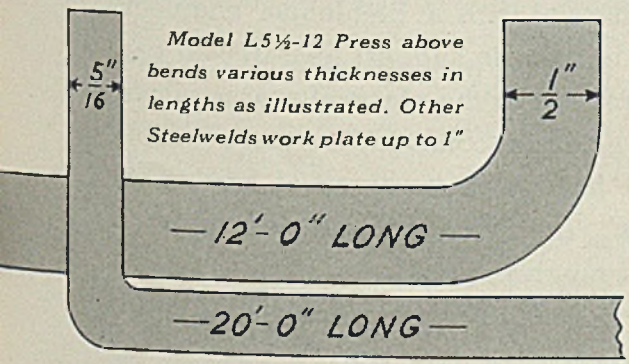
(*Concluded from Page* 64)

standard data that applies to this product. It is only necessary for the plant man to fill in the necessary order number and weight of the box.

In the event that the box is not going into stock, the shipping address is stenciled in place and the unit is ready to go. When stock is called for shipment from the warehouse, another power driven conveyor is utilized to lift the boxes from the shipping room floor to level of the nearby loading platform for freight cars and highway trucks. This conveyor is automatic, running continually. An operator merely dumps a box on it from his hand truck, the conveyor picking it up and raising it to the required level and delivering it to a short section of gravity roller conveyor line.



BENDS 20 FEET OF HEAVY PLATE



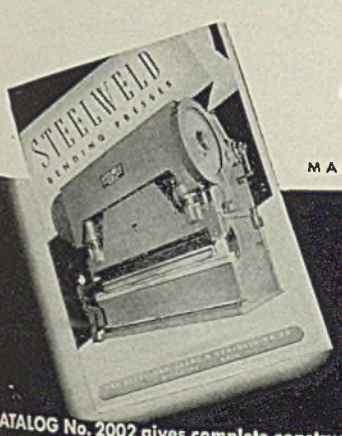
Model L5½-12 Press above bends various thicknesses in lengths as illustrated. Other Steelwelds work plate up to 1"

How long does it take you to weld or rivet two $\frac{5}{16}$" x 20'-0" steel plates together at right angles? How long if you were making a U-shaped or Z-shaped item?

For work of this sort you will find a Steelweld Press a most useful tool. It will cut time and cost to a small fraction. You will save even when you only have occasional odd jobs. For production runs the reduction in time is tremendous. And you will save rivets and angles or welding rod and power too.

Bending is just one of the various types of work you can do on a Steelweld Press.

GET THIS BOOK!



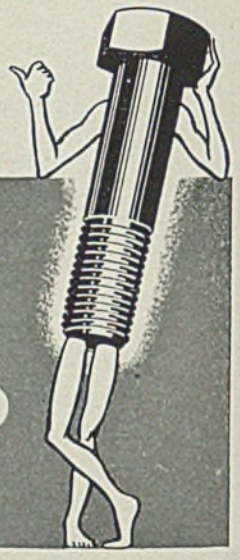
CATALOG No. 2002 gives complete construction and engineering details. Mail

THE CLEVELAND CRANE & ENGINEERING CO.
STEELWELD MACHINERY DIVISION
1125 EAST 283RD STREET • WICKLIFFE, OHIO.

MANUFACTURERS OF • CLEVELAND CRANES • CLEVELAND TRAMRAIL • STEELWELD BENDING PRESSES

STEELWELD
BENDING PRESSES

Are you waiting for a "SPECIAL"...



while a "STANDARD" may be waiting for you?

Designers often specify bolts and nuts of a special size or of a special-analysis steel when, if only they realized it, there's a standard bolt and nut that could do the job just as well. As a result, critical materials are used unnecessarily, needless expense is incurred, and sometimes valuable time is lost in waiting for deliveries.

Perhaps you are waiting for a special type of bolt and nut, long on order, while all the time a suitable "standard" is available, waiting for you. You may save yourself money and time . . . as well as help to conserve critical materials . . . by going over your orders for bolts and nuts with a Bethlehem engineer. He may be able to suggest heat-treated carbon steels to take the place of scarce alloys. Possibly he can recommend certain available standard fastenings in place of hard-to-get "specials". In any case you have nothing to lose, and much to gain.

If you would like to make such a check-up, we suggest that you phone your local Bethlehem representative. Or write to Bethlehem Steel Company, Bethlehem, Pa. There's no obligation, of course.

BETHLEHEM STEEL COMPANY

BETHLEHEM STEEL

MARKET SUMMARY

DEMAND	PRODUCTION	PRICES
Continues in excess of production.	*Advanced ½-point to 98 per cent.*	*Unchanged under ceiling levels*

Steel Delivery Schedules Uncertain

Producers unable to make definite promises under present conditions. . . End-use symbols now essential. . . Scrap supports high steel production rate, without surplus

DELIVERY schedules are in a state of flux as a result of rerating and changes incident to applying the quota system and PRP. Although application of new ratings is being done selectively the upper range is nearly as crowded as was the case when A-1-a represented the top.

Steel producers find it increasingly difficult to make definite delivery promises and some do not attempt it on receipt of the order, even under AA-1 ratings. This presents difficulties for consumers but producers insist that short of definite directives or allocations they can not know what they will be able to do.

There is not only the matter of reratings, which continues a disturbing factor, but uncertainty at the moment as to September production directives under the quota system and the question of special directives and allocations, although it is claimed these will be greatly reduced or eliminated.

Some mills have adopted a policy of not only making no promise on acceptance of the order but of giving no assurance of shipment until the order is definitely scheduled, which may mean as late as within two weeks of delivery. Some producers are willing to offer reasonable assurances on receipt of order, with a proviso covering a wide range of contingencies, leaving the purchaser in a state of uncertainty.

* * *

By Aug. 31 all end-use symbols must be in on old orders or they will lack standing. Indications point to a revision in the pattern of these symbols.

Mill quotas have changed the picture in steel sheet deliveries and wider differences prevail as to priority ratings required by various mills for early scheduling and shipment. The realignment tends to widen shopping to fill requirements, placing the tonnage with a mill whose current quota fits the finish or size needed. Thus one result of the quota plan is to give more flexibility in distribution. Sheet bar allowances to integrated mills are larger than can be consumed under their finishing mill quotas, thus providing a supply to be furnished non-integrated sheetmakers. This is in accord with normal mill practice.

Scrap collections continue to supply material to sustain operations of steel mills at a high rate but the margin is close in many cases, daily receipts being depended on to maintain operation. In some districts a distinct lull has been experienced over the past fortnight, for no apparent reason, and receipts have been appreciably lower than in recent weeks. Official report is that automobile wrecking yards produced 434,448 tons of scrap in July, 1,633,369 tons in four months, but supply from this source is dwindling and this large production may not be repeated. In spite of efforts to gather all dormant material in industrial, household and agricultural sources the supply is not sufficient to allow melters to accumulate reserves for more than a few weeks consumption. Some large users have supply for only ten days. July scrap consumption is estimated by the Institute of Scrap Iron and Steel Inc. at 4,600,000 gross tons, compared with 4,608,000 tons in June; seven months consumption is given as 32,443,000 tons, compared with 30,948,000 tons in the same period last year.

* * *

Continuing its near-capacity level ingot production last week advanced ½-point to 98 per cent on small gains at six producing centers. Chicago edged up 1 point to 103 per cent in spite of thin scrap supply, Buffalo regained 3½ points to 93 per cent, St. Louis gained 12 points to 95½, Cincinnati 3 points to 91, Cleveland 4½ points to 99 and New England 2 points to 92 per cent. Detroit slipped back 2 points to 89 per cent and Wheeling 5½ points to 78 per cent. Unchanged rates were maintained at Pittsburgh, 94; eastern Pennsylvania, 95; Youngstown, 96 and Birmingham, 95.

The Great Lakes iron ore fleet has been augmented by addition of two carriers with combined trip capacity of 19,650 tons. Ships in the ore trade now total 302, compared with 292 a year ago. In addition to these American boats 35 Canadian ships have participated in the ore movement so far this season.

Composite prices of steel and iron are steady at the prescribed ceilings, finished steel at $56.73, semifinished steel at $36.00, steelmaking pig iron at $23.05 and steelmaking scrap at $19.17.

COMPOSITE MARKET AVERAGES

	Aug. 29	Aug. 22	Aug. 15	One Month Ago July, 1942	Three Months Ago May, 1942	One Year Ago Aug., 1941	Five Years Ago Aug., 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	20.50

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

	Aug. 29, 1942	July 1942	May 1942	Aug. 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	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Aug. 29, 1942	July 1942	May 1942	Aug. 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	24.00	24.00	24.00
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	18.75
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	21.50

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.)
Josiyn Mfg. Co. may quote 2.35c, Chicago base.)

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		
4100 .15-25 Mo.	0.55	T 1300, Mn, mean 1.51-2.00	0.10
46.00 .20-.30 Mo. 1.50-2.00; Ni	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.)

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

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
⅝	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron 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 ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
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
½-1-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

*OPA Schedule No. 77, Jan. 26, 1942, Hillman Coal & Coke Co. may charge $6.35 at Poland plant, effective April 20, 1942. 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. 10, 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.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

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.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.50c; packed 5.75c; ton lots 6.00c; less-ton lots 6.25c; less 200-lb. lots 6.50c. Spot prices ¼-cent higher.

Electrolytic manganese: 99.9% plus, less carlots, per lb. 42.00c.

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 $128; ton lots $140.50. Spot $5 per ton 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

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.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports
	L s d
Merchant bars, 3-inch and over	$66.50 — 16 10 0
Merchant bars, small, under 3-inch, re-rolled	3.60c — 20 0 0
Structural shapes	2.95c — 15 10 0
Ship plates	2.90c — 16 2 6
Boiler plates	3.17c — 17 12 6
Sheets, black, 24 gage	4.00c — 22 5 0
Sheets, galvanized, corrugated, 24 gage	4.61c — 25 12 6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20 — 1 10 9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

		L s d
Foundry No. 3 Pig Iron, Silicon 2.50-3.00	$25.79	6 8 0 (a)
Basic pig iron	24.28	6 0 6 (a)
Furnace coke, f.o.t. ovens	8.87	2 4 0
Billets, basic soft, 100-ton lots and over	49.37	12 5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14 10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17 12 0††
Shapes	2.77c	15 8 0††
Ship plates	2.91c	16 3 0††
Boiler plates	3.06c	17 0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22 15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26 2
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	23 15 0
Bands and strips, hot-rolled	3.30c	18 7 0

(a) del. Middlesbrough. 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
[illegible]mer	4.45
High phosphorus	4.35
[illegible]ssbi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00c

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

Manganese Ore

(Nominal)

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	....
S. African, 48%	80.00-86.00
Indian, 50%	80.00-86.00
Brazilian, 46%	78.00-84.00
Cuban, 51%, duty free	85.00
Domestic, 48%, f.o.b. mines	$1.00

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	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

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, tube scrap $3 over, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** refer to mixed borings and turnings, shoveling turnings, No. 2 busheling 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 88

Demand for black and galvanized sheets is spotty, orders tending to be fewer but larger. A steady volume of sheets finds its way into civilian defense products, notably for helmets. Cold-rolled sheet producers still seek high-rated contracts to keep their mills busy. Stamping shops are soliciting war contracts. A large manufacturer of tin cans is asking for sheet metal work, stampings and subassemblies under more prime or subcontracts on war business for its 45 scattered plants, with 16,000 workers skilled in mass production.

Dependent on mill quotas, steel sheet deliveries are more varied and wider differences prevail as to priority ratings necessary for early scheduling. A mill may have a relatively high quota for galvanized and a low allotment on black while another can schedule long ternes on A-1-k and galvanized only at AA-1. This causes buyers to shop more widely. The quota plan allows more flexibility in distribution.

Integrated mills have heavier quotas for sheet bars than for finishing departments to aid coverage for non-integrated finishing mills. This follows the normal production schedule practice used by steel mills for years.

While sheet orders continue to decline, sellers are still greatly occupied with reratings. Certain leading sellers are unable to make anything like definite promises on tonnage carrying less than AA-2.

Re-rolling operations with some producers of narrow cold strip are restricted by annealing capacity, heat-treating still being a choke-point with the ratio of demand for high carbon strong. Incoming orders are more spotty, but bolstered by a few large individual contracts extending over a year on a monthly specification basis, total bookings this month are in excess of shipments with several smaller mills. Practically all new business is rated in the AA brackets and hot strip deliveries are geared as high, shipments against A-1-a being uncertain.

Plates

Plate Prices, Page 89

Tank fabricators have recently had some cancellations as a result of changes in the synthetic rubber program. In at least one instance much of the steel, fire box plate, had already been fabricated. On the other hand, there are at least three jobs on which work is definitely going ahead and for which some plate work has been fabricated.

Certain district offices report a larger quantity of railroad steel in their September allocations than for the past several months. This tonnage is almost solely for repair work.

Plate deliveries to warehouses, which have been slightly improved in recent weeks, running largely to odds and ends, will be sharply reduced in September allocations, although some uncompleted shipments from August quotas will be made during the first part of the month. Allotments to shipyards and miscellaneous fabricators engaged on war contracts will about equal this month. Two new build-

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ers recently started production, and to meet initial production schedules, allocations have in the recent past been heavy to enable the yards to get into operation on all ways as soon as possible. For flame-cutting, an eastern shop is heavily engaged on heavy plates for special shapes, material taking top rating in line with prime contracts for which the shapes are required.

Bars

Bar Prices, Page 88

Fabricators of carbon and alloy bars, 100 per cent on war production, command high priorities without exception. Orders in these brackets dominate mill bookings with directives and deliveries are not as prompt as implied by high ratings. In effect the re-rating of bar volume is only changing the color of the tag without materially improving fundamental factors involved in distribution except in individual cases where more flexible conditions are derived from the mill quota system.

Fewer, but larger new inquiries for most finishes are appearing, all in the AA group, and specifications against old contracts tend slightly higher each month, but at a slightly less accelerated rate. A major difficulty confronting consumers is placing of fill-in requirements, cold-rolled and alloys especially, material in small lots frequently needed to maintain schedules.

Jobbers with NE steels are moving them in better volume, but deliveries are below expectations in most instances, these grades failing to fill the gap caused by the drop in shipments of the old alloys; 8620 and 8739 grades are being accepted by more users. Nevertheless NE quotas are lagging, with October rolling scheduled on some of the earlier tonnages placed. As in other products, ratio of high carbon inquiry is high. Smaller sizes of low carbon cold-rolled flats and rounds are not as active as the heavier rounds.

In medium sizes of rounds little AA-1 tonnage can be obtained under 10 weeks and of two inches and larger, 14 weeks. In alloy bars the best promise heard recently on AA-1 ratings is 32 weeks and some mills can not make even that delivery.

Producers of cold-drawn bars are completing a special analysis of facilities and order books and are scheduled to be in Washington, at the request of the War Production Board, Sept. 4. Some cold drawers believe their industry will subsequently be placed on an allocation basis. However, as the industry has already been scheduled to operate on such a basis at least three times without the program actually going into effect, many are not counting on such a development.

Pipe

Pipe Prices, Page 89

Producers of small sizes of cold-finished seamless tubing are heavily booked, several through the balance of the year on AA-1 volume, with a substantial part of demand for aircraft. Heavy requirements for the navy fill mills producing larger diameters and tonnage reaching distributors is meager. Stocks of welded tubing are freer, sellers anticipating recommendations that this grade be used where possible, building moderate inventories in some instances.

Substantial tonnages of tubing normally entering into civilian goods, including steel furniture, have been eliminated by limit and stop orders. Lower demand for butt and lap weld steel pipe is accompanied by a tightening in priority ratings required for replacements, and while distributors may move smaller sizes without ratings, within quotas, higher priority is needed for new stock. Some fairly large direct mill shipments of lap weld develop from time to time. Ratings for lap weld sales are substantially higher than butt weld in mill volume. Maintenance of distributor inventories is increasingly affected by the ratio of ratings covering sales to consumers and priorities high enough for replacements to warrant allotment of semifinished to mills. This gap is adversely affecting some jobbers, notably plumbing supply houses; ratings are too low for new supplies and inventories are dwindling, both as to totals and sizes. The jobber directly connected with the war effort is in a more favorable position.

Wire

Wire Prices, Page 89

Amassing of high rerated wire bookings, with new orders mostly in the AA classification, has weakened the force of priorities as affecting deliveries, and for fourth quarter, clarification of production schedules will be attempted by closer application of the mill quota plan with PRP. Scattered A-1-a orders are being

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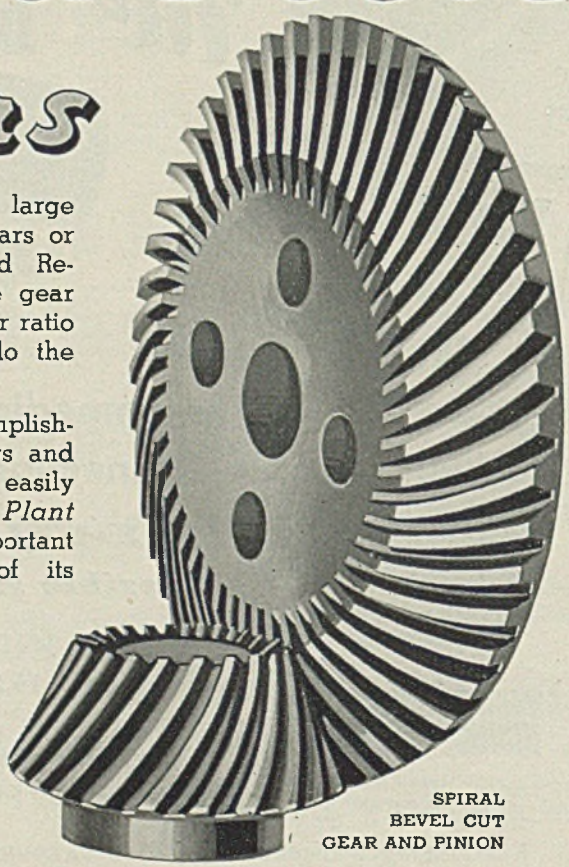

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accepted with delivery indefinite. Production of wire products is entirely for war needs, but is confused by distribution details and to some extent by the nature of demand; there is a predominance of high carbon rounds and a lag in low carbon and flats. With some mills bookings are spotty and under shipments. Spring wire volume is now centered largely in fine wire specialties, numerous users of more standard items, being unable to get steel. Rods continue to be spread thin, integrated producers releasing tonnage to others with high ratings. Even integrated mills are at times dependent on normal competitors for fill-in car lots. Alloys are more extended by delays in primary melting schedules and two months' delivery is about the best promised on plain wires requiring a minimum of processing. Rod producers in some cases are restricting finishing operations in some departments, losing semifinished to non-producers under the mill quota setup, but the prospects of clarifying schedules based on better known supply and demand are likely to be enhanced.

Rails, Cars

Track Material Prices, Page 89

Freight cars placed in service by Class I railroads in seven months this year totaled 51,606, the Association of American Railroads reports. New cars on order Aug. 1 totaled 36,453, against 89,416 a year ago. Locomotives placed in service in the seven months totaled 432, against 323 in the 1941 period. Units on order Aug. 1 were 881, against 603 last year.

Railroad repair shops are engaged more heavily on direct war production. Several large units in the East are making engine block castings for ships and others are doing machine and miscellaneous parts work under prime and subcontracts. The volume of steel consumed by some shops is probably greater than when they were working entirely on rolling stock repairs.

While our builders are engaged in an effort to exchange plain materials, for the construction, with War Production Board's approval, of certain orders on their books, it appears that some builders are being given a little more relief than heretofore through allocations; also it appears that some railroads are obtaining more steel for badly needed equipment repairs. However, car construction continues greatly restricted, with indications that builders will not be able to turn out more than 3000 cars a month at most over the remainder of this year.

Reinforcing Bars

Reinforcing Bar Prices, Page 89

Rolling quotas for concrete reinforcing bars, cut back for August, will be limited to about the same volume next month, possibly slightly higher; authorization of construction and engineering projects is more closely controlling production during the next few weeks. Under PRP and the mill quota system, distributor and warehouse stocks and quotas are also lower, with a view to maintaining stocks sufficient for more highly rated fill-in small-lot requirements.

While several large supplemental contracts have just been awarded for

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depots and advance bases, notably in Rhode Island, including additional reinforced concrete tanks for Navy fuel oil storage, new construction is scrutinized with the view of saving semi-finished steel for other products where possible. Decline in building needs is partially cancelled by heavy tonnages of bars required for 43 concrete barges, 350-foot units, with cargo capacity of close to 5000 deadweight tons each, contracts going to three Pacific coast builders; 26 were primarily designed for the transportation of bauxite. Inquiry for highway mesh has disappeared, demand for building mesh also being light, with at least an AA-3 rating needed to get steel for the operation of fabricating equipment.

Stock lengths are being shipped on Army-Navy jobs outside this country, instead of fabricated bars as formerly. Reason for this is the armed services are building up stock of bars at coastal points, can then ship them to external job sites when bottoms are available. More flexible handling is possible than if bars were fabricated and then earmarked for specific jobs.

Structural Shapes

Structural Shape Prices, Page 89

In spite of cancellation of part of the war plant construction program demand for structural shapes shows little sign of slackening in most districts, though there is some easing here and there. Much current business is for supports for heavy equipment in connection with blast furnaces, handling installations and similar projects, rather than for buildings.

Used material is in demand and much structural steel that normally would be scrapped is being salvaged for use. In many cases abandoned structures are being dismantled for erection elsewhere. General Electric Co. needed a bridge to connect two shops at Lynn, Mass., and searched out an old bridge at Newmarket, N. H., about to be replaced by a larger structure. This was purchased and re-erected at the Lynn works.

Shipments of fabricated structural steel in July were slightly above the monthly average for the current year, according to the American Institute of Steel Construction. July shipments were 181,193 net tons, compared with 182,699 tons in June. Shipments for seven months aggregated 1,258,873 tons, 1.8 per cent under the total for the corresponding period last year. Orders booked in July amounted to 116,673 tons, against 184,516 tons in June.

Pig Iron

Pig Iron Prices, Page 90

Foundry operations in some sections are leveling off, especially in the case of smaller gray iron shops, which have had difficulty in obtaining emergency work. As a result there has been some decline in pig iron movement to this class of melters.

Producers of machinery castings in general appear to have caught up with requirements, further reducing pressure for deliveries. The reduction is a result of limitations placed on use of castings for various types of civilian work. Steel castings continue at a brisk pace but some slackening has been noted by malleable producers, though output in this line still is good.

September pig iron allocations are expected to anticipate the application of ODT order No. 18 on Sept. 15, with tonnages in round carlot figures, consumers whose needs involve fractions of carlots usually being given sufficient to fill the car requirement. These extra tons, however, probably will be deducted from tonnage for the next month.

Scrap

Scrap Prices, Page 92

Irregular conditions prevail in the scrap market, several districts encountering a lull in receipts, total tonnage falling off from the quantity brought in over previous weeks. Stocks at dealers' yards in these instances are almost depleted.

At Detroit mill stocks are out of balance, containing much material which is not usable in regular production because of preference or government regulations. Numerous scrap collectors normally accounting for a substantial quantity of marginal materials have abandoned business to enter war plants or because scrap drives have taken away their business.

Pittsburgh mills have been receiving material at about the same rate as last month and stocks at mills range upward from about ten days supply, two consumers said to be down to that minimum.

Automobile wreckers in July produced 434,448 tons of steel and iron scrap, as

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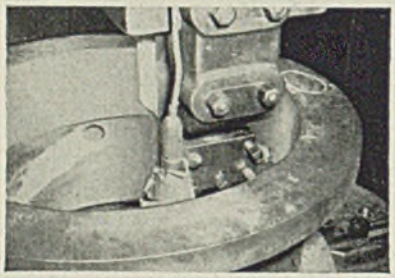

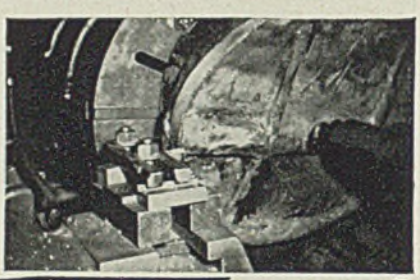

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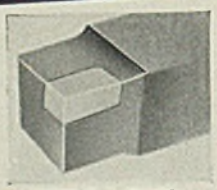
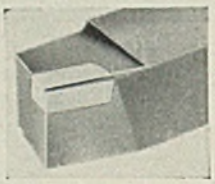


STYLE 3 TOOL



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reported by the Conservation Division's Auto Graveyard Section. This makes a total of 1,633,369 tons in the four months the division has been pressing for larger tonnage. The average has been 408,342 tons per month, against an average last year of 150,000 tons. June turnover rate was 67 days, in July 45 days on the average, with some sections making complete turnover in 35 days. Last year the average turnover was seven months. Wreckers had 535,000 tons of scrap on hand July 31.

Army posts and camps are turning over for scrap all non-essential metal and equipment for scrap, including obsolete guns, cannonballs, fences. Many cities and towns are turning in for scrap war mementoes, cannon, tanks and the like. From July 1 to Aug. 10 the Ordnance Department collected 37,900 tons of iron and steel scrap and 7600 tons of nonferrous metals.

Various aids to the general scrap drive are being developed. In St. Louis 19 movie theaters offer admission in return for five pounds of iron and steel scrap, with prizes for the largest contributions. Proceeds of sale go to the USO.

Tin can collections for the most part do not come up to expectations, housewives apparently not taking the trouble to prepare their discarded cans.

A proposal that scrap being lost in lend-lease shipments of semifinished steel to Great Britain be returned in part to this country is receiving favorable reaction. Thousands of tons have been lost to this country under the present arrangement. Returning ships carrying ballast would solve the transportation problem. It is assumed that War Materials Inc. would handle transactions, with returned scrap directly allocated without dealers and brokers being involved.

Warehouse

Warehouse Prices, Page 91

Warehouse receipts, still spotty, are beginning to show a better balance with shipments. A large percentage of mill shorts and seconds is being sold through warehouses than would normally be the case. Incoming shipments of prime material have moved up somewhat, particularly on bars, which have been scarce for some time.

Most current warehouse business is made up of top flight priority orders, arising from fill-in orders from war plants which find it impractical to place small quantity orders with normal mill suppliers. In some cases recently, warehouses which have taken steel arising from runovers on regular mill orders have found the customer referred to them by the mill for additional material.

All jobbers are finding it exceedingly difficult to keep within the 5 per cent limit on low-rated maintenance and repair steel. In many cases warehouses are aiding repair work by furnishing steel to repair vital machinery before the slow-moving priority machinery can grind into action and supply the necessary rating. Such orders, of course, must be kept within the 5 per cent figure until rated otherwise.

Some relief has been extended to warehouses with depleted stocks following assignment of AA-3 ratings to certain specified steel products for shipment from mills. Effect of this change is not expected to be felt much before Sept. 1.

WPB offices at Detroit have been making efforts to arrange for transfer of excessive inventories of high-speed steel from users' plants to warehouses for redistribution. Some of these inventories are inordinately high because buyers were compelled to take minimum mill tonnages on direct purchases, where only a fraction of such quantity was required.

Pacific Coast

Seattle—Production at the plant of the Boeing Airplane Co., Seattle, will be doubled next year according to announcement of H. Oliver West, executive vice president. Output of flying fortresses will be increased by 50 per cent by the end of the year. He states that material shortages, which have retarded production, will soon be relieved. Employment of women, he added, has been satisfactory and within a few months they will constitute 50 per cent of the personnel.

Scarcity of materials is illustrated by stoppage of Seattle's Spokane street viaduct because of a lack of 70 tons of reinforcing bars. This tonnage has now been assured but only one section will be completed, the other end awaiting the end of the war. Local rolling mills are still struggling under a heavy backlog and are taking no new work except what is urgently needed for pending government projects. The same condition exists in the fabricating industry.

The Navy announces that 1000 addi-

Cuts Two 6" dia. Gear Blanks every 11 minutes.

There are 12 MARVEL Saws at the Northern Pump Co., Minneapolis, some of which are in their tenth year of service. The Giant Hydraulic No. 18 MARVEL pictured above, is a comparative newcomer in the Northern MARVEL family, having been installed just a few months ago, to speed up production on large work. When pictured, it was cutting-off blanks from 6" dia. S.A.E. 3120 hot rolled steel, two at a time, cutting-off two blanks every 11 minutes.

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tional workers will be added at Puget Sound yard within the next month. In the Portland area 10,000 additional housing units have been authorized to care for shipworkers, a $13,000,000 project. Of the total 6064 will be built at Vancouver, 3946 at Portland. Congestion in both cities is reported acute.

Seattle has $63,000 available for construction of a substation near Renton to provide a tie-in for a 230,000-volt line from the Skagit, increasing the city's power by one-third. The city will also spend $300,000 to recondition its emergency steam plant. Tacoma will open bids Aug. 31 for relocating 6½ miles of the Tacoma & Eastern railroad, due to the second Nisqually power project. Several bridges are involved.

Wegman & Son, Portland, Oreg., will construct an addition to the dock erection building at the Kaiser Swan Island shipyard, 110 x 125 feet, and Ralph Horowitz, Portland, has the contract to complete the steel frame assembly building.

Murray & Woodworth, Tacoma, Wash., will dismantle the Narrow bridge towers and cables on a bid of $69,000, plus cost. About 6000 tons of materials are involved.

Army engineers at Seattle and Portland have awarded many contracts for various military installations in the Pacific Northwest and others are in negotiations. Most of these are on a cost plus basis, due to scarcity of materials, priorities, shortages of labor and other conditions. Practically all the important contracting firms in this area are engaged in defense projects.

Canada

Toronto, Ont.—Despite steadily increasing demand for finished and semi-finished steel, production of ingots showed some tapering during the past week or ten days, due to closing of open hearths for relining. It also is reported that a shortage of experienced bricklayers causes more than average delay. However, curtailed production of steel is expected to be only temporary and the quota of about 3,200,000 tons set for this year will be attained. Current steel production is said to be about 92 per cent. Blast furnaces are operating at 100 per cent.

Sharp upswing in output of all classes of war products in Canada is throwing a heavier load on steel producers to meet requirements, and steel demand on this account will be increased considerably in the next few months. According to local mill representatives there has been no slowing in orders for steel, notwithstanding the fact that practically all non-essential consumers have been shut out. According to government announcements Canada's secondary industry soon will be in a position to double and in some instances triple production of guns of all types, tanks, aircraft and other war materials and while arrangements have been made for a big increase in steel production in the Dominion, it is stated that Canada will have to continue to look to the United States for a large part of her steel requirements.

While consideration is being given to further increase in shipbuilding activities it is not expected there will be much expansion until early next year. One of the chief drawbacks is supply of steel, especially plates. Canadian plate mills are maintaining production well above rated capacity, but only by curtailed activities in other departments. The government is supervising deliveries of plates and is having difficulty meeting requirements. Armor plate for tank construction shows demand in excess of supply and additional production facilities will not be available until after the first of the year. Rolling stock builders are running behind on car deliveries, due to difficulty in obtaining plates, but special allocations are being made to get out urgently needed cars to handle war materials.

Used bar steel has been receiving special attention recently and many consumers unable to obtain new material are taking used whenever available. A ceiling has been placed on used steel prices which is practically the same level as new steel, but before this was done used steel in some instances sold at prices double those of new stock.

Pig iron sales rose to better than 10,000 tons last week and as war industry increases, demand for iron is gaining. However, the more plentiful supply of scrap recently has relieved some pressure on delivery of pig iron.

Local dealers report decline in offerings of scrap, with a heavy drop from the rural districts. Local plants are maintaining an increasing flow of scrap, chiefly clippings, borings and turnings. Dealers look for another flurry from the rural districts when the harvest is over. Mills and other consumers are still building stock piles and no actual shortage that might interfere with steelmaking is expected for the next six months.

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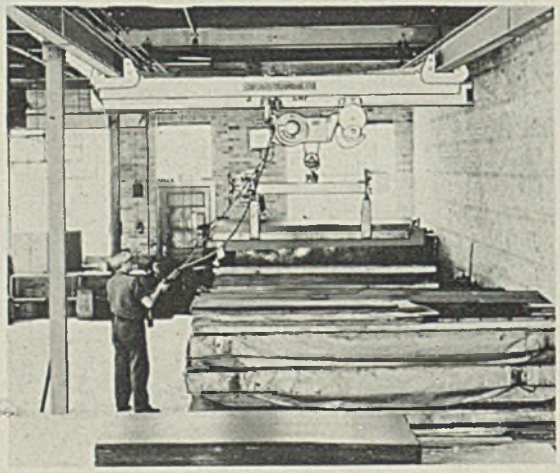

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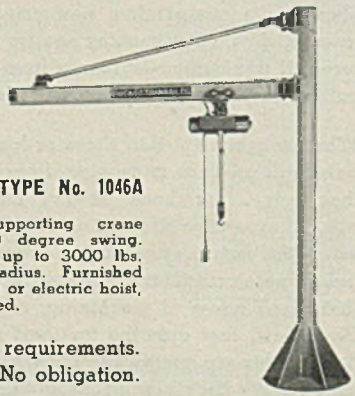

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Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 89

While an increasing saving of steel is being made in fabrication, assembly and building of war equipment, in only a few cases can steel or metal be eliminated entirely. This is especially true of fastenings, bolts, nuts, rivets, screws and nails. Most of the 880,000 trucks and trailers recently awarded 41 manufacturers in 64 separate contracts will have wood bodies, thus immediately creating heavy demand for fastenings. Another case in point is the wooden barge production program and the widespread substitution of wood for steel in construction.

Metallurgical Coke

Coke Prices, Page 89

Beehive coke production in the Connellsville, Pa., district is static and no increase in number of active ovens has been made in the past two months. Few inactive units have been put into operating condition. This is partially due to economic factors, which may change now that an increased price has been allowed to marginal ovens. A large part resulted from inadequate supplies of coal suitable for coking, available to the idle ovens.

Demand for foundry coke is somewhat better. Furnace coke demand is steady. Buyers show no tendency to oppose revision of existing contracts to meet the increased ceiling and all shipments from hand-drawn ovens affected by the order are at the new price.

Iron Ore

Iron Ore Prices, Page 91

Vessels in the American iron ore fleet on the Great Lakes numbered 302 as of Aug. 15, an increase of two over the previous mid-month and compared with 292 a year ago, according to the report by C. C. Lindeman, statistician for the M. A. Hanna Co., Cleveland.

Pittsburgh Steamship Co. increased its fleet to 71 by commissioning the new VOORHEES, and the Jupiter Steamship Co. placed its one carrier in the service. Trip capacity of the fleet was 2,759,140 tons Aug. 15, compared with 2,739,490 tons July 15 and 2,688,040 Aug. 15, 1941, based on 20-foot draft. Canadian ships in the ore trade this season numbered 35.

Steel in Europe

Foreign Steel Prices, Page 91

London (*By Cable*)—Substantial bookings of steel for third quarter delivery are being taken by steel mills in Great Britain. Calls for plates are most urgent. The improvement noted recently in demand and supply of heavy structural shapes is being maintained. Supplies of scrap are adequate under intensive methods of collection.

Ferroalloys

Ferroalloy Prices, Page 90

Ferromanganese production continues to meet consumption requirements. The situation has not reached the point where the government believes that this alloy should be placed on an allocation basis, such as is the case in ferrochrome, ferrotungsten, ferrovanadium and some other alloys. Only on shipments of ferromanganese for export have any allocations been made, and such instances have been few.

Producers of ferroalloys under allocation expected to be advised as to the September distribution around the last day of this month.

Equipment

Seattle—The acute shortage of machinery and equipment in the Pacific Northwest is an outstanding problem. Discarded equipment is being rehabilitated but the supply is far below demand. Many contractors are unable to offer on public jobs because of this condition and it is largely responsible for the negotiated contracts which feature work under supervision of the Army engineers. The activity in wood shipbuilding in this area has created a strong demand for certain classes of machinery which are difficult to obtain. Tacoma has awarded a contract to the International Harvester Co. for three two-ton trucks for the garbage department, high bidder at $6222 but closest to the specifications. Vancouver, Wash., has decided to retain three graders, refusing an offer of $3400 for a four-year-old machine because it cannot be replaced at present. Neither will the city rent its equipment.

When charging high scrap mixtures in basic open hearth practice . . . stop expensive foamy reactions, hot roofs, and soft heats . . . use No. 34-30 Mexican Graphite under the lime to give efficient, dependable carbon recovery . . . provides a good working period and helps clean up the hearth quickly . . . contains no sulphur or harmful impurities . . . avoid carbon delays and make steel more quickly with a modern recarburizer highly efficient . . . full particulars and prices quoted upon request.

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO. 34-30 MEXICAN GRAPHITE

Nonferrous Metal Prices

Aug.	Copper Electro, del. Conn.	Copper Lake, del. Midwest	Copper Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
1-27	12.00	12.12½	11.75	52.00	52.00	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	8.00- 8.25
Yellow brass castings	5.50- 5.75
Auto radiators	6.25
Red Brass, borings & turnings	7.75- 8.00

Zinc

Old	4.75
New clippings	6.00- 6.25

Aluminum

Clippings	9.50-10.00
Cast	8.50- 8.75
Pistons	8.50- 8.75
Sheet	9.00

Lead

Heavy	4.75- 5.00
Mixed babbitt	4.50- 5.25
Electrotype shells	5.00- 5.75
Stereotype, Linotype	6.25- 7.00

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-38.00
Solder joints	7.75-10.00

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

3 AIDS TO GREATER PRODUCTION for your furnaces!

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MODERN BURNERS
QUICK FUEL CHANGE-OVER

BLOOM ENGINEERING COMPANY

MAKERS OF THE FAMOUS BLOOM LONG FLAME BURNERS

916 BEHAN STREET, PITTSBURGH, PA.

Nonferrous Metals

New York—With supplies of all major nonferrous metals, except lead, inadequate to meet esential requirements fully, more attention is being centered on methods of conserving available tonnages. The Army expects to save more than 31,000 tons of tin and aluminum during 1942 and 1943 through conservation techniques developed by the Army Ordnance Department. The following savings already have been made: Steel, silver and plastics are being substituted in functions heretofore filled by tin; redesign has reduced amount of tin used in packing boxes for both artillery projectiles and small arms ammunition; chromium steel liners are used in place of tinned copper in smokeless powder boxes; tin used in the solder for a signal flare has been cut 20 per cent; substitution of plastics for aluminum in trench mortar fuses is expected to save 17,500 tons of aluminum by the end of 1943.

In order to stimulate production, the government's premium price plan for copper, lead and zinc may be revised. Lower quotas for each mine may be established, permitting mine operators to realize larger returns and enabling them to pay higher wages.

ODT has issued an order providing in part that shippers of metals must certify that each car is loaded to full capacity and that the car moves fully loaded to its destination and will be fully loaded upon return. Only exception is for the receiver to certify that he has been allocated only so much material by the WPB and hence is unable to meet the ODT specification.

The United States Department of State has reached an agreement with Mexico whereby the price of imported silver will be raised to 45.00c, f.o.b. New York or San Francisco, effective Aug. 31.

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:

Cruse-42-1: Michigan firm is looking for subcontracting facilities for the manufacture of connecting ends. Material, WD 4140, Spec. 57-105. Tolerances, plus or minus .005. Quantity 648,000 pieces, production to start as soon as possible and to be as rapid as possible. Equipment needed, 2000-pound forging hammers, No. 2 Cincinnati millers and 1¼-inch drill press. Blueprint at Philadelphia office.

Cruse-43-1: Pennsylvania concern looking for subcontracting facilities for swivel and elevating sockets, single; same, twin; castings, brass or malleable. Material, brass 80,000 pounds tensile strength; malleable 55,000 pounds tensile strength. Material, patterns and fixtures to be furnished by contractor. Tolerances, .002. Quantity, 25 to 50 pieces per day, production to start soon. Equipment, 1-inch horizontal boring mills, No. 4 Cincinnati miller and drill press. Contract by negotiation. Prints and specifications at Philadelphia office.

Eser-38-2: Ohio company requires subcontracting facilities for locking rings. Material, steel, WAS57,107-12. Equipment, broaching machine or four or six spindle Acme, Gridley, Cleveland or Davenport automatic turret lathe. Priority rating A-1-a. Quantity, 36,000 at rate of 500 per day.

Eser-38-3: Indiana manufacturer desires subcontracting facilities for driving disc, subassembly of driving plate, driving ring, coil core, housing, worm and cam, worm gear and shafting. Material, ½ to 2½-inch bar stock, steel, SAE X 51410, Carpenter No. 5 or equivalent. Equipment, gear cutting, screw machines, key seating, lathes and surface grinding. Delivery, immediate. Quantities of 5000, 10,000 and 20,000 each of 11 pieces. Prints and samples at Philadelphia office.

Jackson-47-1: Pennsylvania concern needs subcontractor to supply surgical forgings. Quantity, 6000, size 10½ inches long, ⅝ wide and ¼ thick, weight ½ pound. Materials, carbon steel, SAE 1065, to be furnished by subcontractor. Equipment, forge hammer, forging dies, trimming dies. Required immediately. A-1-a priority rating.

Keefer-48-1: Missouri concern requires subcontracting facilities for manufacture of fuze adapter, size 1¼ inches O.D., length overall, 2.12 inches, external and internal threading, finish "f". Material, cold-drawn steel WDX 1314. Alternate material, cold-drawn steel WDX 1112. Tolerances, plus or minus .02. Quantity, 90,000 at rate of 20,000 per month. Equipment, multi-spindle automatic screw machines. Prime contractor states from previous experience proper price on this part should be 30 to 35 cents, including material and labor, f.o.b. manufacturer's plant. Blueprint at Philadelphia office.

Keefer-47-1: Pennsylvania firm needs subcontracting facilities for manufacture of base and adapter. Size of base 4.29 inches O.D., length 1⅝-inch, weight three pounds. Adapter 2⅛-inch O.D., length 1 1/16-inch, weight 12 ounces. Forging facilities, turret lathes and multi-spindle automatic screw machines needed. Materials, drop forgings and cold-rolled steel WD 1115. Prime contractor can furnish drop forgings if necessary. Quantity, 500 of each per day. Prints, specifications and samples at Philadelphia office. Priorities, AA1, AA2 and A-1-a.

O'Hara-26-1: Pennsylvania firm requires subcontracting facilities for cylinder frames. Equipment, planers 4 x 5 x 20 feet and No. 4 heavy millers. Material to be furnished by prime contractor.

Thompson-48-1: Government needs subcontractor for Johnson light machine gun, 15,000 each of 19 component parts required, up to 1¼ pounds each. Materials, steel, SAE 1020, 1045, 3140, 4150, and 4650, spring steel, shelby tubing. Materials furnished by prime contractor. Equipment, tools, jigs, fixtures and gages to be quoted separately, drilling, milling, profiling, heat treating, forging, stamping and Parkerizing equipment. Parts required as early as possible. Prints at Philadelphia office.

Chase-45-1: New York manufacturer requires facilities for finishing complete small precision parts, largest about two inches in diameter by 2½ inches long. Large quantity urgently required. Equipment, automatics or turret lathes, gear hobbers or cutters, heat treating and precision external grinders. Tolerances close. Contract by negotiation. Prints and specifications at Philadelphia office.

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

D-43: Michigan manufacturer seeks subcontractors with facilities for making 35 special precision tools. Material, high-speed steel, precision tolerances, quantities 1 to 100 of each. Machines needed, precision toolmaking facilities, including centering, milling, lathes, heat treating and external grinding. Samples at New York office.

S-2768: New York City manufacturer seeks subcontract facilities for machining bomb tail fuzes involving six parts. Material, steel. Tolerances, close. Quantity 50,000 to 100,000 pieces. Machines needed, one to two-inch automatic screw machines. Material and gages to be supplied by prime contractor.

S-2853: Government procurement agency requires facilities for fabricating cams, inner and outer. Material, cold-rolled steel, to be furnished by procurement agency. Tolerances, .001. Quantity, 5000 sets at minimum of 50 per day. Machines needed, 3-inch automatic screw machines or turret lathes, drilling, cadmium plating facilities.

S-2871: New York City manufacturer seeks production shop with facilities for machining cast iron hydrants and valves. Tolerances, commercial. Quantity, large. Facilities also desired for small and medium sized gray iron castings.

S-174: New Jersey manufacturer seeks subcontractors having horizontal boring mills with 4 to 6-inch bars. Small end of bar must be no more than four inches, the tables 48 inches wide. Tolerance, plus or minus .001. Machine hours required, 10,000.

S-2817: Government procurement agency seeks facilities to make dies and forge steel hooks. Quantity 1200 5½-inch hooks, 2000 6-inch hooks. Machines needed, 6000-pound hammer and die-making facilities. Materials to be furnished by the procurement agency.

S-2819: Pennsylvania contractor requires subcontracting facilities for machining, grinding and polishing of shafts. Material, stainless steel to be furnished by prime contractor. Dimensions, 14 to 23 inches long, 3 to 5 inches diameter. Tolerances, .001. Quantity, 16 pieces. Machines needed, machining engine lathe with thread-cutting and keyway cutting facilities, drilling, grinding and polishing.

New Orleans, La., office, naval and marine section, 414 Canal building, is seeking contractors for the following:

7-J-27—Contractor to cast stern frames. Height 32 feet at rudder stock, 28 feet and 27 feet overall fore and aft. Can be made in three pieces, horizontal joint 6 feet above bottom transverse, joint 26 feet above bottom joints to be welded by shipyard; 48-inch diameter flange at upper rudder stock to be faced. Alternate shipyard to do machining. Approximate weight, 23 tons. Material cast steel annealed.

7-J-35—Contractor to machine adapter assemblies dwg. Q-18045 for air tanks on destroyers. Could be handled on turret lathes or screw machines having 1½-inch bar capacity, liberal tolerances. Piece two made of bronze casting. Weight approximately 2 lbs. (Print on request.)

7-J-36—Contractor to furnish cast steel valves. Material to be 49S1 (Navy) B-1-inch screwed self closing valves similar to Lunkenheimer Fig. 635.

7-J-37—Contractor to furnish traps "S" 1¼-inch cast iron. Galvanize with 1¼ slip joint inlet and 1¼ female I.P.S. outlet ¾" I.P.S. vent and cleanout, large quantities.

7-J-38—Contractor to cast fittings, material carbon molybdenum steel. Manufacturer to furnish all patterns, patterns to become property of shipyard. Fittings to be hydrostatically tested to 1585 psi, consists of Y's—7 x 5 x 5-inch—Standard tees 7 x 7 x 7-inch, supporting lugs ¾-inch (boiler plate). Large quantities.

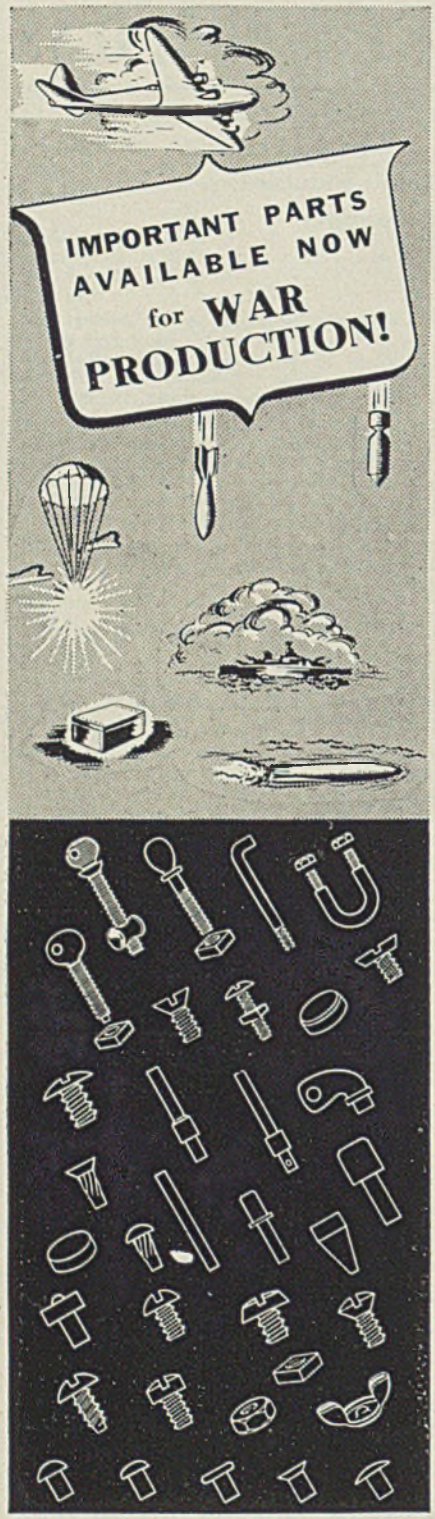
Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Job No. 2138: End connection. Local prime contractor desires forging equipment for production of this part of WD No. 4140 or WD No. 4045 steel. Requirements, minimum of 30,000 per month on A-1-a priority.

Job No. 2139: Sleeve. Material, WDX No. 1314 steel. Equipment required, automatic screw machine, 1⅝-inch O.D. Order is for 4000 or more per day. Priority, A-1-a.

Job No. 2141: Valve stem. Material, ⅛-inch H.R. monel rod, and is furnished and also tools if 1-inch model C Acme is used. Equipment required, screw machine, ⅛-inch O.D., lead screw threader, centerless grinder, lathe with collet. Order is for 25,000 pieces for urgent immediate delivery to be followed by additional order of 100,000. Priority, A-1-a.

Job No. 2142: Nuts. Material, AMS 6317 which



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Central's fast and accurate "cold upset" method of fabricating small parts in steel, brass and other suitable materials *speeds* deliveries. Heat treating expertly done. Plating applied to Government specifications. Write

CENTRAL
SCREW COMPANY
3517 SHIELDS AVE. · CHICAGO, ILLINOIS

is furnished. Equipment required, screw machine ⅝-inch O.D., sensitive drill, mill, cadmium plate. Order is for 500,000 on delivery of 150,000 per month. Priority, A-1-a.

SHAPE AWARDS COMPARED

	Tons
Week ended Aug. 29	19,650
Week ended Aug. 22	00,000
Week ended Aug. 15	10,400
This week, 1941	5,761
Weekly average, 1942	21,864
Weekly average, 1941	27,284
Weekly average, July, 1942	7,708
Total to date, 1941	988,100
Total to date, 1942	743,377

Includes awards of 100 tons or more.

STRUCTURAL SHAPES .

SHAPE CONTRACTS PLACED

19,000 tons, expansion, Continental Roll & Steel Foundry Co., East Chicago, Ind., 13,000 tons to American Bridge Co., Pittsburgh, and 6000 tons to Bethlehem Steel Co., Bethlehem, Pa.; John Griffith & Sons Co., Chicago, contractor.

650 tons, towers, Western avenue bridge for city of Chicago, to American Bridge Co., Pittsburgh; William J. Howard Inc., Chicago, contractor; bids July 27.

SHAPE CONTRACTS PENDING

250 tons, state highway bridge, Pottstown, Pa.; bids Sept. 4; priority not yet established.

240 tons, state highway bridge, Jefferson county, New York; bids Sept. 2.

REINFORCING BARS . .

REINFORCING STEEL AWARDS

1000 tons, storehouse at navy yard, to American Steel Engineering Co., Philadelphia, through Horst & Herzog, contractors.

150 tons, expansion, Continental Roll & Steel Foundry Co., East Chicago, Ind., to Joseph T. Ryerson & Son Inc., Chicago, through Dahl Stedmare Co., Chicago, contractor.

REINFORCING STEEL PENDING

176 tons, concrete dock, Seneca, Ill., for Chicago Bridge & Iron Co., J. L. McConnell & Associates, Chicago, architects; bids Aug. 27.

PIPE . . .

STEEL PIPE PLACED

400 tons, 36, 42 and 48-inch pipe for Sun Oil Co., Chester, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

RAILS, CARS . . .

CAR ORDERS PENDING

Carnegie-Illinois Steel Corp., ten 50-ton flat cars, bids asked.

Colorado Fuel & Iron Corp., thirty 75-ton ore cars, bids asked.

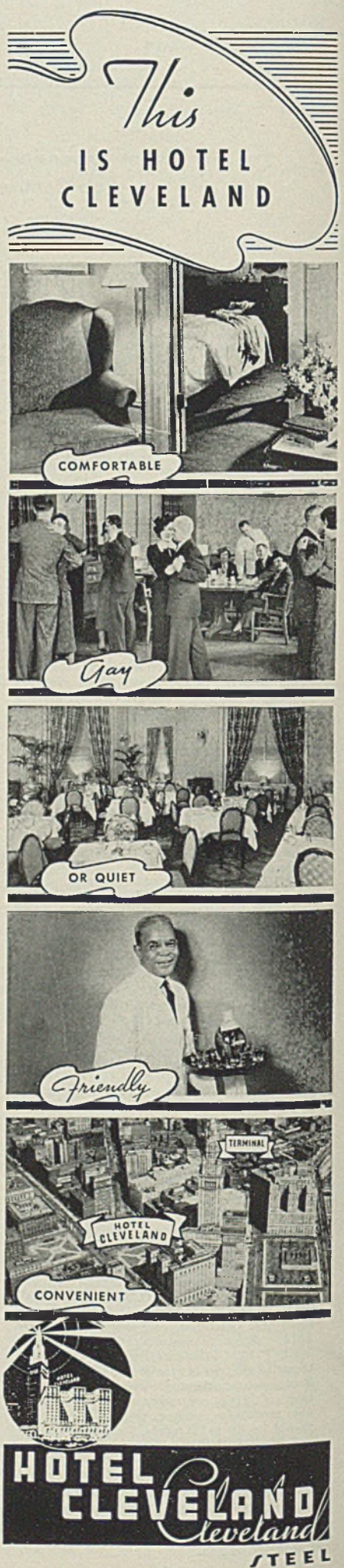
Colorado Fuel & Iron Corp., 30 ore cars, 75-ton capacity.

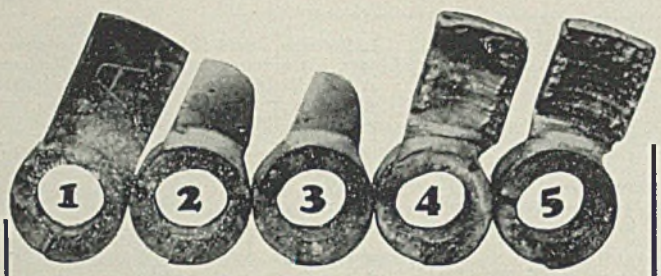
Republic Steel Corp., 20 to 125 seventy-ton hopper cars, bids asked.

CONCRETE BARS COMPARED

	Tons
Week ended Aug. 29	1,150
Week ended Aug. 22	1,472
Week ended Aug. 15	6,208
This week, 1941	7,912
Weekly average, 1942	9,330
Weekly average, 1941	13,609
Weekly average, July, 1942	11,878
Total to date, 1941	440,114
Total to date, 1942	317,219

Includes awards of 100 tons or more.





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The Pug Knives shown above tell a graphic story of the unusual wear resisting qualities of COLMONOY hard-surfacing alloys and overlay metals.

1. New, 24 lb. pug knife, made of high alloy steel.
2. and 3. Same type, after only 3 months of service. Worn beyond efficient operation, with loss of over half of blade material.
4. and 5. Same type. Each blade coated with 1½ lbs. of COLMONOY No. 6. In constant use for over a year, and still operating efficiently.

COLMONOY alloys are playing a vital part in the machine tool industry. Use them on parts subject to great wear—lathe centers, dogs, chip breakers, wire straightening shoes, thrust bearings, screw machine fingers and cams, grinder feed fingers, forming and drawing edges, etc.

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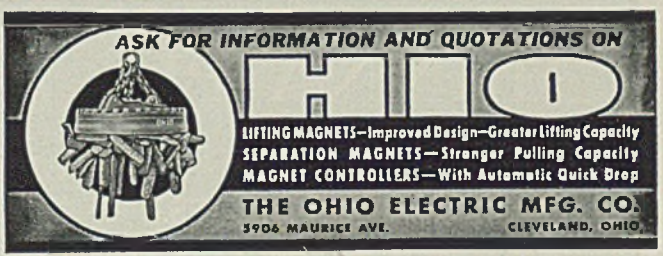
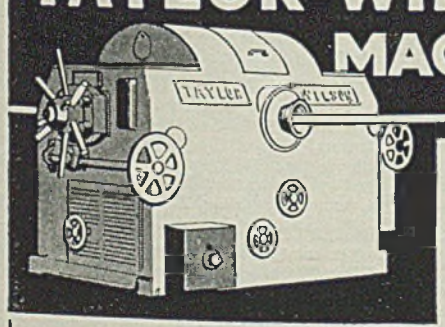


TAYLOR-WILSON MACHINE for



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CONSTRUCTION AND ENTERPRISE . . .

Ohio

BEDFORD, O.—Lewis Welding & Engineering Corp. has applied for priority rating on improvements to be made soon to factory building.

CLEVELAND—Cuyahoga Tool & Mold Co., 16131 Holmes avenue, is having plans prepared for factory building. James L. Love is proprietor.

CLEVELAND—W. A. Bingham, building designer, 1531 East 254th street, is preparing plans for tool shop addition for undisclosed firm.

CLEVELAND—Cloyes Gear Works, Raymond T. Cloyes, proprietor, is completing plans for $12,000 addition to offices at 17214 Roseland road.

CLEVELAND—White Motor Co., Robert F. Black, president, has started work on an addition of 1250 square feet to house electrical substation.

CLEVELAND—Atlantic Tool & Die Co., Louis L. Hoffman, president, and Paul Guszits, manager, has acquired former Clifton rollerdrome at 1374 Highland avenue, Lakewood, O., and will move from 3167 Fulton road upon completion of $8000 alteration job.

CLEVELAND—Wellman Bronze & Aluminum Co., 6017 Superior avenue, Fred S. Wellman, president, and H. G. Wellman, vice president and secretary, plans additions to plant for storage and boiler room.

CLEVELAND—Monarch Aluminum Mfg. Co., Raymond Deutsch, president and treasurer, will start construction of $40,000 addition to foundry building at 9301 Detroit avenue. Contract has been awarded to H. L. Vokes Co.

CLEVELAND—Addition to factory of Bettcher Mfg. Co., 3106 West Sixty-first street, are being made by R. Hansen Construction Co. Approximately 1842 square feet of space will be provided in one building and 330 in another.

CLEVELAND—Alterations to heat treating plant of Marquette Metal Products Co. will be made by Algar-Rau Inc., on plans by C. B. Rowley & Associates.

HAMILTON, O.—City, R. P. Price, city manager, W. J. Welsh, purchasing agent, plans municipal light plant addition and improvements, including new boiler. Bids will be taken at noon Sept. 9. Froehlich Engineering Co., Toledo Trust building, Toledo, O., consulting engineer.

LEETONIA, O.—M. L. Gailey, Poland, O., has acquired title to part of land formerly occupied by old Cherry Valley Iron Works here. He plans to repair many of the coke ovens and begin manufacture of coke for the market.

WOOSTER, O.—Steel Storage File Co., 1131 East Bowman street, forced to suspend operations because of priorities on steel, will soon resume production using corrugated fibreboard. A new addition will be erected for assembly and other operations. Walter F. Regenhardt is president.

Connecticut

BRIDGEPORT, CONN.—Owner, care of C. F. Davis, architect, 83 Fairfield avenue, has completed plans for two-story, 50 x 100-foot factory. Estimated cost $45,000.

New Jersey

BAYONNE, N. J.—General Cable Co., 243 West First street, has awarded contract for alterations and addition to laboratory to H. K. Ferguson Co., 205 West Forty-third street, New York. Estimated cost $150,000.

TRENTON, N. J.—Turbo Engineering Co., 853 Nottingham way, has given contract to John W. Ferguson & Co., 152 Market street, Paterson, N. J., for one-story, 77 x 800-foot manufacturing plant. Estimated cost $300,000.

Pennsylvania

GALLERY, PA.—Prack & Prack, architects, 517 Martin building, Pittsburgh, has let general contract for two-story 40 x 180-foot factory and two additions to office building for Mine Safety Appliances Co., 300 Braddock avenue, Pittsburgh.

CORRY, PA.—Plans are being revised to meet WPB approval for a one-story addition and alterations to factory building on West Main street for Acro Supply & Mfg. Co., Henry Shenk Co., 1115 Sassafras street, Erie, Pa., general contractor. Meyers & Johnson, 811 Commerce building, Erie, architects.

PHILADELPHIA—V. C. Henrich, Bristol, Pa., representative of Rohm & Haas Co. Inc., 222 West Washington square, Philadelphia, has made preliminary survey for equipment of a plant in Tennessee for war production. Plans call for remodeling a wood products plant and installing more than $1,000,000 worth of equipment to manufacture plastics. Mr. Henrich will be manager of the new plant.

PITTSBURGH—Contract for an addition 36 x 60 feet to factory building of Armstrong

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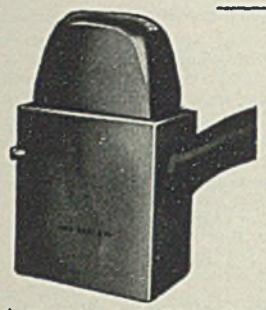

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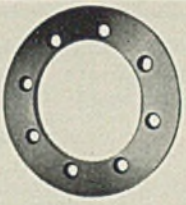

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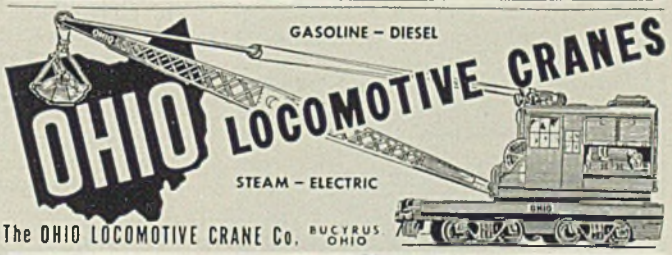

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Cork Co. has been awarded to Martin & Nettrour Contracting Co., Pitt Bank building. Henry Boettcher, Pittsburgh, architect.

Kansas

COFFEYVILLE, KANS.—Bonds totaling $97,000 have been voted for water and power line.

Texas

HOUSTON, TEX.—Anderson Clayton Co., Cotton Exchange building, will take bids soon for warehouse units. Estimated cost $75,000.

HOUSTON, TEX.—A. O. Smith Corp., 817 Niels Esperson building, has awarded contract to T. D. Howe Construction Co., 321 White Oak drive, for plant buildings. Estimated cost $260,000.

TEXAS CITY, TEX.—Pan American Refining Corp. will build pump and control houses, costing about $50,000.

California

LOS ANGELES—Contract has been awarded for dross recovery plant at 5151 Alcoa avenue, for Aluminum Co. of America, to cover an area 50 x 60 feet, and to cost $20,000.

PATTERSON, CALIF.—General Dry Battery Inc., 13000 Athens street, Cleveland, plans magnetic separation plant here costing approximately $100,000.

Washington

SEATTLE—Coolidge Propellor Co., 1608 Fairview avenue, is building addition to machine shop.

RENTON, WASH.—City has called bids Sept. 1 for first unit of proposed $387,000 sewage system. Bids will be called soon for disposal plant. James W. Carey, Seattle, engineer.

SEATTLE—Bethlehem Steel Co.'s engineers have completed plans for addition to power house at 4001 Twenty-eighth avenue Southwest.

Canada

BRANTFORD, ONT.—Slingsby Mfg. Co. Ltd., 268 Grand River avenue, has given general contract to Schultz Construction Co. Ltd., 45 Albion street, for plant addition to cost about $15,000.

COLLINGWOOD, ONT.—Collingwood Shipyards Ltd., J. S. Leitch, general manager, has let general contract to Bennett-Pratt Ltd., 30 Bloor street West, Toronto, for foundry and moulding shops to cost about $75,000, and awards are pending for further additions to plant. Richards & Abra, 55 Metcalfe street, Ottawa, architects.

COOKSVILLE, ONT.—Ward Electric Laboratories, Dundas street and Orchard road, has purchased site here and will start work soon on plant to consist of four buildings, each 100 x 600 feet; two buildings, each 50 x 200 feet, and power house administration building, two stories, 50 x 50 feet.

NIAGARA FALLS, ONT.—Canadian Carborundum Co. Ltd., Stanley street, will start work soon on plant additions to cost about $750,000, with equipment.

OTTAWA, ONT.—Northern Tool & Gauge Ltd., McArthur road, Eastview, has plans for plant addition to cost about $36,000.

ST. CATHARINES, ONT.—English Electric Co. of Canada Ltd., George street, has given general contract to Newman Bros. Ltd., 127 St. Paul street, for pattern shop building and pattern storage building to cost about $25,000. T. H. Wiley, 186 St. Paul street, architect.

TORONTO, ONT.—Canada Packers Ltd., St. Clair avenue West at Keele street, has called bids for processing building, to cost about $30,000.

TORONTO, ONT.—National Iron Corp. Ltd., 324 Cherry street, has given general contract to Foundation Co. of Ontario Ltd., 1158 Bay street, for plant addition to cost about $25,000 with equipment.

TORONTO, ONT.—Canadian Pacific Railway Co., V. A. G. Day, division engineer, Union station, has given general contract to Wells & Gray Ltd., Confederation Life building, for addition to machine shop at West Toronto plant to cost about $30,000 with equipment.

WINDSOR, ONT.—Walker Metal Products Ltd., 1511 Kildare road, has given general contract to Hein Construction Co. Ltd., 172 Aylmer avenue, for plant addition to cost about $60,000, with equipment.

WINDSOR, ONT.—Canadian Automotive Trim Ltd., 658 St. Luke road, is having plans prepared for plant addition and installation of equipment, estimated to cost about $35,000.

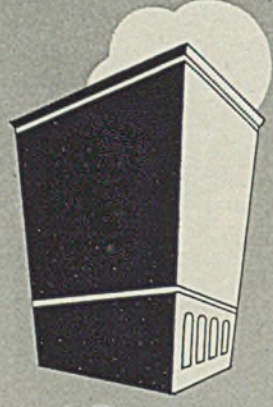
MONTREAL, QUE.—Liberty Smelting works, 269 Prince street, is having plans prepared by Eliasoph and Greenspoon, architects, 4683 Bonavista avenue, for plant addition and installation of equipment, to cost about $25,000.

MONTREAL, QUE.—Engineering Products of Canada Ltd., 5035 Ontario street East, will start work soon on plant addition to cost about $20,000, with equipment.

MONTREAL, QUE.—Department of Munitions and Supply, H. H. Turnbull, secretary, Ottawa, in association with an aircraft manufacturing company, is having plans prepared and bids will be called soon for plant addition, 520 x 630 feet, to cost about $160,000. T. Pringle & Son Ltd., 485 McGill street, designing engineer.

MONTREAL, QUE.—Dominion Bridge Co. Ltd., First avenue, Lachine, plans further additions to plant here to cost about $50,000, with equipment.

VANCOUVER, B. C.—Burrard Dry Dock Co. Ltd. will start work soon on plant addition to cost about $300,000, with equipment.



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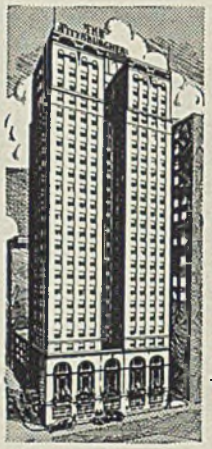

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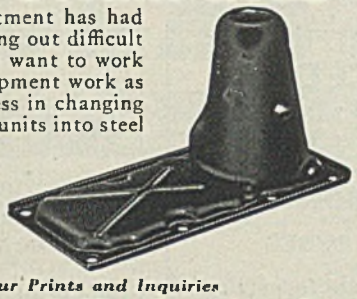

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