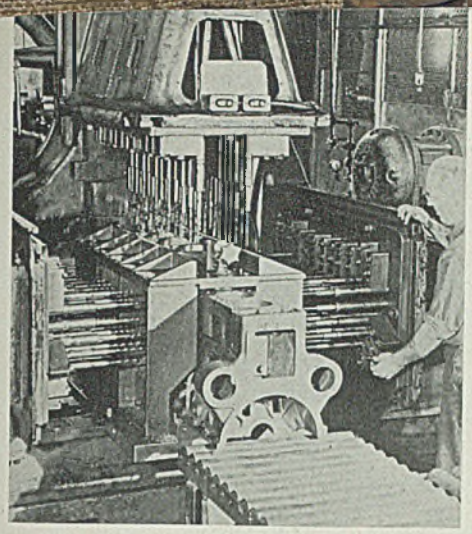

WPB orders transfer of machine tools to needy plants to correct maldistribution. Page 55

STEEL

The Magazine of Metalworking and Metalproducing

MARCH 8, 1943

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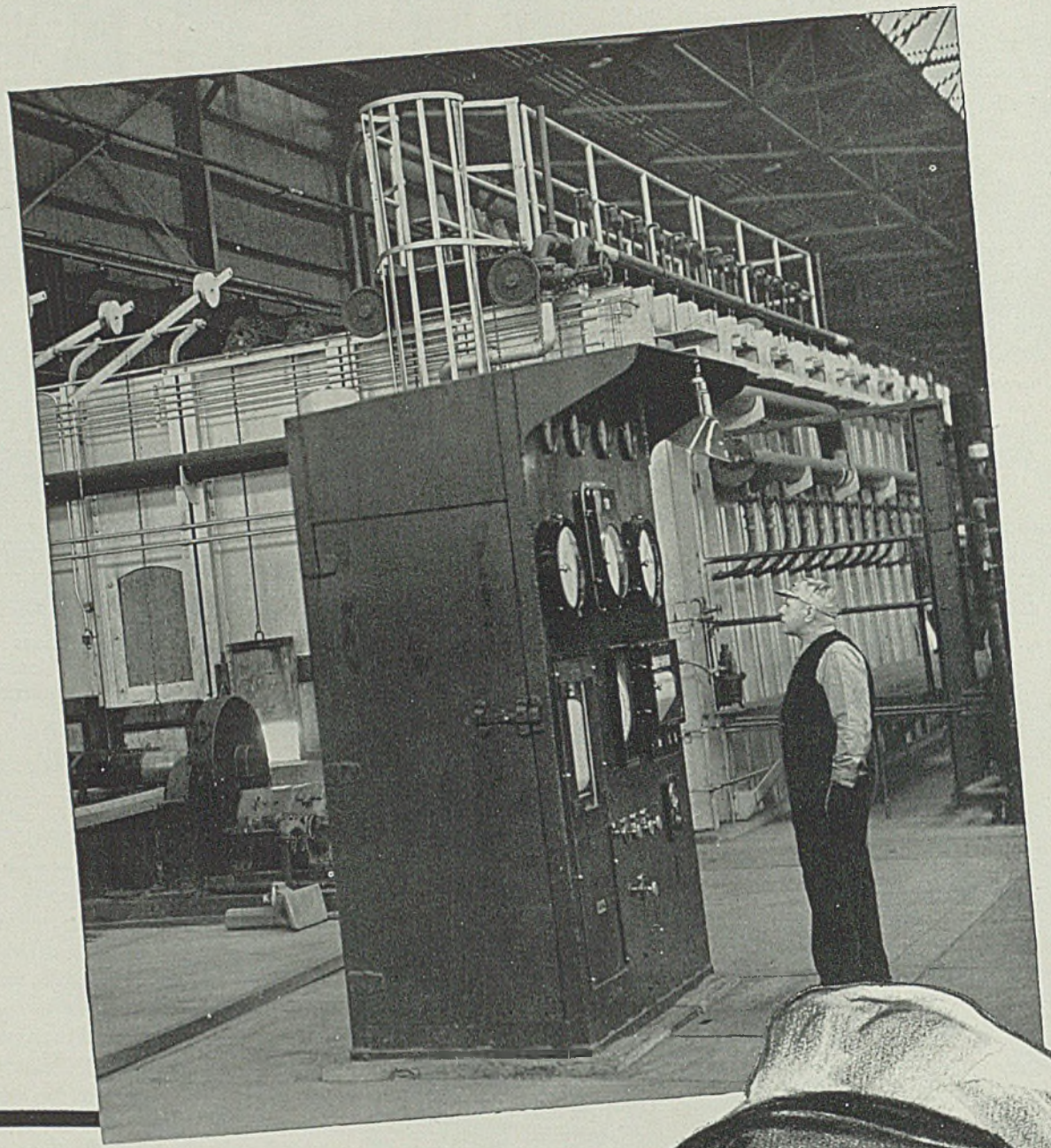
NEWS

FEATURES

TECHNICAL

PRODUCTION

MARKETS



I'm looking at Victory... written in ink!

"Victory is written in ink on these charts! They tell a story in hot steel that will roll faster and faster until it spins into coils — 173 miles of rod every hour! . . . Or swings down the beds in bars and merchant shapes as fast as a tank can travel!

"My end's down here at the furnace watching these charts — keeping 'em in line. I get a great kick out of it because we're rolling steel on this mill, an' don't you forget it!"

R-110

MORGAN CONSTRUCTION COMPANY • WORCESTER, MASS.

HIGHLIGHTING

this issue of STEEL

LABOR Manpower shortage in Detroit is being overemphasized, according to A. H. Allen (p. 75). Essential industries still are interviewing hundreds of applicants, although the shortage in civilian lines is acute. . . Regulations for transferring to the 48-hour week as ordered by the President have been issued (p. 62) by War Manpower Commission. . . Iron ore miners and operators have negotiated a union contract (p. 61). . . Novel cause for absenteeism is reported from Canadian plants (p. 73) where workers stop in the middle of a shift to go out for a beer. Reason is the shortage of the brew caused by wartime regulations.

PRODUCTION Steelmaking capacity of more than a million tons and pig iron capacity of more than three million tons were put into operation during the last half of 1942 (p. 59). This country's capacity is believed to be more than half that for the entire world and is 50 per cent greater than at the end of World War I. . . More extensive use of subcontracting to speed up munitions output is being urged by the War Department (p. 69) which at one time was accused of desiring to place the great majority of its orders with large companies.

MATERIALS More than 70,000 tons of "frozen" steel produced for the manufacture of civilian goods is flowing into war work each month (p. 58). . . A new general scheduling order (p. 68) designed to break production bottlenecks by facilitating the orderly flow of materials and components has been issued by WPB. . . Fate of War Materials Inc., organized to recover high-cost scrap, is in doubt following the resignation (p. 70) of President B. C. Moise who charged that WPB restrictions had "choked" the agency in its efforts. . . New Controlled Materials Plan procedures are established in amendments (p. 70) to regulations. A simplified certification (p. 72) has been announced.

POSTWAR PLANNING Many manufacturers will book a large amount of business in the rehabilitation of Europe and other devastated areas (p. 64). Although food will be the first requirement, a considerable amount of capital goods also will be needed. Not only the war-torn countries, but also those nations which are contributing to postwar relief will be customers for a wide variety of durable goods. . . Combined Raw Materials Board is expected to play a part in settling the problem of raw material supplies and distribution after the conflict is over.

IN THE NEWS War Production Board gradually is moving toward decentralization (p. 69). PD-1A forms now will be filed in the district offices.

Only 1 per cent of the plants engaged in war production have been awarded (p. 82) the Army-Navy "E".

Machine tool dealers (p. 55) promoted volunteer rationing long before the WPB ordered transfer of "idle" tools to war plants.

Popular belief that corporations are growing rich as the result of the war contracts is exploded by a survey of 2225 profitable companies (p. 58) which shows that although earnings before taxes increased 113.8 per cent from 1940 to 1942, actual net income was reduced by 18.1 per cent.

TECHNICAL In discussing fatigue failures, J. O. Almen points out that metallurgical examination of failed parts is not sufficient unless supplemented by thorough examination for design faults and possible bad fabrication practice (p. 88). He sheds some light on typical factors in design and fabrication that lead to such failures.

Specifications are issued for NE (National Emergency) CARBON steels (p. 90). These are similar to corresponding AISI-SAE standard carbon steel grades but with a lower manganese content. Additional data and charts on NE ALLOY steels are also presented (pages 90, 91, 92, 94, 96 and 98)). User report No. 10 details experience of Timken-Detroit Axle Co. with NE alloy steels as material for gears and similar parts (p. 109).

A. E. Dorod concludes his presentation telling how to keep your power trucks in good condition (p. 113). . . Blast cleaning as an effective means of assuring good bonding and protection against corrosion does an excellent job, according to Edwin F. Bramin who describes methods and excellent results obtained (p. 100).

John D. Sawyer explains a novel method of repairing open-hearth bottoms (p. 116) that cuts lost time as much as 50 per cent. Details of a typical repair job are given.

H. C. Elliott reveals a method that has been utilized successfully to make globe valves by fabricating them from welded tubing, plates and bars (p. 103). The valves can be made for all sizes from 2 inches up and for all pressures because of the extreme flexibility of the design.

Critical Alloys Lost Forever

If you do not segregate scrap at the source. Each handling increases the difficulties of reclaiming valuable war metals.

Every scrap program should include careful segregation and identification methods that will conserve critical alloying elements and metals. The most effective way to segregate scrap is at the source—at the machines where it is produced—because the danger of mixing increases with each handling. Ferrous and non-ferrous scrap should be collected in separate containers, and each class of alloyed iron and steel scrap should be kept separate so that their alloying contents can be returned to service.

There are many reasons why scrap segregation is of vital importance to America's war effort:

1. Most war equipment requires the use of alloys, many of which are scarce.
2. Segregated and identified scrap can be used for making alloy steels of the same or similar analysis.
3. If alloy scrap gets into a charge of carbon steel, not only are the alloys lost, but the heat may be rejected.
4. Mixtures of various kinds of alloy scrap are often harmful and the alloying elements are completely wasted.
5. Non-ferrous scrap, mixed in iron and steel scrap, not only wastes critical non-ferrous metals, but may cause the rejection of steel heats.

Great quantities of alloys are needed for the production of tanks, guns, planes, etc. Help steelmakers—help manufacturers—help our fighting men, by segregating and identifying every pound of scrap you produce.

Check your scrap segregation methods today—improve them if possible.

ARMY E NAVY

Dedicated to Victory

INLAND STEEL CO.

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

STEEL
March 8, 1943

Industry's "Secret" Weapon

Whenever a military victory is won, somebody is sure to attribute it to the use of a "secret" weapon. When the Japs suffered naval losses at Subic bay, they explained it by saying the Americans employed a "secret" naval unit. When the Red army began to push back the enemy on the eastern front, the Nazis alluded to a "secret" combat strategy.

Sooner or later the Axis will have to explain to its people the unprecedented production of war equipment and supplies by American industry. The explanation will have to be good because Hitler has stated repeatedly that American citizens and American corporations are too selfish and too individualistic to be organized effectively for a united war effort. Possibly he will fall back on the old explanation that we have some "secret" method of production.

It is true that a more or less secret factor is contributing heavily to great achievements on the production front. However, it is secret only to the extent that comparatively little has been said about it. It is the trick of pooling industrial facilities and experience.

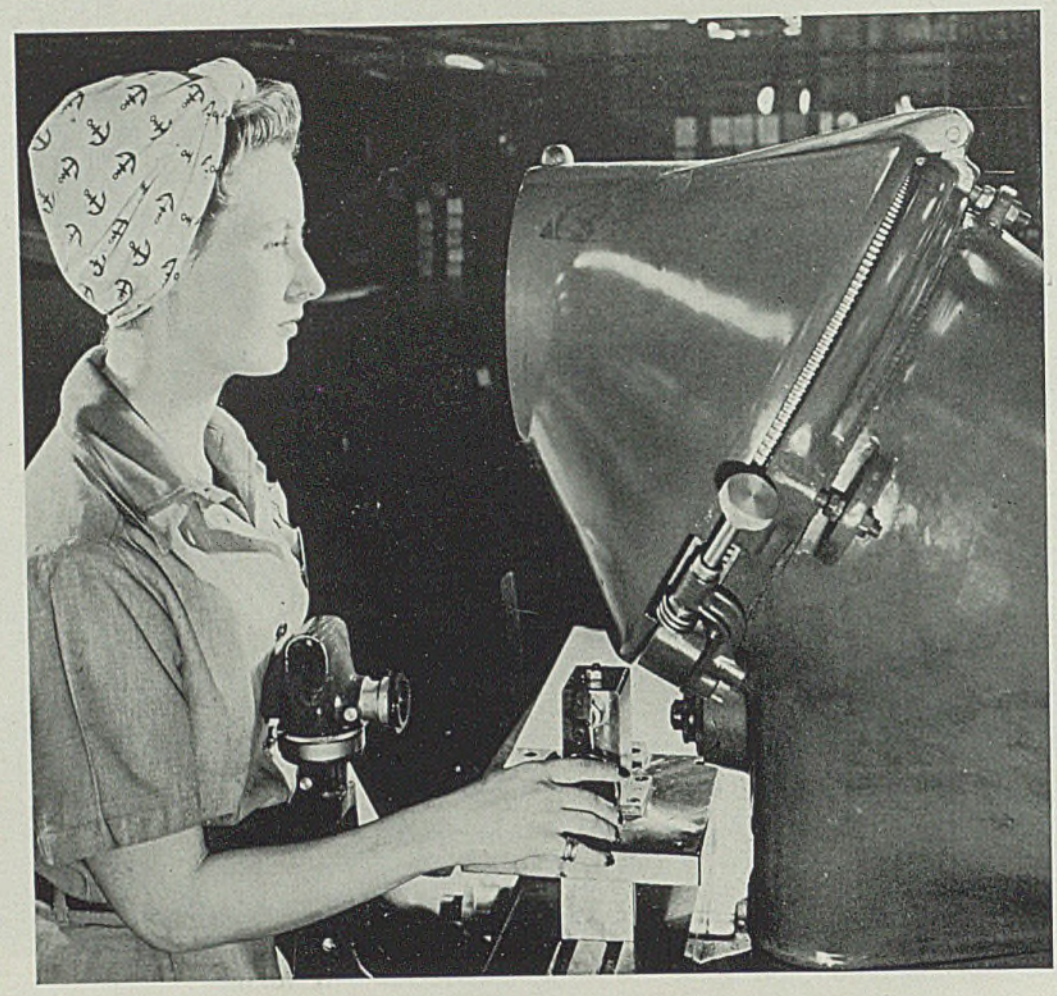
Few persons outside of industry realize how far the technicians and operators of American industry have progressed in the interchange of equipment, materials, formulas, designs, methods and skills in the present emergency. Informally and through such organizations as the Automotive Council for War Production, manufacturers are pooling their resources to an extent never even remotely approached before.

When an improved method is developed in one plant, it is made available for any other shop that can use it. It is not uncommon for companies that were competitors in peacetime to lend or exchange facilities to speed war output. Engineers from a score of companies often join forces to solve a knotty problem.

This pooling of production "know how" will prove to be one of the brightest chapters in the history of America's participation in World War II.

E. L. Shaner

Editor-in-Chief



Checking an engine valve on a comparator in a Chevrolet aircraft engine plant is Mrs. Sheila Gold, native of England and wife of a British army officer, who came to the U. S. with her two small daughters at the start of the London blitz and after working a short time as a model decided to lend her help to the war production effort. Modern equipment such as this enables thousands of women with no more shop experience than Mrs. Gold to do gaging and checking which formerly would have taxed the ingenuity of a skilled inspector working with old-fashioned equipment—and to do it more accurately and immeasurably faster

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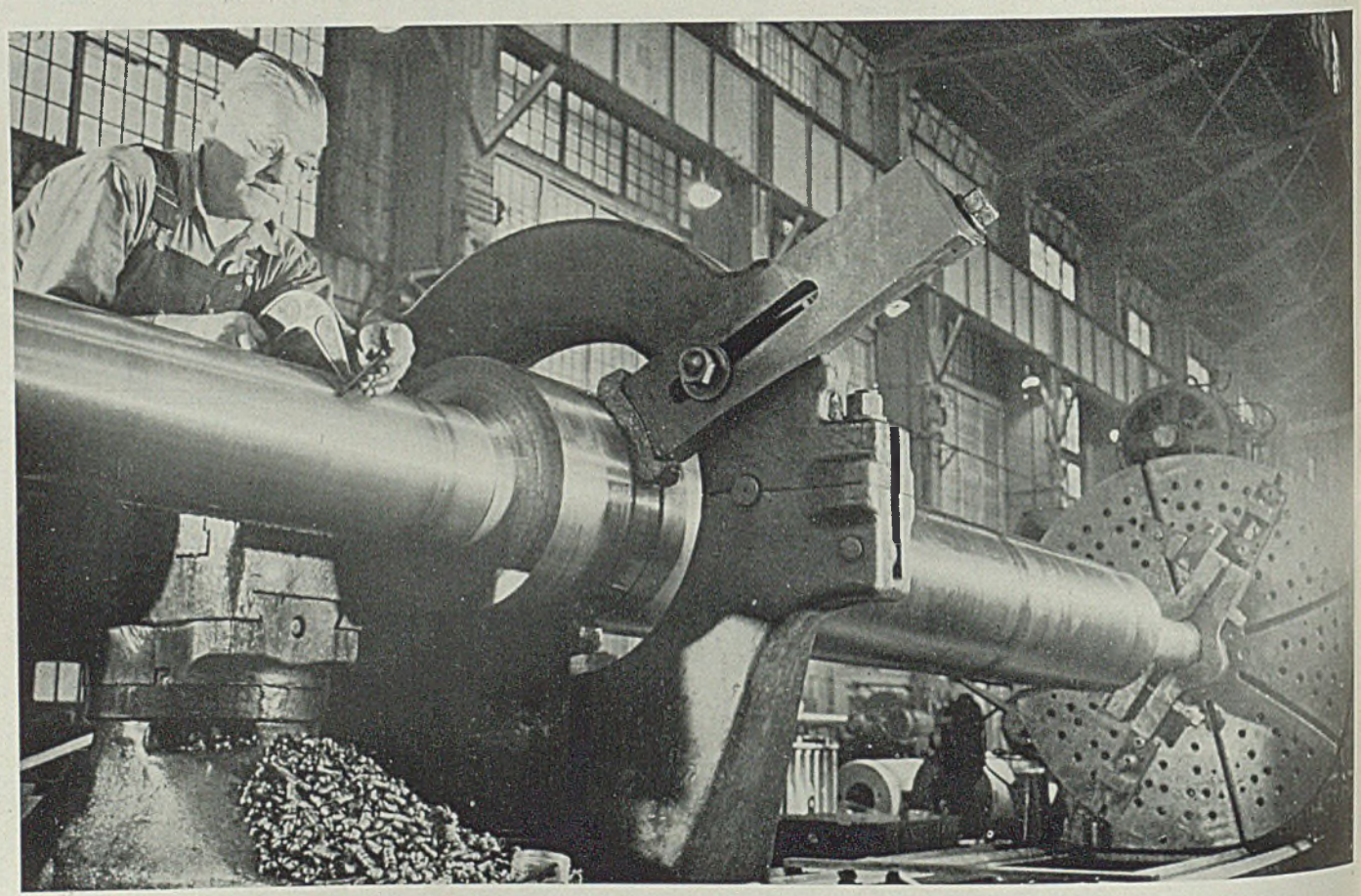
All rumors to the contrary, no machine tool builder has blanket deferment. Many an "old-timer" is being called from retirement to take over, as young men are drafted



Early Maldistribution Caused By Intensity of War Effort

Builders promoted "volunteer rationing" long before unbalance was noted by government agencies. . . War Production Board now asking for transfer of tools to needy war contractors

By GUY HUBBARD
Machine Tool Editor

NOW that the smoke of battle for production of machine tools is beginning to clear to some extent, it is becoming possible to get some idea as to how things stand along the entire production front as far as this basic manufacturing equipment is concerned.

Just as a general may find that at the peak of an emergency he rushed too much equipment to certain sectors—leaving others with too little, the high command of the war production drive now finds that too many machine tools have been rushed into some sections of industry, at the expense of other sections whose importance was underestimated.

Just as an able commander makes quick changes in the disposition of men and *materiel* to correct initial errors in strategy and to meet sudden new and unexpected developments, both the Army and Navy have been equally quick to act to insure immediate redistribution of available machine tools and those now on order, to insure effective and co-ordinated action along the entire industrial front. This is the reason for the recent directive, sponsored jointly by the Army and Navy, empowering the Tools Division of the War Production Board to transfer machine tools and related equipment from any plant anywhere in the United States, wherein they are not urgently needed, to any other plant wherein they will better serve the war production program. This sweeping order applies not only to government establishments, but also to all privately owned plants turning out war *materiel*, and to all subcontractors involved.

Sensational nature of this order has given rise to a number of equally sensational—but incorrect—newspaper stories regarding the birth and implications of the directive. One widely syndicated columnist pictured it as being the subject of a terrific feud in high places in Washington, involving the balance of power between military and civil authorities and resulting in the "firing" of one of the top men of the War Production Board. Those close to the heart of things brand this as fiction based on backstairs gossip. Inasmuch as the columnist referred to the equipment involved, as "machine tool hammers", it is evident that his knowledge of the subject is not exactly profound.

Another rumor which has just begun to raise its head is that machine tools have been tremendously oversold by builders who have taken advantage of a national emergency and the lack of experience of many hastily organized buying agencies. In this case, the true facts are almost diametrically opposite to those pictured by would-be rumor mongers. It might be said that in some cases machine tools have been overbought, but that statement should be qualified by explaining that the overbuying has been the natural result of emergency conditions, and that in every case it has been discouraged—not encouraged—by the machine tool industry.

Discouraged Overbuying

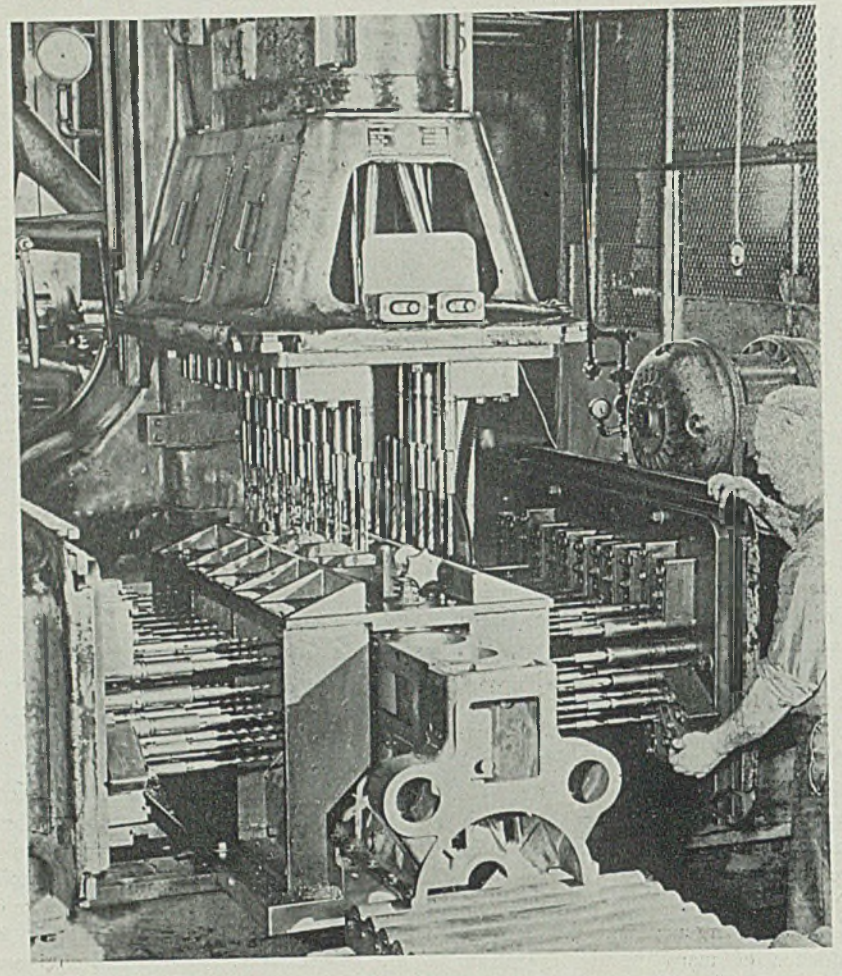
Busy though the machine tool builders have been since the collapse of France—and long before then, for that matter—they themselves as well as their distributors have used up a lot of valuable time analyzing customers' requirements for war work and trying to keep customers' orders down to the reasonable minimum as far as critical equipment is concerned. They have urged that the greatly increased output possible on the latest machines, as compared to the old models which had predominated in government arsenals, should be taken into account. They urged that in the emergency, existing facilities be utilized fully before new were added. They urged that every piece of equipment, new or old, be pushed to its limit—in other words that it should not be "babied", as in peacetimes.

To sum up the matter, the machine tool industry since the beginning of the emergency, has been promoting "volunteer rationing" of machine tools. They were doing this long before George Brainard, former chief of the WPB Tools Division, urged them to do it many months ago, and they did it in the face of a lot of pressure from "expediters" whose fanatical zeal for gaining deliveries for their companies—always at the expense of somebody else—exceeded their exact knowledge of how many machines really were needed on their pet project—and just how urgent the early delivery date really was.

While trying to "unsell" people like this, the machine tool builders, contrary to common opinion, have had and increasingly are having to cope with manpower and material shortages much more serious to them than comparable shortages are in ordinary metalworking industries. On top of all this they have had to cope with the aggravating and costly complications involved when a production machine tool which has been completely tooled up for one customer, suddenly is switched over to another whose tooling requirements are entirely different. To the bureaucrat this switch simply means pulling a peg out of one hole in an order board and sticking it into another hole. To the tool engineer it may mean ripping off tools which took weeks to design and build, and which cost as much as the basic machine, and replacing them by an entirely new set equally costly in time and in money.

Before too many magical results are foreseen under the new program of machine tool transfers under governmental edict, restrictions imposed by special tooling must be kept in mind. If much of this shifting is done, a new wave of activity may sweep over some of the tool shops currently reported to be catching up with their work. Rapidly changing techniques in tooling based on the past four years of concentrated experience, enforced adoption of new materials and the rising tide of women workers in production and tool shops, gives unusual point to the exhibit of new tools and techniques to be held in Milwaukee by the American Society of Tool Engineers, March 25-27. At a time when industrial exhibitions generally are being postponed or canceled, current events in the war production program definitely justify this one.

Without being able yet to predict what the results of WPB's new powers for transplanting machine tools will be, or to what extent it will be involved, it is possible to give some idea as to what already has been accomplished and what has come to light largely through the



At the touch of a button more than 100 holes on three sides of this engine cylinder block are drilled simultaneously. Operation is at the Hudson Motor Car Co., Detroit, which is building Hall-Scott engines for installation in invasion barges. The machine and a companion unit which taps the drilled holes, are typical examples of the extensive and highly individualized tooling which makes quick shifting of machine tools from one plant to another difficult or even impractical in cases where an entirely different type of work is involved

efforts of the machine tool industry itself.

Point No. 1 is: For some time cancellations of machine tool orders have been running as high as $25,000,000 per month, due in no small degree to the fact that, following repeated urgings by the machine tool industry in this direction, prodigal customers have been prevailed upon to "renegotiate" their equipment orders on the basis of sound production estimates, in place of the guesswork on which the original orders were based.

Point No. 2 is: That as Washington authorities investigating the situation get deeper into the picture, they are finding, as was predicted by machine tool builders, cases where several hundred new machines representing either over orders or orders which called for entirely premature delivery, are standing idle while as many more in addition to these still are on order from hard-pressed suppliers. In practically every such instance these unintentional "machine tool hoards" are being broken up and redistributed voluntarily as soon as official attention is called to them.

Value of 26,000 new machine tool units shipped during January was $117,432,000, WPB's Tools Division reports. This is a reduction of 11 per cent from the December figure of $131,960,000.

January figures are based on reports received from 384 machine tool manufacturers, five more than reported in December.

Backlog of orders shows an 8.1 per cent drop in value from the December figure. The average time required to complete unfilled orders was 6.8 months at the end of January as against 6.5 months at the end of December.

Nelson Elevates Four Aides in War Board

Regrouping of top War Production Board staff was started last week by Chairman Donald M. Nelson and Executive Vice Chairman Charles E. Wilson.

Changes among key men include:

Ralph J. Cordiner, who has been director general for war production scheduling, has been appointed a vice chairman of WPB and will serve as special assistant to Mr. Wilson. Mr. Cordiner was president of Schick Inc. before joining WPB.

J. A. Krug, director of the Office of War Utilities, becomes vice chairman of WPB in charge of materials distribution. He also becomes chairman of the Requirements Committee and continues as director of war utilities. Before entering government service, he was power director for the Tennessee Valley Authority. Donald D. Davis, recently director of the Program Bureau, has been named WPB vice chairman of operations. Formerly president of General Mills Inc., Minneapolis, he joined the war board last November.

Curtis Calder, director general for operations, has been appointed executive assistant to Mr. Wilson.

All four are expected to report to Mr. Wilson, who has direct charge of production and materials distribution.

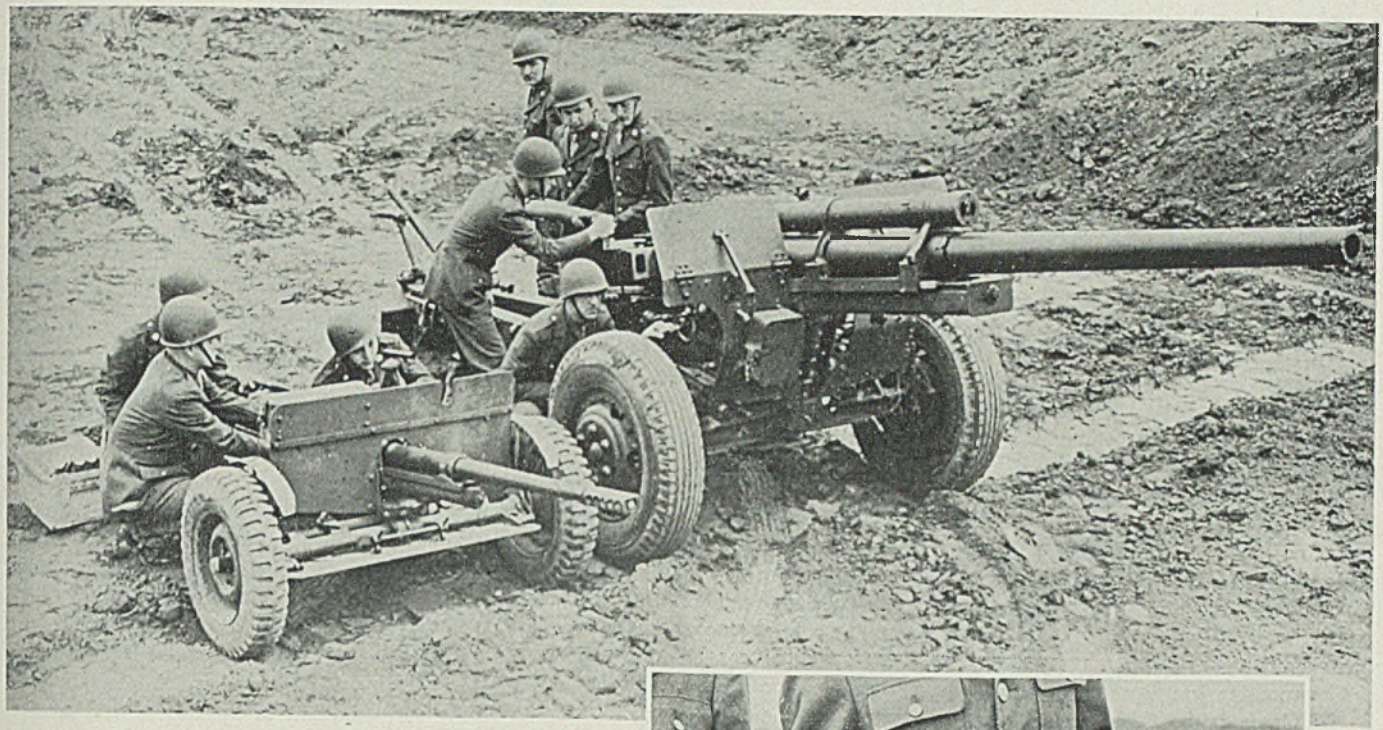
William L. Batt will continue to serve as WPB vice chairman, and Col. Robert E. Johnson, head of the Smaller War Plants Corp., retains the rank of deputy chairman.

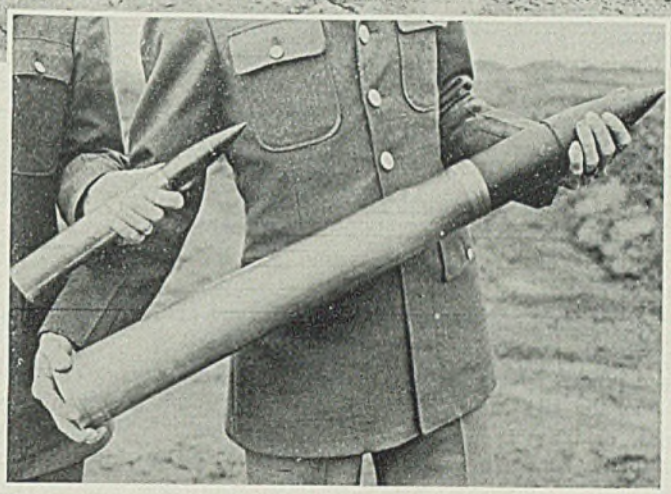
Top WPB officials indicated these changes were preliminary to a more extensive regrouping which now is being worked out in detail.

Mortar Shells Sized By Hydraulic Pressure

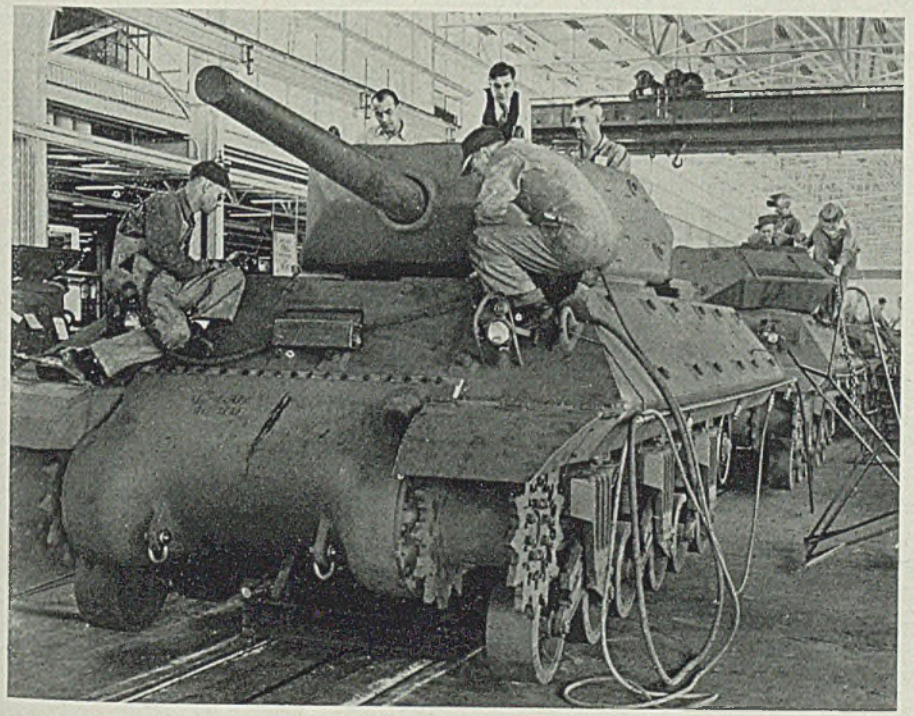
Critical material, time, and labor are saved by a new method, developed by a commercial company, of sizing the body of a 4.2 chemical mortar shell by hydraulic pressure instead of turning it on a lathe, the War Department announced last week. Known as hydro-sizing, the process is applicable to other types of artillery shells.

Sizing the inside of a shell to exact dimensions by the use of 12 lathes on tubular steel is slow, highly skilled work. In hydro-sizing, the operation is performed by a machine using hydraulic pressure. This method saves 24 per cent in material, or 205 tons of metal on each 100,000 shells and reduces time required from six minutes per shell by the old method to 30 seconds per shell.





High-velocity, 3-inch anti-tank gun, shown above at right at Aberdeen, Md., proving ground, is claimed by Army engineers to be superior to the German 88-millimeter anti-tank gun. It is capable of destroying any enemy tank at long range with one shell. For comparison, the 37-millimeter is shown at its side. At right, are shown shells for the 3-inch gun and for the 37-millimeter gun



Army's newest tank destroyer, the M-10, is shown at left on the production line at the tank arsenal of Fisher Body Division of General Motors. Already tested in battle, the hard-hitting vehicle carries its high-velocity gun in an open counterbalanced turret, is built on the chassis of an M-4 medium tank. Studs along the side are to accommodate extra armor plate, bolted in position, if tactical demand calls for it. For further reference see Mirrors of Motordom, page 76

36 Per Cent of Total Production Converted to Special Steels

EXTENT to which Bethlehem Steel Corp. has converted its production to special purpose steels to meet war demands was revealed last week in the company's report to employes. Of a record 12,451,692 tons produced in 1942, an average of more than 1000 tons a day over the previous record, there was a conversion of 36 per cent to war purpose steels.

Another major contribution to the war effort, the report pointed out, was delivery of 162 new major ships last year. This was in addition to 322 small craft of landing barge and similar types, and repair and conversion work on 5857 other craft.

Commenting on earnings, President E. G. Grace said: "Our net income is less than in peacetime and it is our policy that this shall be so. Wherever large scale operations and our continuous improvement of methods have saved money, we have voluntarily reduced prices to the government. Savings to the government have amounted to many millions of dollars."

On conversion to special steels, Mr. Grace pointed out that forging steels for ordnance products have almost doubled in volume, the 1942 output being 208,000 tons, or 92 per cent above 1941.

Steel plates for ships have been outstanding items of war materials and Bethlehem's contribution in 1942 was 52 per cent above the previous year, a total of 1,782,000 tons.

Tanks, aircraft and other instruments of war have created exceptional demand for alloy steels and in this department Bethlehem produced 1,151,000 tons in 1942, a gain of 38 per cent over the prior year.

Fifty per cent of the capacity of Bethlehem's structural fabricating shops is devoted to prefabrication for ship construction. Facilities have been converted for the manufacture of rudders, welded diesel engines bases, steel blanks for cartridge cases and fabricated steel sheets for making airfield landing mats and field shelters.

Tool steel production in 1942 was four times that of record prewar years. Production of wire rope has tripled in the past two years. Production of steel castings for ship construction has doubled.

More than 30,000 subcontractors and suppliers are enlisted in Bethlehem's part in the war effort, the report continued.

Employment currently is 270,000, a gain of 60,000 over last year. More than 200,000 new employes have received training in the past three years.

"Frozen" Steel Moving Into War Work at Rate of 70,000 Tons Monthly

"FROZEN" steel produced for automobiles, household equipment and other items before their manufacture was restricted or stopped is being located and put to war uses at the rate of more than 70,000 tons monthly, according to A. Oram Fulton, assistant to H. G. Batcheller, director, WPB's Steel Division.

Shift from peace operations to war work resulted in a large accumulation of excess steel, said Mr. Fulton. "It includes many varieties badly needed in war production, including stainless and alloy steels, carbon steel in structural shapes, bars, plates, sheet and strip, tubing, wire, castings and forgings; high-alloy castings, tool steel, tin plate and other types. This tremendous stockpile of unused steel is estimated by some to run into millions of tons."

Last spring the WPB took steps to get the idle steel into war production. Steel Recovery Corp. was chartered in May, 1942, with an allotment of $400,000,000 from Metals Reserve Corp. to find the steel and its logical users and bring them together in the quickest possible time.

Volume of steel being moved is expected to reach its peak in May, continue on that level for several months, then gradually decline as supplies are exhausted. It is estimated that steel will be forthcoming from over 100,000 inventories, covering 17 varieties and aggregating perhaps 2,000,000 items.

The WPB official explained that the idle steel is divided into two classes: "As-is" and "remelt".

"As is" steel can be used in its present condition or after some re-rolling or re-processing," said Mr. Fulton. "On the other hand, there is quite a volume of steel, partially or wholly fabricated, whose only possible use in the war effort is to be returned to the steel mills for remelting."

Where the steel can be used in its present form, the Steel Recovery Corp. merely puts buyer in touch with seller and negotiations are conducted by them under present price ceilings. Where re-rolling or re-processing is necessary, the government buys the steel at what is known as "limited cost" and turns the metal over to the new purchaser at the market price, absorbing any loss.

When remelting is the only solution, SRC pays what Mr. Fulton called the "government price", which runs from 15 per cent to 30 per cent below "limited cost". The corporation then sells the metal to a steel mill at the regular scrap price, absorbing the loss. In such cases, holders of the excess steel receive up to four to six times the price they would have derived, if they themselves had sold the metal as scrap.

WPB's Goal for 1943 Iron Ore Shipments Lowered

Lake Superior iron ore requirement estimates for 1943 are being revised downward, according to reports from Washington. Members of the WPB Steel Division are understood to have recommended a lake movement of 95,000,000 tons, which with estimated rail shipments of 2,500,000 tons, would bring total shipments to 97,500,000 tons. Original estimated requirements were 100,000,000 tons.

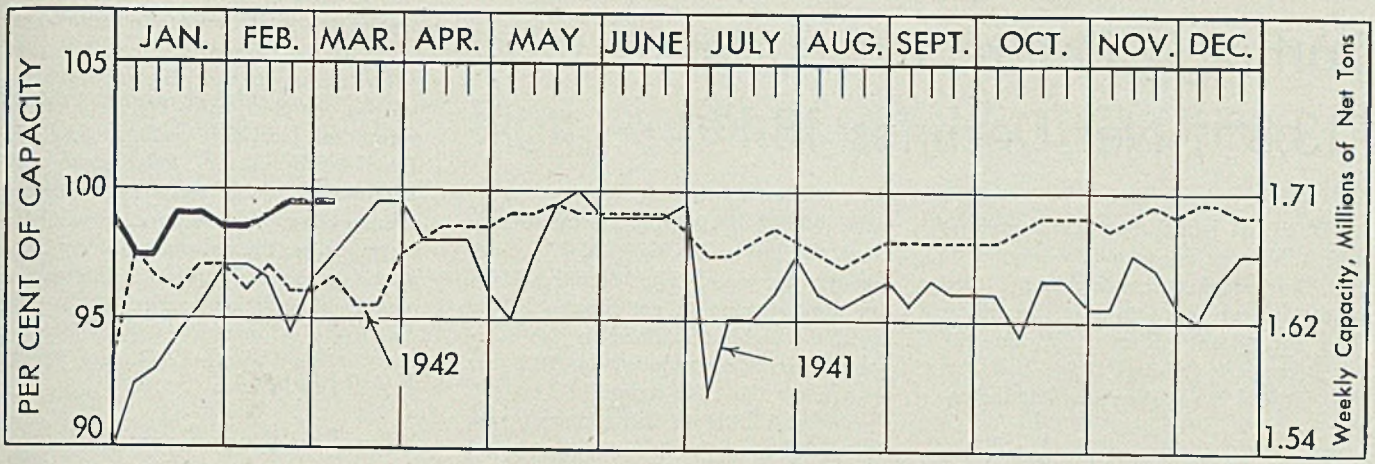
Delay in completion of blast furnaces using Lake Superior ore, easing in the scrap situation, and greater emphasis on coal and grain shipments were reasons advanced for the lower goal.

Pre-season estimates of lake ore shipment and actual end-of-the-season figures ordinarily vary widely. Shippers state they are ready to move all the ore required.

Idea Wins $1000 War Bond

Ed Thomas, assembly department worker, Warner & Swasey Co., Cleveland, recently was presented a $1000 War Bond by Charles J. Stilwell, president, for his suggestion of tapping holes in hexagon turrets by machine. Prior to his suggestion it was done as a hand operation.

Walter C. Mendenhall, director, Geological Survey, retired Feb. 27, after serving more than 48 years.



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,408	....	....	....	....	....	....	....	....	....	....	....
1942	7,124	6,521	7,392	7,122	7,386	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150

PIG IRON PRODUCTION

1943	5,194	....	....	....	....	....	....	....	....	....	....	....
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,066	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

U. S. Operating Half World Steel Capacity

NEW steelmaking capacity for 1,098,140 net tons and new pig iron capacity for more than 3,100,000 tons were put into operation in the last six months of 1942, according to the American Iron and Steel Institute.

Already at the highest level in history at 89,194,520 tons, capacity was increased to 90,292,660 tons of ingots and castings annually, as of Jan. 1, 1943. Blast furnace capacity rose to 63,933,530 tons of pig iron and ferroalloys, also the highest total ever attained.

Present steelmaking capacity probably is more than half that for the entire world and is almost 50 per cent larger than at the close of the first World War.

Since January, 1940, capacity has been increased 8,700,000 tons, representing in three years the equivalent of half the steel industry of Great Britain. Today the United States can produce 50 per cent more steel than can be made in all Axis and Axis-dominated countries.

Upon completion of the present program steel capacity will be close to 96,000,000 tons annually and blast furnace capacity 69,000,000 tons.

As of Jan. 1, 1943, open-hearth capacity is rated at 79,180,880 tons, an increase of 933,650 tons over July 1, 1942. Electric furnace capacity was increased 329,090 tons, to 4,554,980 tons. To meet greatly increased war needs, electric furnace facilities have been enlarged by more than 140 per cent in the past three years.

Bessemer capacity Jan. 1 was rated at 6,553,000 tons. Because of greater use of bessemer converters for preparation of molten iron to increase open-hearth steel production, that total is 168,400 tons less than at July 1, 1942. Crucible steel capacity was unchanged

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Republic Steel Corp. has placed in operation its new 61-oven by-product coke plant at Warren, O. The by-products recovery plant and exhauster will not be completed for several months. The new battery will supply coke for the 1100-ton blast furnace which was blown in at Republic's Youngstown plant Oct. 12. The coke plant has capacity of more than 1000 tons daily.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Mar. 6	Change	Same week 1942	Same week 1941
Pittsburgh	99	+0.5	95.5	98
Chicago	101	—0.5	103.5	100
Eastern Pa.	95	None	90	95
Youngstown	97	None	91	97
Wheeling	84.5	+1	85.5	88
Cleveland	92.5	—1	91.5	91.5
Buffalo	93	None	79.5	93
Birmingham	100	None	95	90
New England	95	None	95	92
Cincinnati	92	+1	94.5	95
St. Louis	91	None	78	93
Detroit	91	None	84	92
Average	99.5	None	°96.5	°97.5

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

Ingot Rate Third Week at 99½%

Production of open-hearth, bessemer and electric furnace ingots last week was at 99½ per cent of capacity for the third week. Three districts advanced, two declined and seven were unchanged. A year ago the rate was 96½ per cent; two years ago it was 97½ per cent, both based on capacity as of those dates.

There was little change in any district, Pittsburgh rising ½-point and Chicago declining the same amount, practically offsetting each other. The slight gain at Wheeling and Cincinnati opposed a loss at Cleveland. Furnace repair continues the dominant factor as no furnaces are down for lack of scrap.

Weirton Reports Record For Ingots in February

Weirton Steel Co., Weirton, W. Va., established a new record in production of steel ingots in February. The company's joint labor management committee made the following announcement:

"Beating all three previous production records established by the company, this new production record stands as an all-time world's high for production of steel ingots from 12 stationary open-hearth furnaces. In February the average production of steel ingots was 5147 net tons, which exceeded by 67 tons the previous record established last December. New records also were reported for finishing mills.

Earnings, Before Taxes, Up 113.8%; Net Declines 18.1%

POPULAR belief that manufacturers, especially those engaged in war production, are reaping and retaining huge profits has no basis in fact, according to a survey on the effect of the war on income, wages and living costs by the National Association of Manufacturers.

"It is fairly clear that the serious tax burden placed on corporations, instead of creating war millionaires, is likely to cripple essential industries and to impair their effectiveness in meeting the postwar problem," it states.

"This is the overall picture in spite of exceptional instances in which some war contractors have been able, largely through more efficient production, to increase their profits on some war contracts."

A recent NAM study of finances of corporations shows total net income, after taxes, to be less in 1942 than in 1940 and 1941, despite a great increase in sales volume. To ascertain the effect of the increased taxes, the association tabulated the reports of 2225 profitable companies. The results are shown in the accompanying chart.

These companies estimated an increase of $1,863,223,000, or 113.8 per cent, in net income, before taxes, from 1940 to 1942. Taxes are estimated to require $2,574,229,000 or 73.5 per cent of the $3,500,423,000 net income, before taxes, and leave only $926,194,000 of net income after taxes. Thus despite a 113.8 per cent increase in net income before taxes, the amount retained by the companies would be reduced by 18.1 per cent below the 1940 figure.

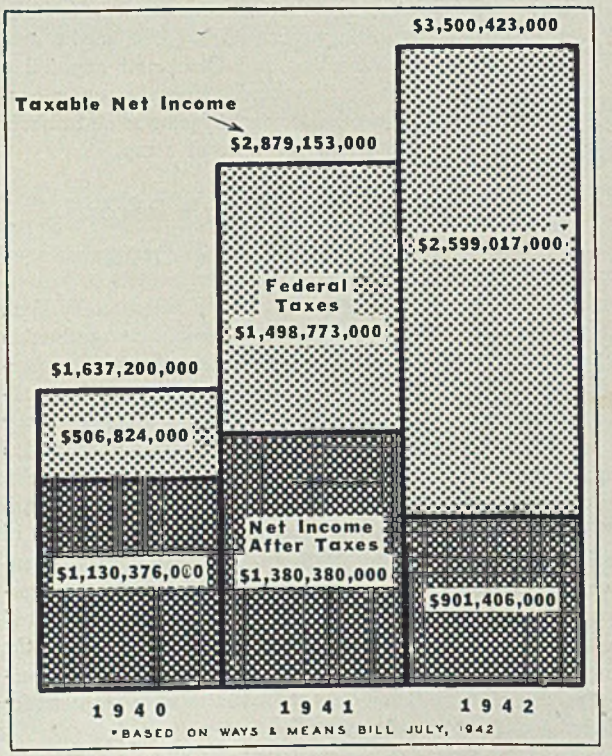
"There is little in this picture," says the association, "to indicate that most corporations are reaping 'unconscionable' profits as result of the war effort. It should be borne in mind that this sample includes only the profitable companies. If unprofitable companies were included the picture would be much worse."

The association's survey traces the increases in national income, hourly and weekly wages and living costs and the trends in the production of durable and nondurable goods.

The national income figures (tentative for 1942) reveal an increase from $70,800,000,000 to $117,000,000,000 last year, or 65 per cent. This increase has been greatest in wages and salaries. In 1939, salary and wage payments were $44,300,000,000 or 62.6 per cent of the total. In 1942, it is estimated wage and salary payments were $80,000,000,000 or 68.4 per cent of the total. In other words, wage and salary payments increased by $35,700,000,000 in 1942 over 1939. This is equivalent to 77.3 per cent of the total increase in national income which occurred during this period.

The tremendous increase in wages and salaries coupled with the decrease in goods and services available for purchase results in the "inflationary gap".

When spendable income exceeds the volume of goods and services available for purchase, the natural tendency is for prices to be bid up until the gap is closed and inflation results.



Effect of taxes on the net income of 2225 profitable corporations is shown in this chart. Although earnings before taxes increased 113.8 per cent from 1940 to 1942, net after taxes was reduced by 18.1 per cent below the 1940 figure

EARNINGS . . .

Wheeling Steel Corp.

Net income of Wheeling Steel Corp., Wheeling, W. Va., in 1942 was $4,441,964, compared with $8,506,304 in prior fiscal year. Normal income and excess profits taxes, after postwar credit of $475,000, totaled $6,650,000, contrasting with $7,566,136 in 1941. Gross sales in the latest period were $118,988,790.

Rustless Iron & Steel Corp.

Net profit for 1942 of Rustless Iron & Steel Corp., Baltimore, Md., totaled $2,644,557, after providing $400,000 for postwar adjustments of inventories and other assets, equal to $2.76 per common share, compared with $2,334,627, or $2.42 a share, in prior year. Federal normal tax and surtax in 1942 amounted to $350,000, and excess profits tax, after $320,000 debt-retirement credit and $460,000 postwar refund, was $7,020,000. In 1941 these taxes totaled $1,147,000 and $4,178,000, respectively.

Lukens Steel Co.

Consolidated net earnings of Lukens Steel Co., Coatesville, Pa., for 1942 totaled $1,172,522, after allowance for income and excess profits taxes, for refund of $2,500,000 under the renegotiation law and reserve of $330,000 for contingencies. This compares with $2,195,605 net profit in 1941. Taxes in 1942 amounted to $3,810,000, exclusive of $135,000 state income tax. In 1941 federal income and excess profits taxes were $1,695,000. Sales for the fiscal year amounted to $43,990,463, 42.5 per cent above prior year.

Continental Roll & Steel Fdry.

In fiscal year ending Nov. 30, 1942, Continental Roll & Steel Foundry Co., East Chicago, Ind., earned net profit of $1,935,856, equal to $5.11 a common share, against $1,449,638, or $3.72 a share, in eleven months of 1941. In latest period $7,500,000 was provided for refund on war contracts and $7,275,000 for federal income and excess profits

taxes, before postwar refund of $100,000.

Eastern Rolling Mill Co.

Eastern Rolling Mill Co., Baltimore, Md., reports net income of $473,162 in 1942, equal to $2.25 per share, after $1,246,336 provision for federal and state income and excess profits taxes, less postwar refund. In 1941 net was $341,259, or $1.62 a share, and tax provision, $97,000. Net sales increased last year to $9,957,734 from $3,963,699 in 1941.

Harrisburg Steel Corp.

Net earnings of Harrisburg Steel Corp., Harrisburg, Pa., in 1942 amounted to $625,833, or $3.41 a common share, compared with $886,754, or $4.84 a share, in preceding year.

Granite City Steel

Granite City Steel Co., Granite City, Ill., reports net income for 1942 as $616,275, equal to $1.61 a share on company's stock, against $479,247, or $1.25 a share in 1941.

Sloss-Sheffield Steel & Iron Co.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reports net profit for 1942 as $1,140,342, or $9.75 a share on common stock, compared with $1,261,503, or $10.97 a share, in 1941.

Lake Superior Iron Mine Operators Sign Agreement with CIO Union

A CONTRACT with 20,000 employes of 13 iron ore companies owning more than 90 mines in the Lake Superior region has been negotiated by company and union representatives, the National War Labor Board announced.

The agreement disposes of virtually all the issues which had been referred to a NWLB panel, of which Jesse Freidin, assistant general counsel for the board, was chairman.

The contract in each case names the United Steelworkers of America, CIO, as the exclusive bargaining agent for the production and maintenance employes and grants time-and-a-half for overtime. It includes a seniority clause, machinery for settling disputes and other provisions.

It is the first time the union has ever held contracts with each company as a whole, although it has had contracts with some individual mines operated by the companies. The union has been certified as bargaining agent in virtually every mine in the area, following labor board elections. The mines in which the union has not been certified are not included under the contract.

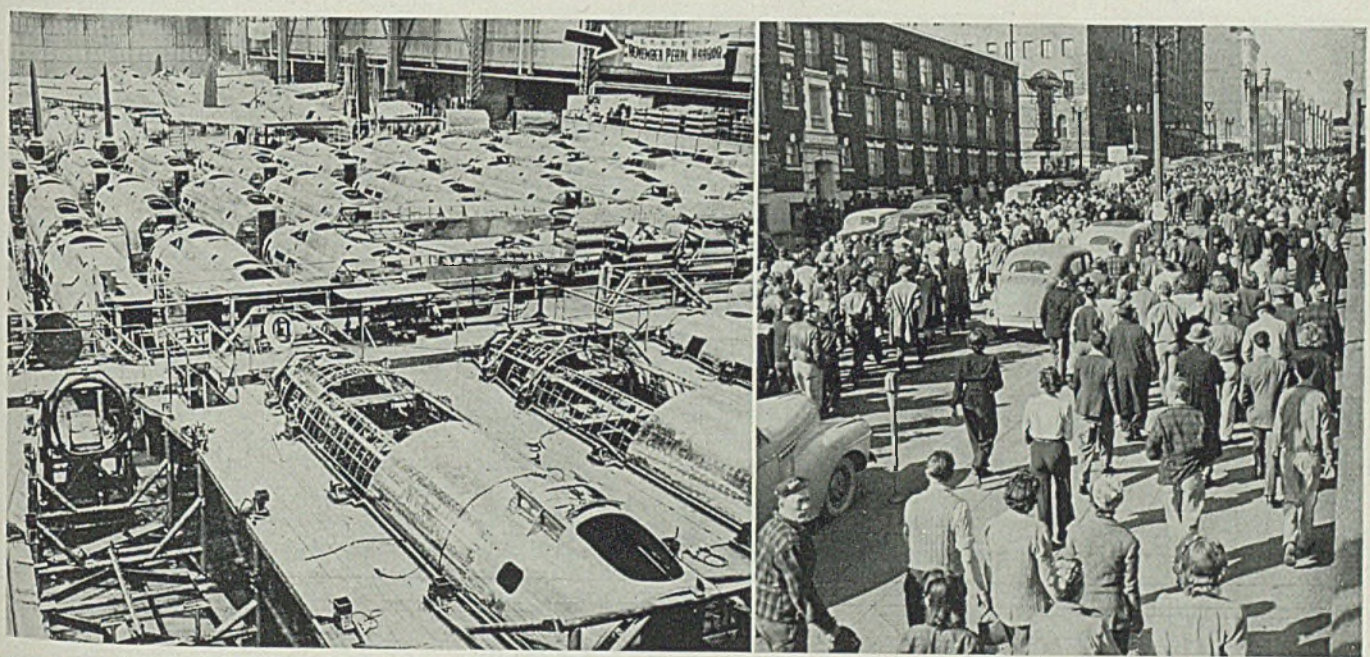
The contract provides for automatic extension to other mines of the companies whenever the union wins exclusive bargaining certification through NLRB elections.

The operators included are Pickands Mather & Co., Cleveland Cliffs Iron Co., M. A. Hanna Co., Evergreen Mining Co., Snyder Mining Co., Pittsburgh Coke & Iron Co., Oglebay, Norton & Co., International Harvester Co., Wheeling Steel Corp., Interstate Iron Co. (Jones & Laughlin Steel Corp.) Inland Steel Co., Republic Steel Corp., and North Range Mining Co.

The contract, at present, does not include wage rates or a union security clause. These two issues are before another mediation panel. Decisions will be inserted in the contract.

Time-and-a-half shall be paid after eight hours a day or 40 hours a week, but an employe shall not be paid both daily and weekly overtime for the same hours worked. Grievance machinery provides for a grievance committee and the appointment of an impartial umpire to settle all disputes which can not be settled through the committee or international representatives of the union and

IDLE SHOP, BUSY STREETS! REMEMBER PEARL HARBOR



IRONICALLY "Remember Pearl Harbor" slogans hung over idle Boeing Aircraft Co., Seattle, assembly lines after workers walked out in protest against delay by the War Labor Board in handing down a decision in a wage equalization case. At right are crowds of the workers marching through Seattle's street to a mass meeting. Upshot of negotiations was WPB's granting of 4½-cents-an-hour advance to 30,000 Boeing workers. Increase of about 7½-cents per hour was given to 110,000 employes of eight other Southern California aircraft companies. The awards, under "Little Steel" formula, left Boeing workers dissatisfied. NEA photos

company representatives. Vacation clauses are contained in some instances.

Contesting the demand of the National Maritime Union of America (CIO) for "hiring hall" regulations requiring employers to engage all seamen through union halls are Inland Steel Co., Interstate Steamship Co., Bethlehem Transportation Corp., and International Harvester Co. Final hearings progressed in Washington last week, but no decision was reached by the labor board.

48-Hour Week Regulations Promulgated by McNutt

Regulations putting into effect the 48-hour work-week in 32 designated areas have been issued by the War Manpower Commission. With a few exceptions, they affect all employers of more than eight persons within the affected area. Exact boundaries of the areas will be determined by regional and area WMC directors.

The longer work-week was ordered on a nation-wide basis for the nonferrous metal mining and lumber industries.

Officials of the commission said that plants affected by the order would be put on the 48-hour week as fast as jobs could be found for the workers who are thereby released.

The changeover may require several months, due to the lack of personnel in offices of the United States Employment Service.

Fowler V. Harper, deputy WMC chairman, said the order would be applied regardless of increased costs that may result in any plant or the effect on profits and prices. There are other government agencies to take care of these problems, he said.

Nor will any consideration be given to union rules of regulation limiting hours to less than 48. Overtime agreements will be upheld, he said.

Under the WMC regulations, plants in the 32 affected areas may follow one of three procedures:

If they can lengthen the work-week without releasing any employes and absorb the extra man-hours in increased production, they should do so at once.

If the workers they release as a result of lengthening the work-week can be absorbed promptly by other employers, the regional or area WMC director will notify them and they should install the new work-week at once.

If the local WMC director reports that workers released because of the lengthened work-week cannot be absorbed immediately, the employer must submit the number of workers affected and their occupational classifications to the WMC, with a schedule of when it is proposed to release them. The WMC will check this schedule and order the lengthening of the work week and the release of the workers as other jobs are found for them.

Employers are required to make their reports by April 1.

Steel Industry's Employment, Payrolls Increased in January

Employment in the steel industry in January averaged 637,000, compared with 633,000 in December, according to the American Iron and Steel Institute. Total steel payrolls established a new peak of $129,760,000 in January, as against the prior record of $129,368,000 in December.

In January, 1942, the steel industry had 651,000 employes and disbursed $118,785,000 in payrolls.

Wage earning employes received an average of 110.7 per hour in January, compared with 109.4 cents in December and 99.2 cents in January of last year. Wage earners averaged 39.8 hours per week in January, 40.2 hours in December, and 39.2 hours in January, 1942.

Challenges War Plants To Match Attendance Record

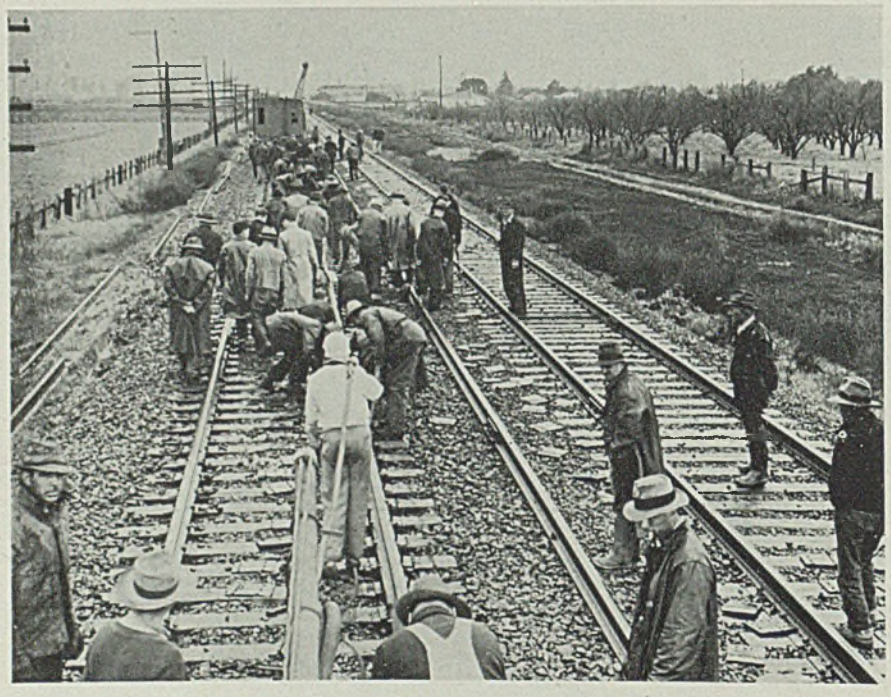
William S. Jack, president, Jack & Heintz Inc., Cleveland, manufacturers of airplane starters, automatic pilots, and other airplane equipment. issued a challenge to war plants throughout the nation to match the 100 per cent attendance record of his 6000 "associates" during the month of February.

At a banquet for his "associates" in Cleveland Public Auditorium, Feb. 27, Mr. Jack declared that $6250 in War Bonds would be distributed to workers of war plants of 6000 employes or more that could show a similar record. He said there were no unathorized absences in any of the firm's plants in February. His only stipulation was that records of plants be certified by the management.

Col. G. H. Moriarity, Wright Field, Dayton, O., praised Mr. Jack as "a philosopher", rather than a production genius. He remarked that he has never seen "such spirit and wholeheartedness" as that which exists in the Jack & Heintz plants. Lieut.-Commander Henry Haskell, Bureau of Aeronautics, Washington, spoke.

A postwar stabilization fund to insure associates of work after the war's end has been setup during the past year, Mr. Jack said. Out of profits $1,500,000 has been set aside and an additional $6,000,000, refundable through the provisions of the 1942 Revenue Act, will be added.

WHITE-COLLAR MEN "WORKIN' ON THE RAILROAD"



WHEN the manpower shortage made maintenance an acute problem for the Southern Pacific railroad, an appeal was issued to white-collar workers. Above is shown a group of businessmen and students who gave up their Sundays to do a rail renewal job near San Jose, Calif.

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, Dec. 14, 1942

L ORDERS

L-49 (Amendment): **Beds, Springs and Mattresses,** effective Feb. 23. Specifies that total use of iron and steel during base period (year ended June 30, 1941) includes only steel used in coil, flat and fabric bedsprings which were not integral parts of beds or other sleeping equipment and all the steel used in box bedsprings. During February and March use of iron and steel in coil, flat and fabric bedsprings is limited to 2½ per cent of amount used in base period plus 4 1/6 per cent of amount used in production of box bedsprings. Exempts manufacturers of bedspring parts from the provisions of the order.

L-123 (Amendment): **Industrial Equipment,** effective Feb. 27. Removes provision that purchase orders for certain repair and maintenance parts of equipment must be accompanied by certificates showing that they are exempted from the restrictions. Deletes following from List A: industrial fans and blowers; industrial pumps, mechanically operated; industrial hand trucks; passenger or freight elevators, inclinators, electrically operated passenger elevating devices appurtenant to stationary stairways, and power operated dumbwaiters; electric motors, one horsepower and over; motor-generating sets ¾ K. W. or one horsepower and over; and electric controllers, rated one horsepower and over. Adds the following: electric motors, rated less than one horsepower except motors used in the operation of passenger automobiles, trucks, truck trailers, passenger carriers and off-the-highway motor vehicles, as defined in L-158, or in the operation of stationary automotive type engines.

L-137 (Amendment): **Hand Tools,** effective Feb. 25. Removes all copper-headed tampers and 16 types of picks from steel products which may be manufactured.

L-204 (Amendment): **Telephone Sets,** effective Feb. 27. Exempts following from the stop-production order: sets for public pay stations, outdoor sets using a minimum of critical material, portable and sound powered sets used by armed forces and defense agencies, explision-proof sets in mines.

L-211 (Amendment): **National Emergency Steel Products,** effective March 2. Permits manufacture of 2 point barbed wire in two styles and 4 point wire in one style. Provides for production of additional style of hog and cattle fence. Restricts galvanizing of wire by limiting use of zinc coating to the weights established by federal specifications, as outlined in the schedule. Sets up specifications for structural steel shapes, axles, and forgings, mechanical steel tubing, and rails and track accessories.

L-252 (Amendment): **Valves,** effective March 2. Provides for specific exemption for cast or forged valves manufactured before May 1, 1943. Changes references to "½ molybdenum" to read ½ per cent molybdenum in the appendix.

L-272: **Industrial Instruments,** effective Feb. 25. Sets up specifications for manufacture of control valves, liquid level controllers, pyrometers and resistance thermometers. Exempts equipment for ship use, other than pleasure craft, and for use in laboratories.

CMP REGULATIONS

No. 1 (Amendment), issued Feb. 27. Sets forth in detail conditions under which delivery order for Class A and B or other products must be refused.

No. 3 (Amendment), issued Feb. 27. Permits such persons as dealers, distributors and jobbers who receive rated orders from their customers bearing allotments numbers or symbols, to use the allotment number or symbol in extending the rating.

No. 4 (Amendment), issued Feb. 27. Clarifies the conditions in which a distributor may fill orders, other than authorized controlled materials orders, for specified quantities of steel shapes and forms.

M ORDERS

M-9-b (Amendment): Copper, effective March 1. Prohibits delivery of copper scrap and copper base alloy scrap containing 0.1 per cent or more beryllium except to persons specifically authorized by WPB to receive such scrap.

M-199 (Amendment): Silver, effective Feb. 25. Restricts use of domestic silver by nonessential industry to one-half the amount used in 1941, or 1942. Exempts from restrictions small manufacturing firms that cannot be converted to war production because of limited facilities. Raises preference rating required for restricted articles in List A from A-3 to A-1-a. Adds optical appliances, including spectacle frames, to list of restricted uses. Permits use of only three ounces of silver for the purpose of a single repair on any one article.

M-293: Critical Common Components, effective Feb. 26. Formalizes existing scheduling practices and provides regular procedures for future contingencies. Provides specific regulation covering manufacture and distribution of critical components, such as valves, pumps, fittings and bearings.

P ORDERS

P-19-h (Amendment): Rated Projects, effective March 2. Provides that preference ratings may be assigned: to tools, machinery or equipment which will be located in the project and which will be used there in the manufacturing or processing of goods, or the performance of services; to any material used in connection with the construction of the project, including hand tools, repair parts for construction machinery, forms, scaffolding, etc. Exempts construction machinery and fuel. Restricts builder to the use of only that critical material which is authorized by WPB.

P-141: Public Sanitation Services, effective Feb. 27. Assigns following ratings: AA-1 for materials needed to repair facilities in event of an actual breakdown; AA-2X for maintenance and repair materials and operating supplies; AA-5 for materials required for protection against hostile acts (if authorized by federal, state agency.)

U ORDERS

No. 1: Utilities, effective March 1. Replaces order P-46 and all amendments and supplements thereto, re-enacting most of the P-46 provisions. Governs flow of materials into entire utilities field with exception of communications. Requires utilities to sell surplus stocks. Authorizes use of AA-1 rating and a Controlled Materials Plan allotment symbol to permit utilities to obtain materials for maintenance, repair and minor construction. Utilities must limit stocks of controlled materials to their needs for a 60-day period.

PRICE REGULATIONS

No. 10 (Amendment): Pig Iron, effective March 3. Establishes prices $2 per ton above base prices for pig iron containing ½ to ¾ per cent nickel with $1 a ton allowed for each additional ¼ per cent.

No. 315 (Amendment): Lead Arsenate, effective March 1. Provides that if a manufacturer's ceiling price has been increased or decreased by the regulation, he shall give each distributor or dealer to whom he sells a written statement showing the change. Statement must be supplied at or before the time of the first delivery following the effecove date of the price changes. This statement may be placed on the invoice.

Aircraft Alloy Steel Section Added by War Production Board

An aircraft Alloy Steel Section has been established in the WPB Steel Division to help speed deliveries of certain alloy items to aircraft plants.

The new section, headed by Louis E. Creighton, formerly vice president, Rotary Electric Steel Co., Detroit, and for many years an operating executive of the Union Drawn Steel Co., will handle problems relating to aircraft alloy steel.

A study of the aircraft alloy situation has just been completed by the Steel Division in collaboration with the Aircraft Scheduling Unit and metallurgical, production, distribution and statistical experts from the steel industry.

Production of alloy steel ingots for aircraft and the many other war-time uses rose in January to 1,260,000 net tons—a new monthly all-time high—and more than 300,000 tons above the 1942 average monthly output. In 1938, alloy steel production averaged only 138,000 tons monthly. By 1944, the nation's capacity will be about 1,400,000 tons a month.

Prescribe Packaging Methods For Overseas Shipments

Specifications prescribing proper methods for packaging war materials for overseas shipments have been made available by the WPB Container Coordinating Committee. Specifications are designed to insure proper delivery of war materials in usable condition, with the most efficient utilization of containers and of transportation and distribution facilities.

A booklet, *Army-Navy General Specifications for Packaging and Packing for Overseas Shipments,* was released to manufacturers and shippers.

All shipments of war materials and supplies, whether scheduled for immediate shipment overseas, or for delivery to storage and subsequent shipment overseas, must comply with the requirements and instructions given in the booklet.

Special care has been taken to provide adequate protection against corrosion of machine parts, and against moisture so that machine parts, assemblies, delicate instruments, etc., may be in a satisfactory operating condition as soon as they are unpacked.

WINDOWS of WASHINGTON

Postwar European relief and rehabilitation program receiving widespread attention among national and international groups. . . Inter-governmental agreements would determine cost borne by each

In the past six issues this spot has been devoted to discussions of principal details of postwar plans that have been drawn under sponsorship of the three major planning groups. These are the National Resources Planning Board, official government planning body and a part of the White House staff, and two private groups, the National Planning Association, which is composed of representatives of industry, labor, agriculture and so on, and the Committee for Economic Development, which represents business and industry only.

As has been stated, this planning is concerned not only with all economic factors in our national life but with the economy of the world as a whole. All planners are agreed that "there must be a stable economy in the postwar world if we are to avoid future wars".

European Aid Outlined

In December of 1942, the National Planning Association issued an important pamphlet entitled "Relief for Europe". In sixty pages it sums up progress already made, not only in planning to relieve and rehabilitate the various European countries, but also the extent to which these plans already have been implemented. In the spring of 1942, the association conducted a series of meetings at which many qualified persons advanced their ideas on the relief problem. The pamphlet is a carefully prepared digest of these ideas; inasmuch as it is too comprehensive to be digested here, those interested in the subject of postwar planning should read it in detail. Copies may be obtained from the National Planning Association, 800 Twenty-first street, N. W., Washington, D. C., at 25 cents each.

Many manufacturers are due to book a vast amount of business, both directly and indirectly, from the rehabilitation of Europe and other areas of the world. Reading the pamphlet will enable them to plan more intelligently. This little volume makes it clear that Europe, now in the midst of a terrible catastrophe, will require assistance on a gigantic scale in order to recover from it.

Plans already are being made for a comprehensive organization to provide assistance to Europe. The Lend-Lease Administration, in close co-operation with various United States government departments and agencies, and with foreign governments, long has been furnishing supplies on a vast and increasing scale to foreign countries. To the Inter-Allied Postwar Requirements Bureau, functioning actively under the chairmanship of Sir Frederick Leith-Ross, with headquarters in London, has been assigned the task of compiling statistics on needs of suffering countries. A large number of agencies are active in the field of relief, such as the Near East Foundation, the Jewish Joint Distribution Committee, the American Red Cross, the American Friends Service Committee, and various relief organizations that are concerned with the plight of China, Russia, Belgium, Greece, Poland, Britain and so on.

A SPECIAL REPORT TO INDUSTRY

POSTWAR PLANNING

This is the seventh of a series of a detailed study of what is being thought about and accomplished toward making the postwar world a place in which the individual and industry may flourish.

In addition, there are some other agencies that can be called on for assistance when it becomes possible for them to participate. Just as an example, there is still an official international public health organization in Europe, the Health Organization of the League of Nations at Geneva. There are certain special arrangements, now in existence or projected, such as the International Wheat Agreement by which the United States, Argentina, Canada and Australia—the four great surplus wheat producing nations—have assumed responsibility for feeding the starving free of charge. A host of other activities likewise are associated with the problem of providing relief to Europe.

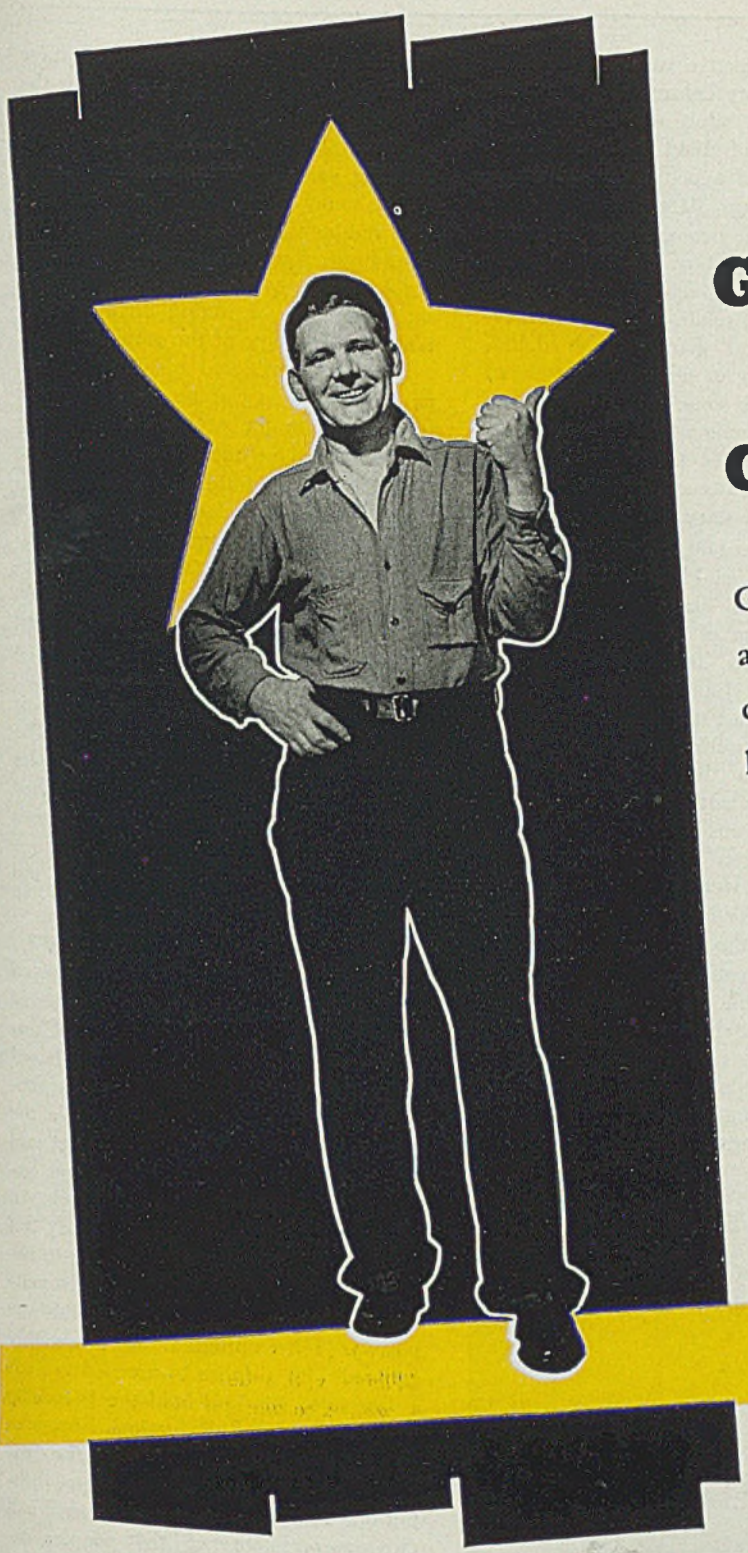
In the meantime a great deal of thought is being given to the problem of finding administrators of the relief and rehabilitation program. This problem looms as of particular importance when it is recalled how political considerations dominated much of the relief work after the first world war—thus helping to plant the seeds for the present war. Hence, administrators of the right type will be needed. Several training projects already are under way both in this country and in England. The United States War Department has established a School of Military Government in Charlottesville, Va., to train officers for administering occupied areas; the curriculum includes relief administration.

While the Army's interest primarily is in military government, many of the officers so trained should be available for civilian administration of relief after they have been released from the Army. Approximately an analogous course, primarily for British army officers, also is in progress at Cambridge University. In addition to these, a 48-week course was established by Columbia University last August to prepare students for tasks of an administrative nature "which Americans may be called upon to perform in such countries or territories as the United Nations may liberate or occupy", including outright government but particularly relief and reconstruction work.

Lehman Appointed Director

Hence, when former Governor Herbert H. Lehman was appointed Director of Foreign Relief and Rehabilitation last December, at least a beginning had been made on the task of organizing to provide relief for Europe. President Roosevelt recognized the need for centralizing this giant enterprise under one responsible authority. In fact, it has grown to such an extent that Mr. Lehman does not expect to require much of an organization of his own. He proposes use of existing agencies and procurement bodies, such as the Lend-Lease Administration, the Treasury Department Procurement Division, the Department of Agriculture Procurement Division and others. His job will be that of coordinating and directing all the activities involved and he will report directly to President Roosevelt.

While a real start, therefore, has been made on a program of providing relief to war-torn Europe as soon as it becomes possible to engage in such activities, much still remains to be done before policy can be established. Whether a good program is evolved depends to a large extent on public sentiment in this country and on the wishes of Congress. It is too early to make any predictions at this time; for example, the degree of



Good Automatics DESERVE Good Operators

Good operators can get the most from any machine, and, because seconds count so much, automatics should be kept in use at peak efficiency.

The Departmental Design of Conomatics helps new operators to learn faster. The extra rigid cross-slide construction permits holding heavier forming cuts to closer tolerances.

Cone handbooks are useful in helping both new and experienced operators to get excellent results from Cone machines.

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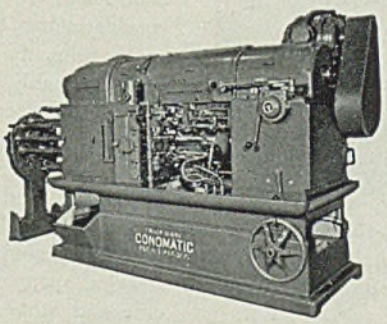


food scarcity here in coming months will be a factor in the determination as to how far we can afford to go in feeding other peoples. Too, the all-important question of inter-governmental cooperation remains to be resolved.

Although it is not possible at this time to draw an exact blueprint of the kind or extent of relief that Europe will require, it is known that food requirements will be vast. War has brought food deficiencies to practically all of Europe, varying in extent and character Real starvation long has been reported from certain countries, including Greece and Poland and the occupied portions of Russia. In most other countries there already is a serious deficiency of protective foods. The situation will become worse as time goes on. The case of France may be cited by way of illustration.

Rations Cut in France

In France, according to an Inter-Allied Information Center release, and according to information developed by the American Friends Service Committee, the number of calories provided in the daily ration for French adults declined from 1307 in November, 1940, to 1090 in September, 1942. This contrasts with the findings of nutritional scientists that an adult leading a sedentary life needs a minimum of not less than around 2500 calories.

Of the 1090 calories in the French daily ration as of September, 1942, 768 were in the form of grain products which have slight protective value in the form in which they are consumed. What the average French adult was eating daily in September of 1942 included about three-quarters of a pound of bad quality bread (perhaps 10 slices), a handful of dried peas or beans, about the same amount of alimentary paste (spaghetti, noodles, macaroni, etc.), perhaps two teaspoonfuls of sugar, a piece of meat not much larger than a silver dollar, a small quantity of cheese, a tiny scrap of butter or else some vegetable oil, and a microscopic amount of ersatz coffee. Sometimes potatoes are available, occasionally fresh fruits and vegetables. Literally, this is a starvation diet.

Equally important, along with food, will be health and medical supplies—for malnutrition already is taking its toll in the form of disease. Dr. Henri Bouquet of Paris, according to the *New York Times* of June 2, 1942, estimated that mortality in France had risen 18 per cent since the outbreak of the war and he reported a desperate shortage of drugs. The situation of diabetics had become disastrous for want of insulin. Tuberculosis has become rampant in Europe; there were 300 per cent more cases in Warsaw in the first half of 1941 than in the same period of 1940. Rickets, bad teeth, and stunted growth now are the rule rather than the exception among Belgian children. Acute avitaminosis has made many children tired and unable to think, so that they are not profiting from schooling as they should. Typhus epidemics have been reported from divers places. Shortage of soap is having a bad effect from the standpoint of sanitation.

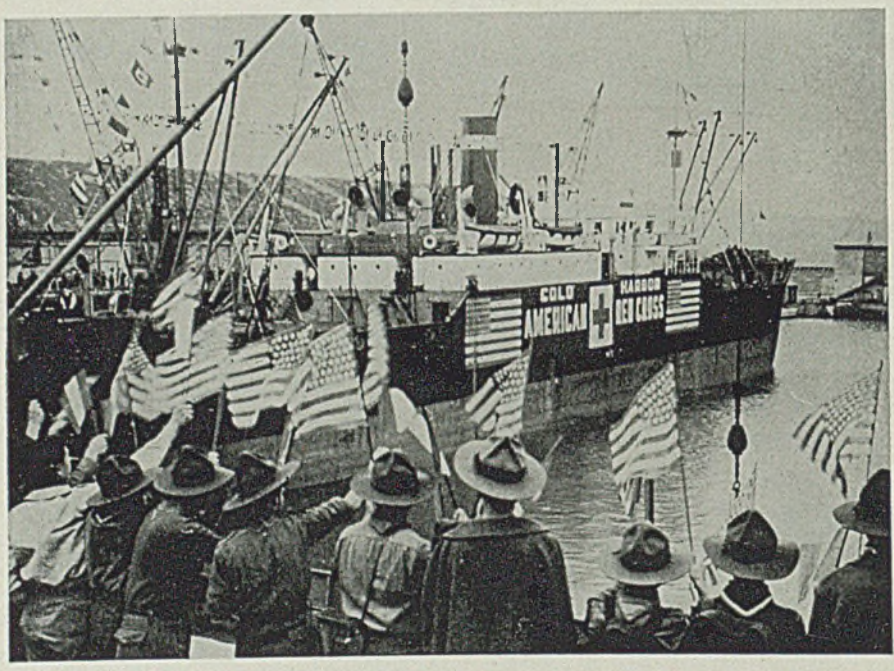
In addition to all this, Europe is developing vast needs for clothing. There will be many other equally serious shortages not now clearly foreseen. Therefore, those who are studying the relief problems are careful about making exact predictions or setting definite timetables at this stage of the game.

It is the considered opinion that the job to be done in Europe must be one of reconstruction; the economic life of the recipient nations must be restarted so that the relief administration can withdraw at an early date without danger of a relapse into starvation. The general opinion is that if we supply immediate needs such as food, medicine, seeds, fodder, soap, cattle, and clothing —together with the things that for a while thereafter will be needed to help the various peoples to get back on their own feet—that will be sufficient. The important thing is to help the peoples to get in their first crops. Once they are in a position to provide their own food and other essentials, they can—from then on—automatically work out much of their own rehabilitation.

Relief Program Requires Diplomacy

In other words, nobody connected with the project believes that Uncle Sam indefinitely should play Santa Claus to Europe—this conviction being based on a number of reasons. There is general agreement that we should give the needed emergency help—then get out of the picture. We should get out before the European countries develop a feeling of resentment, such as many did after the last war, through having to accept "charity" from abroad. As a matter of fact, everybody involved with our postwar relief program is thoroughly embued with a desire to proceed in such a way as to win *and hold* the friendship and confidence of the various European peoples. For instance, one of the features of the plan, is that instead of dishing out our relief ourselves we will call on representatives of the peoples involved to advise with us on the relief problem in general and with their administration in particular. Under no circumstances should we allow business considerations to influence relief.

One gets the impression that capital goods probably will be involved to some extent in reconstructing Europe, particularly agricultural tools and machinery, food processing machinery, textile machinery and perhaps certain other types of durable goods. This phase perhaps would not last long. After starving, peoples receiving food, medicine and other essentials of life can be



One of the first steps in re-establishing a new order in the world after the war will be the feeding of hungry millions in the countries devastated by the Axis. Symbolical of America's part in the task is this American Red Cross relief ship on a mission of mercy to France early in the war

counted on to rehabilitate their industries and business activities primarily through their own efforts. Demand from Europe for capital goods then should be largely the same to which we have been accustomed in the past.

On the other hand, European relief should bring about a considerable demand from other parts of the world for capital goods. The program as now conceived calls for full participation by all surplus producing countries of the world. A good example is Argentina with her grain and meat surpluses. It seems quite reasonable to expect that Argentina will call for a wide variety of equipment required to improve and expand her production of foodstuffs. It seems equally reasonable to expect that Argentina will want to invest money in improving communications and transportation, and that she will need more service facilities such as warehouses.

Canada, among its various other possibilities, is considered as a potential source of livestock for rehabilitating the herds of cattle in Europe—this for the reason that her climate is quite similar to that of much of Europe. Africa and Brazil are considered as important potential suppliers of vegetable oils to the Europe of the future. These are but a few of the potentialities that producers of various types of capital goods should start thinking about in connection with their place in the postwar world.

Cost Not Determined

One of the questions most frequently asked regarding postwar relief and rehabilitation is: "Who is going to pay the bill?" The answer to this question remains to be determined through intergovernmental agreements still to be formulated. Those who have thought about this subject seriously assume that the bill will be paid by all of the supplying nations in the form of the goods they contribute to the common cause.

A representative analysis of the ideas of the majority of thinkers in connection with postwar planning may be had by quoting from the pamphlet mentioned in the opening paragraphs of this discussion, namely, the National Planning Association's publication entitled "Relief for Europe".

"Financing," declares this pamphlet, "is really a secondary problem, if the principle is accepted that needs constitute the primary criterion. The limit of relief and reconstruction aid will then be determined by the magnitude of available supplies, rather than by how much money can be spared. Modern experience shows that governments can spend astronomical sums of money without ruining the economy. The important question is, how does the world want to use its physical resources?

"The experience of the American Relief Association shows the dangers of allowing financial considerations to affect a relief enterprise. The A.R.A., though inspired by the highest motives of disinterested service, was run like a commercial enterprise. But the nature of the task prevented its being a successful business enterprise, while the commercial policy pursued impaired its efficiency as a relief organization, as the following brief sketch of A.R.A. methods and their results will show.

"Selling Relief Created Ill-Will"

"In the first place, American relief (after the first World War) was for the most part, sold, not given away. About 82 per cent of the gross value of all relief to Europe was for cash or credit. Over 2 per cent was paid out of profits, and the balance, about 16 per cent, was charity, governmental and private. Almost 61 per cent of the gross value was on credit, and the sum (over $1,400,000,000) was added to the war debts. As a matter of fact, it was never paid back, so that in the long run, the program turned out to be mainly a gift after all. Approximately one-quarter of the total was paid for in cash. The policy of selling relief made a bad impression and created some ill-will.

"Secondly, prices charged were different in various countries, an extra amount being added where the risk was thought greater. Risks included revolution and confiscation. Countries where risks were high were often countries where need was greatest, and ability to pay smallest.

"Thirdly, American relief was partially designed to relieve our country of its embarrassing agricultural surpluses. Desire to get rid of wheat and pork had some effect on the type of relief sent over, and a great effect on its price.

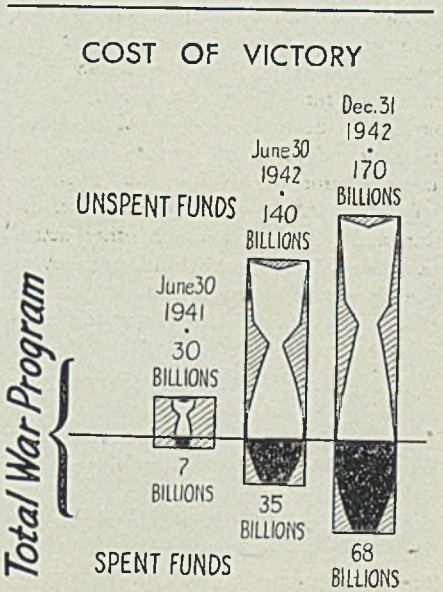
"Lastly, a different financial arrangement was made for relief to ex-enemy countries than to others. During the Armistice period (when the bulk of relief was furnished) ex-enemies paid for about nine-tenths of their relief in cash. Liberated countries and ex-Allies received about nine-tenths of theirs on credit. This distinction proved unfortunate. Requiring cash from the exhausted Central powers meant that they were unable to get a proportion of total relief commensurate with their need. (The differential on account of risk worked to the same effect.) In addition, immediate cash payment for relief contributed in large measure to the economic difficulties of the ex-enemy countries. Their supply of foreign exchange was, thereby, depleted, adding to the danger of currency depreciation, which finally occurred with results devastating, not only to themselves, but to the whole world.

New Concept Has Developed

"The experience of the A.R.A. shows that relief and 'business', like war and business-as-usual, do not mix. In the future, there must be no attempt to combine them. It seems probable indeed that the notion of specific repayment for relief supplies will be discarded. Compensation will be in the form of world healing, in which we all have an interest. Every nation can take part in relief, for all have something to contribute either in goods or services. All these resources should be considered as a pool, and the allocation regarded as a multilateral, reciprocal lend-lease arrangement."

This statement is just another reflection of the new concept that has been developed by our planners in reference to money. That is that real wealth is constituted of resources in manpower and materials, and ability to produce on a large scale and thus satisfy human needs and desires. The concept is that money should be the government-controlled instrument for implementing the economy.

In next week's issue this section will be devoted to a bibliography of the literature that has accumulated on the subject of postwar planning. It will enable interested readers to select for further study such publications as cover phases of the overall planning program with which they are concerned.



PROGRESS of the war program is shown graphically in above chart, depicting authorizations and expenditures. Figures are cumulative since June, 1940. Data by WPB

Code Order Designed To Facilitate Orderly Flow of Materials, Parts

AS part of its program for breaking production bottlenecks, the War Production Board has just issued a general scheduling order, M-293, formalizing existing scheduling practices and providing regular procedures for future contingencies.

Similar orders have previously been issued on specific items as follows: L-100, Compressors, April 17, 1942; M-84, amended, Agave Fiber, August 5, 1942; L-163, Turbo-Blowers, August 7, 1942; L-205, Combat Measuring Instruments, Oct. 13, 1942; E-1-b, Machine Tools, April 30, 1942, and M-50, Jewel Bearings, as amended Feb. 9, 1943.

At a press conference recently, Chairman Donald M. Nelson said that orderly handling of both raw-materials flow and production of critical common components could increase war production substantially. The order just issued is one of the tools with which this increase will be accomplished.

The order provides specific regulation covering manufacture and distribution of critical components—such as valves, pumps, fittings, and bearings—the production of which today constitutes the bottleneck.

Evolutionary Step

An evolutionary step, based on proven practices already tried in a number of cases, the order was worked out after many consultations with scheduling representatives of the Army, Navy, and Maritime Commission. It does not represent a wholly new device so much as a formalization—or "codification"—of steps already tried.

Procedure outlined in the new order ties in closely with procedures under the Controlled Materials Plan. CMP provides a system for distribution of raw materials; the scheduling order sees to it that these raw materials, when properly distributed, are put into production and processing channels adequate to handle them promptly and on time.

Critical components are broken down into three categories, according to scarcity and need. Manufacturers of the first type, by far the largest, need make only regular operation reports to WPB, showing productive capacity, and orders unfilled, received, shipped, cancelled, and scheduled for the specific period.

Manufacturers in the second group, Class X, in addition to filing the operation report, will report delivery schedules for the specified period, and may deliver such components only under the schedule as approved by WPB. Such deliveries will be made notwithstanding preference ratings which other orders may bear.

The third group, Class Y, consisting of the most critical of the common components, comprises only seven types of objects.

The components in that classification are:

Machine tools, three types of compressors, one type of heat exchanger, seven types of turbo-blowers and turbo exhausts, two types of industrial jewels, two types of radio test equipment designed for military use, and machetes. All these, except for machetes and the radio test equipment, are already under existing scheduling orders.

Persons seeking to place an order for any component in Class Y must first receive specific authorization of WPB, which may specify the manufacturer with whom the order is to be placed. Any order so authorized must be accepted by the manufacturer with whom it is placed, provided regular price and terms are met. Once having been given such an order, the manufacturer will make delivery in accordance with schedule, regardless of preference rating on other orders.

When extremely urgent problems, arise, the WPB may, as in previous cases, take additional measures to increase production. Under these it may direct return or cancellation of any order for critical components on the books of a manufacturer, direct changes in delivery or production schedule of a manufacturer, allocate an order from one manufacturer to another. It may revoke any authorization to place an order, and it may "take such other action as it deems necessary, with respect to the placing of orders for, or the production or delivery of, critical common components."

It is possible for a specific program to be given an adequate allotment of raw material—say, steel. However, since some of this steel goes into valves, and since fabricating facilities for valves are not being used to best advantage, the same program may be and often is held up, not because of lack of raw material, but because of ineffectively applied facilities to produce the component part—in this case, valves.

Therefore the WPB must have adequate controls at both points. It must allot adequate materials to go into the end product, and it must make sure, through scheduling, that the components are produced. This is why CMP and scheduling controls must go hand in hand. Experience with specific scheduling orders in the past has shown good scheduling to be the most efficient way to "break bottlenecks" and get production back into an even flow.

OWU Requires Utilities To Sell Surplus Stocks

Office of War Utilities, created by WPB to administer war activities of electric, gas, water, steam, and communications utilities, has issued its first basic order.

The order, U-1, replaces the former P-46 and all amendments and supplements thereto, re-enacting most of the P-46 provisions. It governs the flow of materials into the entire utilities field, with the exception of communications, and is the first industry order to be integrated with the CMP.

An important group of provisions within the order, designed to effect sharing of material and equipment in utility inventories, requires utilities to sell surplus stocks as a condition for continuing to receive priorities assistance. These provisions are linked with the creation of regional surplus stock offices, to be in operation throughout the United States this month, through which utilities will carry on the redistribution of their surplus materials and equipment.

The order authorizes the use of a higher rating, AA-1, and a Controlled Materials Plan allotment symbol, to permit utilities to obtain materials for maintenance, repair and minor construction. The order also, for the first time, brings under inventory regulation stocks of controlled material held by utilities for use in construction. It requires utilities to limit such holdings to their needs for the ensuing 60 days.

A sharp reduction in the inventory which may be held for maintenance and repair after March 31, 1943, is made in the new order.

Although communications is now a part of the Office of War Utilities, the telephone and telegraph industry will continue to operate for the present under maintenance orders P-130 and P-132.

A new zinc-coated steel penny, which will conserve 4600 tons of copper, was placed into circulation last week by the Treasury Department in limited numbers. The new coin, designed like the present Lincoln penny, has the shiny appearance of a nickel. As current penny stocks dwindle, the new coin will be circulated.

PD-1A Applications To Be Filed With WPB's Branch Offices

A PLAN to shorten considerably the time required by WPB to process PD-1A applications started to take effect last week in the most important step toward decentralization attempted by that agency.

When the plan becomes fully effective, it is expected that most PD-1A forms will be processed and back in the applicant's hands within 12 to 48 hours instead of the week or more now required to clear through Washington.

PD-1A, sometimes referred to as the "catch-all" form, is an application for a preference rating—generally to purchase capital equipment—when no other form has been specified.

Hereafter, all PD-1A forms are to be filed with the district WPB offices. Until March 15, district offices will forward them to Washington for processing. After that date, however, WPB regional offices will handle the processing of applications involving $100 and less, and after April 15 the regional offices will process applications calling for amounts up to $500. Requests involving larger amounts will be forwarded by the district offices to Washington.

Form PD-1A has been revised on the basis of suggestions from industry representatives and the Industry Divisions of WPB. Copies of the revised form are available in WPB field offices.

Major revisions: (1) Change from a column-type form, with accompanying instruction sheet, to a block-type question and answer form designed to facilitate application and to reduce to a minimum special requests for additional information; (2) incorporation of the clearance form used in processing the application to speed handling; and (3) addition of some questions not previously asked, to eliminate need for supplemental forms.

In order to allow time for full distribution of the revised form, WPB will continue to process applications filed on the old form until April 1.

Recently WPB has received about 35,000 PD-1A forms weekly, 57 per cent of which involve $100 or less and 83 per cent of which call for $500 or less of material or equipment. Since this transfer will relieve Washington of considerable of this load, processing of the larger applications also will be speeded up, it is expected.

Purpose of requiring all applications to be filed originally with the nearest district office before they are transmitted to the regional office or to Washington is to permit their being "screened". This will insure they are properly filled out and if not that there will be little delay in obtaining the required information from the applicant.

Another move to give WPB field offices more responsibility in handling priority matters is in the construction field. Beginning March 8, applications for construction authorization involving $10,000 and less are to be filed with district offices, where they will be "screened" and forwarded to regional offices for processing. Regardless of the size of the work, however, the following types will be handled in Washington rather than in the field: Industrial, utilities, mining, off farm facilities, hospitals, and projects financed in whole or in part with federal funds.

This trend toward decentralization is expected to continue. No additional moves have been authorized, but consideration is being given to the handling by field offices of appeals for relief from orders and regulations and the processing of PD-1X forms.

PROMISE PRODUCTION GOALS WILL BE ATTAINED

CONFIDENCE in the country's ability to meet 1943 production quotas was expressed by WPB Chairman Donald M. Nelson and Charles E. Wilson, right, executive vice chairman, at a Washington press conference. Mr. Nelson said the equipping and maintenance of an armed force of 11,000,000 by the end of this year will be possible without reaching "Bedrock" civilian economy. NEA photo

War Department Asks More Intensive Use of Subcontracting

War Department has asked all its supply branches to speed up production of munitions and other vital combat materials through greater spread of subcontracts. It directed them to instruct branch and local offices throughout the country to urge prime contractors to restudy their facilities in the light of increased demand and, where advantageous, assign part of the work to outside plants.

"Although some of the services are cooperating fully in aiding and encouraging prime contractors to carry subcontracting into effort," the War Department order declared, "there is evidence that some of the local or regional offices appear to be reluctant to push this.

"Production can be increased more rapidly through subcontracting than through waiting for new machine tools and equipment. There is a large available industrial capacity on critical machine tools and other equipment. This has affected not only prime contractors, but many manufacturers supplying them."

New CMP Procedures Established In Amendments to Regulations

IMPORTANT changes in Controlled Materials Plan Regulations, establishing procedures for contingencies not previously covered, are effected by amendments to CMP Regulations Nos. 1, 3 and 4.

Of most interest to manufacturers is the revisions of paragraph (p) of CMP Regulation No. 1, which now sets forth in detail the conditions in which delivery orders for Class A and B or other products must be refused.

Effective at once, no manufacturer may accept an allotment for the manufacture of a Class A product, regardless of the accompanying preference rating, if he does not expect to be able to fulfill the related authorized production schedule. Additionally, if he has accepted an allotment and an authorized production schedule for a Class A product, he may not accept any other delivery order, except one rated AAA, if its filling would interfere with the completion of the previously accepted schedule.

Certification Simplified

A manufacturer turning out Class B products to fill unrated or low-rated orders must accept higher rated orders, as provided in Priorities Regulation No. 1, unless he is also making a Class A product on an authorized production schedule. In the latter case, he will be guided by the provisions of the paragraph above.

Another change in CMP Regulation No. 1 gives effect to the recently announced discontinuance of Form CMP-6. That form was originally prescribed for use in placing authorized controlled material orders with a producer of controlled materials. In place of CMP-6, the regulation now provides a form of certification which may be placed on the purchase order. This will result in substantial savings of paper work on the part of those operating under CMP.

CMP Regulation No. 3 is amended to permit such persons as dealers, distributors and jobbers, who receive rated orders from their customers bearing allotment numbers or symbols, to use the allotment number or symbol in extending the rating. Previously they were allowed to extend only the preference ratings without allotment numbers. However, allotment numbers used in connection with the extension of preference ratings do not constitute an allotment and therefore may not be used to obtain controlled materials.

Production material, as redefined in the new version of Regulation No. 3, now includes items purchased by a manufacturer for resale to round out his line, if these items do not amount to more than 10 per cent of his total sales.

This regulation also now permits a manufacturer who has received a rating with an authorized production schedule to apply to deliveries to be made to him during the second quarter of this year any rating previously received which he is authorized to use, despite the provisions of Priorities Regulation No. 12 regarding the compulsory extension of downward re-ratings. In authorizing production schedules for secondary consumers of controlled materials to whom he had already extended a rating previously received by him, such a manufacturer may extend the appropriate allotment number for use with the earlier rating. This provision will prevent to a large degree disturbances to existing production schedules which might otherwise occur.

Changes in CMP Regulation No. 4 clarify the conditions in which a distributor may fill orders, other than authorized controlled materials orders, for specified quantities of steel shapes and forms.

Moise Resigns as Head of War Materials Inc.

B. C. Moise, retired vice president of National Tube Co., Pittsburgh, last week announced his resignation as president of War Materials Inc., government agency entrusted with the recovery of high-cost scrap.

The announcement came after a week of reverberations following a press conference at which Mr. Moise outlined what he termed the complete failure of the agency to accomplish the job for which it was organized. Mr. Moise blamed the War Production Board for "choking" WMI's activities to such an extent that only 8522 tons of the 5,000,000 tons of scrap for which it had been commissioned had been recovered.

Maintenance of the organization for such a small recovery of scrap, according to Mr. Moise, was a clear waste of the taxpayers' money. He served notice on the WPB that activities of the WMI would come to an abrupt halt unless some change were made, and indicated he would resign rather than continue as in the past.

C. W. Nichols, vice president, Metals Reserve Co., then asked for Mr. Moise's resignation, which Mr. Moise forwarded immediately to Charles B. Henderson, MRC president.

Petroleum Industry Finds Large Crude Oil Reserve

Total known underground reserves increased to 20,082,793,000 as of Dec. 31, 1942. Reserves on Jan. 1, 1942, totaled 19,589,296,000 barrels. The estimates include only reserves known or blocked out in proved fields, and recoverable by present production methods.

Most of the new oil was added through upward revisions of reserves in fields found prior to 1942. The institute reports that further development of these older fields revealed a net addition of 1,618,925,000 barrels. Estimates of reserves do not reflect the availability or the rate at which the reserves can be produced, the committee declared.

Brazil Supplies U. S. with Industrial Diamonds

Extension of the Brazilian highway system and greatly increased prices for industrial diamonds are expected to encourage exploration and development of new diamond mines in that country, now a major source of imports by the United States.

The United States is overwhelmingly the world's largest consumer of industrial diamonds and is almost 100 per cent dependent on imports. In 1940, 3,908,071 carats were imported by this country at a cost of $11,026,563.

Metals Reserve Co. has agreed to buy a maximum of 300,000 carats annually from Brazil for the next two years, and the increased demand for the gems in war industries may require purchases at the maximum figures.

Brazil is unique among the countries of the Western Hemisphere for its deposits of the stones. Principal output of the Brazilian mines are carbonados (black diamonds) noted for their particular hardness.

Mexico, Venezuela and British Guiana also are producers but their output is relatively insignificant.

Expansion of copper output at Cananea, Mexico, will represent an estimated investment of approximately $12,000,000. United States currency, and the employment of about 1500 additional laborers, according to a report to the Department of Commerce. Railroads will be used to transport surplus concentrates which the Cananea smelter is unable to handle.

Combined Board May Aid Control of Postwar Distribution Problems

COMBINED Raw Materials Board, created a year ago by President Roosevelt and Prime Minister Churchill may provide part of the foundation for settlement of the world-wide scramble for raw materials that is bound to occur after the war ends, according to William L. Batt, WPB vice chairman.

Operations of the board in the past year, Mr. Batt said, aided immeasurably in "bringing order out of what might have been chaos" on the raw materials front.

The raw materials problem, serious as it is during the war, can become greater in the postwar period, and such combined approach as the board provides may be able to play a substantial part in its solution, Mr. Batt predicted.

"There will be a greater confusion of demand when the war is over," he said. "At the present time, we are confronted with only a limited number of purchasers of raw materials and there is a limited shipping capacity to carry what is available. When the war ends, there will be a scramble by all nations for available supplies in order to restore their economies to a peace-time basis as speedily as possible.

"Experience after the first World War has shown that such a scramble can result in complete demoralization of supply, price, and other factors in a peacetime economy. It is impossible to see how such a situation can be met unless through some form of combined machinery. Existence of the Combined Raw Materials Board might contribute substantially to the solution of this important postwar problem.

Reports "Very Real Progress"

Reviewing the 1942 operations, the board reported that "very real progress" has been made by the United States, Great Britain and others of the United Nations towards a "planned and expeditious utilization of the combined raw materials resources in the prosecution of the war."

Without combined machinery, the report said, attempts to settle joint problems of supply, distribution and use of critical raw materials "would inevitably have been surrounded with difficulties and obstacles involving delay, uncertainty and dissatisfaction."

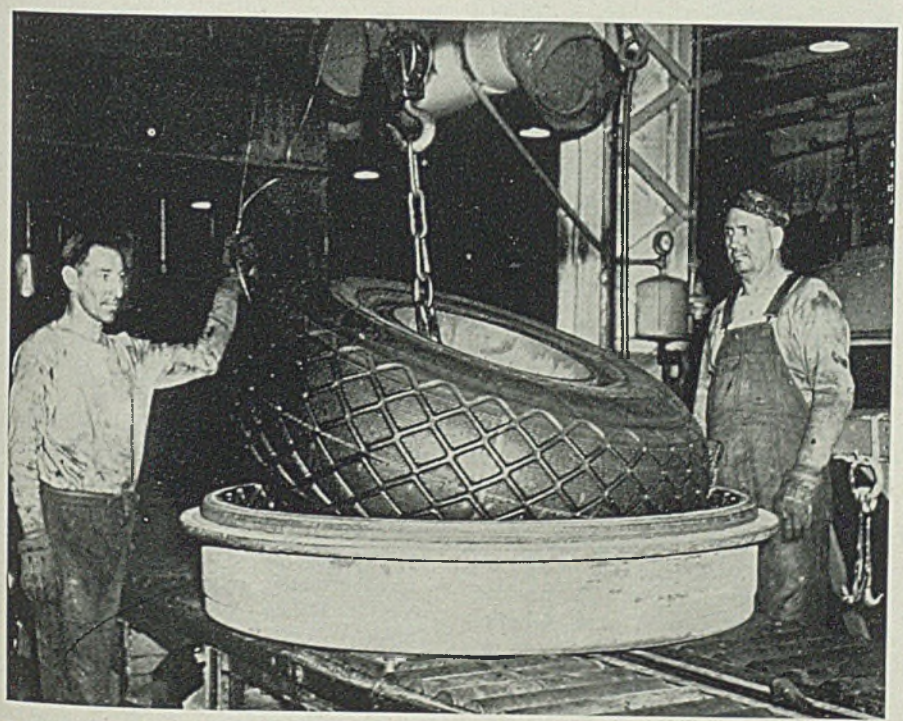
Commenting on the board's activities during the past year, Mr. Batt said:

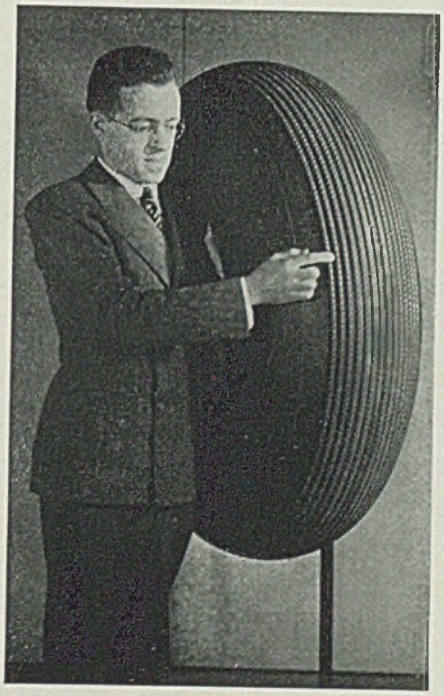
"The first 12 months of operations resulted in stabilization of the raw materials situation. It was recognized that, with the enemy in possession of many sources of vitally needed materials and constantly threatening others, no one of the United Nations could win the raw materials battle alone. Together, we have made great strides toward winning it.

"As a result of the board's activities, world traffic in raw materials among the United Nations now flows in orderly fashion. The board provides a meeting ground where all can go and get a decision—a decision that will be accepted and implemented.

"The board, after careful studies, has made recommendations covering about 30 strategic materials, including nickel, copper, tin, lead, zinc, rubber, manganese, tungsten, cobalt, chromite, and others vital to the successful prosecution of the war. In addition, consideration based on less detailed working surveys

STEEL TREAD GIVES "BITE" TO AIRCRAFT TIRES





SKID-FREE landings and takeoffs on icy airport runways and in arctic regions are made possible by new tires in which steel coils are imbedded in the rubber tread. The tires are being produced "in considerable numbers" for the armed services by Goodyear Tire & Rubber Co., Akron, and the B. F. Goodrich Co., Akron. The Goodyear product is shown at left, while Robert H. Judson, Goodrich technician, displays his company's tire at right

has been given to a wide range of materials, mainly in connection with specific problems that have arisen in respect to them. Some of the materials covered in this manner were aluminum, cadmium, iron ore, long staple cotton, jute, glycerine, bristles, and quartz crystals."

The board, which was charged with responsibility for planning and integrating the raw materials program of the United States and Great Britain, and for collaborating with the other United Nations to make certain that their raw materials resources were most effectively deployed to assist the common cause, exercised its function during the past year in three principal ways:

1. Agreement was reached among the governments concerned to regulate supply, distribution and use of the major strategic materials—tin, rubber, tungsten, etc.—so that each country would be put in a position to make its maximum contribution to the production side of the war program. This common action was based on an assured allocation of raw materials to each country in proportion to demonstrated needs and available supplies, common restrictive measures, and interchange of technical information and experience.

2. Co-operative purchasing and supply arrangements were worked out between the United States and Great Britain to prevent a scramble for so-called secondary materials, such as balata, balsa wood, shellac, kapak, etc., which have been affected by expanded requirements not arising in peacetime, or the supplies of which have been curtailed by loss of normal sources.

3. Day by day discussions have been held concerning problems arising either in the United States or Great Britain, and information and evidence have been assembled to form a basis for solution of these problems.

Certification Standardized In Controlled Materials Plan

Another step in the series of simplifications of Controlled Materials Plan procedures has been announced. A forthcoming regulation, CMP Regulation No. 7, will provide a single standard form of certification which may be placed on any delivery order, in lieu of one or more of the other forms now required for use in varying circumstances by CMP Regulations 3, 4 and 5. The earlier forms, however, may still be used in the appropriate circumstances if a controlled materials purchaser so chooses.

CMP Regulation No. 7 will provide that any delivery order under the Controlled Materials Plan may be validated by endorsing it, or accompanying the order with a certificate, in substantially the following form, signed manually or with a facsimile signature as provided in Priorities Regulation No. 7:

"The undersigned purchaser certifies, subject to the penalties of Section 35 (A) of the United States Criminal Code, to the seller and to the War Production Board, that, to the best of his knowledge and belief, the undersigned is authorized under applicable War Production Board regulations or orders to place this delivery order, to receive the item (s) ordered for the purpose for which ordered, and to use any preference rating or allotment number or symbol which the undersigned has placed on this order."

If an applicable CMP regulation requires that an allotment number or symbol, preference rating or other identification be included in a certification, it must be placed on the delivery order if the form above is used.

Use of this standard form by those who wish to take advantage of it will obviate the necessity, which will otherwise arise in many cases, of placing several different certifications on a single order.

TEST WOODEN KEGS

MANY business opportunities are open to manufacturers in processing and packaging food for shipment abroad. For example, authorities say the merest start has been made in dehydration of meat. The illustration relates to one small "angle" of packaging—a test to determine whether wooden kegs can be substituted for metal containers for packing butteroil under vacuum. Butteroil stays fresh for a long time without refrigeration when in tin cans or metal drums. Will it keep equally well in wood? Photo courtesy United States Department of Agriculture

More Construction Items May Receive Priority Aid

Types of materials which in future construction projects may be assigned preference ratings have been substantially broadened by WPB.

Under a new order preference ratings may be assigned not only to construction material but also to tools, machinery or equipment which will be located in the project and which will be used there in the manufacturing or processing of goods or the performance of services. Ratings may also be assigned to any material which will be used in connection with the construction of the project, including hand tools, repair parts for construction machinery, forms, scaffolding, etc.

Construction machinery and fuel are not included.

WPB will continue to assign preference ratings to all commodities, equipment, and accessories which are to be physically incorporated into the project.

The new order, P-19-h, also restricts the builder to the use of only that critical material which is authorized by WPB. Critical material in excess of allowances may not be used, regardless of whether taken from stock, or made available by gift or loan.

This project rating order also enables an applicant to acquire all needed materials on one application. Only in the case of exceptions will the applicant have to file additional papers.

Beryllium Advisory Committee Appointed

WPB has announced establishment of a Beryllium Industry Advisory Committee with M. H. Billings as government presiding officer. Members: Wilbur B. Driver, Wilbur B. Driver Co., Newark, N. J.; Andrew Gahagan, Beryllium Corp. of Pennsylvania, Reading, Pa.; H. L. Randall, Riverside Metal Co., Riverside, N. J.; C. B. Sawyer, Brush Beryllium Co., Cleveland; Elton S. Wayland, American Brass Co., Waterbury, Conn.; and R. E. Windecker, Clifton Products Co., Painesville, O.

Defense Plant Corp. Authorizes War Plant Expansions, Equipment

DEFENSE Plant Corp. last week authorized additional new war plant facilities, expansions and equipment purchases. DPC will retain title to the facilities which will be operated by the contractors. Authorizations were granted to:

Kalunite Inc., Salt Lake City, Utah, to provide additional facilities in Utah at a cost of approximately $990,000 resulting in an overall commitment of approximately $4,500,000.

Detroit Broach Co. Inc., Detroit, to provide additional machinery in a plant in Michigan at a cost of approximately $37,000, resulting in an overall commitment of approximately $260,000.

Douglas Aircraft Co. Inc., Santa Monica, Calif., to provide additional facilities at a plant in California at a cost of approximately $3,890,000 resulting in an overall commitment of approximately $6,135,000.

Rohr Aircraft Corp., Chula Vista, Calif., to provide additional facilities in California at a cost of approximately $640,000, resulting in an overall commitment of approximately $2,500,000.

General Electric X-Ray Corp., Chicago, to provide equipment for a plant in Illinois at a cost of approximately $68,000.

Se-Ling Hosiery Mills Inc., Nashville, Tenn., to provide additional equipment for a plant in Tennessee at a cost of approximately $20,000 resulting in an overall commitment of approximately $85,000.

Weston Electrical Instrument Corp., Newark, N. J., to provide additional plant facilities in New Jersey at a cost of approximately $690,000 resulting in an overall commitment of approximately $1,850,000.

E. I. Dupont de Nemours & Co., Wilmington, Del., to provide equipment in a plant in New Jersey at a cost of approximately $75,000.

National Carbide Corp., New York, to provide plant facilities in Kentucky at a cost of approximately $280,000.

Standard Oil Co. of California, San Francisco, to provide plant facilities in California at a cost of approximately $6,200,000.

Clifford Mfg. Co., Boston, Mass., to provide additional facilities in a plant in Massachusetts at a cost of approximately $275,000, resulting in an overall commitment of approximately $1,535,000.

Aerojet Engineering Corp., Pasadena, Calif., to provide plant facilities in California at a cost of approximately $150,000.

Upper Columbia Logging Co., Hood River, Oreg., to provide equipment for operations in Washington and Oregon at a cost of approximately $100,000.

Babcock & Wilcox Tube Co., Beaver Falls, Pa., to provide additional equipment for a plant in Pennsylvania at a cost of approximately $35,000, resulting in an overall commitment of approximately $960,000.

Dow Magnesium Co., Midland, Mich., to provide additional plant facilities in Texas at a cost of approximately $335,000 resulting in an overall commitment of approximately $62,000,000.

Fairchild Aviation Corp., Jamaica, N. Y., to provide additional equipment for a plant in New York at a cost of approximately $65,000, resulting in an overall commitment of $450,000.

Projects Costing $1,304,055,747 Halted by WPB Since Oct. 23

Construction projects having a total cost of $4,161,181 were stopped during the week ended Feb. 19 by WPB.

Projects were halted through the revocation of preference ratings in conformance with the policy of curtailing construction not directly related to the war effort.

This brings to $1,304,055,747, the total cost of all projects which have been halted since Oct. 23, 1942.

Cost of projects stopped during the period Feb. 13 to Feb. 19, follows:

Project	Total Cost
Petroleum	$1,500,000
Highways	2,552,152
Shipbuilding	93,774
Communications	15,255
TOTAL	$4,161,181

CANADA . . .

War Production Facilities at Peak; No Beer, No Bonds

TORONTO, ONT.

STEEL mills are operating at capacity following the sharp curtailment during the strike in January. The threat of a walkout by employes of Algoma Steel Corp. Ltd., and Dominion Steel & Coal Corp. Ltd., set for Feb. 25, has been held in abeyance, pending developments before the National War Labor Board. When the strikers returned to work it was under provision they would go out again Feb. 25 if their full demands were not met in the meantime. The strike was called for a basic wage of 55 cents per hour and a cost-of-living bonus. The wage rate has been granted but the bonus still is under consideration.

C. D. Howe, minister of munitions and supply, has announced that operations will be resumed at Dominion Steel & Coal Corp.'s Ltd., Wabana, Newfoundland, iron ore mines when navigation opens. The government will supply ships to move the ore to blast furnaces at Sydney, N. S.

Dominion Steel & Coal Corp. Ltd. has acquired control of Canadian Tube & Steel Products Ltd., Montreal. This company has a modern plant, including electric furnaces, and specializes in wrought pipe, copper-bearing steel pipe, bolts, nuts, rivets, spikes, couplings, bars, wire rods and other products. About 15 years ago the Dominion Corp. took over the Peck rolling mill at Montreal, which has been operated as a subsidiary on wire products. It is understood these two plants will be operated as a unit.

Several years ago this company acquired the plant of the Canadian Steel Corp. at Ojibway, Ont., and the Canadian Bridge Co. at Walkerville, Ont., both formerly owned by the United States Steel Corp., and has been operating them as subsidiaries. It also controls the Graham Nail & Wire Products Ltd., Toronto.

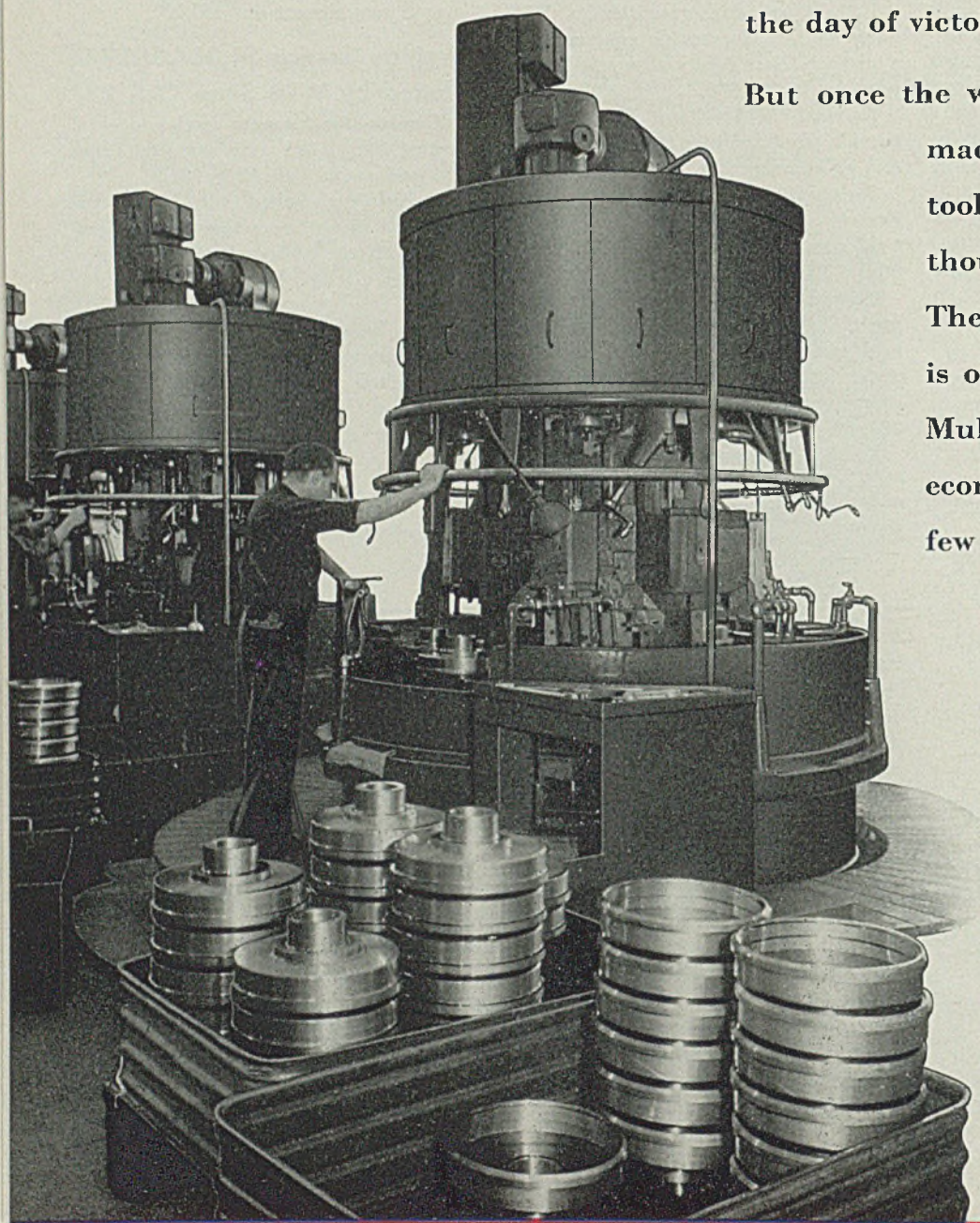
Power Rights Exchange Bill has been approved by the legislatures of Ontario and Quebec, which will enable the two provinces to proceed with hydroelectric power developments with total rated capacity of 4,500,000 horsepower. For the immediate future proposed development will be 850,650 horsepower, 428,390 for Ontario and 422,260 for Quebec.

New government beer and liquor regulations, which have resulted in a shortage of beer, practically shutting out war workers from obtaining supplies, have created a problem in some plants. According to reports a number of workers walked off their jobs at a government construction project to get beer and at a Toronto plant about 100 employes stopped work in the middle of a shift for the same reason. They contended they were unable to get a drink when they ended their shift and had decided to get it when the supply was available. Shop bulletin boards contain notices reading: "No beer, no bonds" and "No beer, no shells."

when the WAR is FINISHED BUSINESS...

As long as we need fighting planes, these Mult-Au-Matics will work hard at their present job. Their swift work is speeding the day of victory.

But once the war is won, these versatile machines can be quickly re-tooled for one or more of thousands of peacetime tasks. The experience of many plants is on record to show that the Mult-Au-Matic method effects economies on runs of even as few as 200 parts.



Rough and finish machining of reduction gears which are Nitralloy Steel forgings on a battery of Bullard Type "D" Mult-Au-Matics in an aeronautical plant. The 7 working stations, with independent speeds and feeds make possible all the work on these gears with but two chuckings.

THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Ogre of labor shortage is overplayed, except in civilian services. . . Better deliveries on machine tools. . . Building engines for Higgins. . . More welding on tank destroyer

DETROIT

STRAIGHT-THINKING is scarce on the real situation here with regard to labor supply and labor shortage in war production plants. Through the haze of conflicting opinions and statements, however, the following points seem clear enough to any impartial observer:

1. At the moment there is no critical shortage in labor supply. Most plants are still interviewing hundreds daily at their employment gates. Managements are not concerned over labor shortages, with the possible exception of the Ford Willow Run plant.

2. There is a definite and increasingly serious labor supply problem in the complete range of civilian services, because of the drainage from these establishments resulting from the draft and war plants. The problem is crucial, because admittedly some semblance of normal civilian services must be maintained if for no other reason than to support the war effort.

3. Union leaders do not believe there is a shortage of labor for war plants, and can see none in the months ahead. They charge there is widespread "hoarding" of labor by plant managements, and they believe immediate steps to correct this condition should be taken. The first means they suggest always is the organization of labor-management committees.

4. A critical situation exists in regard to supervisory personnel, even in war plants, which may in turn partly explain labor hoarding if there actually is such a thing being practiced. Upgrading of men to supervisory ranks is difficult because of the lack of sufficient number and also because many workmen "on the line" are making more money than their foremen and are not inclined to accept promotion if it does not mean more money.

Union Charges Labor Hoarding

It may be of interest to analyze briefly some of the thinking of union labor leaders in this area, and what follows can be taken as coming from the highest sources.

Union leaders are vehement in their charges on the score of labor hoarding and cite actual examples to prove it. One particular case involves a young girl recently hired in a war plant who, after several weeks on the job, complained to the union that she was quitting because she had nothing to do and her foreman was admonishing her for not keeping busy. She was advised by a union official to pick up a bar of steel and hammer it when the foreman was near and thus avoid his ire. So far, it is related, she has been pounding this bar of steel for three months and still has no definitely assigned work.

When a union spokesman was asked why this girl did not take her complaint direct to the foreman instead of to the union, the reply was to the effect that she did this and was told by the foreman to "look busy" when he was around even though she might have no specific task to do; the inference of course being that the plant management was simply hoarding labor against the day when increased production schedules might permit full utilization of labor capacity.

Suggestion Box Plan Attacked

Union leaders regard the suggestion-box plan, now in operation widely in war production plants, as a "lousy, paternalistic and impersonal system," to use actual quotes, and they point out, with perhaps some logic, that a $25 war bond and a merit button are small rewards for men who have contributed ideas which may result in actual savings in production costs running into thousands of dollars a year. A specific case is mentioned of a Detroit workman who perfected an idea which resulted in a $28,000 annual cost saving for his company, and his reward was a $50 war bond.

It is doubtless true that in the current flood of ideas which workmen are submitting to their managements are many which merit more attractive cash awards, but it must be remembered that many of these ideas are natural outgrowths of the sudden acceleration of war production which plant managements have hardly had time to digest, and are not altogether the result of intensive thinking on the part of the workmen. And further, there is the matter of the basic conception of a factory job: When a man goes to work for an employer his brain as well as his hands are hired, and his contributions to more efficient production are not necessarily eligible for extra compensation. It is all a part of the job. There are thousands of engineers, designers, layout men, metallurgists and others who are contributing ideas every day of their lives to better production, and they do not have to have a cash award for every worthwhile suggestion.

There is widespread belief that unions are unalterably opposed to any form of incentive system of wage payment. This is not altogether true. They are opposed to incentive systems as they once were practiced in Detroit. That is why union contracts signed by the motor companies place nearly all wages on a straight hourly basis. However, at the moment, union leaders say they are willing to negotiate incentive systems, in fact now have them in some agreements with smaller plants. There are other things they want before incentive systems, though, particularly in the large plants. One of these is the labor-management committee; another is some form of guaranteed minimum weekly wage.

Unionists make no bones about the fact that they are working to knock the "Little Steel" wage formula higher than a kite, as mentioned here last week. They fear, however, that the scrapping of this formula will, in the end, be accomplished by John L. Lewis and his mineworkers, with the result that the anti-administration Lewis will emerge as a great hero in the ranks of all organized labor—a development which would be disconcerting to say the least, no matter how justifiable may be a $2 a day increase for hard coal miners now earning a measly $5.40 per day.

Lewis is girding for a real fight and he has reasonable ground on which to premise his fight. If he emerges victorious and rallies around him union labor outside the UMW ranks, then the New Deal and the administration might just as well kiss itself out of the Washington picture in 1944. They will be dead ducks when the vote is counted.

Better Deliveries on Tools

While demand for all types of machine tools in this area has tapered off appreciably in recent months, delivery periods now being about one-half what they were a year ago, an appreciable volume of work still is pending for aircraft and ordnance programs. Changing of the "freeze" period on all tools to 60 days recently has provided better assurances to buyers that they will obtain ordered machines on time. The term "freeze" in this connection means simply that by directive the machine tool branch of WPB has required tool builders to class all machines with delivery promises of 9 weeks or less as frozen, insuring the customer that he will receive his equipment as promised. Previously there had been a continuous reshuffling

of machine tool orders and deliveries, resulting in disrupted planning and schedules. Then one class of tools was placed in a 30-day freeze; another in a 60-day freeze. Now all are in the 60-day period.

Currently, such tools as centerless grinders, milling machines and the like are being quoted on a 9-10 week delivery basis, or just outside the freeze period. This likely will improve before long. In fact, there is talk of a number of machine tool builders being hungry for business at the moment. This would suggest the possibility of turning capacity in these shops over to production of parts for war equipment. As far as known, this is not being done yet.

Latest machine tool directive is that permitting the transfer of idle machines at one plant to another plant where they are needed. Whether this ruling will apply to new tools which are idle because of delay in receipt of parts or materials is not known, but presumably they would not be affected.

Tool and die shops in this area have passed their peak periods and are now operating in many cases well under the 7-day schedules once in force. Here again the opportunity would appear to be present for turning over parts production to such shops as have idle capacity, but the practical application of what in theory appears sound has many serious difficulties.

Tucker-Higgins Co. at Ypsilanti, Mich., is now buying materials and parts for production of a 6-cylinder L-head engine for installation in landing boats being built by the Higgins interests in New Orleans. The recently organized company will build a preliminary lot of about a dozen engines at Ypsilanti, after which production operations may be set up in the South. Two of the engines are used in each landing boat, geared to a cross shaft. Local sources are being arranged for parts such as blocks, studs, bolts, pumps, crankshafts and camshafts.

M-10 tank destroyer, referred to briefly here last week, is disclosed to be in production at the Fisher Body tank arsenal (and elsewhere) and closely resembles, from the waist-line down, the M-4 medium tank. Ordnance officials point out, however, that the destroyer is not considered as a successor to the M-4, each weapon having its specific purpose. The M-10, shown with other armament on page 57, has a lower silhouette than the M-4 tank and wherever possible, sections are of welded armor plate, rather than cast plate. The turret, for example, was designed for almost complete fabrication from rolled material, in contrast to the cast turret of the M-4. Most welding operations are done by machine, resulting in substantial savings in production time.

Commenting upon delays encountered in the B-26 medium bomber program, in which Chrysler, Hudson and Goodyear companies are supplying subassemblies to a Martin assembly plant in Nebraska, Col. G. E. Strong, public relations officer of the Central Air Corps Procurement District, notes that "production of completed planes has not come up to initial expectations, but it is now evident original schedules were too optimistic."

Design Modification Necessary

He adds that many design modifications were necessary in the evolution of the plane through its "growing pains," including increase in the number, caliber and disposition of guns, and larger wings and control surfaces to improve handling qualities. As a result, subcontractors were compelled to decelerate their production and to set up modification lines for altering completed parts. Late last summer, however, Hudson was 300 per cent ahead of schedule deliveries, Chrysler 500 per cent ahead, and Goodyear had "overcome its difficulties," in the words of Col. Strong.

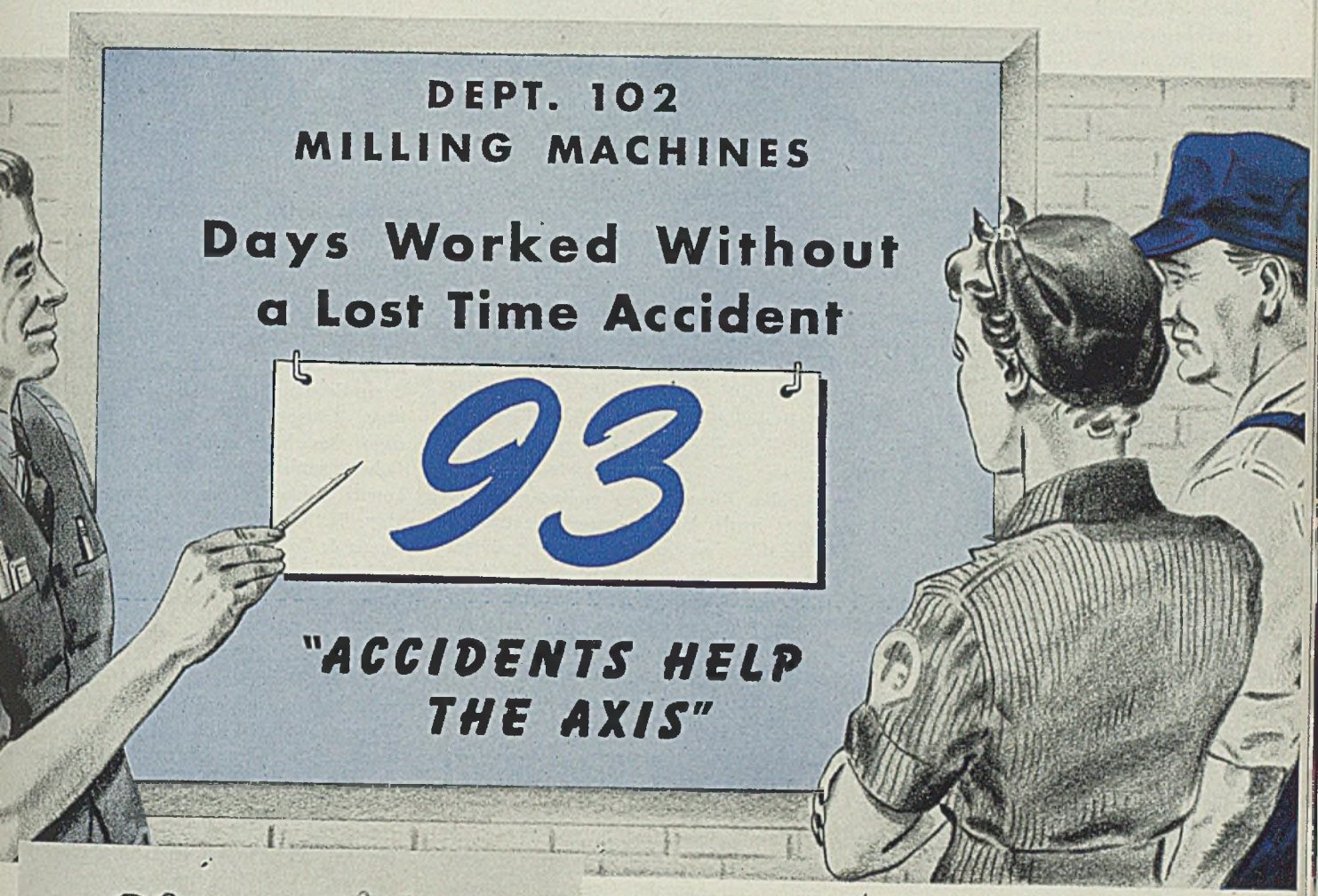
Meanwhile Martin was having its troubles at Omaha. There was a minimum of trained personnel available to send from the main plant at Baltimore. Thousands of farm workers had to be hired and trained for aircraft assembly. Concurrently Martin was being harassed by a host of modifications necessary in planes produced in the East. Hence production has had to be held at a less-than-maximum rate in the subcontractors' plants, pending an acceleration in the final assembly rate.

As a means of making uniform the gaging practices employed in inspection of precision parts of war equipment, the Automotive Council for War Production has proposed that the American Standards Association undertake an intensified standardization program to accelerate the development of a suitable standard for specifying fits and tolerances and methods of gaging inspection and gage control. The project would be of immediate benefit to all industry, according to George Romney, managing director of the council, and also could be applied to routine changed in design and tooling of war products and to new production tasks undertaken during the war as well as in the post war era.

WOMAN ORIGINATES REPRODUCTION OF PLANT LAYOUT

TWO-DIMENSIONAL equipment layouts are common in determining floor plans of new or rearranged metalworking plants, but here is a three-dimensional project at the Nashville division of Vultee Aircraft Inc., conceived by Sara Cobb (left) whose hobby was formerly the fashioning of wooden doll furniture. She is handing to Charles Gross, in charge of plant layout, a scaled reproduction of a lathe for placement on the planning board on which hundreds of other miniature pieces of plant equipment are spotted

VICKERS HYDROMOTIVE CONTROLS PROMOTE SAFETY



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Accident rates increase in times like these when unskilled workers must be hired to operate production machines. Machines equipped with Vickers Hydromotive Controls help to keep down accident rates.

Vickers Hydromotive Controls are simple, easily mastered and offer less opportunity for accident-producing mistakes. Completely automatic cycles are easily set up. Overload protection is positive and automatic. Controls may be so interlocked that incorrect operation sequence is impossible. Vickers Controls can be operated with one finger and can be placed wherever most convenient for the operator. As a result, the operator is not subjected to nervous or muscular strain.

All of these factors tend to reduce accident rates, increase production, reduce work spoilage, eliminate damage to machines. Vickers Application Engineers will gladly consult with you on specific machine requirements.

VICKERS *Incorporated*

1480 OAKMAN BLVD., DETROIT, MICHIGAN

MEN of INDUSTRY

Charles H. Manion, vice president in charge of operations, Follansbee Steel Corp., Pittsburgh, has been elected a director. He joined Follansbee in 1919 as a designer while the Toronto, O., plant was being built. From 1920 to 1921 he was maintenance engineer and subsequently efficiency engineer for both plants of the company, later becoming chief engineer, which position he held until July, 1940, when he was elected vice president in charge of operations at the Toronto and Follansbee, W. Va., plants.

—o—

Herman Rohde has resigned as manager, convector radiator enclosure department, Ferro-Co Corp., Brooklyn, N. Y.

—o—

A. E. Askerberg, general manager, Horton Mfg. Co., Fort Wayne, Ind., has been elected president, to succeed the late Henry J. Bowerfind.

—o—

Robert C. Trundle has rejoined Trundle Engineering Co., Cleveland, as a general assistant. He has returned from Washington, where for the past two years he was with the Army Ordnance Department.

—o—

F. Carl Hirdler Jr. has joined the Los Angeles laboratory staff of Turco Products Inc. He worked as a chemist in mid-western steel mills and other industrial laboratories before joining Lockheed Aircraft Corp. two years ago where he was employed as a processing engineer.

—o—

H. Tom Collard, of Protective Coatings Inc., Detroit, has been appointed representative in Michigan, the far West and in certain other localities for Mitchell-Bradford Chemical Co., Bridgeport, Conn.

—o—

Harry G. Miller, assistant mechanical engineer, Chicago, Milwaukee, St. Paul & Pacific railroad, Milwaukee, has been appointed mechanical engineer, to succeed **Charles H. Bilty**, who has retired after 50 years' service. **Vernon L. Green** has been made assistant mechanical engineer.

—o—

George W. Burpee and **Bradley Stoughton** have been elected to the board of directors, Lukens Steel Co., Coatesville, Pa. Mr. Burpee and Mr. Stoughton replace **W. Perry Tyson**, who becomes associate counsel of Lukens and its subsidiaries, and **Robert B. Haines III**, who, because of pressure of other obligations, withdrew as a candidate for re-election to the board. Mr. Burpee, a consulting engineer, has been associated with the engineering firm of Coverdale & Colpitts since 1921. Mr. Stoughton, metallurgist and consulting engineer, has been professor of metallurgy at Lehigh University since 1923.

C. H. MANION

—o—

Folke Richardz, an engineer for 17 years with Westinghouse Electric & Mfg. Co., has been appointed manager of engineering in the company's gearing department, Nuttall Works, Pittsburgh. He succeeds **S. L. Crawshaw**, resigned. He was assigned to the Nuttall Works as a design engineer in 1931, being named section engineer in the gearing department a year later.

—o—

Armin C. Kessler, vice president and general manager, Buffalo plant of Farrel-Birmingham Co. Inc., the past 24 years, has been transferred to the main offices at Ansonia, Conn., as general works manager. He will direct all manufacturing operations of the company's plants at Ansonia and Derby, Conn., and Buffalo. **L. D. Chirgwin**, formerly assistant general manager, has been named general manager at Buffalo.

—o—

Harold N. Evans has been appointed New York sales manager, Century Steel Products Co., succeeding **E. W. Fiedler**, who is now affiliated with the parent company, Century Steel Co., with main headquarters in Chicago. Mr. Evans the past year was in the iron and steel section of the Office of Price Administration in New York, and before that was in the stainless steel sheet sales division of Republic Steel Corp. for 15 years in its New York office.

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Roberts B. Thomas has been elected secretary, American Institute of Steel Construction, New York, to succeed **V. G. Iden**, who has joined the staff of the Bureau of National Affairs, Washington. Mr. Thomas will continue as general counsel of the institute.

—o—

Benjamin J. Harlan, superintendent of blast furnaces, Lackawanna plant of Bethlehem Steel Co., has resigned to become associated with the Lone Star Steel Co., Daingerfield, Tex. Mr. Harlan had been associated with Bethlehem 20 years.

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John B. Hill, heretofore assistant superintendent, has been appointed superintendent of blast furnaces at the Lackawanna plant of Bethlehem, succeeding Mr. Harlan. Mr. Hill has been associated with Bethlehem 22 years.

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Joel Claster, Luria Bros. & Co. Inc., Philadelphia, has been appointed chairman, brokers' committee, Institute of Scrap Iron and Steel Inc. **Walter Erman**, Erman-Howell & Co. Inc., Chicago, has been made vice chairman. Other members are: **Herman D. Moskowitz**, Schiavone-Bonomo Corp., Jersey City, N. J.; **Myer W. Singer**, M. W. Singer & Co., Pittsburgh; **William Rosenthal**, Hyman-Michaels Co., St. Louis; **Louis Z. Zalk**, Duluth Iron & Metal Co., Duluth.

—o—

H. M. Rowlette, newly elected vice president and general manager, Whiting Corp. (Canada) Ltd., will be in active charge of the Canadian subsidiary, headquarters of which have been moved to 45 Richmond street, West Toronto, Ont. He succeeds **Col. James Mess**, now devoting full time to government duties at Ottawa. Mr. Rowlette has been with the parent company at Harvey, Ill., since 1912, and for many years was in charge of purchases and stores. Serving with him as assistant general manager is **Alex Ritchie.**

H. T. Doran, 515 New Birks building, Montreal, and **W. Bruce Campbell**, 628 Royal Bank building, Winnipeg, will continue as sales representatives of the Canadian company.

—o—

Dr. Harold Moore, C.B.E., has been awarded the Institute of Metals (London) medal. A fellow of the institute, of which he was president in 1934-1936, Dr. Moore has a long and distinguished metallurgical career. He will receive the medal as one who has rendered "outstanding services to nonferrous metallurgy".

—o—

Edwin S. Armstrong has been appointed district manager at Milwaukee for the W. W. Sly Mfg. Co., Cleveland, with

headquarters at 7936 Rogers avenue, Wauwatosa, suburb of Milwaukee. Long identified with the foundry industry, Mr. Armstrong has held executive positions with Fairbanks, Morse & Co., Shaw Crane Works, Campbell, Wyant & Cannon Foundry Co., Studebaker Corp., and International Harvester Co.

—o—

Dr. Joseph Slepian, associate director of research, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been awarded the 1942 Lamme medal of the American Institute of Electrical Engineers, "for his contributions to the development of circuit interrupting and current rectifying apparatus." The medal and certificate will be presented to him at the national technical meeting of the institute to be held in Cleveland, June 21-25.

—o—

Maurice V. Cornell, former sales representative for Marion Steam Shovel Co., Marion, O., has enlisted in the United States Navy and has been commissioned a lieutenant junior grade. **E. T. Bettels,** former sales representative for the company on the iron ore ranges, has been commissioned lieutenant, U. S. N. R.

—o—

Bradley H. Booth, the past four years metallurgist, Jackson Iron & Steel Co., Jackson, O., has become foundry engineer, Carpenter Bros. Inc., Milwaukee. Prior to affiliation with Jackson Iron & Steel, Mr. Booth served as metallurgist with Illinois Malleable Iron Co., Decatur, Ill., and chemist with Laconia Malleable Iron Co., Laconia, N. H.

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John B. Klumpp has been elected a director, American Meter Co. Inc., New York. Prior to engaging in private practice as a consulting engineer in 1929, Mr. Klumpp was employed by the United Gas Improvement Co. in various engineering capacities.

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Wendell H. Funderburg, central district sales manager. Continental Can Co. Inc., Chicago, has been appointed vice president in charge of packers' can sales, and **Paul E. Pearson,** manager of the equipment manufacturing division, has been made vice president in charge of equipment development. Both will maintain Chicago headquarters.

—o—

Harry D. Byers has been named treasury manager, Pacific Coast district, Westinghouse Electric & Mfg. Co., with headquarters at San Francisco, where he has served the past four years as treasury department representative.

—o—

H. M. Capron, who organized the Equipment Corp. of America, Chicago, in 1918, has been elected chairman of the board. **Joseph V. Sullivan,** vice president in charge of sales, succeeds Mr. Capron as president. **M. E. Jost** and **L. T. Kern** have been elected vice presidents, and **E. H. Belfrey,** re-elected secretary-treasurer.

—o—

C. R. Van Gorder has been appointed district engineer, Cardox Corp., with offices at 233 Broadway, New York. He formerly occupied a key position on the corporation's engineering staff at the home office in Chicago.

OBITUARIES . . .

Stanton Hertz, 48, vice president and assistant to the president, Copperweld Steel Co., Glassport, Pa., lost his life in a fire in his home in Pittsburgh, Feb. 27. Joining Copperweld in 1921, Mr. Hertz served successively as chief engineer at the New York office, general manager of sales, and vice president. He served as executive director of Copper Wire Engineering Association for five years beginning in 1936 and on his return to Copperweld in 1941 assumed the post he held at his death.

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Axel Nelson, 70, president, Aurora Steel Products Co., Aurora, Ill., died in that city, Feb. 28.

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William J. Kibler, 70, president, Buffalo Steel Co., Tonawanda, N. Y., died Feb. 25, in Tonawanda. He was associated with Buffalo Steel for nearly 50 years, advancing from bookkeeper to the presidency.

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Herbert B. Crile, 65, who represented the Superior Sheet Steel Co., Canton, O., in Ohio, Indiana and Michigan, until his retirement five years ago, died Feb. 18, at his home in Canton.

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William A. Humphreys, 76, vice president, Robinson Clay Products Co., Akron, O., died at his home in Chicago, Feb. 22. His association with the company dated from 1894 when he became manager of its Chicago office.

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Frederick Kinsey, 72, personnel director, Union Asbestos Co., Berwyn, Ill., and former superintendent, Chicago division, New York Central railroad, died in Oak Park, Ill., Feb. 18.

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H. C. Cappel, 58, treasurer and general manager, Greer Steel Co., Dover, O., died Feb. 25. He had been associated with the company 26 years.

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Judson M. Stone, 43, vice president, Belle City Malleable Iron Co., Racine, Wis., died in that city, Feb. 23.

—o—

Arthur Aldrich Hale, 58, vice president, Griffin Wheel Co., Chicago, died Feb. 21, at his winter home in Coral Gables, Fla. Associated with the company 37 years, he had been vice president since 1927.

—o—

Anthony T. Brodie, 72, manager of the Cleveland office of Pittsburgh Piping & Equipment Co., died Feb. 22, in Cleveland.

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Benjamin A. Keiley, 69, president, R. & J. Dick Co. Inc., Passaic, N. J., and the Barry Pulley Co. Inc., Muscatine, Iowa, died Feb. 17 in Chicago, where he was attending a meeting of the Multiple V-Belt Drive Association, of which he was president. He was also chairman of the board, Power Transmission Council Inc.

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C. G. Gilbert, 60, manager of the Detroit office of Federal Products Corp., Providence, R. I., died Jan. 28, in Detroit. He had been associated with the corporation 22 years, and had been manager at Detroit since 1926.

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Vern C. Hughes, 71, lake ore analyst, and president of Crowell & Murray Inc., Cleveland, analytical chemists and metallurgists, died Feb. 28, in Cleveland. He had been associated with Crowell & Murray since 1931, when the Hughes-Guentzler Co. merged with it.

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Charles Owen, 75, retired pioneer of the automobile industry, who recently re-entered the field as contact man between the testing and experimental departments at the Cleveland Diesel Engine Division of General Motors Corp., died Feb. 23, at his home in Cleveland.

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Martin Schiff, 52, chief engineer, Century Electric Co., St. Louis, died Feb. 15, in that city.

—o—

Harry Hanford, 38, the past ten years Ohio sales representative for the Standard Pressed Steel Co., Jenkintown, Pa., died March 2, in Cleveland.

Durham Mfg. Co., Muncie, Ind., receives the joint "E" pennant, above. Left to right: Capt. H. P. Burnett, U. S. Navy; Earl A. Munger, company president; E. M. Morris, chairman of the board; Col. W. R. Martin, executive officer, Cincinnati Ordnance district; Rear Admiral T. D. Ruddock; E. R. McEndarfer, president, National Industries

Left—Showing the "E" flag being awarded Crane Co., Chicago, for outstanding production of valves, left to right: Estelle Maslowski, representative worker; Rear Admiral Clark H. Woodward; J. H. Collier, president of Crane Co., Howard H. Upton, representative worker; Col. J. F. Butler

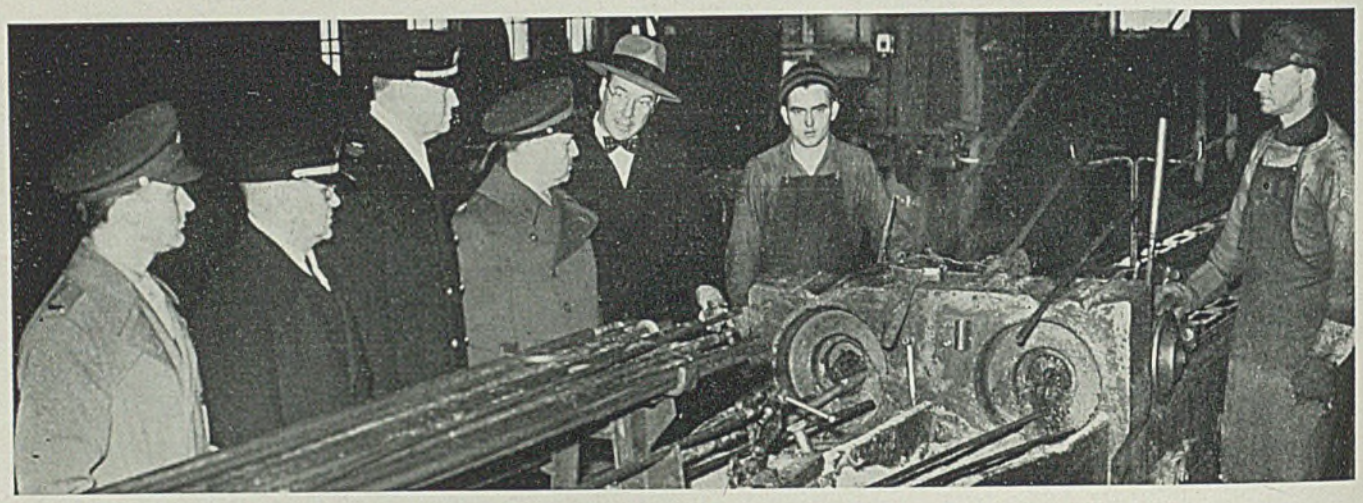
Maj. Robert G. Allen, executive officer, Philadelphia Ordnance district, Herbert W. Anderson, president, Fidelity Machine Co., Philadelphia, and Maj. F. A. Lutz pause in the inspection and testing room during a tour of Fidelity's plant after the company received the "E" flag

A. G. Pratt, president, and P. D. White, right, vice president and general manager, Babcock & Wilcox Tube Co., Beaver Falls, Pa., hold the burgee awarded the company for trebling production since Pearl Harbor. At Mr. Pratt's shoulder is Rear Admiral William C. Watts, who made the award

Julius F. Heim, superintendent, presents, right, family heirloom flag to V. P. Reilly, president of the Illinois Gear & Machine Co., Chicago, for use in the company's Army-Navy "E" ceremonies, Feb. 19

Participating in the award to the Simonds Saw & Steel Co., Fitchburg, Mass., below, were left to right: Maj. Daniel Simonds, president of the company now on leave for service in the Army; Gifford K. Simonds Jr., general manager; Brig. Gen. Burton O. Lewis who made the presentation; Sakari Lindstrom, employe with 47 years continuous service; Alfred Woollacott, Fitchburg mayor; Capt. Gordon C. Hall, U. S. Navy

Only 1 per cent of all the plants engaged in war production have been given the right to fly the Army-Navy "E", Brig. Gen. A. G. Gillespie, commandant, Watervliet arsenal, said as he presented the burgee to the East Springfield, Mass., plant of Westinghouse Electric & Mfg. Co. Receiving the pennant, above, are William O. Lippman, left, works manager, and Leo Benoit, employe representative. Employes received lapel insignia



Viewing a draw bench at the plant of the Michigan Seamless Tube Co., South Lyon, Mich., are, left to right: Lieut. R. Vanderkloot; Lieut. R. C. Turner; Lieut. Commander H. S. Dilcher; Col. George E. Strong; William A. McHattie, president of the company; and draw bench operator. Photo was snapped on inspection tour of plant in connection with award of "E" pennant

W. J. Fisher, vice president, A. B. Farquhar Co. Ltd., York, Pa., and Irwin J. Trone, labor leader, right, accept the pennant from Maj. Robert G. Allen and Lieut. P. J. Kaufman

Additional Plants Honored by Services

PRODUCTION awards for outstanding war work last week were granted by the Army and Navy to the following plants:

Davis Emergency Equipment Co., Inc., Newark, N. J.

Desmond-Stephan Mfg. Co., Urbana, O.

Edison General Electric Appliance Co. Inc., Chicago.

Fairfield Mfg. Co., Lafayette, Ind.

General Electric Co., Appliance and Merchandise Department, Bridgeport, Conn.

Kilby Steel, Anniston, Ala.

Fred M. Link, New York

Oliver Farm Equipment Co., Springfield, O.

Patterson Screen Co., Towanda, Pa.

Sebastion Lathe Co., Covington, Ky.

Solar Mfg. Corp., Avenue A plant, Bayonne, and Fifty-second Street plant, West New York.

Spun Steel Corp., Canton, O.

Sprague Specialties Co., Plant No. 1 and Plant No. 2, North Adams, Mass.

Truscon Steel Co., Youngstown, O.

Uchtorff Co., Davenport, Iowa.
Van Dorn Iron Works, Cleveland.
T. C. Wheaton Co., Millville, N. J.
Wincharger Corp., Sioux City, Iowa.

Cleveland Scrap Dealers Win WPB Merit Pennant

M. Cohen & Sons Co., Cleveland, have been awarded the War Production Board merit pennant for outstanding service in the collection and shipment of scrap in furtherance of the war effort. Comparable to the Army-Navy "E" production awards, the salvage pennant was presented by Everett J. Swanson, assistant chief of the scrap processors branch of the board. Employes received lapel insignia.

General Machinery Corp. Adds Gold Star to "M" Pennant

General Machinery Corp., Hamilton, O., has been awarded a gold star to be added to the Maritime "M" pennant which it received last July. General Machinery Corp. embraces the Nile Tool Works Co., the Hooven, Owens, Rentschler Co., Hamilton, and the General Machinery Ordnance Corp., Charleston, W. Va. They are producing heavy machine tools, steam and diesel engines, cannon and gun barrels.

Precision Measuring Service Offered Gratis

Free engineering and laboratory service through which ordnance and other manufacturers of mechanical parts may obtain precise readings on flatness and profile, was offered last week by L. P. Jackson, vice president in charge of engineering, Mid-West Abrasive Co., Detroit.

Company's new service, Mr. Jackson said, is designed primarily to assist ordnance manufacturers who have to cope with rigid government specifications on finish and tolerances. However, it is offered gratis to any manufacturer who requires such readings and does not have measuring equipment on hand.

The Mid-West laboratory, Mr. Jackson said, is equipped to measure accurately depth of scratch down to one-tenth of a micro-inch or to determine promptly whether or not any given part is optically flat. In event a part is found to be not optically flat, the laboratory will make it flat if that is requested by users of the service. There will be no charge.

The service includes return of the part along with readings and complete technical data on the grain, grade, tool speed, coolant and pressure recommended to produce the required finish.

Foundrymen Sponsor Four Educational Lectures

Metropolitan chapter, American Foundrymen's Association, is sponsoring a war time educational course of four lectures to be held on the ninth floor, Woolworth building, 233 Broadway, New York, March 10, 17, 24 and 31, respectively. Speakers and subjects follow:

March 10, "Properties of Cast Metals" by T. D. Parker, metallurgical engineer, Climax Molybdenum Co., New York, and W. E. Martin, metallurgist, Sperry Gyroscope Co. Inc., Brooklyn, N. Y.

March 17, "Selection of Cast Metals" by J. B. Godshall, assistant metallurgist, Ingersoll-Rand Co., Phillipsburg, N. J.

March 24, "Intelligent Design" by R. E. Ward, assistant chief metallurgist, Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J.

March 31, "Expediting Army-Navy Approval of Re-Designs" by T. J. Little, conversion engineering section, New York Ordnance District, New York.

Tickets at $1 for the series may be obtained from K. A. DeLong, International Nickel Co. Inc., 67 Wall street, New York. Under OPA regulations, cars may be driven to these meetings if adequate public transportation is unavailable.

American Management Association—Wartime Conference, Hotel Pennsylvania, New York, March 24-25, is expected to give a broad picture of how companies are handling financial problems. Among the speakers will be: O. N. Lindahl, vice president, finance, Carnegie-Illinois Steel Corp., K. Powlison, treasurer, Armstrong Cork Co., and R. Seybold, vice president and comptroller, Westinghouse Electric & Mfg. Co.

Electrochemical Society—A feature of the eighty-third meeting in Hotel Roosevelt, Pittsburgh, April 7-10, will be symposium on dielectrics. Tentative program also includes papers on corrosion, electrothermics and automatic control.

"Frontiers in Chemistry"—Twelve of America's distinguished scientists will participate in a series of lectures at Western Reserve University, Cleveland, which began Feb. 19 and will be held on successive Fridays through May 21. Admission is by ticket, but tickets will not be sold for individual lectures. Tuition will be $10 for each part. The first part of the series deals with advances in nuclear chemistry; the second part with major instruments of science and their application to chemistry.

American Chemical Society — Advances made by chemical science and industry in relation to war effort will feature the 5-day war meeting in Hotels Statler and Book-Cadillac, Detroit, April 12-16. Five sessions will be sponsored by the Division of Industrial and Engineering Chemistry.

American Mining Congress—Coal mining war conference will be held in Cincinnati, May 17-18.

American Supply & Machinery Manufacturers' Association, Inc.—War conference of the mill and industrial supply industry will be held under the auspices of the Three Mill Supply Associations, Netherland Plaza hotel, Cincinnati, May 10-12.

Safety Engineers—Annual convention, March 23-25, Hotel Pennsylvania, New York.

American Society of Tool Engineers—March 25-27. Machine and tool progress exhibition, Milwaukee Auditorium, Milwaukee. Ford R. Lamb, 2567 West Grand Boulevard, Detroit, is executive secretary.

Midwest Power Conference—Palmer House, Chicago, April 9-10. S. E. Winston, Illinois Institute of Technology, 330 Federal street, Chicago, is conference director.

American Management Association—Packaging conference, April 13-16, Hotel Astor, New York. J. O. Rice, 330 W. 42nd street, New York, is assistant secretary.

National Electrical Manufacturers Association—Spring meeting, April 20-23, Palmer House, Chicago. R. J. Blais, 155 E. 44th street, New York, is convention manager.

American Society of Mechanical Engineers—Spring meeting, April 26-28, Hotel Black Hawk, Davenport, Iowa. C. E. Davies, 29 W. 39th street, New York, is national secretary.

American Foundrymen's Association—Forty-seventh annual meeting, April 28-30, Hotel Jefferson, St. Louis. R. E. Kennedy, 222 W. Adams street, Chicago, is secretary.

American Institute of Mining and Metallurgical Engineers—Open Hearth Conference, annual meeting, Hotel Statler, Cleveland, April 29-30. Frank T. Sisco, 29 West 39th street, New York, is secretary.

Four Destroyers Launched In 14 Minutes at Kearny

Four destroyers were launched in 14 minutes Feb. 28 by Federal Shipbuilding & Dry Dock Co. at its Kearny, N. J., yard. The warships were sent into the water two at a time by the United States Steel Corp. subsidiary.

This was the third quadruple destroyer launching in the past ten months at the Kearny yard. The first quartet was sent down the ways, one at a time, last May 3 in a total of 50 minutes. The second four were launched, two at a time, in 28 minutes on Armistice Day.

Grants Government Free Use of 200 Wire Patents

The government has been granted the use of some 200 patents royalty free by the General Cable Corp., New York, Dwight R. G. Palmer, president, announced last week. Under the terms of the offer the government is free to place orders with wire manufacturing concerns regardless of whether they are licensees of the General Cable Corp.

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Lindsay & Lindsay, Chicago, formed in January, 1943, has purchased from Dry-Zero Corp. the assets and business of the former Lindsay Structure Division of that concern for manufacture and sale of Lindsay Structure, a new method of light steel construction, Harvey B. Lindsay, former president of Dry-Zero announced. He resigned from that position to direct activities of the new organization.

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Package Machinery Co., Springfield, Mass., has contracted with the Navy for the manufacture of gyroscopic compasses under a licensing agreement with the Sperry Gyroscope Co., Brooklyn, N. Y.

—o—

American Engineering Co., Philadelphia, has appointed American Equipment Co., Detroit, its representative for Hele-Shaw pumps in Michigan.

—o—

Fansteel Metallurgical Corp., Chicago, has leased a one-story fireproof building, 200 x 400 feet, at 1900 Marquette street, to be used for drafting and manufacturing.

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Metal & Thermit Corp., New York, has been conducting a contest for photographs and descriptions of welded work. Three hundred dollars in war bonds and stamps were offered for the best selections received during July, September and November.

—o—

Detroit Rex Products Co., Detroit, announces establishment of two new offices. The north central region, which includes all of Michigan except the upper peninsula, has headquarters in Detroit, with R. W. Pflug in charge. W. F. Newbery is manager of the south central region, comprising Ohio, Indiana and Kentucky, with offices in the Mutual Home building, Dayton, O.

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Wahl Refractory Products Co., Fremont, O., has appointed Wolverine Foundry Supply Co., Detroit, distributor of its products in that area.

—o—

Keystone Drum Co., Pittsburgh, has leased the idle plant of Charleroi Steel Foundry Co., Charleroi, Pa., to manufacture fiber drums with steel heads. The plant will replace Keystone's Butler, Pa., plant which was destroyed by fire several months ago. It is estimated output will reach 40,000 drums per month.

—o—

Vern R. Drum has organized Vern R. Drum & Associates, production engineers, with headquarters in the New Center building, Detroit. Mr. Drum recently resigned as consultant on manufacturing problems to the Cleveland Ordnance District to form his own company. Previous to that connection he was vice president in charge of manufacturing, Willys-Overland Motors Inc., and at one time served as president and general manager of Hupp Motor Car Co., Logan Gear & Stamping Co., Toledo, O., and Ryerson Haynes Co., Jackson, Mich.

—o—

New manufacturing plant and general offices of Plan-O-Mill Corp., formerly at Royal Oak, Mich., are located at 1511 East Eight Mile road, Hazel Park, Mich., just outside Detroit. Plan-O-Mill Corp. in addition to manufacturing thread and form milling machines, now produces a line of cutters.

—o—

Stroman Furnace & Engineering Co., Franklin Park, Ill., has been made a division of Petersen Oven Co., with offices at 300 West Adams street, Chicago, and plant at Franklin Park. Business of the Stroman company has been increasing faster than production facilities could be expanded under war conditions. Consequently, the association with a corporation with ample and suitable plant facilities was found advisable.

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Hazeltine Service Corp., Chicago, has changed its name to Hazeltine Electronics Corp., the plant now having additional facilities for electronics research and development.

—o—

Sheffield Corp., Dayton, O., and Wickman Corp., have been operating jointly under an exclusive manufacturing and selling agreement relating to certain machine tools. Under this agreement Sheffield designed and manufactured these machine tools for the American market. This joint operation is being discontinued by mutual consent upon completion of orders received under the agreement.

—o—

Campbell-Ewald Co. Inc., eastern division, New York, has moved its offices from 1230 Sixth avenue to the Eastern Air Lines building, 10 Rockefeller Plaza.

—o—

Clayton & Lambert Mfg. Co. has found it necessary to expand its facilities because of concentration on war work. The Torch and Fire Pot Division has been moved to 14247 Tireman avenue, Dearborn, Mich., and the general offices will also be established at the new address.

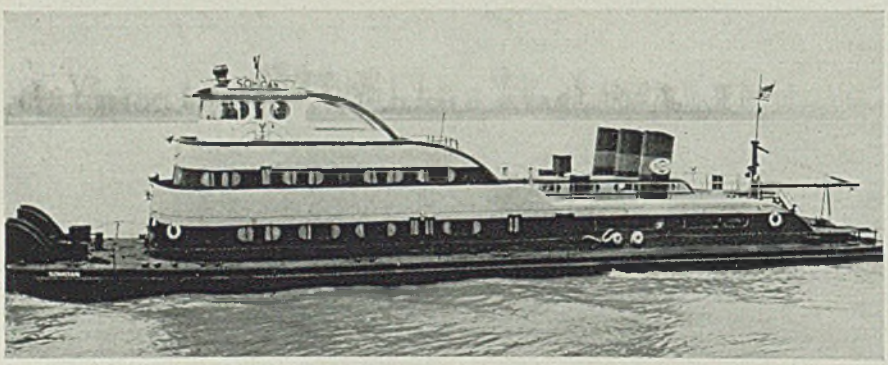
—o—

Acro Electric Co., Cleveland, has moved into new quarters at 1305 Superior avenue, with manufacturing facilities and space enlarged 300 per cent. B. Winston is president; C. A. Robinson, general manager, and J. S. McComb, vice president and sales manager.

—o—

Parker Wire Goods Co., Worcester, Mass., has changed its name to Parker Mfg. Co. because of the wider range of products it now manufactures. There has been no change in management or business policy. The company is erecting an addition to its plant costing approximately $37,500.

STREAMLINED TOWBOAT TO CARRY OIL ON MISSISSIPPI



SETTING a new style in Mississippi river boat architecture, the SOHIOAN will carry petroleum products for the Standard Oil Co. of Ohio from the oil fields on the lower Mississippi to pipelines on the upper river for refineries in the north and east. It is powered with three 800-horsepower diesel engines

Civilian Activity Drops As War Output Climbs

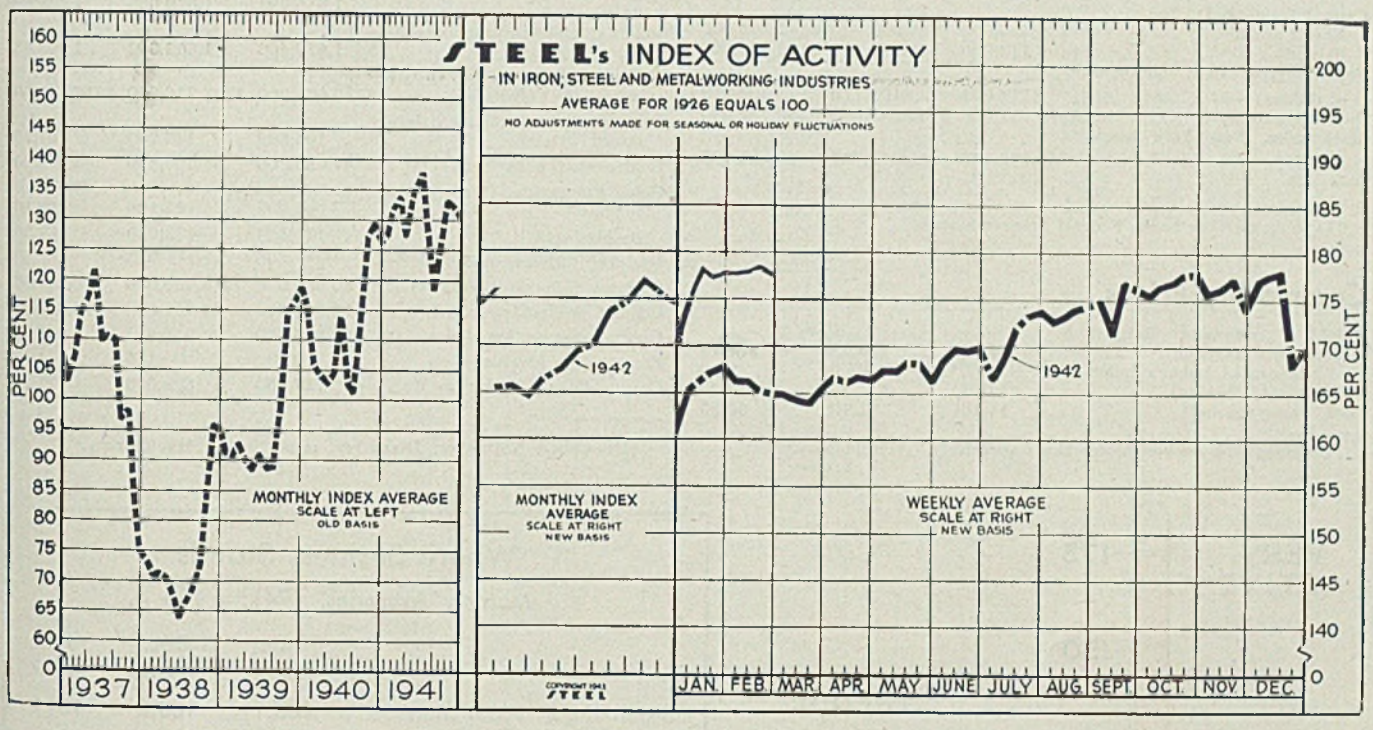
AS the year progresses, incursions of the war program on the civilian economy become more pronounced. The volume of munitions production continues to grow from month to month, each increase in the rate of output signaling further restrictions to come for unconverted producers of consumer goods, new inroads on manpower and materials.

Industrial production rose farther in January, stimulated by the higher tempo of aircraft and essential machinery lines. Deliveries of merchant vessels by shipyards declined slightly from December during the month, but were still at the high level of over one million tons. Reflecting largely a growth in munitions operations, the Federal Reserve Board's index climbed to 200 from 197 in December, standing 15 per cent above the figure for January, 1942.

In contrast, civilian production has been reduced in recent months close to the 1938 level, or roughly 15 per cent under the 1935-39 average, moving steadily downward toward the point indicated by WPB as "desirable"—a level barely above the 1933 average.

Steel production, so essential to the maintenance of a high-speed war machine, was held close to capacity through January and February, the rate of operations ranging narrowly between 98.5 and 99.5 per cent from Jan. 9 on. Ingot output in the first month totaled 7,408,000 tons, topped only by the record month of October, 1942. Consumption of scrap in January was 60,000 tons greater than the 4,693,000 tons reported in December, the heightened activity at furnaces being well supported by ample supply. In the like month of 1942, 4,590,000 tons were consumed.

Seasonal factors are influencing the trend in output of electrical energy, a downward curve being noted at the



STEEL'S index of activity receded 0.7 point to 177.3 in the week ending Feb. 27:

Week Ended	1943	1942
Feb. 27	177.3†	165.0
Feb. 20	178.0	165.1
Feb. 13	177.8	166.2
Feb. 6	177.6	166.3
Jan. 30	177.6	167.9
Jan. 23	177.2	167.4
Jan. 16	177.9	166.6
Jan. 9	175.7	165.6
Jan. 2	170.0	161.0
Week Ended	**1942**	**1941**
Dec. 26	167.8	120.5

†Preliminary.

Mo. Data	1943	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932
Jan.	175.7	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6
Feb.	177.6†	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3
March		164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2
April		166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8
May		167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8
June		169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4
July		171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1
Aug.		173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0
Sept.		174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5
Oct.		176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4
Nov.		175.8	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5
Dec.		174.1	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2

Note: Weekly and monthly indexes for 1942 and 1943 have been adjusted to offset the forced curtailment in automobile production and to more accurately reflect expanding steel production

end of January when record demand consumed 3,976,844 kilowatt hours, an all-time peak. In the latest week, ending Feb. 27, kilowatt hours totaled 3,892,796, 14.2 per cent above the corresponding week of 1942 but 55,953 k.w.h. under the period ending Feb. 20.

Weekly average loadings of revenue freight in January took 727,450 cars, compared with 809,000 in December and 711,284 in the first month of 1942. Greatest number of actual loadings for any week in the past two months occurred in the period closed Feb. 13, when 764,950 cars were called, 9581 cars above the highest previous week of the year to date. This compares with 909,957 cars used in the most important week of 1942.

Monthly average for STEEL's index of activity in January was 175.7, against 174.1 in December and 165.7 a year before. Preliminary index for February is 177.6, up 1.9 points from previous month showing positive response of this compilation to forces on the uptrend.

BUSINESS BAROMETER

Financial Indicators

	Jan., 1943	Dec., 1942	Jan., 1942
30 Industrial Stocks°	121.52	117.16	111.11
20 Rail Stocks°	28.59	26.83	28.01
15 Utilities°	15.57	14.02	14.41
Average Price of all listed bonds (N.Y.S.E.)	$97.47	$96.70	$95.24
Bank Clearings daily average (000 omitted)	$1,334,170	$1,392,183	$1,210,900
Commercial Paper, interest rate (4-6 months)	0.57%°	0.69%	0.56%
Com'l loans (000 omitted)†	$9,738,000	$10,321,000	$11,241,000
Federal Reserve ratio (per cent)	77.3	76.3	90.8
Capital flotations:†			
New Capital	$36,696,000	$29,029.000	$142,346,000
Refunding	$108,113,000	$68,842,000	$102,596,000
Federal gross debt (millions of dollars)	$111,069	$108,170	$60,099
Railroad earnings†	$170,851,000	$148,949,000	$80,549,000
Stock sales, New York Stock Exchange	18,032,142	19,312,762	12,993,665

°Dow-Jones series.
†Leading member banks Federal Reserve System.

Commodity Prices

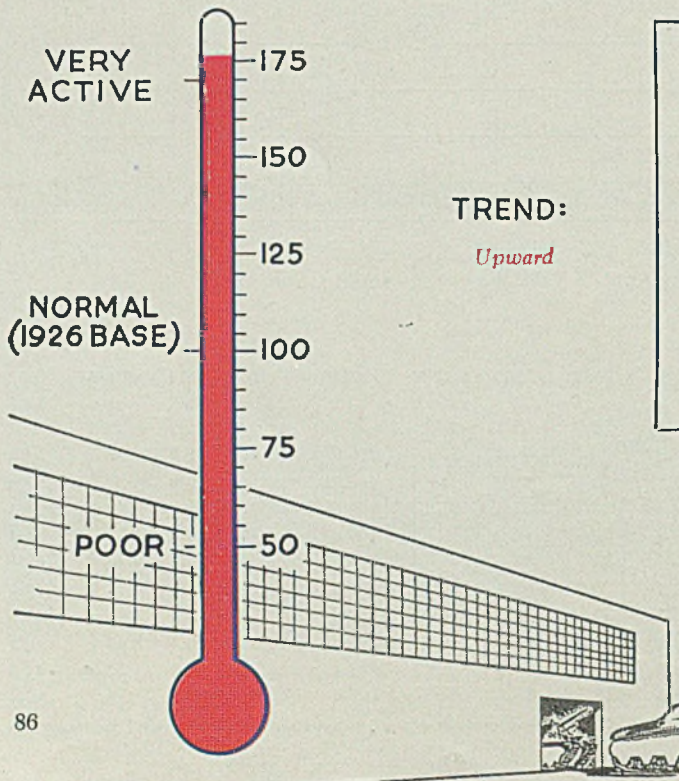
STEEL's composite finished steel price average	$56.73	$56.73	$56.73
U. S. Bureau of Labor's Index	101.9°	101.0°	96.0
Wheat, cash (bushel)	$1.325	$1.325	$1.308
Corn, cash (bushel)	$1.10	$1.10	$0.83

†December, November, December, respectively. °Preliminary.

Industrial Indicators

	Jan., 1943	Dec., 1942	Jan., 1942
Commerce Dept.'s Mfgs. Index†			
Orders	255.0°	279.0	232.0
Shipments	242.0°	232.0	188.0
Inventories	177.6°	177.9	158.4
Industrial Production Index (Federal Reserve Board)	200	197	171
Iron and Steel Scrap consumption (tons)	4,753,000	4,693,000	4,590,000
Gear Sales Index	268	300	288
Foundry equipment new order index	429.8	382.5	532.7
Finished steel shipments (net tons)	1,685,993	1,849,635	1,738,893
Ingot output (average weekly; net tons)	1,672,403	1,652,303	1,608,335
Dodge bldg. awards in 37 states ($ Valuation)	$350,661,000	$708,716,000	$316,846,000
Fabricated structural steel shipments (Tons)	105,669	145,280	167,753
Coal output, tons	47,029,000	48,390,000	48,540,000
Coke Production (Daily Av.)			
Beehive°	22,000	22,106	22,100
By-Product°	173,163	173,029	167,500
Business failures; number†	506	585	898
Business failures; liabilities†	$6,950,000	$13,469,000	$5,245,000
Cement production, bbls.†	14,090,000	16,241,000	13,810,000
Cotton consumption, bales	915,479	935,511	947,539
Freight Car Awards	0	135	4,253
Car loadings (weekly av.)	727,450	809,000	771,284

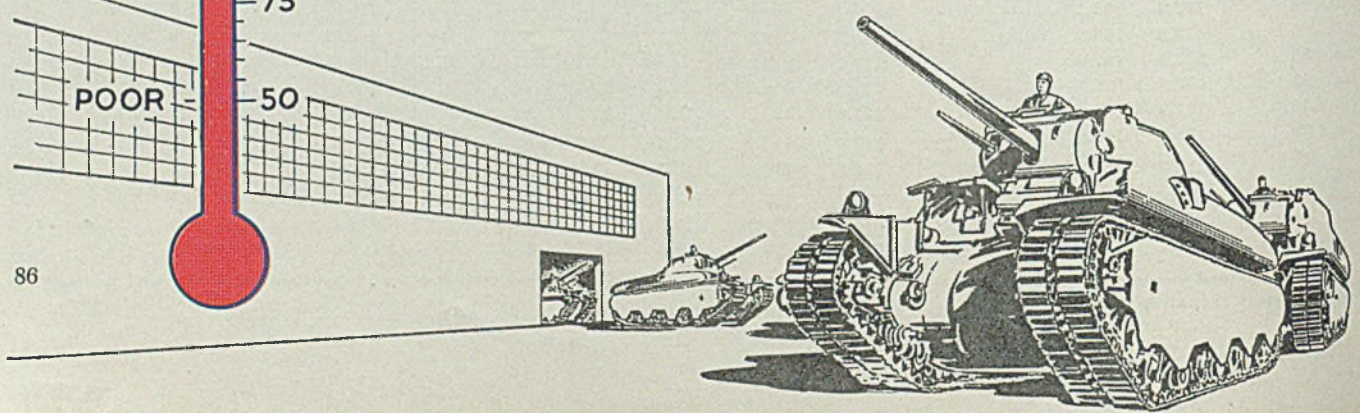
†December, November, December, respectively. °Preliminary.



Where Business Stands

Monthly Averages, 1941 = 100

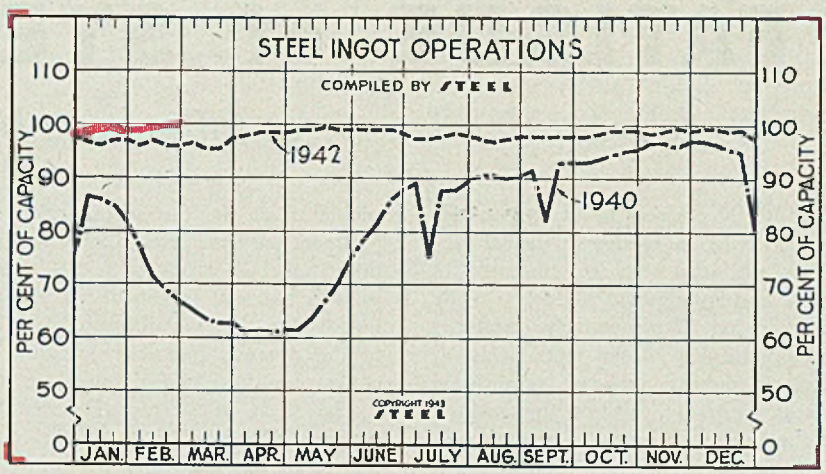
	Jan., 1943	Dec., 1942	Jan., 1942
Steel Ingot Production	105.1	103.8	101.2
Finished Steel Shipments	89.8	108.5	92.6
Structural Steel Shipments	61.9	77.4	98.4
Freight Carloadings	89.5	87.1	94.8
Building Construction	70.0	141.5	63.3
Wholesale Prices	116.7	115.3	109.2

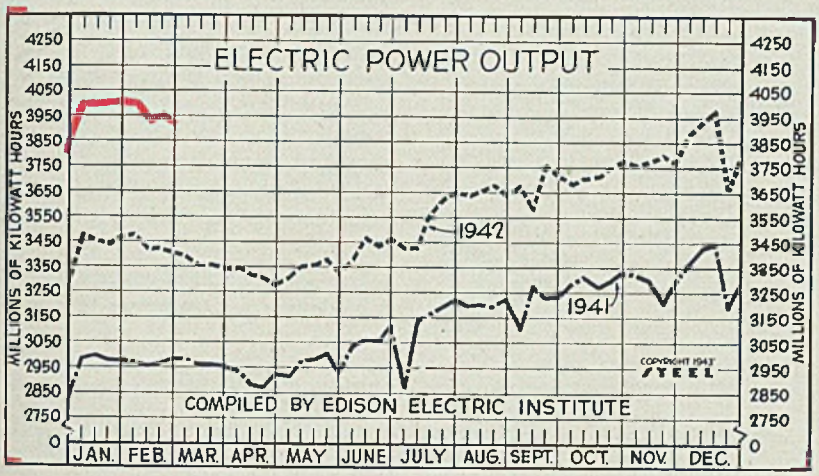


Steel Ingot Operations

(Per Cent)

Week ended	1943	1942	1941	1940
Feb. 27	99.5	96.0	96.5	65.5
Feb. 20	99.5	97.0	94.5	67.0
Feb. 13	99.0	97.0	96.5	69.0
Feb. 6	98.5	96.0	97.0	71.0
Jan. 30	98.5	97.0	97.0	76.5
Jan. 23	99.0	97.0	95.5	81.5
Jan. 16	99.0	96.0	94.5	84.5
Jan. 9	97.5	96.5	93.0	86.0
Jan. 2	97.5	97.5	92.5	86.5
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	99.0	93.5	80.0	75.5
Dec. 19	99.0	97.5	95.0	90.5
Dec. 12	99.5	97.5	95.5	92.5
Dec. 5	99.5	96.5	96.5	94.0
Nov. 28	99.0	95.0	97.0	94.0
Nov. 21	99.5	95.5	97.0	93.5





Electric Power Output

(Million KWH)

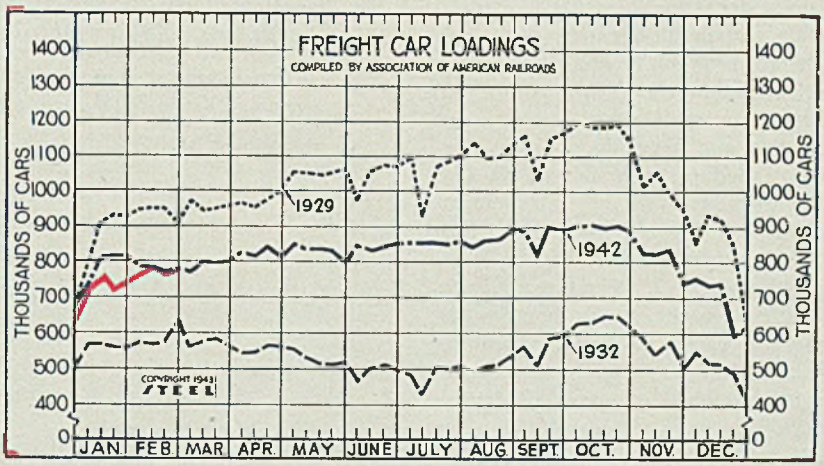
Week ended	1943	1942	1941	1940
Feb. 27	3,893	3,410	2,825	2,479
Feb. 20	3,949	3,424	2,820	2,455
Feb. 13	3,939	3,422	2,810	2,476
Feb. 6	3,960	3,475	2,824	2,523
Jan. 30	3,977	3,468	2,830	2,541
Jan. 23	3,974	3,440	2,980	2,661
Jan. 16	3,952	3,450	2,996	2,674
Jan. 9	3,953	3,473	2,985	2,688
Jan. 2	3,780	3,289	2,831	2,558
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	3,656	3,234	2,757	2,465
Dec. 19	3,976	3,449	3,052	2,712
Dec. 12	3,938	3,431	3,004	2,674
Dec. 5	3,884	3,368	2,976	2,654
Nov. 28	3,766	3,295	2,932	2,605
Nov. 21	3,795	3,205	2,839	2,561

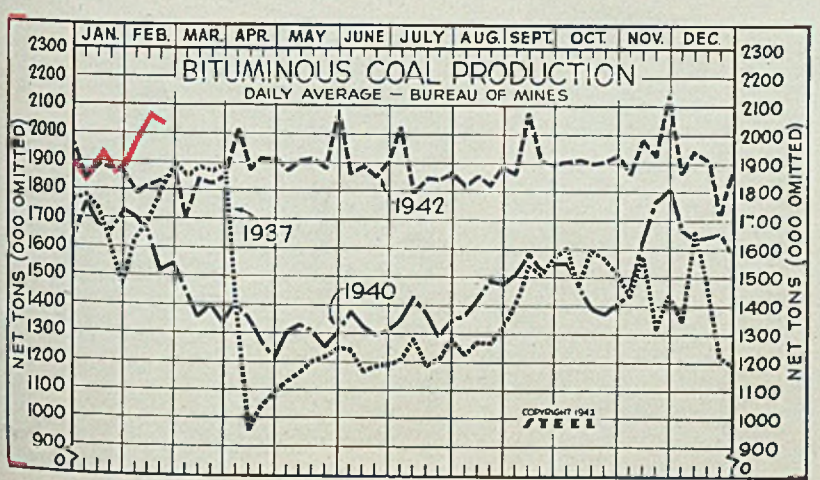
Freight Car Loadings

(1000 Cars)

Week ended	1943	1942	1941	1940
Feb. 27	764†	781	757	634
Feb. 20	752	775	678	595
Feb. 13	765	783	721	608
Feb. 6	755	784	710	627
Jan. 30	735	816	714	657
Jan. 23	709	818	711	649
Jan. 16	755	811	703	646
Jan. 9	716	737	712	668
Jan. 2	621	674	614	592
Week ended	**1942**	**1941**	**1940**	**1939**
Dec. 26	592	607	545	550
Dec. 19	743	799	700	655
Dec. 12	740	807	736	681
Dec. 5	760	833	739	687
Nov. 28	844	866	729	689

†Preliminary.





Bituminous Coal Production

Daily Average

Net Tons (000 omitted)

Week ended	1943	1942	1941	1937
Feb. 20	2,025†	1,833	1,736	1,807
Feb. 13	2,033	1,817	1,736	1,696
Feb. 6	1,980	1,793	1,683	1,634
Jan. 30	1,900	1,866	1,684	1,466
Jan. 23	1,867	1,886	1,656	1,605
Jan. 16	1,929	1,883	1,609	1,731
Jan. 9	1,833	1,842	1,691	1,780
Jan. 2	1,860	1,960	1,762	1,764
Week ended	**1942**	**1941**	**1940**	**1937**
Dec. 26	1,714	1,632	1,591	1,230
Dec. 19	1,913	1,792	1,656	1,477
Dec. 12	1,944	1,817	1,645	1,669

†Preliminary.

FATIGUE of STEELS

. . . as influenced by design and internal stresses

By J. O. ALMEN
Mechanical Engineering Department
Research Laboratories Section
General Motors Corp., Detroit

FULLY 90 per cent of all fatigue failures occurring in service or during laboratory and road tests are traceable to design and production defects. Only the remaining 10 per cent are primarily the responsibility of the metallurgist as defects in material, material specification or heat treatment. While this ratio is not a measure of the quality of workmanship contributed by each department, it can be said that the metallurgist has a better appreciation of his responsibility for fatigue failures than the designer, engineer or men in the production department. In fact, this appreciation of responsibility by the metallurgist contributes to his relative reluctance to accept the entire blame when things go wrong.

Metallurgists are familiar with the routine followed when a failed part is received by the laboratory. The fracture is examined and is found to be due to fatigue, the material is analyzed for composition, sections are studied for all of the many things that are metallurgically important and a report is written describing the things that are and are not up to par. But no matter how many possible metallurgical causes of trouble are found, such examination is far from sufficient *unless the failure is also examined for design faults and possible bad fabrication and assembly practice.*

Most failed parts should not be sent to the metallurgist at all, but unfortunately few engineers or production men are adequately trained in diagnosing fatigue trouble and, therefore, failures are seldom examined for contributing mechanical causes. Like the cowbird, who lays her eggs in the nests of other birds, most engineers pass all fatigue problems on to the metallurgical department with the implication that something must be wrong with the material or with the heat treatment. The metallurgist does his metallurgical best and, in the process, frequently destroys the evidence of mechanical faults.

The study of fatigue of materials is properly the joint duty of the metallurgical engineering and production departments. Unless all three have an understanding of fatigue phenomena and the factors that promote fatigue, they cannot recognize their individual responsibilities for the product they manufacture. There is no definite line of demarcation between mechanical and metallurgical factors that contribute to fatigue and there must, therefore, be close co-operation between the metallurgist and the engineering fatigue specialist, if such there be, or the metallurgist must possess the qualifications of metallurgist, designer and machinist.

This overlapping of responsibility is not sufficiently understood in industry, and hence the engineers are constantly demanding new metallurgical miracles instead of correcting their faults. It would be helpful if metallurgists would be less willing to look for metallurgical causes of fatigue and insist that equally competent examination for mechanical causes be made. Until this is done, we cannot hope to make full use of engineering materials.

The development of engineering materials, designs and processes require lab-

Fig. 1—Indicator for measuring curvature of surface treated strips

Fig. 2—Bar of SAE 4615 steel after machining, lapping and shotblasting, showing reappearance of machining marks after shotblasting

Fig. 3—Device for measuring compression-stressed layer. Thin flat strip is mounted on heavy base, rolled or peened on surface, then removed and curvature noted

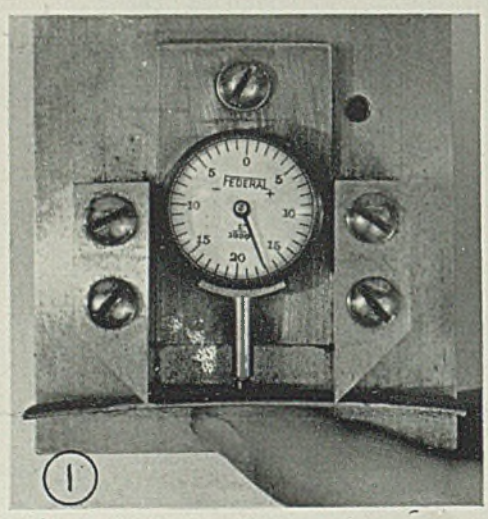
Fig. 4—Test sample showing residual stress resulting from carburizing and hardening. Specimen was split by saw after carburizing upper and lower faces only

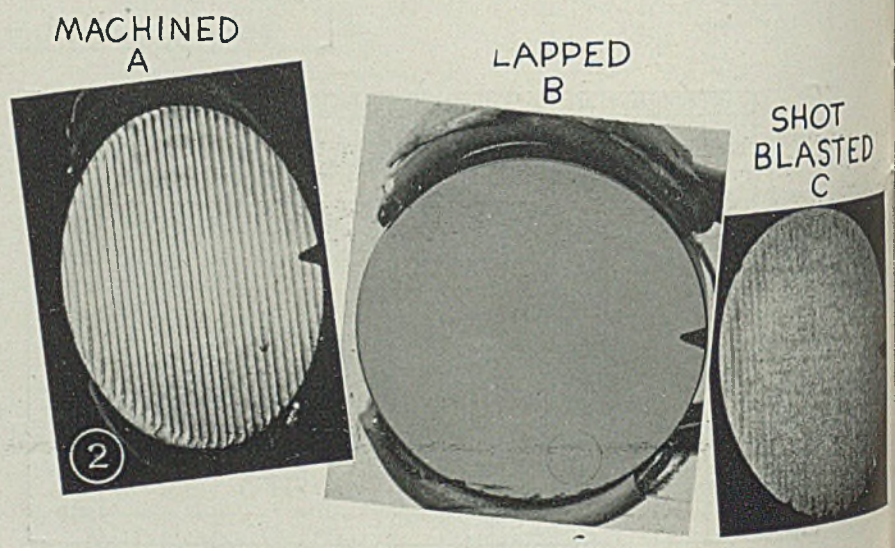
Fig. 5—Typical measuring strips, revealing curvature after surface treatment on one side

Fig. 6—Magnaflux transfer print on cellulose tape showing surface fractures in ground gear tooth

Fig. 7—Chart showing stress magnitude and depth of stressed layer at constant cold work intensity on two test strips

Fig. 8—Illustrating change in slope of S-N curves or fatigue strength induced by rolling steel railroad axles





In the twilight zone the spheres of the metallurgist, engineer and designer of steel parts lies the realm of fatigue. Much research has been done on the subject of fatigue of metals, but its practical aspects are not too well understood by engineers and designers. Mr. Almen has spent 20 years probing into fatigue phenomena and herewith presents an understandable analysis of fatigue in steels as influenced by design of the part and by internal stresses in it. The article is abstracted from a paper delivered before the Detroit chapter of the American Society for Metals recently. It is worthy of careful study.

oratory tests by which these factors may be evaluated, but to devise a reliable laboratory test is far from simple. The common belief that we can reproduce the conditions of service in a laboratory test is wholly erroneous. By the time the laboratory investigator has provided for all the conditions that occur in service, he will, in the case of automobile parts, find himself on the road with a complete automobile, and even then he will not represent the type of driver who most severely taxes the strength of the machine.

Many laboratory tests have been used and are still being used by which to grade materials and processes that are now known to have been costly to the automobile and other industries. Thus, the fiction that a carburized part should have a hard case to resist wear and a tough core to resist breakage arose from laboratory tests. In this test the strength of the part was judged by the number or intensity of hammer blows a part would withstand before fracture; and since, for example, gear teeth resisted impact fracture in accordance with the physical properties of the core, it seemed logical to specify heat treatments to bring out the best compromise between the imagined requirements of the case and the core. Being compromises, these heat treatments were not the best for either region. If, instead of counting the number or measuring the intensity of hammer blows to produce fracture, the gear tooth had been examined after the first impact, the tooth would have been found bent and, therefore ruined. Hence it would make no difference how many more blows were required to fracture the tooth.

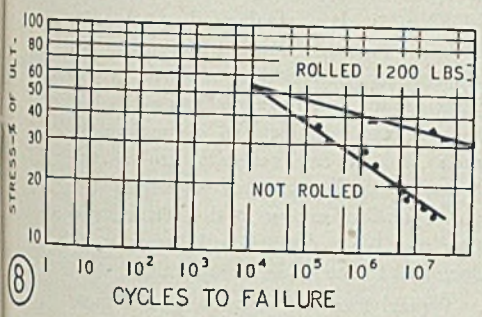
This compromise heat treatment resulted in reducing the quality of many millions of gears before it was realized that gear teeth fail by fatigue and that fatigue failure, for the usual depth of carburization, always originates at the surface of the case. It then became clear that the heat treatment should consider the requirements of the carburized case only and that the properties of the core were relatively unimportant since, in bending and in torsion, the core serves mainly as a stuffing for the case.

Alloy Steels: Similarly, gear steels and steels for many other parts have long been selected by false standards that are based only upon arbitrary tests, among which are fatigue tests of ideal specimens. For many years industry has paid premium prices for alloy steels because of their fancied advantages when used in gears and in other parts. Fatigue tests on actual machine parts correlated with service records have shown that there is no detectable difference between the high-priced alloy steels and many of the low-priced alloy steels when used in many machine elements. This is probably due to the fact that, as fatigue specimens, machine parts are so far removed from the ideal laboratory fatigue specimens that the latter are misleading as measures of worth.

Surface Finishes: Efforts to improve products by improving surface finish may sometimes have the opposite effect. Highly finished surfaces and fillet may lead to a false sense of security if, as the result of machining or straightening operations, the parts have high internal stresses of the wrong kind. In ground surfaces, such as shafts, wrist pins and gear teeth, grinding operations may introduce high surface tension stresses and thus promote fatigue failures. It is the writer's opinion that, from the standpoint of fatigue strength, *more harm than good often results from the grinding of machine parts.* The surface tension stresses from grinding are often so great as to produce visible or magnaflux surface cracks, but, whether detectable or not, surface tension is frequently serious.

Fig. 6 is a magnaflux transfer print on transparent cellulose tape showing surface fractures in a ground gear tooth. This tooth failed by spalling originating in these surface fractures. Since fatigue cracks start on the side of the gear tooth that is loaded in tension, the effective stress is the grinding prestress plus the working stress. Frequently we find that a hardened part will show a file-soft skin after grinding which not only pro-

(*Please turn to Page* 132)



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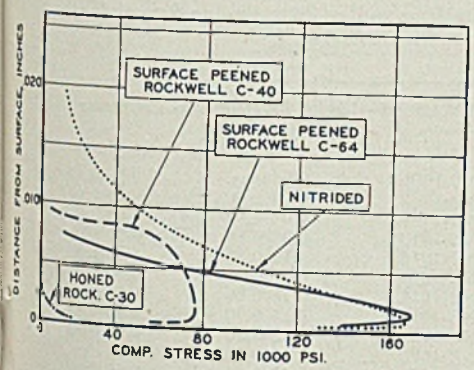

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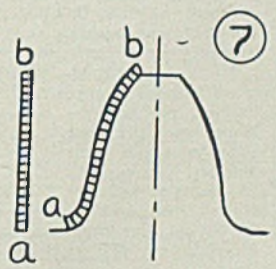

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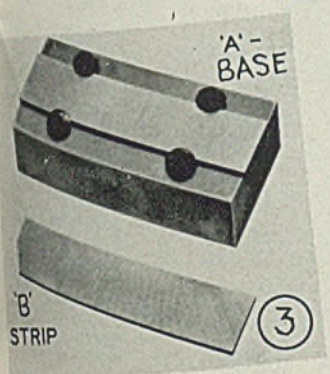

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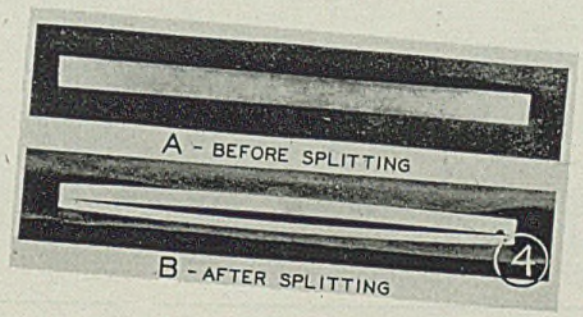

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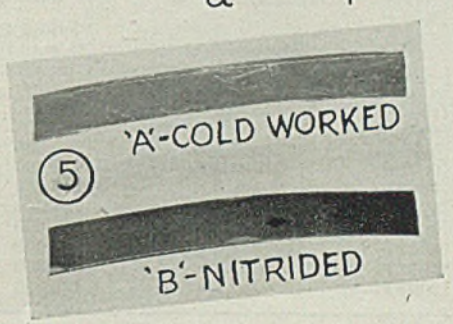

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THE PROBABILITY of a shortage in ferromanganese was perceived in the industry by the middle of 1941, which led to a study of the possibilities of conserving manganese through the general adoption of emergency specifications in which a lower average for the manganese ranges would be set up.

A committee of the American Iron & Steel Institute scrutinized the prevailing grades of steel on the basis of three classifications for the probable effects of reduced manganese upon production or quality:

—Where the effects would be little or none;

Specifications Issued for . . . .

NE (National Emergency) CARBON STEELS

For information on development of the NE steels and their properties, see STEEL, Feb. 9, 1942, p. 70; March 16, p. 72; June 8, p. 66; June 15, p. 66; July 13, p. 80; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41, p. 76; Sept. 7, p. 78; Oct. 19, p. 66; Nov. 9, p. 96; Dec. 28, p. 27; Jan. 25, 1943, p. 84; March 1, p. 94.

For reports from users of NE steels, see Nov. 16, p. 106; Nov. 23, p. 90; Nov. 30, p. 62; Dec. 7, p. 112; Dec. 14, p. 99; Dec. 21, p. 70; Jan. 11, 1943, p. 60; Jan. 18, p. 66; Feb. 1, p. 100.

For latest revised listing of the NE ALLOY steels, see March 1, p. 98.

For list of AMS (Aircraft Materials Specification) steels, see Sept. 7, 1942, p. 78.

For details of WD (War Department) steels and complete listing, see Feb. 8, 1943, p. 80.

TABLE I—NE-8744, Preliminary Locomotive Forging Data

Part I, Quenched and Drawn:

Pins

The following physical properties were obtained on locomotive crankpins of 12" diameter with a 3" bore. Pins were normalized from 1650° F., oil quenched from 1550° F. and drawn as shown.

	1100° F. Draw	1240° F. Draw
Tensile Str., p.s.i.	125,000-121,000	110,000-110,000
Yield Point, p.s.i.	96,000- 92,000	79,000- 80,000
Elongation in 2", %	18-22	21-21.5
Reduction of Area, %	45-49.5	55-55
Izod Impact, ft. lb.	15.5-19	30-42

Axles

The following physical properties were obtained on locomotive driving axles of 14½" diameter with a 4" bore. Axles were normalized from 1650° F., oil quenched from 1550° F. and drawn as shown.

	1100° F. Draw	1240° F. Draw
Tensile Str., p.s.i.	125,000-123,500	
Yield Point, p.s.i.	91,000- 95,000	
Elongation in 2", %	18-18	Not yet completed
Reduction of Area, %	49.5-40.5	
Izod Impact, ft. lb.	...-15.5	

Part II, Normalized and Drawn:

Pins

The following physical properties were obtained on locomotive crankpins of 12" diameter with a 3" bore. Pins were normalized from 1650° F. and drawn as shown.

	1100° F. Draw	1280° F. Draw
Tensile Str., p.s.i.	121.000-119 500	99,000-98,500
Yield Point, p.s.i.	99,000-102,500	67,500-67,500
Elongation in 2", %	16.5-18.0	24-26
Reduction of Area, %	37.5-40.5	56-59
Izod Impact, ft. lb.	13-10.5	15-31

Axles

The following physical properties were obtained on locomotive driving axles of 14½" diameter with a 4" bore. Axles were normalized from 1650° F. and drawn as shown.

	1100° F. Draw	1280° F. Draw
Tensile Str., p.s.i.		102.500-102,500
Yield Point, p s.i.	Results erratic	70.500- 71,500
Elongation in 2", %		22.5-20
Reduction of Area, %	Test to be re-run	53.5-51
Izod Impact, ft. lb.		21-13

Composition of heat tested: Carbon, 0.41 per cent; manganese, 0.76 per cent; phosphorus, 0.034 per cent; sulphur, 0.030 per cent; silicon, 0.29 per cent; nickel, 0.48 per cent; chromium, 0.55 per cent; molybdenum, 0.24 per cent.

TABLE II—NE-9540, PHYSICAL TEST DATA—SINGLE HEAT RESULTS

Chemical Composition

Carbon, per cent	0.42
Manganese, per cent	1.32
Phosphorus, per cent	0.015
Sulphur, per cent	0.011
Silicon, per cent	0.48
Nickel, per cent	0.42
Chromium, per cent	0.63
Molybdenum, per cent	0.17

Grain size: 7

Critical Points

Ac_1	1360° F.
Ac_3	1450° F.
Ar_3	1320° F.
Ar_1	1200° F.

Physical Properties

Test pieces normalized at 1800°F. Oil quenched 1525°F. and tempered as shown below:

Test pieces taken from center of 1¼ in. square bars—treated in 0.520 in. round, tested 0.505 in. round.

Tempered	T.S.	Y.P.	R.A.	Elon. 2"	BHN
400° F.	295,000	272,500	32.5	9.5	555
500° F.	277,600	255,700	39.2	9.5	534
600° F.	264,000	243,500	40.4	9.5	514
700° F.	230,000	215,000	44.9	11.5	461
800° F.	213,000	194,500	46.3	12.0	444
900° F.	186,500	170,000	47.8	14.0	401
1000° F.	170,000	154,000	50.6	15.0	363
1100° F.	153,000	137,000	53.4	17.5	321
1200° F.	138,500	123,500	59.9	19.0	302

—Where the probable effects could be adverse: and

—Where the effects are definitely adverse.

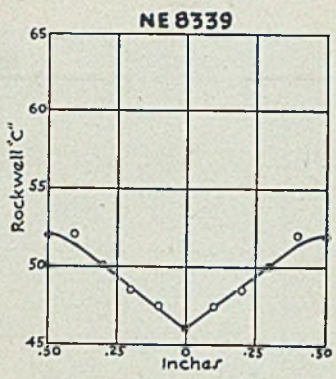
The third classification eliminates from consideration the alloy steels and the sulphurized carbon steels. Plain carbon steels therefore remained as available for changes in manganese contents.

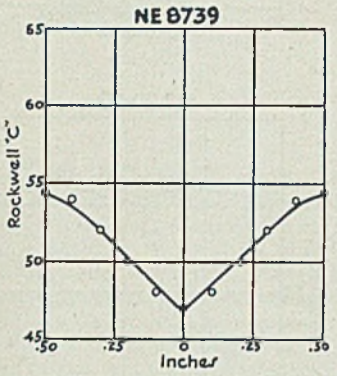
Further study by the General Technical committee of the American Iron & Steel Institute and its products committees has resulted in setting up the series of "NE" carbon steel grades having a lower manganese content than the corresponding AISI-SAE standard carbon steel grades and listed in Table III. For those "NE" grades the reductions in mean manganese contents are of the order of 0.10 per cent, representing a corresponding saving in the ferromanganese for basic open hearth heats when specified to the "NE" compositions.

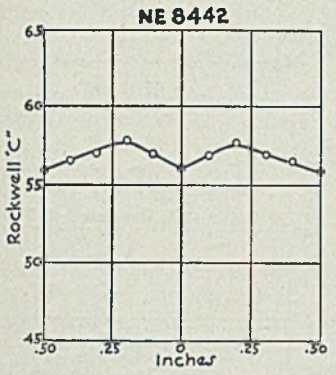
Typical mechanical properties of these steels as well as considerable data on low-

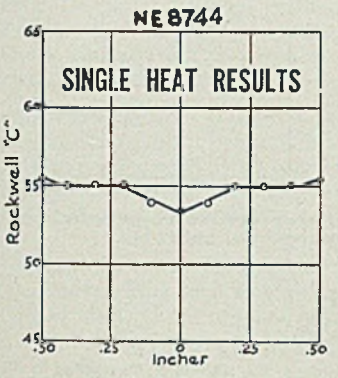
TABLE III—List of NE (National Emergency) Carbon Steels

No.	Carbon	Manganese
NE-1006	0.08 max.	0.20-0.40
NE-1008	0.10 max.	0.20-0.40
NE-1009	0.07-0.12	0.20-0.40
NE-1010	0.08-0.13	0.50 max.
NE-1012	0.10-0.15	0.50 max.
NE-1015	0.13-0.18	0.50 max.
NE-1017	0.15-0.20	0.50 max.
NE-1018	0.15-0.20	0.50-0.80
NE-1019	0.15-0.20	0.60-0.90
NE-1020	0.18-0.23	0.50 max.
NE-1022	0.18-0.23	0.60-0.90
NE-1023	0.20-0.25	0.50 max.
NE-1025	0.22-0.28	0.50 max.
NE-1029	0.25-0.31	0.50-0.80
NE-1030	0.28-0.34	0.50-0.80
NE-1038	0.35-0.42	0.50-0.80
NE-1040	0.37-0.44	0.50-0.80
NE-1041	0.36-0.44	1.20-1.50
NE-1042	0.40-0.47	0.50-0.80
NE-1045	0.43-0.50	0.50-0.80
NE-1050	0.48-0.55	0.50-0.80
NE-1054	0.50-0.60	0.40-0.60
NE-1055	0.50-0.60	0.50-0.80
NE-1059	0.55-0.65	0.40-0.60
NE-1060	0.55-0.65	0.50-0.80
NE-1065	0.60-0.70	0.50-0.80
NE-1078	0.72-0.85	0.50 max.
NE-1080	0.75-0.88	0.50-0.80
NE-1086	0.82-0.95	0.50 max.
NE-1095	0.90-1.05	0.50 max.









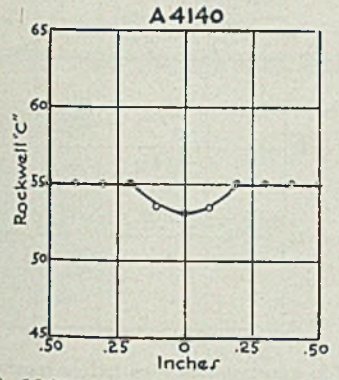


TABLE IV—NE-9430, PHYSICAL TEST DATA—SINGLE HEAT RESULTS

Chemical Composition

Carbon, per cent	0.38
Manganese, per cent	1.18
Phosphorus, per cent	0.016
Sulphur, per cent	0.016
Silicon, per cent	0.50
Nickel, per cent	0.27
Chromium, per cent	0.37
Molybdenum, per cent	0.09

Grain size: 6/7

Critical Points

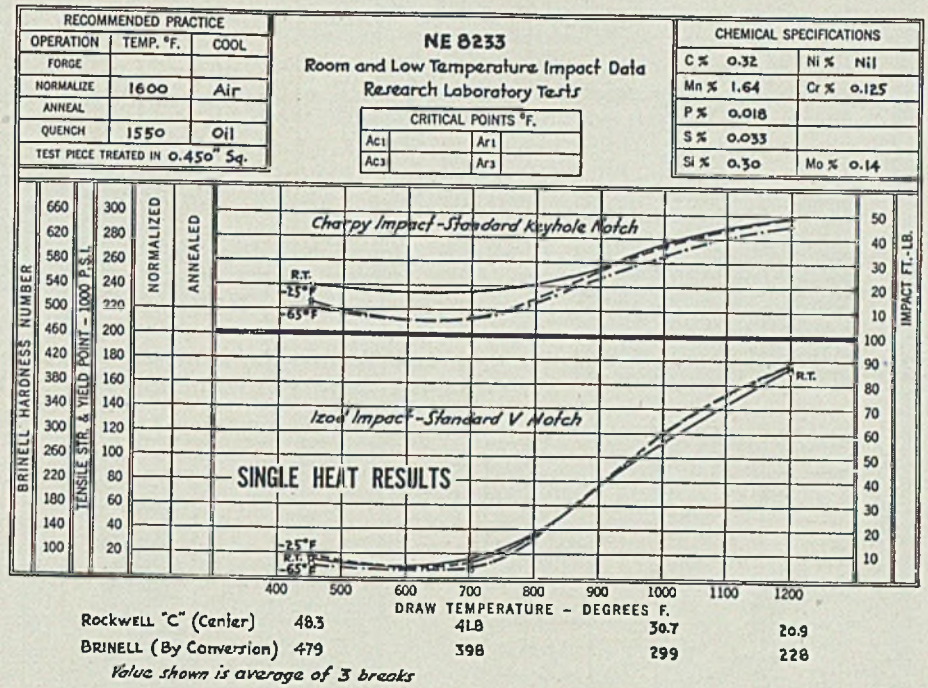
Ac_1	1360 °F.
Ac_3	1430° F.
Ar_3	1240° F.
Ar_1	1190° F.

Physical Properties

Test pieces normalized at 1800°F. Oil quenched 1550°F. and tempered as shown below.

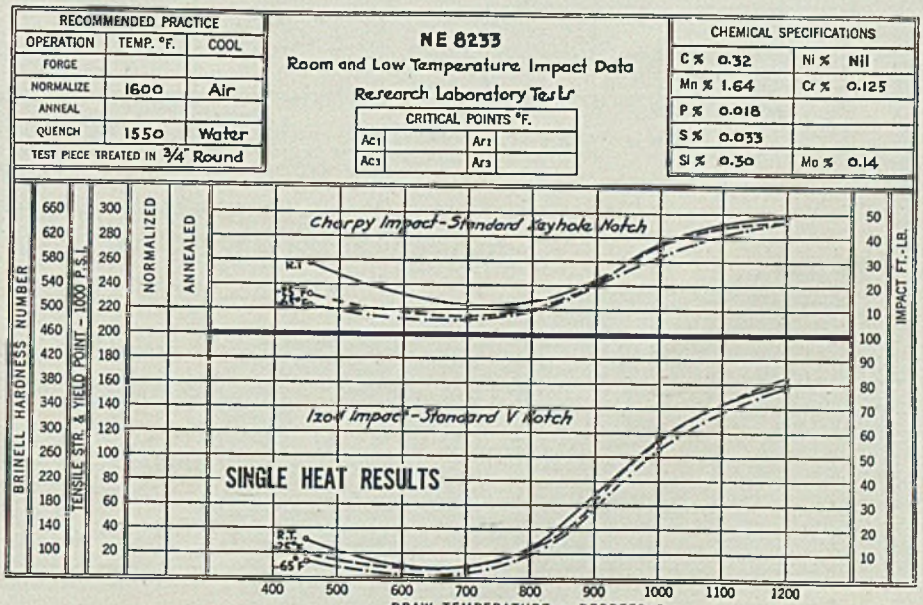
Test pieces taken from center of 1¼ in. square bars—treated in 0.520 in. round, tested 0.505 in. round.

Tempered	T.S.	Y.P.	R.A.	Elon. 2"	BHN
400° F.	256,500	234,500	35.7	11.0	514
500° F.	243,000	222,500	44.9	12.0	495
600° F.	231,800	211,400	46.3	12.0	477
700° F.	190,500	170,700	53.8	13.5	387
800° F.	184,000	164,500	54.7	13.5	375
900° F.	162,000	144,000	58.5	15.5	340
1000° F.	144,000	128,500	59.8	18.0	302
1100° F.	133,000	118,000	63.6	20.0	286
1200° F.	123,800	109,000	66.4	21.5	269



Rockwell "C" (Center)	48.3	41.8	30.7	20.9
Brinell (By Conversion)	479	398	299	228

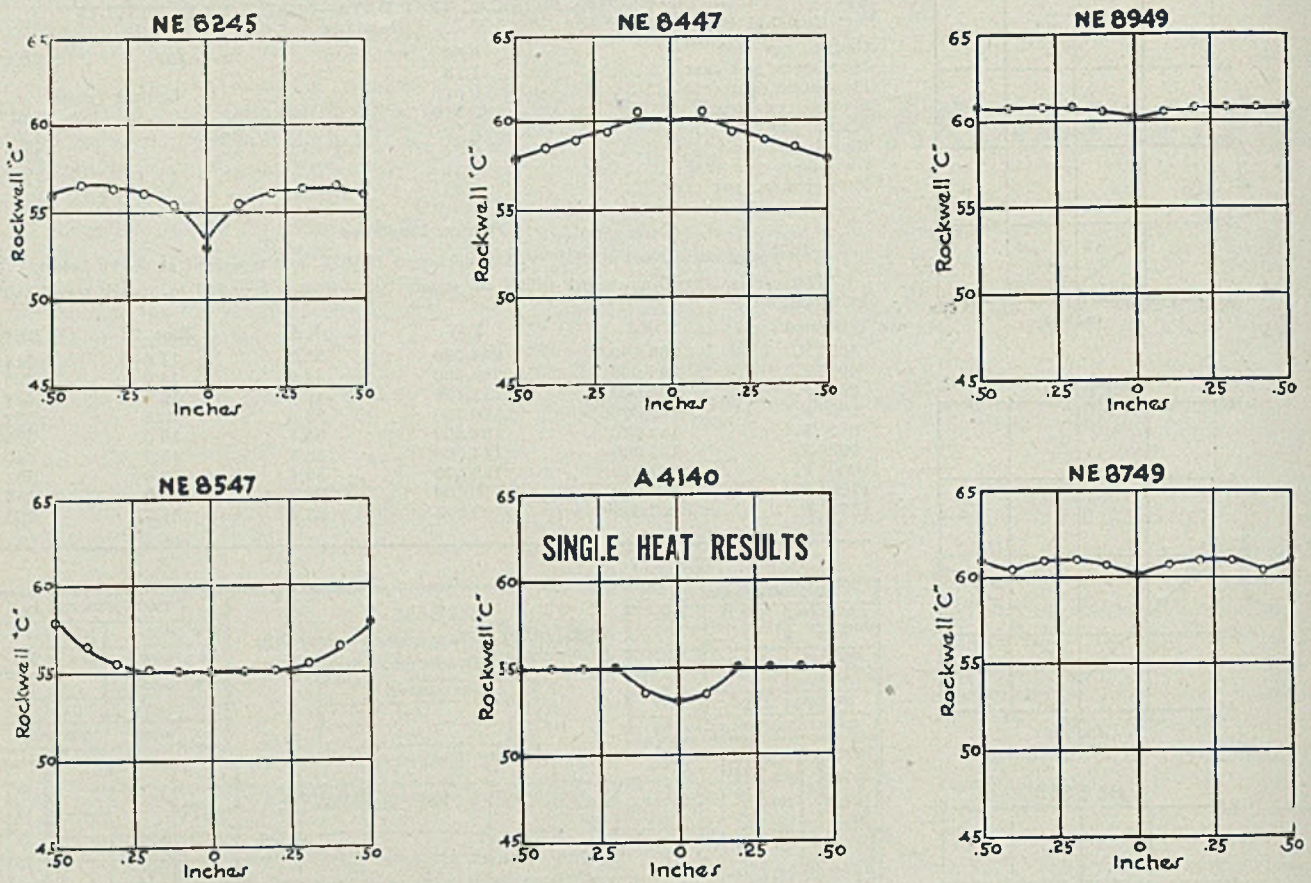
Value shown is average of 3 breaks



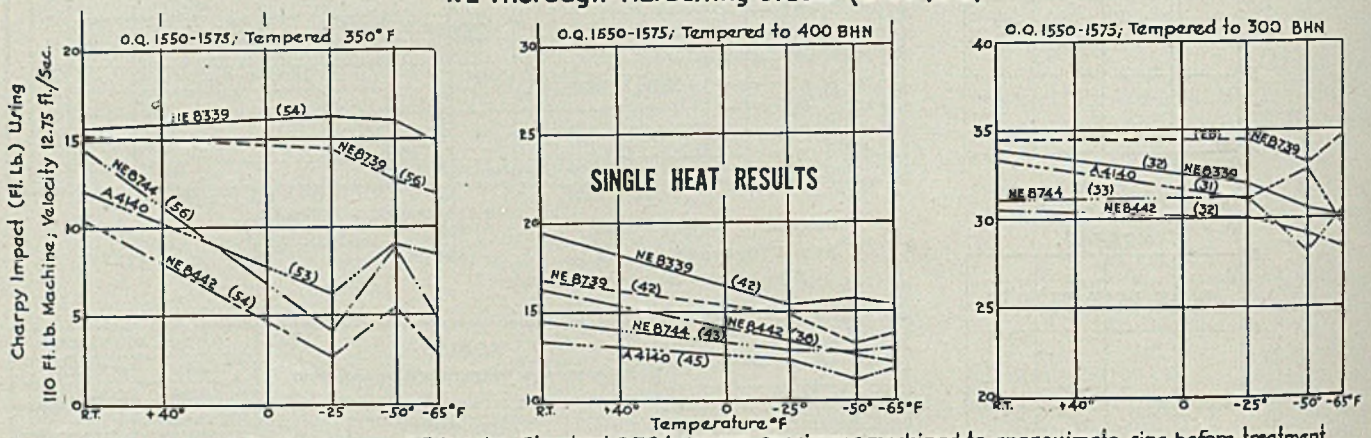
Rockwell "C" (Center)	48.1	42.2	30.8	21.0
Brinell (by Conversion)	478	404	300	229

Value shown is average of 3 tests

Hardness Penetration Charts

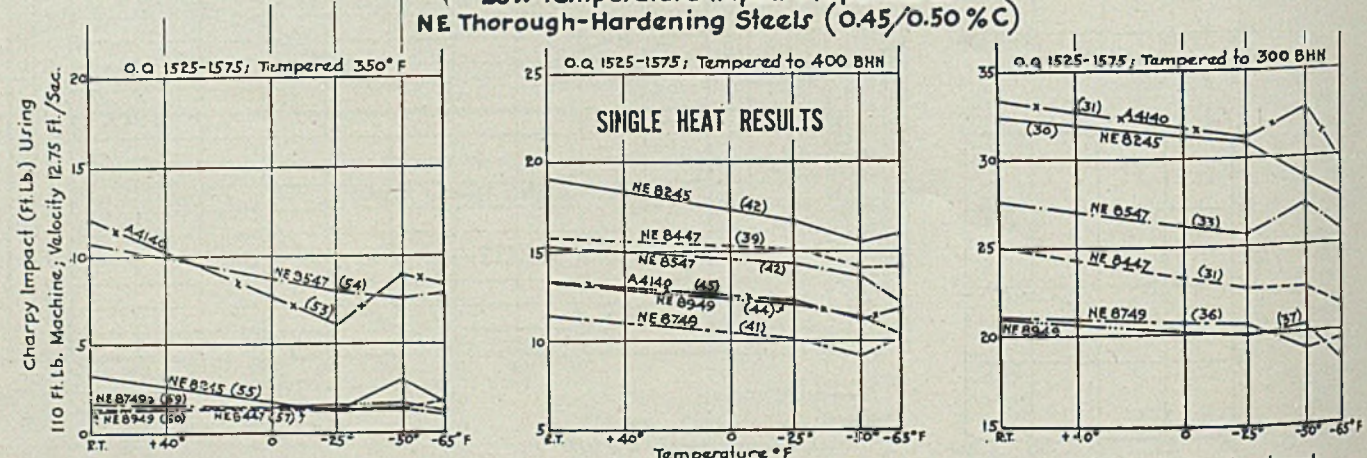


Low Temperature Impact Properties of NE Thorough-Hardening Steels (0.40 % C)



Value plotted is average of 3 breaks. Standard 0.394 square specimens machined to approximate size before treatment
Figures in parentheses are Rockwell "C" Hardness after heat treatment as indicated
(See reverse side for chemical compositions)

Low Temperature Impact Properties of NE Thorough-Hardening Steels (0.45/0.50 % C)



Value plotted is average of 3 breaks. Standard 0.394 square specimens machined to approximate size before treatment
Figures in parentheses are Rockwell "C" Hardness after heat treatment as indicated
(See reverse side for chemical compositions)

How to "Trouble Shoot" Tool Failures

The term "trouble shooting" has been aptly applied to the business of trying to find out why something went wrong. A good trouble shooter must be open minded and unprejudiced. He cannot first make up his mind what he "hopes" the trouble is—and then set out to prove he is right. Furthermore, he must be well informed on his subject. Discussed below are a few tips on tool trouble shooting that may be of help in your tool room.

Spalling in Service—Tools like header dies, coining dies, striking dies and embossing dies which are under heavy pressure must usually be made from a surface hardening tool steel. If they are made from a tool steel that hardens clear through, they are likely to split—they need the reenforcement of a tough core in order to hold together. If the hardened case is too shallow for the pressures involved, it will cave in like thin ice. This sinking action frequently progresses slowly—but eventually a chip will come loose and this is known as spalling. An example is shown in Figure 1.

FIG. 1

The remedy for this is to use a higher hardening heat, or a flush quench, or both, to drive the hardness penetration deeper. Failing in this, use a steel having slightly deeper hardening characteristics.

Heat Checks—In the red-hard tool steels used for hot forming operations, the working surface of the tool will frequently become crazed with a pattern that is suggestive of grinding checks. When a tool is in contact with the heated work, it is *suddenly heated.* If a liquid coolant is used, the minute the hot forging is removed the surface is *rapidly chilled.* This process is repeated many times and finally the surface starts to heat check. A badly checked hot drawing mandrel is shown in Figure 2.

FIG. 2

Heat checking can be greatly helped by not employing so violent a coolant. A stream of water can be replaced by an air blast. Also, a tool that has been drawn back far enough to have some ductility will resist heat checking better than a harder tool.

Grinding Checks—Grinding checks so fine that they cannot be seen with the naked eye can so weaken a tool that it may later fail in service. Figure 3 shows a tool with grinding checks that has been boiled in acid to make them visible. If this tool were to fail as a result of grinding checks, the edge of the fracture would follow the path of some of the checks. This makes a characteristic jagged edge to the fracture which should immediately suggest grinding checks. Boiling the tool in acid will make them visible.

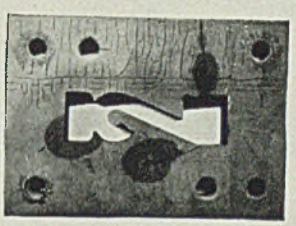


FIG. 3

Obviously, all grinding checks are not the fault of the grinder. If he receives a poorly hardened and poorly drawn tool that is almost ready to fall apart when he gets it, he cannot grind it successfully, no matter how careful he may be. On the other hand, it is so easy to hog into the work on the roughing cuts that many *good* tools are ruined in grinding.

Machining—It is well to be suspicious of tools from which large amounts of metal have been cut, and those that have deep, sharp stamp marks. In case of doubt, it is better to be on the safe side and give such tools a strain relieving anneal before hardening them. Figure 4 shows a pneumatic chisel that failed in service from fatigue that started in a deep stamp mark.

FIG. 4

These tips on trouble shooting were extracted from "Tool Steel Simplified". They are just part of one chapter of the book. Put *all* the useful facts on many subjects in this book to work for *you*—right in your tool room. Order copies for the tool room men you want to train—for your "trouble shooters"—today.

THE CARPENTER STEEL COMPANY, 139 BERN STREET, READING, PA.

"TOOL STEEL SIMPLIFIED"

315 pages, 105 illustrations. Available at cost in the U. S. A.—$1.00 a copy ($3.50 elsewhere).

More than 35,500 copies of "Tool Steel Simplified" are now being used in plants like yours to train new men, "up-grade" older hands, save time, trouble shoot—get better and faster production.

Carpenter MATCHED TOOL·STEELS

TABLE V—NE-9420, PHYSICAL TEST DATA—SINGLE HEAT RESULTS

Chemical Composition

Carbon, per cent	0.21
Manganese, per cent	0.95
Phosphorus, per cent	0.016
Sulphur, per cent	0.010
Silicon, per cent	0.53
Nickel, per cent	0.26
Chromium, per cent	0.38
Molybdenum, per cent	0.15

Grain size: 7

Critical Points

Ac_1	1340° F.
Ac_3	1510° F.
Ar_3	1390° F.
Ar_1	1270° F.

Physical Properties

Test pieces taken from 1¼ in. sq. bars. Normalized 1800°F. Pseudo-carburized at 1700°F. for 8 hours. Oil quenched, tempered at 300°F.

Treated in 1 in. round. 0.505 test pieces taken from center.

Quenched	°F.	T.S.	Y.P.	R.A.	Elon. 2"	BHN
Direct	1700	157.500	107,500	38.8	15.5	388
Reheat	1525	142,500	104.000	47.8	18.5	321
Reheat	1550	143,500	104,500	51.9	18.5	321

TABLE VI—NE-9440, PHYSICAL TEST DATA—SINGLE HEAT RESULTS

Chemical Composition

Carbon, per cent	0.41
Manganese, per cent	1.13
Phosphorus, per cent	0.015
Sulphur, per cent	0.008
Silicon, per cent	0.50
Nickel, per cent	0.32
Chromium, per cent	0.31
Molybdenum, per cent	0.13

Grain size: 7/6

Critical Points

Ac_1	1350° F.
Ac_3	1425° F.
Ar_3	1290° F.
Ar_1	1190° F.

Physical Properties

Test pieces normalized at 1800°F. Oil quenched 1525°F. and tempered as shown below:

Test pieces taken from center of 1¼ in. square bars—treated in 0.520 in. round, tested 0.505 in. round.

Tempered	T.S.	Y.P.	R.A.	Elon. 2"	BHN
400° F.	298,000	283,500	30.9	9.5	555
500° F.	280,000	265,000	34.1	9.5	514
600° F.	262.000	247.000	41.9	9.5	477
700° F.	226.000	211,500	43.4	10.5	444
800° F.	205,500	190 500	47.8	13.0	388
900° F.	180 000	165.000	53.4	15.0	363
1000° F.	158,500	137,500	54.7	15.5	321
1100° F.	141,000	126,500	58.5	19.0	302
1200° F.	128,000	111,000	61.6	20.5	255

temperature impact and hardness penetration are given in the accompanying charts, pages 91, 92, 94, 96 and 98.

There are certain conditions that should be understood mutually in the use of these emergency grades, thus:

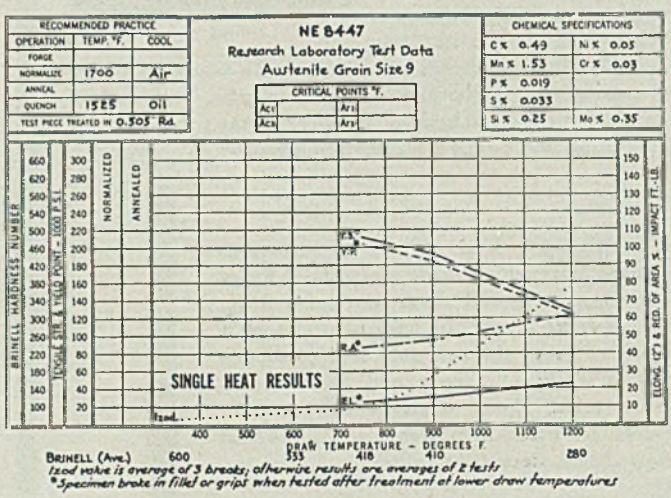
—The National Emergency standard "NE" grades are identical with the corresponding AISI standard grades except as to manganese contents, the purpose being solely to conserve the nation's supply of manganese.

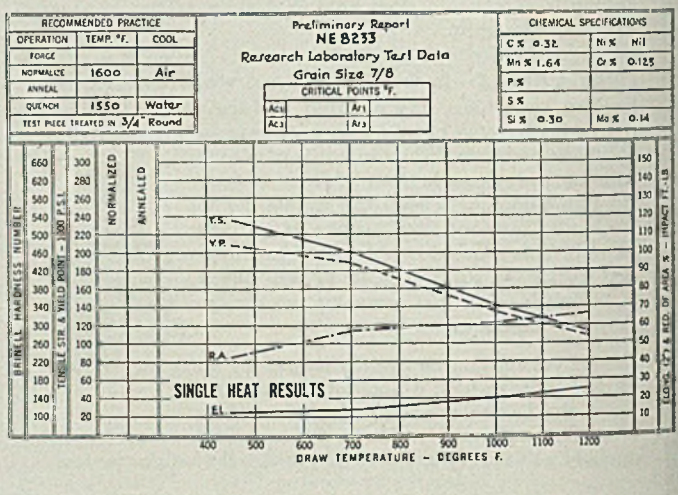
—The respective compositions however are not subject to any restrictions in the chemical ranges (or maximum limits where so expressed), such as are provided for the standard AISI grades.

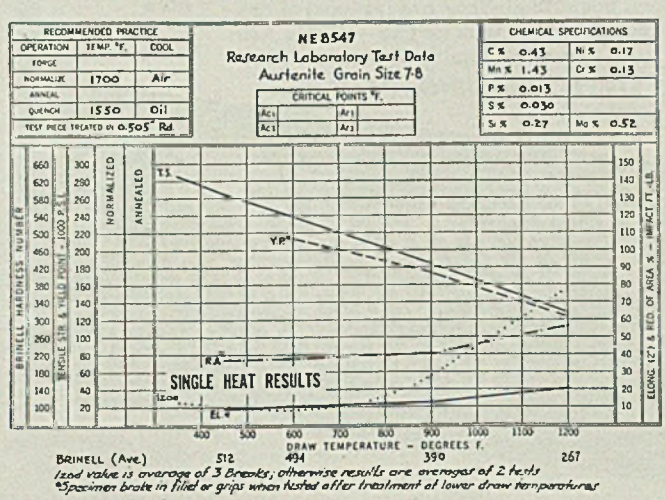
—Check analysis procedure and limitations are the same as for standard steels.

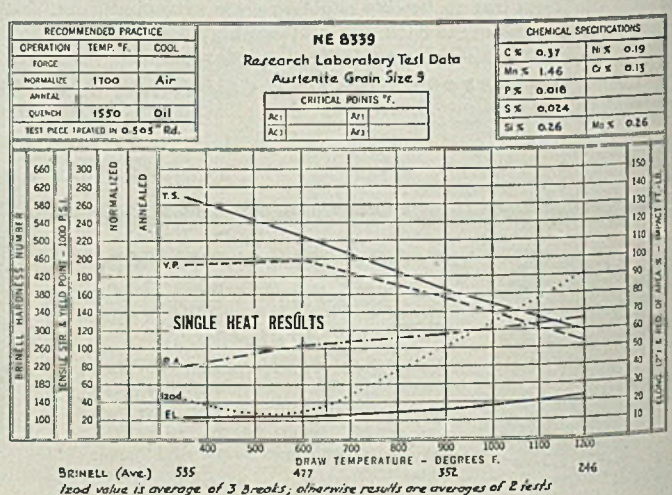
—The use of the "NE" grades of carbon finished products as well as both "CR" and "CQ" quality of carbon steel semifinished products is urged as a means whereby the consumer may co-operate in an important item of conservation and they should be specified wherever they can be used.

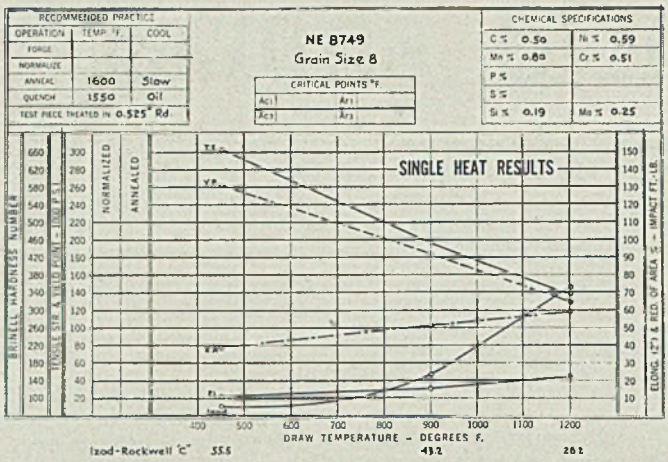
Some of the first information available on properties of the NE alloy steels in heavy sections is included in Table I.

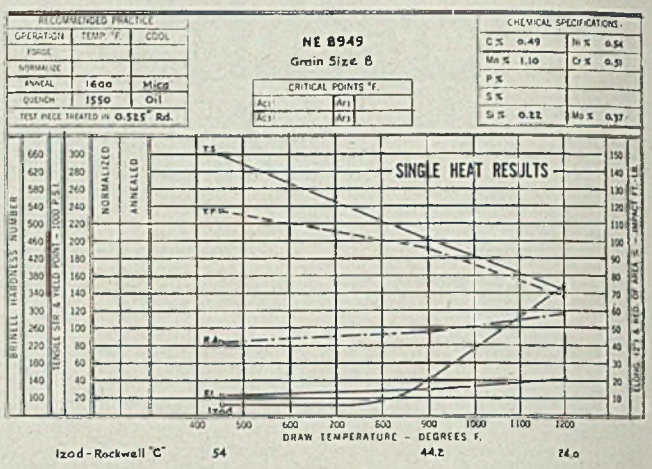


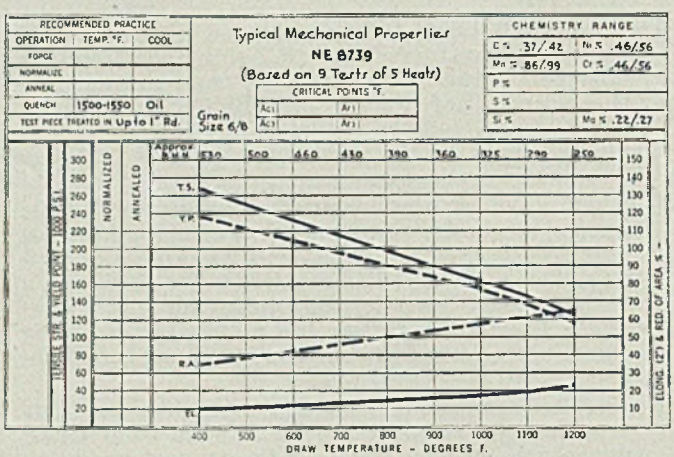


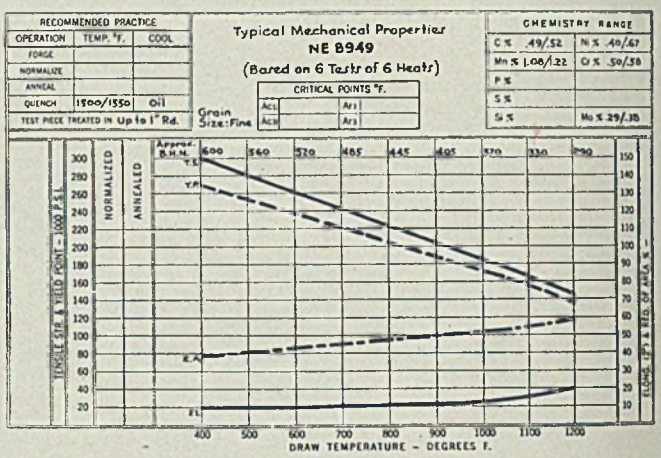


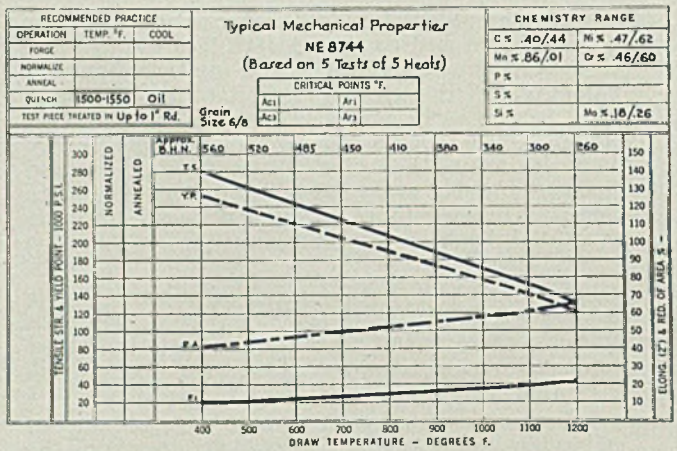


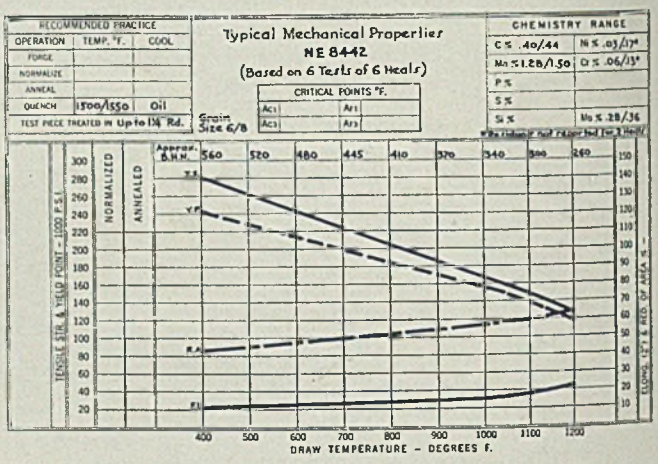

RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL | 1600 | Slow
QUENCH | 1550 | Oil
TEST PIECE TREATED IN 0.525" Rd.
NE 8749
Grain Size 8
CRITICAL POINTS °F.
Ac1 | Ar1
Ac3 | Ar3
CHEMICAL SPECIFICATIONS
C % 0.50 | Ni % 0.59
Mn % 0.80 | Cr % 0.51
P %
S %
Si % 0.19 | Mo % 0.25
SINGLE HEAT RESULTS
BRINELL HARDNESS NUMBER
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
Izod
ELONG. 12") & RED. OF AREA % — IMPACT FT.-LB.
DRAW TEMPERATURE — DEGREES F.
Izod-Rockwell "C" 55.5 43.2 28.2

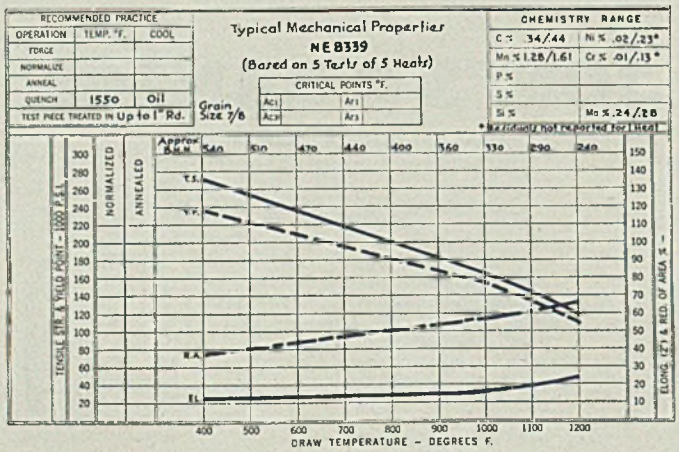

RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL | 1600 | Mica
QUENCH | 1550 | Oil
TEST PIECE TREATED IN 0.525" Rd.
NE 8949
Grain Size 8
CRITICAL POINTS °F.
CHEMICAL SPECIFICATIONS
C % 0.49 | Ni % 0.54
Mn % 1.10 | Cr % 0.51
P %
S %
Si % 0.22 | Mo % 0.37
SINGLE HEAT RESULTS
BRINELL HARDNESS NUMBER
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
Izod
ELONG. 12") & RED. OF AREA % — IMPACT FT.-LB.
DRAW TEMPERATURE — DEGREES F.
Izod-Rockwell "C" 54 44.2 24.0

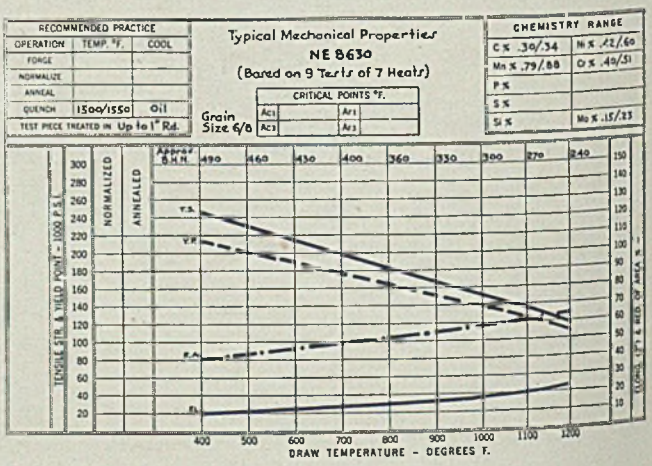

RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1500-1550 | Oil
TEST PIECE TREATED IN Up to 1" Rd.
Typical Mechanical Properties
NE 8739
(Based on 9 Tests of 5 Heats)
Grain Size 6/8
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .37/.42 | Ni % .46/.56
Mn % .86/.99 | Cr % .46/.56
P %
S %
Si % | Mo % .22/.27
Approx. B.H.N. 530 500 460 430 390 360 325 290 250
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.

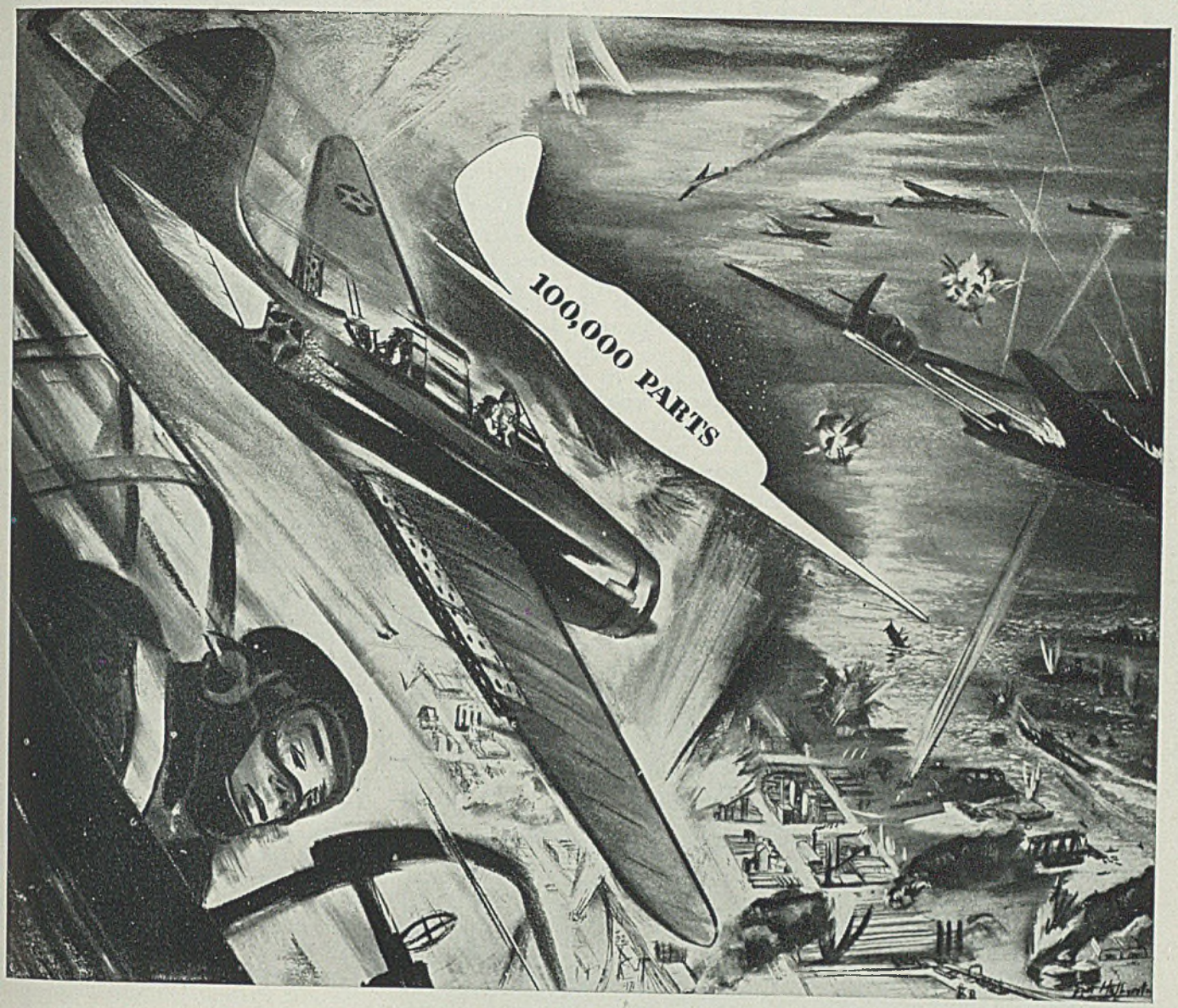

RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1500/1550 | Oil
TEST PIECE TREATED IN Up to 1" Rd.
Typical Mechanical Properties
NE 8949
(Based on 6 Tests of 6 Heats)
Grain Size: Fine
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .49/.52 | Ni % .40/.67
Mn % 1.08/1.22 | Cr % .50/.58
P %
S %
Si % | Mo % .29/.35
Approx. B.H.N. 600 560 520 485 445 405 370 330 290
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.


RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1500-1550 | Oil
TEST PIECE TREATED IN Up to 1" Rd.
Typical Mechanical Properties
NE 8744
(Based on 5 Tests of 5 Heats)
Grain Size 6/8
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .40/.44 | Ni % .47/.62
Mn % .86/.01 | Cr % .46/.60
P %
S %
Si % | Mo % .18/.26
Approx. B.H.N. 560 520 485 450 410 380 340 300 260
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.


RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1500/1550 | Oil
TEST PIECE TREATED IN Up to 1¼" Rd.
Typical Mechanical Properties
NE 8442
(Based on 6 Tests of 6 Heats)
Grain Size 6/8
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .40/.44 | Ni % .03/.17*
Mn % 1.28/1.50 | Cr % .06/.15*
P %
S %
Si % | Mo % .28/.36
Approx. B.H.N. 560 520 480 445 410 370 340 300 260
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.


RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1550 | Oil
TEST PIECE TREATED IN Up to 1" Rd.
Typical Mechanical Properties
NE 8339
(Based on 5 Tests of 5 Heats)
Grain Size 7/8
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .34/.44 | Ni % .02/.23*
Mn % 1.28/1.61 | Cr % .01/.13*
P %
S %
Si % | Mo % .24/.28
* Residual not reported for 1 Heat
Approx. B.H.N. 540 510 470 440 400 360 330 290 240
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.


RECOMMENDED PRACTICE
OPERATION | TEMP. °F. | COOL
FORGE
NORMALIZE
ANNEAL
QUENCH | 1500/1550 | Oil
TEST PIECE TREATED IN Up to 1" Rd.
Typical Mechanical Properties
NE 8630
(Based on 9 Tests of 7 Heats)
Grain Size 6/8
CRITICAL POINTS °F.
CHEMISTRY RANGE
C % .30/.34 | Ni % .12/.60
Mn % .79/.88 | Cr % .49/.51
P %
S %
Si % | Mo % .15/.23
Approx. B.H.N. 490 460 430 400 360 330 300 270 240
TENSILE STR. & YIELD POINT — 1000 P.S.I.
NORMALIZED
ANNEALED
T.S.
Y.P.
R.A.
El.
ELONG. 12") & RED. OF AREA % —
DRAW TEMPERATURE — DEGREES F.



DOWNED! BY THE 17,901st?

GUNS BLAZE in the dark sky. That boy up there trusts his own skill and courage—and the many thousands of metal parts that keep his plane strong and flying against heaviest odds.

What if some tiny part *we* helped to make turns traitor in mid-battle?

If we could only see those tracer bullets sow red death across the cockpit, feel with him his sharp and lonely peril in the sky . . .

We'd say, "Our pay is still the comfort of our homes; his pay hot lead, night battles, chance of flaming death."

We'd say, "If we don't give the best we've got, our smallest failure is a crime against the life he scarcely lived and gladly risked for us."

And so we pledge: to make each metal part that keeps him fighting *true* to the minutest fraction; to conserve our metal; to work with our best skill; to think with precision; and so keep faith with those who do our fighting.

In this spirit, we at R B & W pledge ourselves to strength and accuracy in the millions of Empire bolts and nuts that we are making to hold American war equipment together. To R B & W's special manufacturing processes, developed through the years, we add the personal energy and care that forms an essential part of R B & W's contribution to Victory.

Reproductions of this ad re-arranged with a slogan for your War Production Drive, are free, upon request. Write Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

RB&W *Making strong the things that make America strong*

RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY

BLAST CLEANING

. . . . helps reduce maintenance costs and extends service life

By EDWIN F. BRAMIN
Gatun, Canal Zone

WITH THE continued pressure for increased production, it is entirely possible that the small detail of corrosion control may not receive the full attention it deserves. Blast cleaning iron and steel surfaces with a stream of sand or steel grit thrown against the surface at a high velocity is one of the best methods for thoroughly and completely removing mill scale, rust and corrosion. Thus it is an extremely valuable method of preparing metal surfaces to receive protective coatings.

Corrosion in iron and steel structures represents a loss in the original metal that went into the making of the structure, since rusting actually consumes metal which is converted into iron oxide. If allowed to go without attention, it is a well-known fact that original strength and performance characteristics of the iron or steel structure can be so reduced by corrosion that it will collapse. Any structure is no stronger than its weakest member. And if that member is not carefully prepared and protected, corrosion will sooner or later get in its devastating work on such parts as springs, bolts, nuts, brackets, links, lap joints, chains, surfaces in joints and crevices that are inaccessible.

Corrosion in iron and steel normally results from two principal causes: (1) A chemical action resulting from exposure to water and air, causing oxidation and the familiar rust. (2) A galvanic action resulting when several unprotected parts are emerged in a saline solution or salt water, especially if metal-to-metal contact exists with another emerged and exposed dissimilar metal. It will be noted that the iron or steel in both instances must be exposed to the corrosive agent without protective coatings in whole or in part if corrosive action is to result.

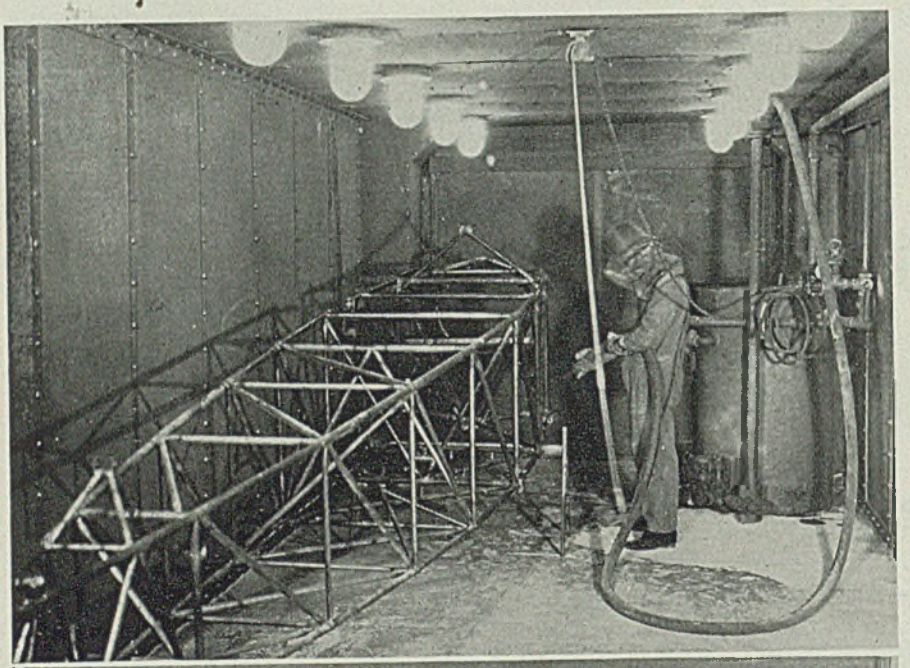
Iron and steel surfaces thoroughly covered by a well-bonded and unbroken protective coat will remain immune from corrosion as long as the protective coat is maintained intact. Where the original protective coat is damaged by scratches or abrasions, such spots must be cleaned immediately and the protective coat repaired and sealed.

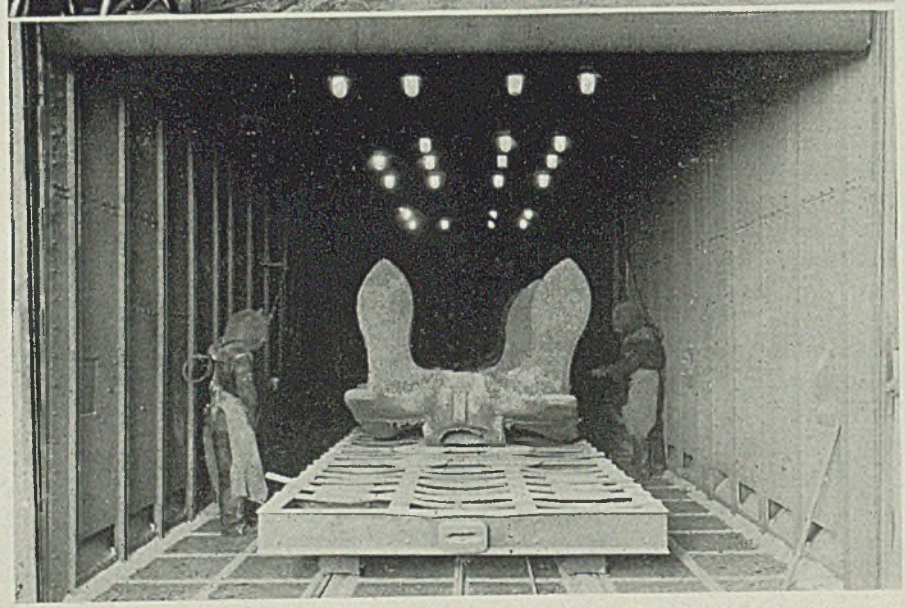
As an example showing the importance of sandblasting as a cleaning method, consider the following: Several years ago the writer was assigned the job of constructing an automatic gas lighthouse on a small rock off the coast of Panama. As an experiment, each member of the tank-house framing, after fabrication, was thoroughly cleaned by sandblasting, dehydrated by heating in a furnace and then a liberal coat of hot tar applied while the steel was still hot. After three years of service on this rock, during which the structures were exposed to salt spray from heavy seas, the galvanized roof and sidings were in a state of collapse. Many bolt heads and nuts had been entirely consumed from corrosion. Yet the steel frame with its original tar coat was in perfect condition with practically no rust, although thickly coated with salt.

A second example is an old steel barge, condemned as unsafe for further use because of structural weaknesses due to corrosion. This barge was taken over

(*Please turn to Page* 104)

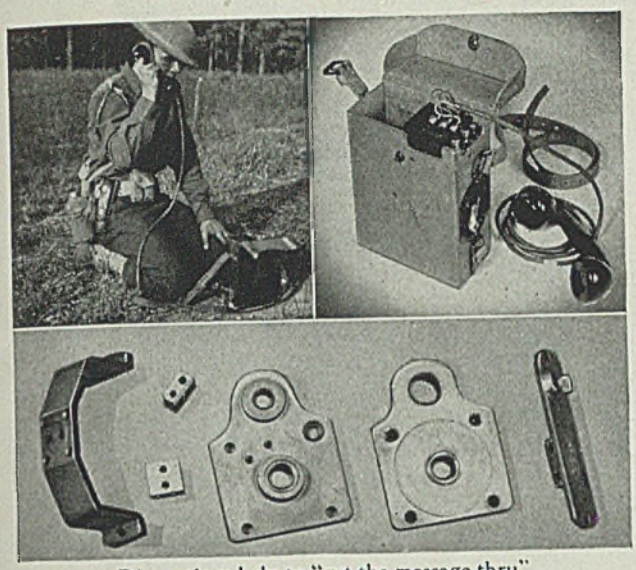
From a paper submitted in the "Compressed Air In Industry" contest sponsored by the Compressed Air Institute, 90 West street, New York.





Above, left—Typical blast room for blast cleaning aircraft fuselages after welding and prior to painting. Photos from Pangborn Corp. Below—Large blast room for blast cleaning heavy work on special rail cars. Note heavy rubber curtain used to seal doorway and protect door which it raises on opening. Note operator's protective devices, special lighting fixtures, car puller cable

PRE-WAR ENGINEERING SHOWED THE WAY



Die castings help to "get the message thru"

Unhampered by tradition, the designers of communications equipment have taken full advantage of all developments in materials and production methods. It is of particular significance, therefore, that zinc alloy die castings have found such wide use in the manufacture of communication and allied products.

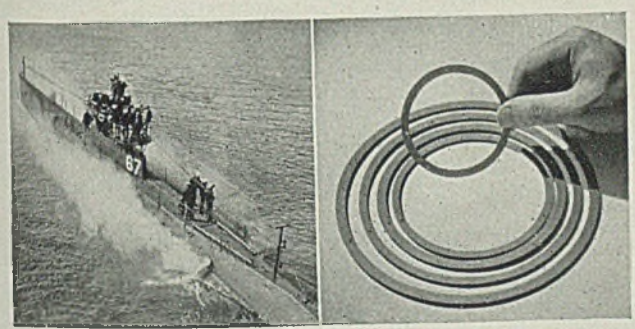
The wartime counterpart of the communications industry—the U. S. Army Signal Corps—is profiting by pre-war advancements in telephone production. For example, the EE-8-A field telephone utilizes the six zinc alloy die castings shown at the bottom of the above illustration. These castings were adopted only after exhaustive testing in competition with parts produced by other methods and of other materials.

Post-war designers please note.

5 IN 1

Pictured below are five bezels for gauges on submarines. They are die cast of zinc alloy and, at first glance, you may ask why. The answer is elimination of scrap loss—a major problem in all metal production today. Actually, by die casting all five rings in a single die, they are produced at little more expense than would be involved in die casting the largest ring alone. The individual rings are broken off the gate and the small amount of metal which joined them is remelted and reused.

Compare these savings with the scrap loss involved in the alternative method of stamping from sheet metal, and you can understand why the die casting process was selected.



The small cored holes in the rings permit grip of a spanner wrench for assembly

THE New Jersey zinc°

FOR VICTORY BUY UNITED STATES WAR SAVINGS BONDS STAMPS

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 No. 7

BAKED FINISHES FOR ZINC ALLOY DIE CASTINGS

Almost any known type of finish can be applied on zinc alloy die castings. The wartime shortage of electro-plating materials has, however, focused attention principally on organic coatings, of which there are many types to meet specific service requirements of die castings. In the case of baked finishes on zinc alloy die castings, the relatively low melting point of the alloy should be kept in mind. Finishes on zinc alloy die castings should not be baked at temperatures higher, or for periods longer, than indicated in the table below.

The subject of finishing is fully covered in the bulletin "The Finishing of Zinc Alloy Die Castings and Rolled Zinc." A copy will be sent to you upon receipt of a request on your Company letterhead.

	MAXIMUM TEMPERATURE –°F. FOR TOTAL BAKING TIME OF			
Alloy	½ Hour	1 Hour	2 Hours	3 Hours
* Zamak 2†	325	275	250	250
Zamak 3††	425	375	325	300
Zamak 5†††	425	375	325	300

* Trade Mark Reg. in U. S. Patent Office
† Corresponds to A.S.T.M. Alloy XXI, S.A.E. No. 921
†† Corresponds to A.S.T.M. Alloy XXIII, S.A.E. No. 903
††† Corresponds to A.S.T.M. Alloy XXV, S.A.E. No. 925

Official U. S. Army Photo

Here's What It Takes To Build Your Glory Road

When a Colonel of engineers said the new Alcan Highway—the "Glory Road of America"—was built by "guts and tractors" he stressed the former.

ALTER EGO: And how right he was! When tough "competition" from the west threatened to annihilate us, it jolted us into super-action. Alcan's 1800-mile route through uncharted wilderness — said to be *impassable* — was a confusion of mud, mountains and mosquitos. Under the spur of Jap "competition", we finished this "glory road" in one season.

Maybe that's a lesson for us to be on the alert for the tough competition that'll invade all business after the war. Let's jolt ourselves into super-action now.

ALTER EGO: Right! We've got to hack through plenty of uncharted wilderness that seems impassable . . . with little time on our hands . . . and come out with *better products* and *lower costs* than the other fellow. *Will-power* and *ingenuity* will build *this* "glory road".

We have the will-power. Let's acquire the ingenuity by improving our welding knowledge *with Lincoln's aid.*

Ask your inner self if welding knowledge isn't the shortcut to postwar success.

THE LINCOLN ELECTRIC COMPANY • CLEVELAND, OHIO

Fabricating Globe Valves

By H. C. ELLIOTT
Mississippi Valley Barge Line Co.

TO FACILITATE manufacture of globe valves and to improve the quality of such valves, all sizes from 2 inches up and for all pressures can be fabricated by welding tubing, plates and bars. No special setup is necessary for tubing manufacturers to produce these valves on a production line basis, since wall thicknesses can be selected from standard sizes. For example, 4¼-inch tubing is now made in 19 wall thicknesses varying from 16 gage to 1⅛-inch walls; 5-inch tubing is made in 17 different wall thicknesses varying from 11 gage to 1-inch thick.

SAE 1035 steel tubing has excellent physicals for such work, including tensile strength of 103,000 pounds per square inch; yield point of 78,000 pounds per square inch; elongation of 24 per cent in 2 inches; reduction of area of 62 per cent. SAE 1035 steel welds as well as or better than any of the SAE carbon steels. A valve body made from this tubing and stress relieved after welding would be almost equal to one made from 6 per cent chromium, 0.05 per cent molybdenum heat-treated steel castings.

Accompanying drawings show method of constructing a 2½-inch high-pressure valve by arc welding. First, the transverse tube is sawed to the right length and a blacksmith swages the ends. A large hole is burned vertically through the tubing, leaving ¼-inch for boring.

Next, a machinist chucks the tubing and bores a hole through it so that the vertical tube will slip in it. Since the horizontal tube is only ⅜-inch larger in diameter than the vertical tube, the horizontal tube has just enough metal left to hold the two sections together after boring through it. But that small amount of metal is burned out after tacking together.

The vertical tube is sawed to the correct length and the top layer of Monel metal weld put in for the seat. Then the tube is turned on its other end and the rest of the bead run. With careful welding, this bead can be run without pin holes and flaws with Monel, stainless steel, Stellite, bronze or mild steel electrodes.

Next, a templet is made to wrap around the vertical tube. This marks off the two slots for the inlet and outlet of the valve. These slots are burned neatly and trimmed with an air chipping hammer. The bottom of this tube is closed and it is then slipped into the horizontal tube for welding. Details of welding are shown on all the drawings.

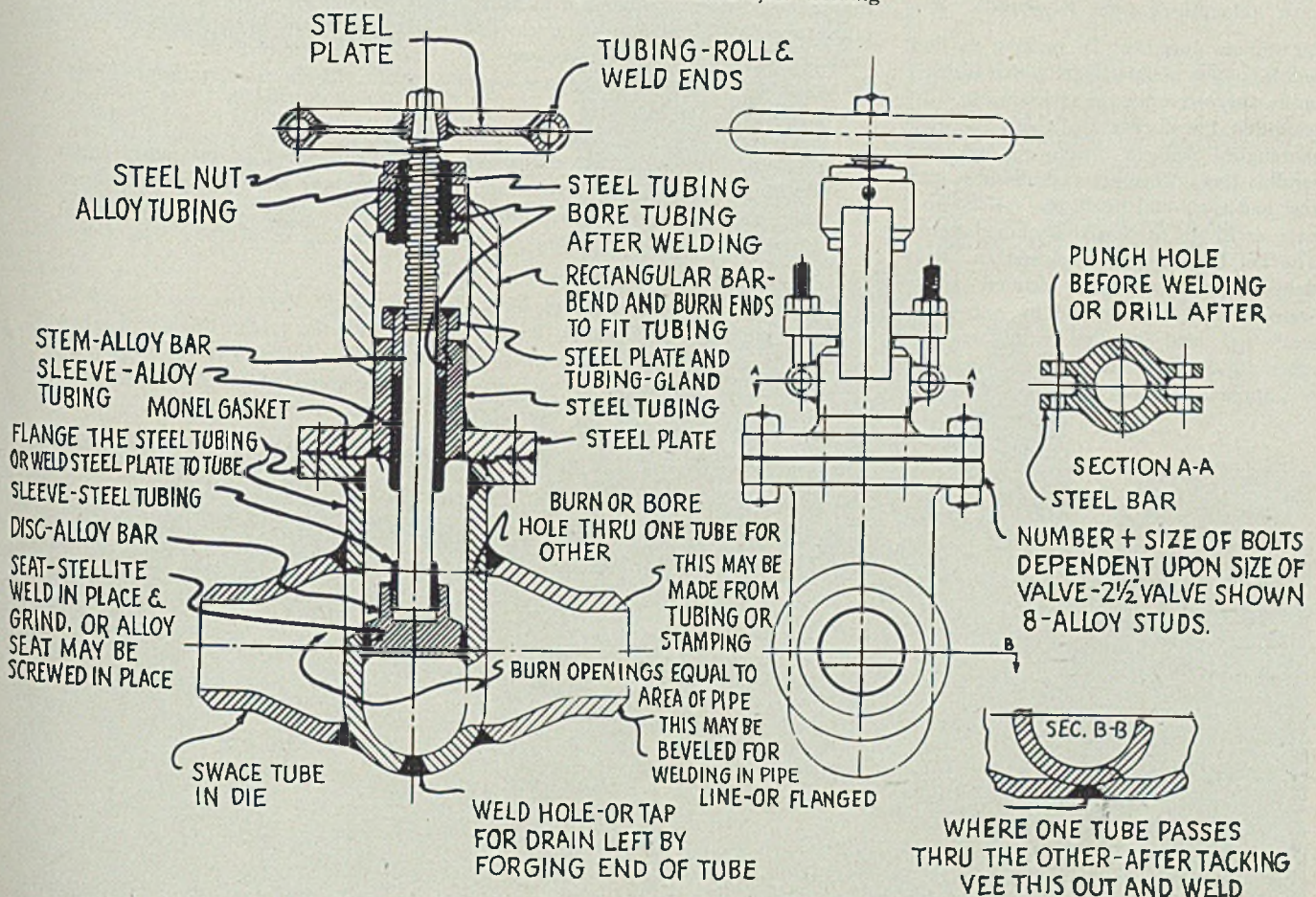
Welded tubes are chucked up and the top of the vertical tube and ends of the horizontal tube faced and chamfered for welding. Next, top plate and flanges are welded on. Now the body is ready for final machining which consists of the following operations:

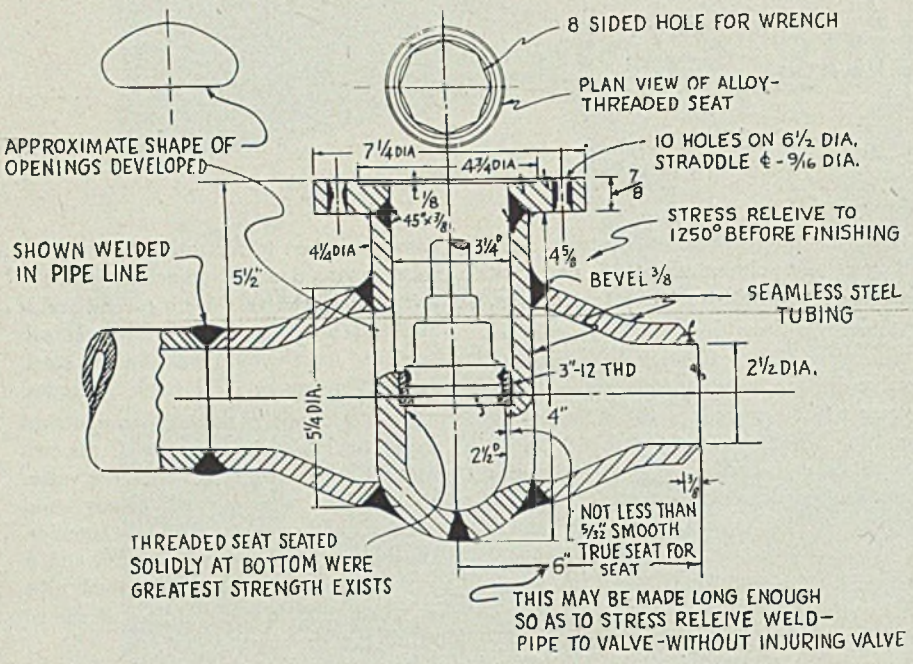
—Facing three flanges (as shown).

—Truing inside welds.

From a paper winning an award in the Hobart monthly arc welding contest.

Completely fabricated globe valve for low pressures, high pressures and super heat, made by arc welding and machined after welding





Constructional and welding details for a 2½-inch valve. For other details, see accompanying drawing. Illustrations furnished by Hobart Bros., Troy, O.

—Machining seat to proper angle.

—Drilling bolt holes.

The bonnet of the valve is welded in a simple fixture which holds the tubing, plates and bars in position while being tacked and while final beads are run. Bonnet requires no preliminary machining of parts. It is chucked up only once for final facing of the bottom flange, boring of the two pieces of tubing, and facing the tubing at three plates.

The packing gland consists of one piece of tubing with a plate welded to one end and machined to fit. The stem guide is made from stainless steel tubing and held in place by a light weld bead of Monel. The valve stem and disk are Monel, both of conventional design.

Using same rates of labor costs and overhead figures, it is estimated that a welded valve can be built for 52 per cent less than a conventional design. A conventional steel valve (standard 2½ inches) weighs 200 pounds. A similar valve of welded steel design weighs only 100 pounds. This 2½-inch welded globe valve is good for a working pressure of 1500 pounds and a total temperature of 750 degrees Fahr. It has been tested by hydraulic pressure to 5500 pounds per square inch.

The American Bureau of Shipping has approved this design as practical for valves for steam power plant equipment. Patent is pending on the method of construction and design.

Blast Cleaning

(*Continued from Page* 100)

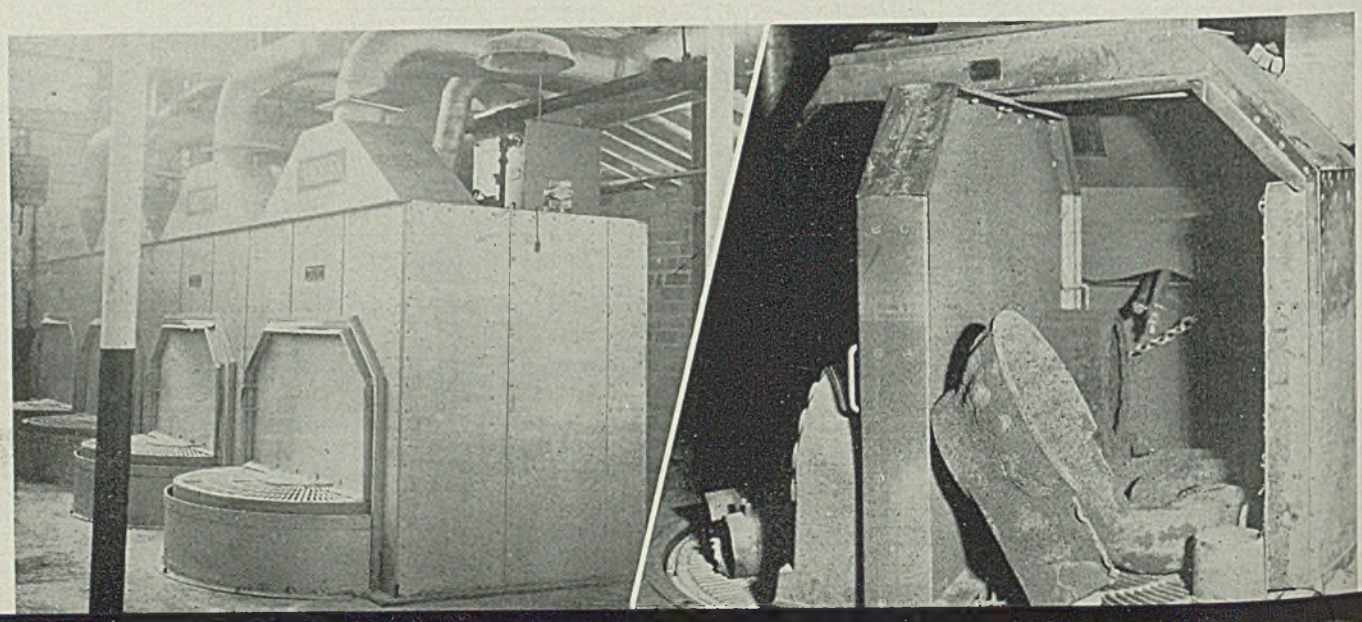
for storage purposes. To prolong its life and minimize maintenance, which is generally very excessive on structures in this condition, the steelwork of the barge was thoroughly cleaned, inside and out, by sandblasting. This removed all old paint, rust and scale and made the surface appear as bright as newly machined steel. The hot tropical sun furnished an ideal dehydrating agent and cleaned areas were immediately covered by a coat of fresh red lead, applied with brushes. After 10 days of curing, a second coat was applied.

This job was accomplished in 1935. Today the barge is still in service and in the same physical condition as when taken over, with practically no rust in evidence. It has not been necessary to do any maintenance on the interior areas and only twice during this period has cleaning and painting been required on decks and outside surfaces—areas where the paint had been damaged by traffic and normal operations.

(*Please turn to Page* 136)

Left—In this type of setup, work is loaded and unloaded on rotary tables which carry it into the work chamber. Tables may revolve continuously or intermittently. These four units are used in cleaning sanitary ware and refrigerator parts preparatory to vitreous enameling at Mullins Mfg. Corp., Salem, O.

Right—Still another type of blast cleaning setup. Here the revolving table carries a movable partition which revolves with the table. Cleaned work is shown at left, uncleaned castings at right. While operator is cleaning work on one half of table, other half of table is being unloaded and reloaded. Table is turned 180 *degrees and the cycle repeated*



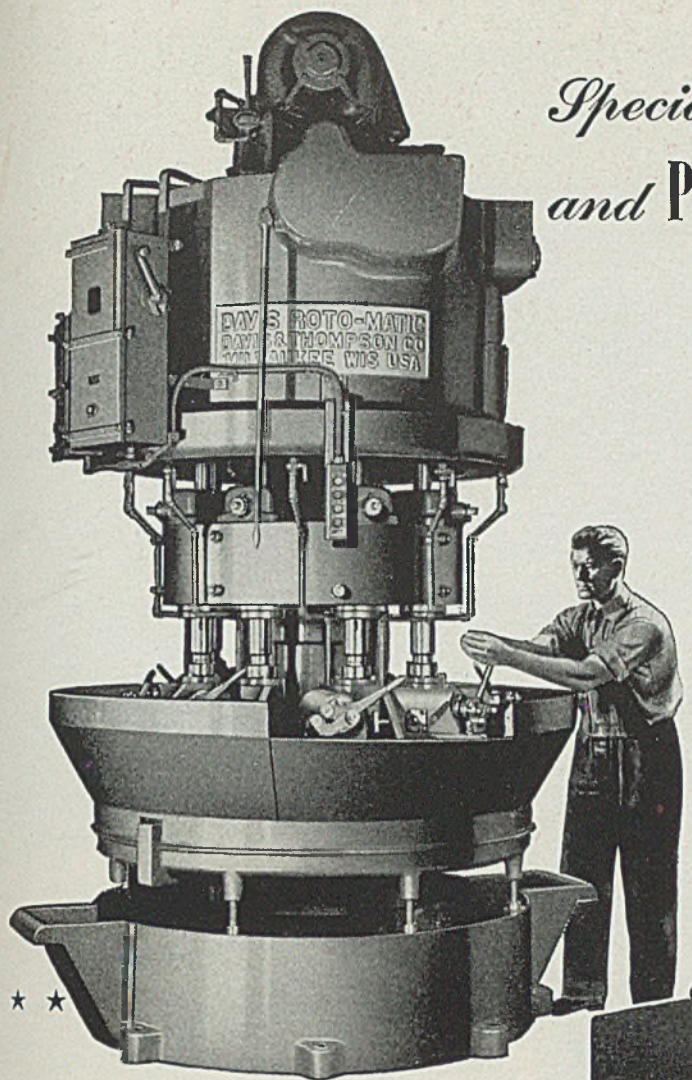
Specially Designed for the SPEED *and* PRECISION *Victory* DEMANDS

High-speed, automatic precision machines designed and built by Davis & Thompson engineers are helping many metal-working manufacturers meet the demands of Victory production.

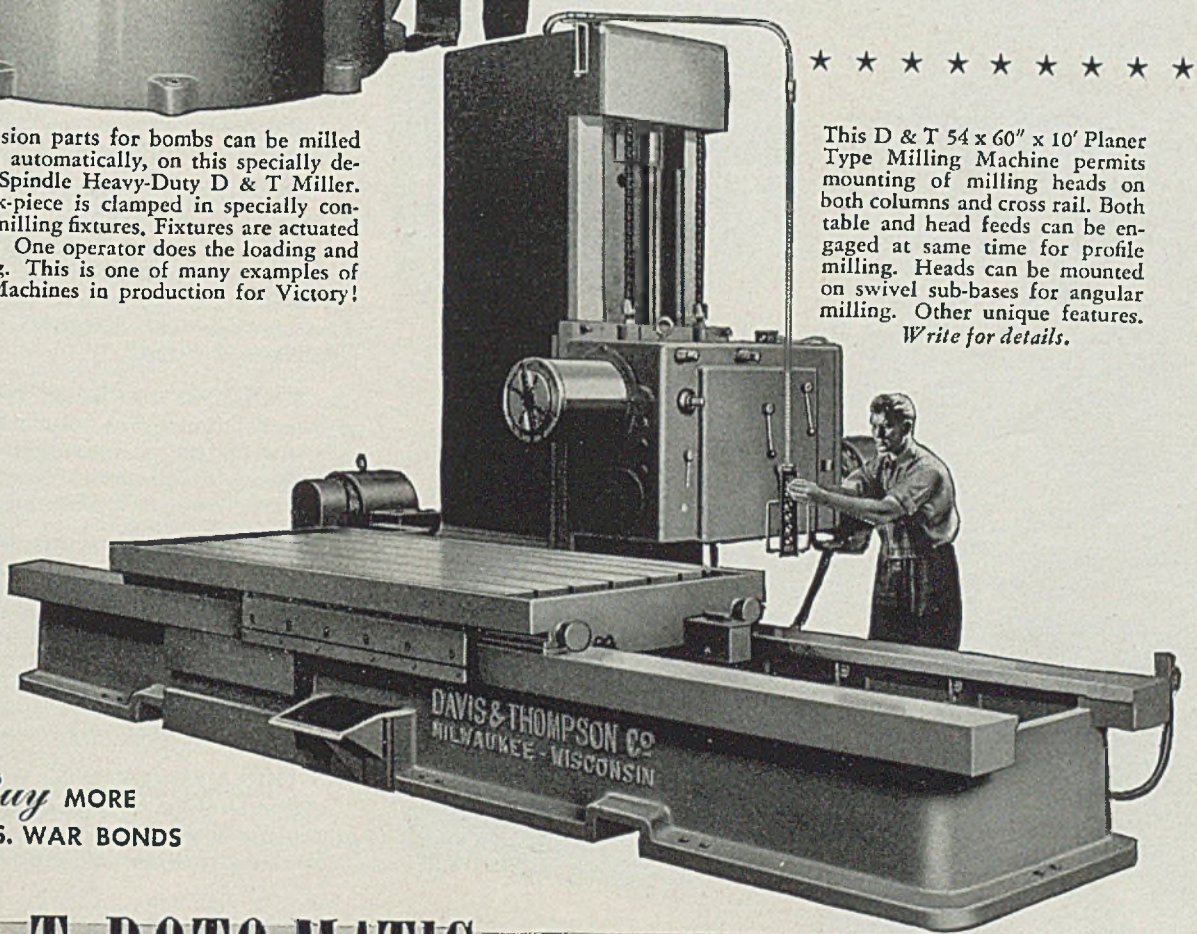
Multiple spindle milling, drilling, boring machines created by D & T for specific jobs, combine many machining steps into fast, automatic operating cycles, in many cases producing hundreds of precision parts *per hour* at speeds never before considered possible. These machines... so simple, automatic and accurate that even semi-skilled operators can maintain peak production records... conserve critical materials, precious time and vital manpower. High production at low cost will continue to be our aim throughout "the duration" and on into the post-war era.

DAVIS & THOMPSON CO., Milwaukee, Wis., U.S.A.

Write for the Book
"VICTORY PRODUCTION"



480 precision parts for bombs can be milled per hour, automatically, on this specially designed 8-Spindle Heavy-Duty D & T Miller. The work-piece is clamped in specially constructed milling fixtures. Fixtures are actuated by a cam. One operator does the loading and unloading. This is one of many examples of D & T Machines in production for Victory!



This D & T 54 x 60" x 10' Planer Type Milling Machine permits mounting of milling heads on both columns and cross rail. Both table and head feeds can be engaged at same time for profile milling. Heads can be mounted on swivel sub-bases for angular milling. Other unique features. *Write for details.*

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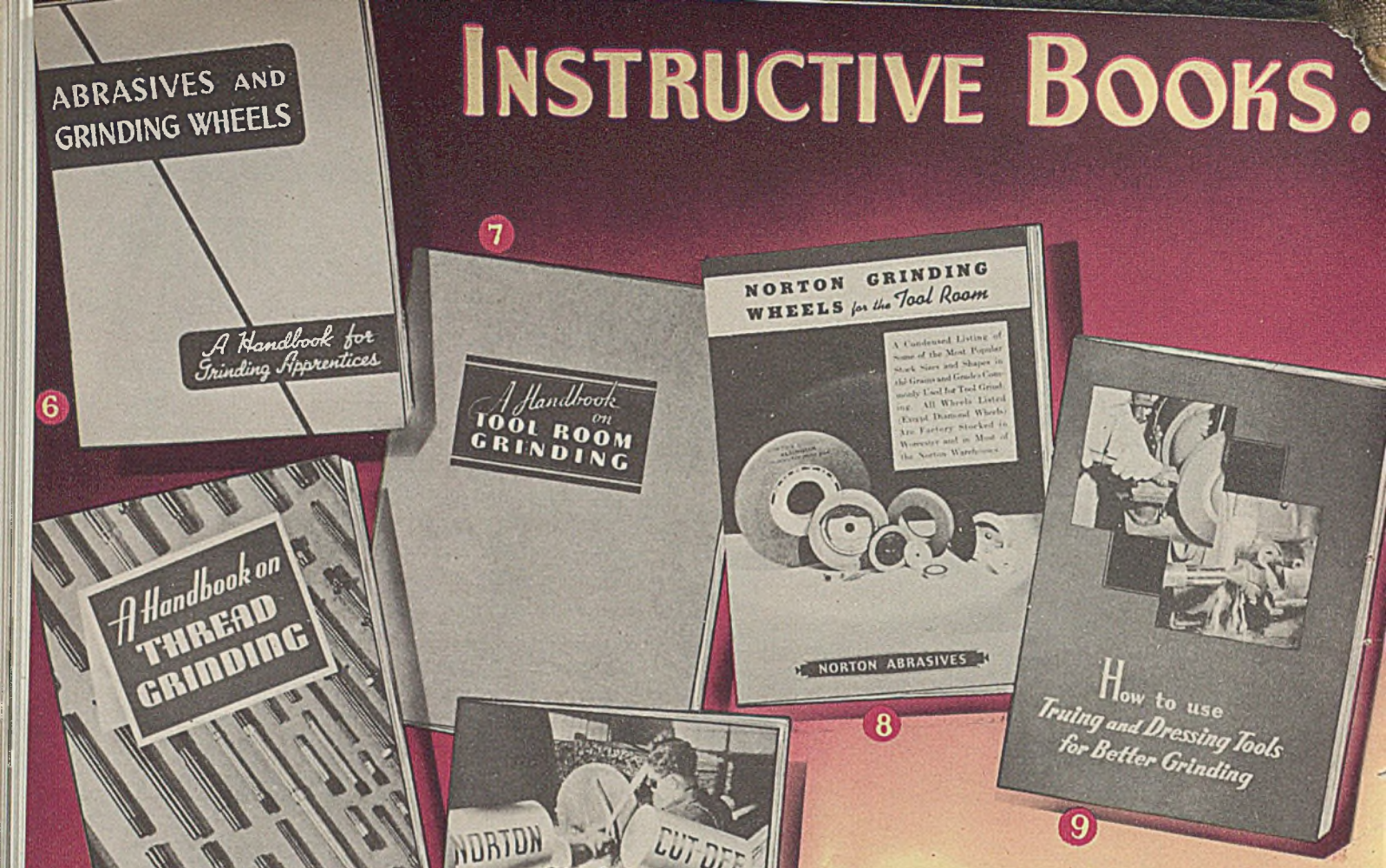
D&T ROTO-MATIC HIGH PRODUCTION MACHINERY

INSTRUCTIVE BOOKS.



1. HOW TO INCREASE TOOL LIFE. Deals with refined surface finishes as applied to regrinding of metal cutting tools. Here is important information for the tool room since it is imperative today that there be increases in tool life and work quality. Photomicrographs of cutting tools show the superiority of edge obtained by finishing with finer grit wheels. 24pp.

2. GRINDING "HAYNES STELLITE" CUTTING TOOLS. To obtain the best results possible from the use of "Haynes Stellite" J-Metal and "2400" tools, it is essential that they be sharpened correctly, that is to say, with highly finished cutting edges, with correct clearance angles and without heat checks. This book tells you how. 32pp.

3. GRINDING CARBIDE TIPPED TOOLS. A 64-page book which gives full information on the correct selection and use of metal bonded diamond wheels, resinoid bonded diamond wheels and Crystolon vitrified wheels for grinding all types of cemented carbide tools.

4. NORTON CUT-OFF WHEELS. This book furnishes an interesting comparison between the abrasive wheel and the metal saw, gives the limitations of uses of cut-off wheels, a general summary of advantages you can obtain by the use of this comparatively new abrasive product. Every mechanic owes it to himself to look into the possibilities of cut-off wheels, and this book will supply him with the information he needs. 28pp.

5. THREAD GRINDING. A handbook which discusses some of the common difficulties encountered in thread grinding and tells how they may be overcome. There are several pages of helpful graphs and tables.

. . . to help you get MORE PRODUCTION

6. ABRASIVES AND GRINDING WHEELS. Defines in an understandable way the two major types of grinding, the three physical characteristics of every grinding wheel, the two artificial abrasives used in the production of Norton wheels, the five general types of bonds; a guide to selection of abrasives, grain size, strength of bond, structure, and grinding wheel markings. 82 pp.

7. A HANDBOOK ON TOOL ROOM GRINDING. This handbook receives a ready welcome in tool rooms everywhere. It is a guide for the tool room operator or apprentice prepared by Norton engineers in co-operation with several tool and grinding machine manufacturers. It contains a wealth of information of great importance in these times when every tool room must operate at the highest point of efficiency possible. 177 pp.

8. NORTON GRINDING WHEELS FOR THE TOOL ROOM. A condensed summary of some of the most popular sizes and shapes of wheels in the grains and grades commonly used for tool grinding. 9 pp.

9. TRUING AND DRESSING. Every successful operator must know how to use truing and dressing tools. Standard methods, based on a few easily understood rules are defined in this booklet, adequately illustrated. It contains illustrated answers to essential questions, as well as guidance to precautions that must be observed in using truing tools. 20pp.

10. THE A B C OF O. D. GRINDING. "O. D." is the common shop expression for the outside diameter of a cylindrically shaped piece or part. This booklet covers the principal elements of cylindrical and centerless grinding, including information on both types of machines and their operation. There is a complete chapter each on the selection of wheels for cylindrical and centerless grinding. 40pp.

11. FACTS ABOUT METAL POLISHING — A booklet that contains 39 pages of helpful information on the selection and use of abrasive grain for polishing. Typical chapter subjects are "Preparation of Glue", "Types of Polishing Wheels", "Setting Up Polishing Wheels", "Setting Up Abrasive Belts", "Correct Drying", "Factors of Efficient Polishing".

12. NORTON ABRASIVES FOR PORTABLE GRINDERS. The many and varied uses of portable grinders — in the foundry, the steel mill, fabricating shop, die shop and the stone industry — are described in this book and the recommended wheel specifications for each job are given. 28pp.

13. A PRIMER ON GRINDING WHEEL SAFETY. Answers many questions which have suggested themselves to grinding wheel operators, such as "What causes grinding wheel accidents?" "What can I do to prevent such accidents?" "What does a grinding machine operator have to know about wheel mounting?" "What speeds are considered safe for various kinds of steel?" 24pp.

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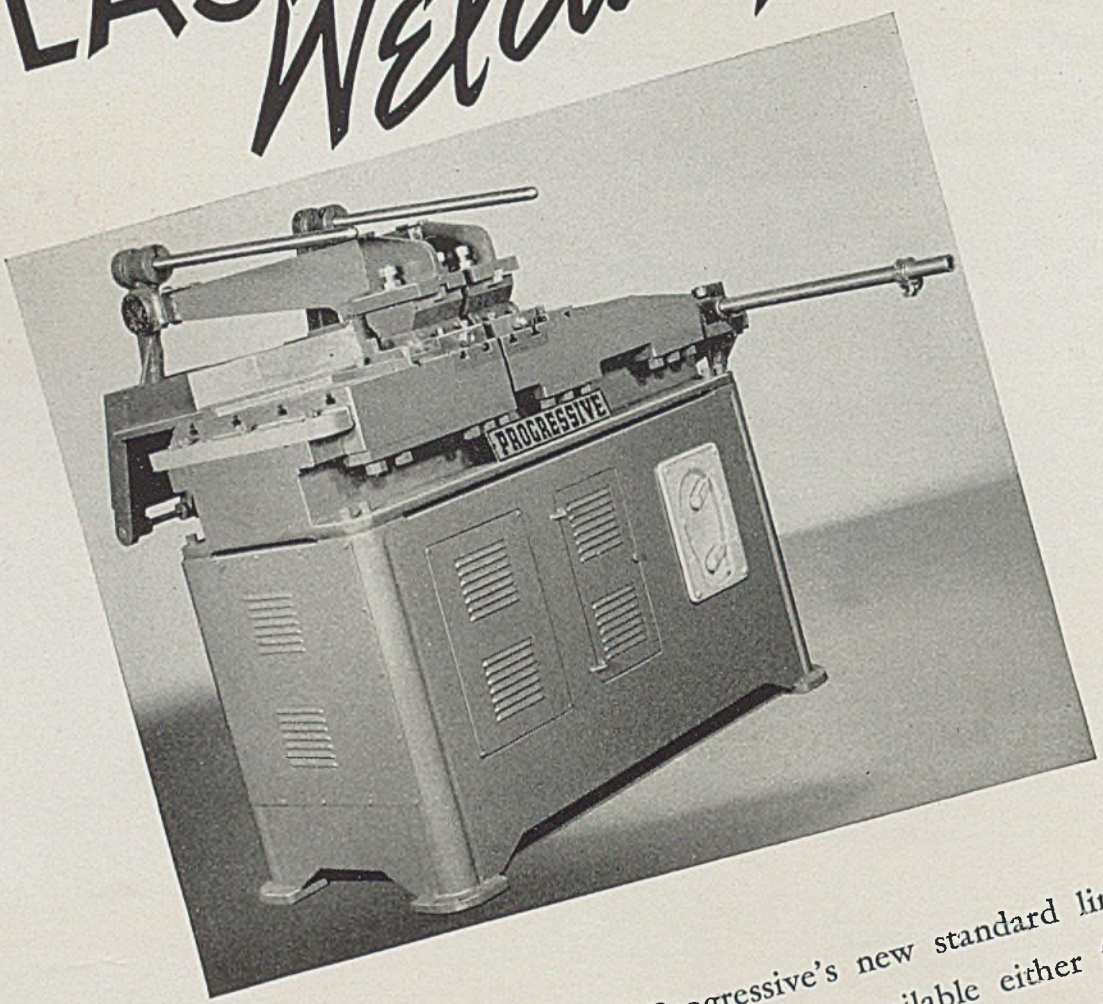
NORTON ABRASIVES

FLASH Welding?



HERE is the first of Progressive's new standard line of flash-welders, a 150 KVA machine available either for conventional manual operation or with the spectacular new "Flash-trol" monitor which automatically controls the rate of feed to prevent short-circuiting of the welding arc.

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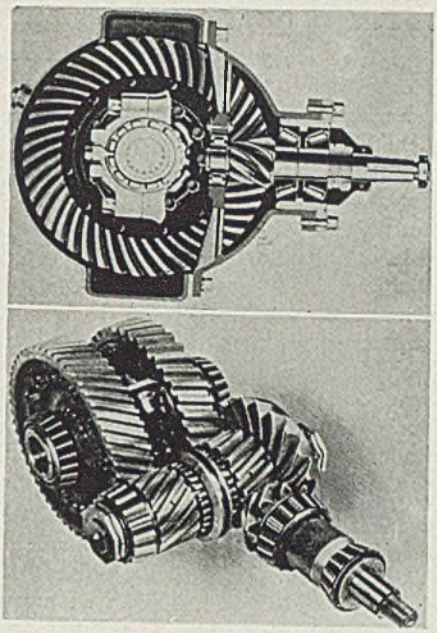
3050 E. OUTER DRIVE DETROIT, U.S.A.

User Report No. 10

On Experience with . . . .

By R. W. ROUSH
Chief Metallurgist
Timken-Detroit Axle Co.
Detroit

NE (National Emergency) ALLOY STEELS



(Concluded from Last Week)

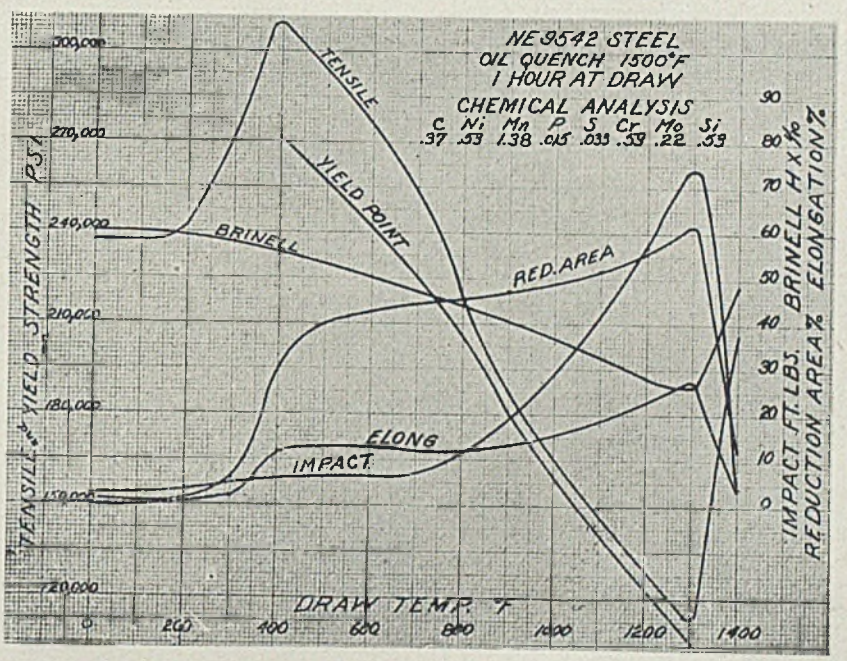
FROM ACTUAL production experience with the NE steels, there have been a few cases reported of flakes or bursts in large forging bars. This happens in the larger sizes and is especially prevalent in the steels of high hardenability. The condition is remedied by slow cooling after rolling. The mills have learned that the same care and slow cooling required for the SAE alloy steels are required for the NE steels. The writer encountered this only in one heat of NE-8720. This heat had to be scrapped as it cracked in *cold shearing* and could not be used for forgings. NE steels are no worse in this respect than any others.

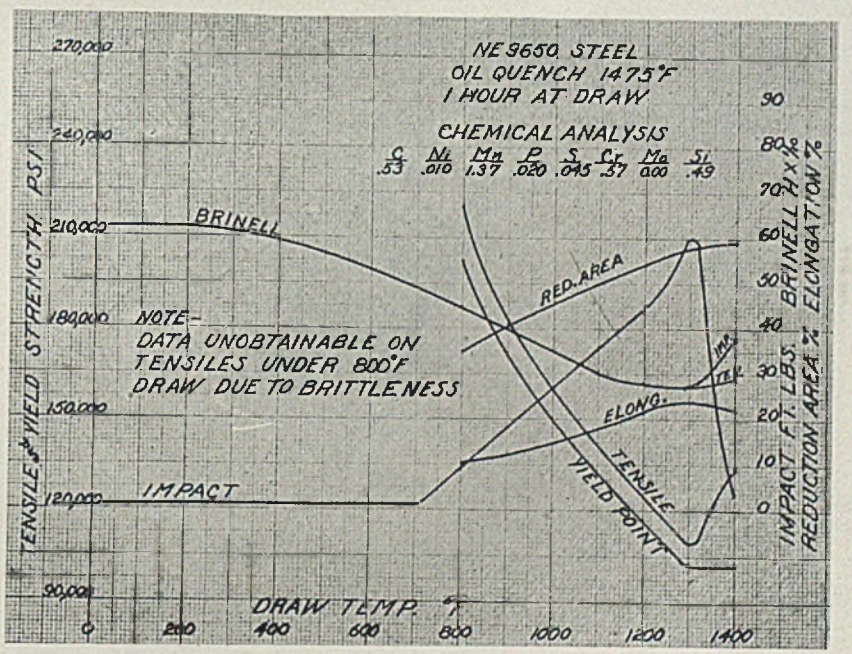
Forging: In forging there has been no very great difference between the old SAE alloy steels and any of the NE steels.

Annealing and Normalizing: As it has been necessary for all manufacturers to use their available equipment for normalizing and annealing, there has been no great change in cycles in going over to the NE steels. Most all of the steels respond to the cycles formerly used for the SAE alloy steels. The carburizing grades of NE steels apparently require less time on cooling than some of the old SAE. There have been some special short annealing cycles worked out and there will undoubtedly be more, which will show economics in time, fuel and machining.

Machining: A number of manufacturers have reported no difference in machining between the NE steels and

From a paper presented at the War Engineering Production Meeting of the Society of Automotive Engineers at Detroit, Jan. 11 to 15, 1943.





Top to bottom, right—

Fig. 7—This 13-inch spiral bevel gear assembly has nine important parts made from NE steels

Fig. 8—A 2-speed double reduction gearset that has 15 important parts made from NE steels, carburized and hardened

Fig. 9—Physical properties of NE-9542 steel, oil quenched from 1500 degrees Fahr. and drawn 1 hour at temperatures indicated. Note high impact strength, low tensile and yield strengths at 1300 degrees

Fig. 10—Physical properties of NE-9650, oil quenched from 1475 degrees Fahr. and drawn 1 hour at temperatures indicated. The 1300-degree point is critical here also

the former SAE steels. In some cases large lots have gone through production lines without the operators knowing there was a change in material. As more NE steels are used, more complete records are kept and a better overall picture is given of machining properties.

In our plant we have made approximately 100,000 spiral bevel rear-axle drive gear sets from NE-8720. This involves some twenty 100-ton heats. In the rough and finish cutting of these gear teeth, complete records are kept of the number of gears per cutter grind. Results in comparison to SAE-4620 and 4120 are shown in Table II.

Turning is done at 187 feet per minute using a 0.010-inch feed and a 5/32-inch depth of cut. Hardness is from 152 to 167 brinell, with an average of 162.

Fig. 7 shows a 13-inch spiral bevel assembly with nine important parts, and Fig. 8 shows a two-speed double reduction with 15 important parts of NE steel carburized and hardened.

In machining NE-8744 compared to SAE 3240 and 4340 at high hardness, our records for a large production are shown in Table III. NE-8949 could not be machined with any success at this high hardness. At 375 to 430 brinell, it can be machined, but cutter life drops 80 per cent from that of SAE-4340.

In the normalized condition NE-8744 and 8949 machine very favorably in comparison to SAE-3420 and 4340. Cutting speeds range from 178 feet per minute with high-speed tools to 460 feet per minute with carbide tools.

At hardness of 200 to 350 brinell, machining of the NE steels is comparable to the corresponding SAE grades; NE-8630 is comparable to SAE-3130 and SAE-4130; NE-8735 to 8740 is comparable to SAE 3135 and 4140; NE-8740 to 8745 is comparable to SAE-3240 and 4340.

Carburizing: There has been a considerable amount of work done on carburizing of the NE steels. Chemical analyses for carbon content of the case, carburized in gas and solid compound have been made and published in a number of recent papers. *See other user reports in this series in* STEEL. In general, the NE steels, especially NE-8620 and 8720, absorb slightly more carbon and show a higher carbon concentration on the surface. Carbon content, micro-structure and hardness at various depths agree closely with the SAE grades 4120, 4320 and 4620.

For information leading to other articles on NE steels thus far carried in STEEL, *see p.* 90

Some manufacturers are reluctant to use an NE steel as a substitute for some of the so-called high-powered steels such as SAE-2512 and 3312. We started out by substituting NE-8817 for these steels. It gave promise of good performance. Since it has been deleted, attempts are being made to substitute NE-8720. No doubt it will suffice for some applications, but whether or not it will meet all the requirements of SAE-2512 and 3312 remains to be seen. Some users have expressed the opinion that there should be an NE-8920. At least, we can say that good judgement was used in retaining the NE--8720 when all of the other NE-8700 steels were deleted.

Opinions are divided as to substituting NE-8720 for SAE-4820 although this is being worked successfully in a number of applications.

Parts made from NE-8620 and 8720 have been quenched direct from the carburizing temperature, cooled slowly and reheated for hardening, and also double quenched. All treatments have been successful in their respective places. It has been found that a higher reheating temperature is required than was used for the same parts made of the SAE steels. It is our belief that these steels are at their best when direct quenched, especially for many heavy-duty applications.

Distortion in hardening of these steels is comparable to SAE-4620. Spiral bevel gears in our plant run 1½ to 2 per cent rejections for out-of-round and out-of-flat.

Carbon determinations of the case on NE-9420 carburized in gas and in compound show it to be equivalent to SAE-4620 and 4320. Some manufacturers

(*Please turn to Page* 137)

TABLE II—Machining Spiral Bevel Gears at 162 Brinell

Generating 1¾-inch Tooth—28 seconds
1.2 ounces Stock Removed Per Tooth

	Gears per Cutter Grind		
	SAE-4620	SAE-4120	NE-8720
Rough, 178 ft. per min.	90	90	90
Finish, 157 ft. per min., 0.008 in. cut	50	40	40
Formate 1¾-inches Tooth—8 seconds			
Rough, 178 ft. per min.	200	190	190
Finish, 157 ft. per min.	600	400	400

TABLE III—Hobbing of Splines at Hardness of 400 to 444 Brinell

Cutter Speed 72 r.p.m.; Surface ft. per min. 84; Depth of cut .5-inch; Feed 0.0057-inch

	SAE-3240	SAE-4340	NE-8744
Pcs. per grind	46	46	34
Pcs. per cutter	785	785	578

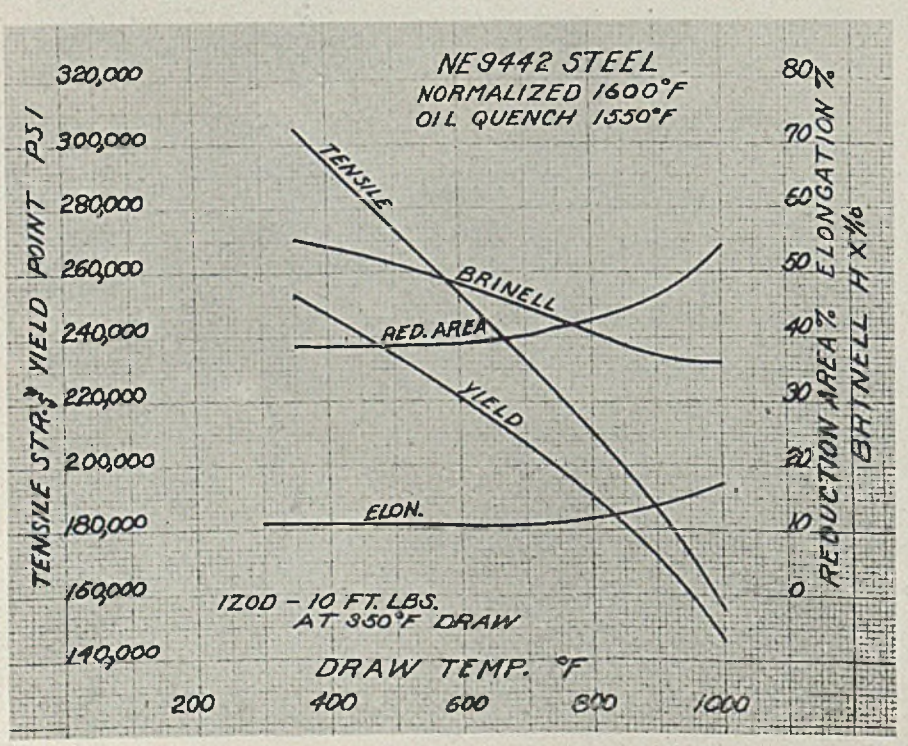


Fig. 11—Physical properties of NE-9442 steel, normalized at 1600 degrees Fahr. and oil quenched from 1550 degrees Fahr.

ILLINOIS Forging

. . . . the source of STRUCTURAL STAMINA essential to maximum tool life!

Precise metallurgical control plays a most important part in the performance of high speed production tools. Specific composition, grain structure and hardness are fundamental factors in producing the tool best suited to the purpose for which it is designed.

Because correct forging contributes so greatly to tool endurance, "ILLINOIS" has its own modern forge shop where skilled craftsmen carefully work the metal to produce exactly the required structure.

For tools that must serve better and longer—call in "ILLINOIS."

ARMY E NAVY

ILLINOIS TOOL WORKS

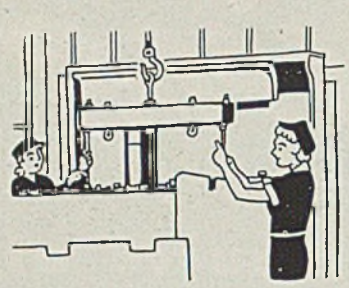
MANUFACTURERS OF METAL CUTTING TOOLS AND SHAKEPROOF PRODUCTS

2501 N. Keeler Avenue, Chicago, Illinois

In Canada: Canada Illinois Tools, Ltd. Toronto, Ontario

OVERNIGHT TO ALL AMERICA . . . FROM THE HUB OF AIR TRANSPORTATION

ILLINTIE HOBS • BROACHES • SHAPER CUTTERS • GEAR CUTTERS MILLING CUTTERS • GROUND FORM TOOLS • SPECIAL TOOLS



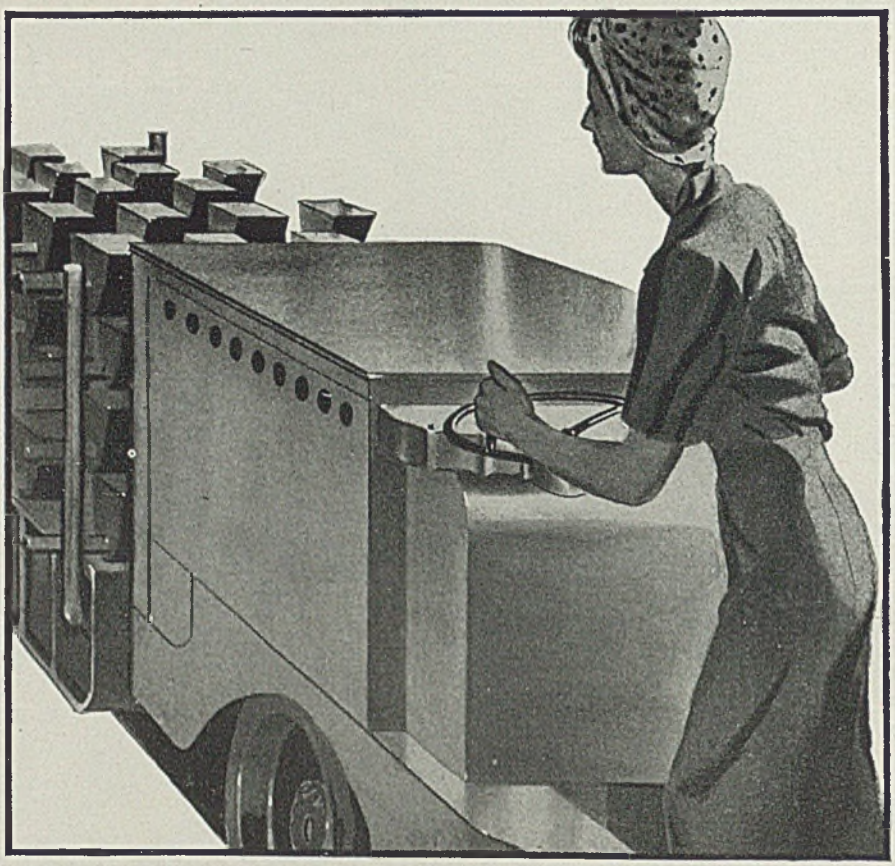
Girls Can Do It. Can women operate battery industrial trucks? Can they charge and exchange the batteries? Do they make good operators? The February issue of Storage Battery Power contains an article describing the experience of one plant with women truck operators. If you have not received a copy, ask for one.

24 Truck Hours Daily. Using three 8-hour batteries or, preferably two 12-hour batteries and exchanging them at corresponding intervals gives you a truck that will operate 24-hours a day with no truck time out for charging or watering of batteries. That's done while the batteries are out of the truck. And alkaline batteries are easy to exchange because of their light weight.

Road-Time. Railroads have no more freight cars in number than during the last war, but are getting double the use out of them. *Quicker loading* and *unloading* and *fuller loads* thanks to lift and fork trucks which permit pallet and skid shipping are part of the reason. More freight cars would be on the road more time if identical pallet and skid systems were in use. Consignor and consignee can get together to standardize shipping procedure—save money for themselves—and help the war effort.

Edison Storage Battery Division
Thomas A. Edison, Inc.
WEST ORANGE, N. J.

POWER TO CARRY ON



"It's the power unit best suited to the war production job." Here you have the answer to the preference for material handling trucks equipped with alkaline batteries. First, *fewer* trucks can do *more* work where storage batteries provide the motive power. There's no time off duty for repairs, "spare" trucks don't have to be on hand for emergencies and each truck can operate 24 hours out of 24. Second, you can use a battery truck *anywhere*—in freight cars, elevators—it can even be made explosion-proof.

And, the advantages of alkaline batteries in such trucks are quite clear. They can be charged in 6 to 7 hours and require no periodic equalizing charges, thus permitting maximum use of charging circuits. Where d-c shop lines are available they can be charged direct from the lines by the use of control panels only. But most important of all, alkaline batteries are dependable—they are not subject to unexpected sudden failure.

INDUSTRY NEEDS THE DEPENDABILITY OF

Edison Alkaline BATTERIES

Industrial TRUCK CARE pays good dividends

By A. E. DOROD
Assistant Chief Engineer
Baker Industrial Truck Division
Baker-Raulang Co.
Cleveland

(Concluded from Last Week)

THE MONTHLY inspection should not be skimmed over as it involves the inspection of the most important mechanical parts of the truck and any slighting of these parts on inspection or lubrication can lead to expensive repairs. Every month, do these things:

Power Axle: Remove fill plug and inspect oil level. If losing oil, inspect for leaks. If truck is not operated sufficiently or at very low speeds, castor oil will not be carried up to worm and bearings, and they may develop a howl. To correct this, run truck at full speed several minutes or jack up one wheel and run in high speed several minutes.

Wheel Universal Joint: Remove flange from power axle wheels. Wash parts in gasoline to remove all grease and dirt. Remove universal joint fork from universal ball. Inspect for wear. If badly worn, replace. The universal forks and ball should last indefinitely if properly lubricated and kept free from dirt and grit. Carefully inspect boot to make sure it is seating properly and cloth has not worn through, permitting the entrance of foreign material. Replace as required, making sure universal is taken out, washed and replaced with proper lubricant.

Wheel Bearings: Inspect wheel bearings while flanges are off for universal joint check-up and repack with proper grade of lubricant.

Spindle Bearings: Place jack under axle and take weight off wheels. Check for play in spindles, which indicates ball has worn into socket, thereby throwing strain on axle shafts and differential spider. Dismantle and replace as required.

Drive and Torque Yokes: See that ball connections are kept tight and that anchor bolts are tight.

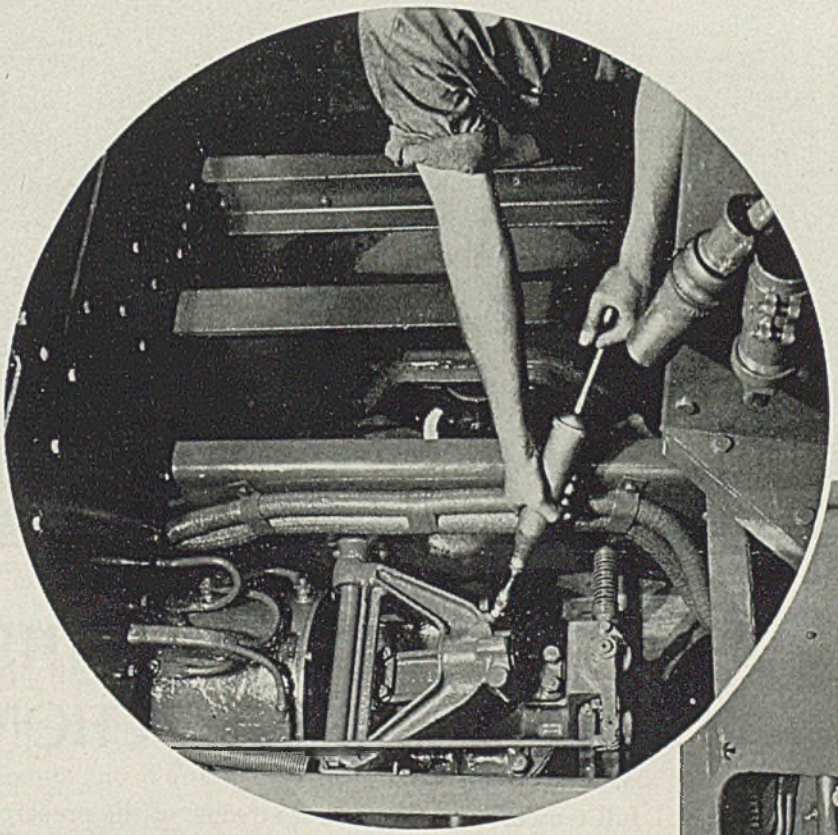
Oldham Coupling: See that cover is neither torn nor cracked, thereby causing it to throw grease. Replace if required.

Trailing Axle and Wheels: Jack up axle so wheels clear floor. Test each wheel for looseness and end play on spindle. Also test for vertical play of knuckles with relation to support axle. If excessive play is apparent, dismantle and examine. Inspect bearings by removing hub cap. Pack with grease as required.

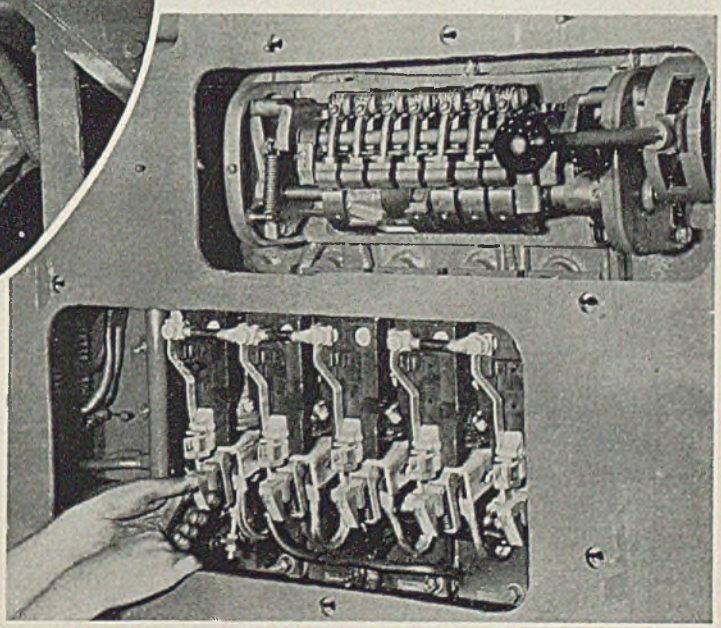
Brake Drum: See that nut holding brake drum on drive shaft is kept tight and that drum has not been allowed to loosen on shaft.

Motors: Remove dust covers and inspect commutator and brushes. Commutator should be bright, clean and free from any pitting. Slots between bars should be clean and mica separations below level of commutator bars.

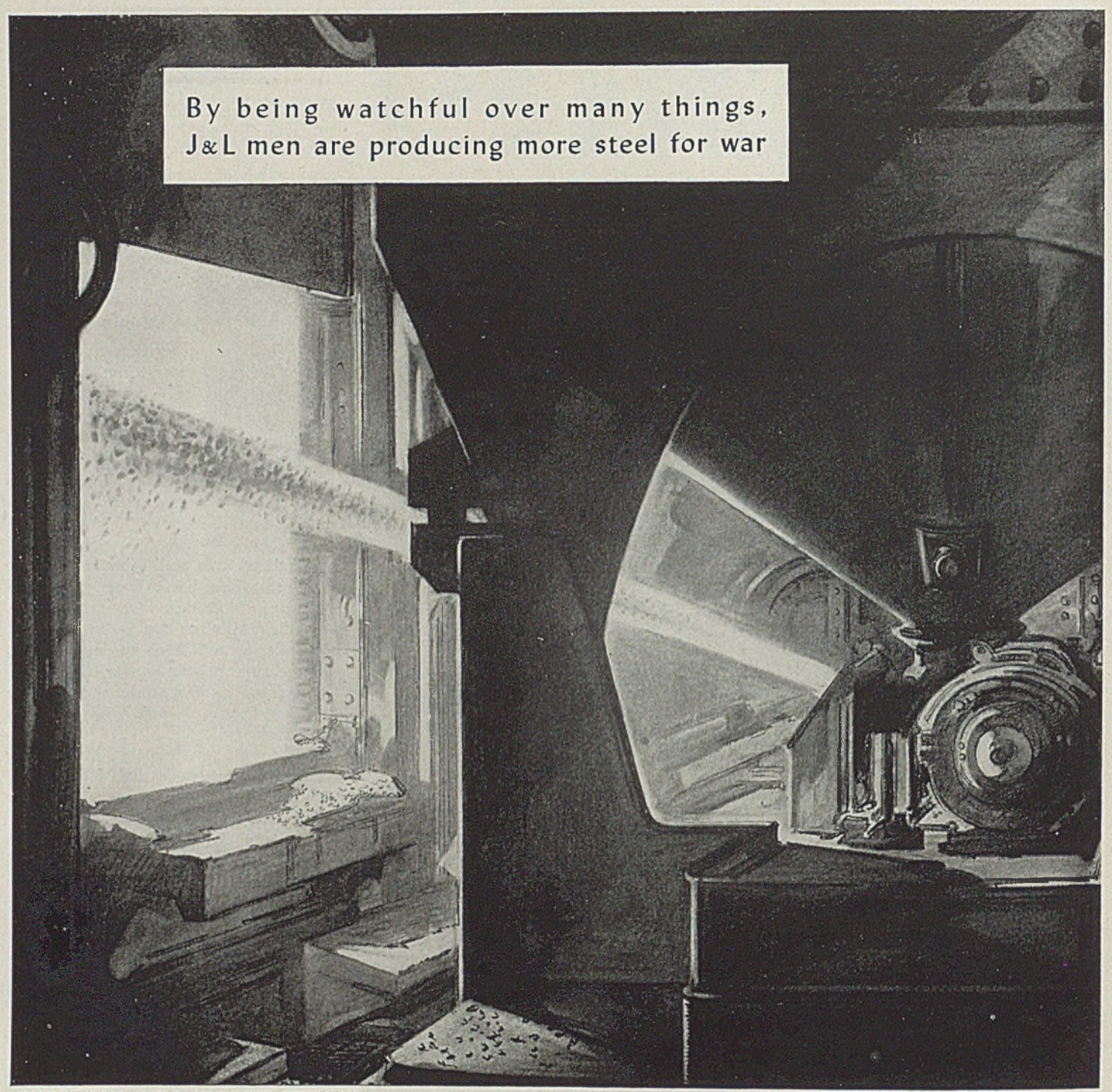
(Please turn to Page 140)



Above—Proper lubrication is vital. Insist on regular lubrications according to manufacturer's recommendations. Avoid over-lubrication



Right—Inspect control equipment every month. Here the controller and contactor covers are removed and the mechanic is replacing a finger tip



DOLOMITE GUNS IN ACTION AT OPEN-HEARTHS HELP MAKE RECORD WAR-STEEL PRODUCTION

Skilled open-hearth men know the exact spots where the churning, boiling metal and slag begin eating away destructively at the dolomite hearths of their furnaces. Instantly, as each batch of steel is poured, these men swing into action with their dolomite guns. While the empty furnace is held at full temperature they shoot streams of the prepared dolomite at the white hot walls and bottom quickly building up the worn spots. Within minutes a new batch of fighting steel is in the making.

Minutes to these men are priceless — for, at the industry's present high rate of production, every

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

minute steel enough is produced to build five army tanks. America's steel mills are producing steel faster today than at any time in history — steels that are providing our fighting men with equipment and weapons to crush enemy forces and protect our own.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

J&L STEEL

CONTROLLED QUALITY STEEL FOR WAR

STONE AND STEEL

Dolomite a marble. This rock mineral used for "making bottom" in open-hearth steel furnaces is, in its original state, a limestone or marble rich in magnesium carbonate. It is found in extensive beds throughout eastern United States. The rock is quarried, crushed and screened for uniformity of size after which it is calcined by heating. In the white-hot steel furnaces this material fuses into a homogeneous hearth-lining resistant to destructive action of boiling steel and slag.

Stone of Heaven was the name for iron in ancient Egypt and Babylonia, indicating that the only pure iron was that obtained from meteorites, or falling "stars."

Higher than Tibet, on 60-mile wide ribbon of minerals 15,000 feet up in the Andes Mountains, Bolivian Indians work in tin and tungsten mines to help supply U. S. war effort with strategic materials.

To pry loose steel's secrets, J&L has Department of Metallurgy and Research with physical testing laboratories and staff that any university might envy. In these laboratories the inner story of steel is collected, classified, reduced to formulas. Many of these formulas are actually worked out in the J&L Pilot Plant, a steel works in miniature, complete with experimental open-hearth furnace, rolling mills and heating furnaces, first of kind in the industry, invaluable in today's urgency to produce new and better steels for war.

Locomotive built by jeweler, Matthias W. Baldwin, in 1831, for a tiny toy railroad in Philadelphia Museum, led to founding of great Baldwin Locomotive Works.

$5.00 to ship bushel of salt from Philadelphia to Pittsburgh was typical of freight rates in days of Conestoga freighters hauled across mountains by six-horse teams, doubled up to pull the broad-tired wagons up Tuscarora's forbidding barrier and over Laurel Mountain's rattlesnake-infested trails. Prior to 1840 there were years when 8,000 wagonloads of materials crossed the mountains carrying textiles, fine furniture and luxuries from the East, taking back iron bars, kettles, nails, hardware from Pittsburgh, budding young iron metropolis of "The West."

126 million pounds of hay, 88 million pounds of oats were purchased by the U. S. Army in 1913. In first World War an infantry division required 4,400 horses and 153 motor vehicles with 3,300 horsepower. Today that same infantry division would require 3,500 motor vehicles (160 types) with 400,000 horsepower — and no hay!

17-ton "bite" of iron ore can be taken out of cargo of lake ore boat by a single clam shell unit in the great Hulett unloaders with which most unloading docks are equipped.

New Kink in REPAIRING OPEN-HEARTH BOTTOMS

By JOHN D. SAWYER
Long Beach, Calif.

Shoveling dolomite on a spoon which is used for dumping it directly over the spot on furnace bank to be patched. (Courtesy, Carnegie-Illinois Steel Corp.)

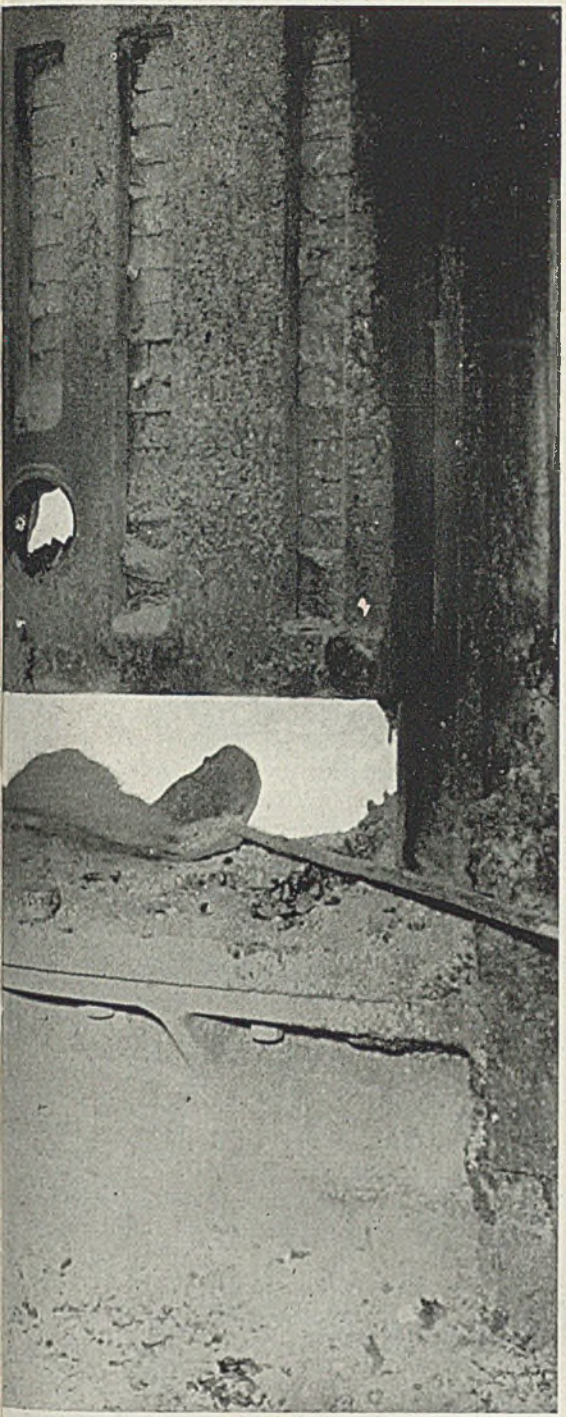
SETTING bottom in a hurry is accomplished in a novel manner at a Pacific Coast plant producing basic steel. Serious damage to the bottom often caused a delay time of 15 to 20 hours in the past. The procedure followed will on some occasions cut lost time by 50 per cent. Rapid setting of the magnesite repair is hastened by simply having the charging car operator dip a charging box of liquid slag from a nearby furnace and dump it on the patch in question.

The method used in these repair jobs has been discussed with several open-hearth furnacemen, some having had as much as 40 years experience; and the consensus of opinion of this new but simple idea is that, with skilled operators, it is entirely practical. A complete account of a repair job using this method is as follows:

No. 3 open-hearth furnace on a recent afternoon turn was charged for a structural angle heat to finish 14 to 20 carbon. The heat while being worked down melted high and developed a bad boil in front of No. 1 door; the melter in charge was forced to tap it as a reinforcing bar heat. The majority of the heat was saved, but the last few hundred pounds of slag went through the bottom in front of No. 1 door. The hole was completely through the pan and it took nearly 8 tons of magnesite to complete the repairs.

The heat under discussion was tapped at 10:30 p. m. and as the gang on the midnight shift came on, the hole through the bottom had been closed by chrome brickbats and a shot of magnesite.

Operators on the new turn were told



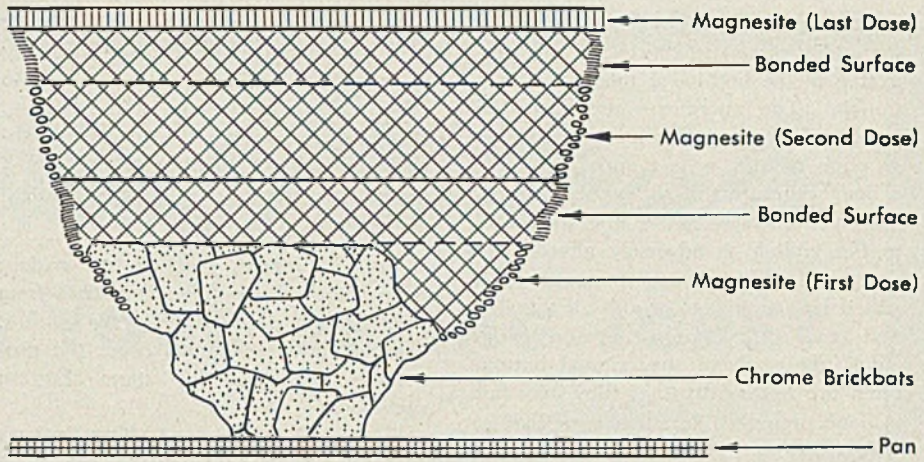
that all the slag bins were empty and that they would find it necessary to grind a batch before they could proceed. Upon inspection, it was found that the grinder could not be put in operation until the next day. A search of the pit revealed that the slag thimbles were full of slag from high-carbon killed heats and the silicon content was such that it was not satisfactory.

The whole shop had been striving for weeks for a new production record that would bring the coveted Army-Navy production pennant. The men were talking over the situation when an old time charging machine man remarked that the second furnace down the line would soon have some good slag as he had just dumped a box of burned lime a few minutes previously. The first helper upon inspection found that the heat on No. 2 furnace had a slag that was shaping up.

The hole under repair was given a double heavy shot of magnesite, the tap hole was closed up short and the second helper given orders to line it up at once. It was then agreed to have the machine man take an old charging box, slag it in the manner of a test spoon, and attempt a transfer of liquid slag. The tracks were all cleared, doormen were stationed at both furnaces; and the maneuver of transferring the hot slag from No. 1 furnace past No. 2 and into No. 3 furnace was accomplished.

The liquid slag dumped in the furnace was cooked for approximately 15 minutes before being tapped. Inasmuch as the bottom had a wet and spongy appearance, a couple of applications of magnesite were given to absorb all the excess slag. Shortly thereafter investigation disclosed that the bottom was well bonded and ready to go without even piping the tap hole. Charging time was 5:00 a.m., this being less than seven hours and a record for a repair of this nature, at least at this shop. The bottom held its contour and hard, solid appearance far longer than usual following such a job. Over 100 heats were tapped before the furnace was taken off for repairs, the patch being in good shape at the end of the campaign.

The liquid slag dumping method also was employed for fixing the breast of the furnace. Damage to the bottom here is more severe because of tearing of the breast by bad scrap, by the falling of fluxes that fail to clear the bank in the door, etc. Hot slag dumped on a magnesite patch at this location helps hasten the job for this is the coolest part of the furnace and the hardest place to fuse bottom materials. Shortly after the hole is built up level with the original bottom the charging car is brought into play again. This time, a box or preferably a paddle for charging large pieces is used as a tool to forge and press the breast and all portions of the banks that can



Schematic diagram of method employed for patching an open-hearth bottom at a Pacific Coast plant

be reached, into the desired contour. Pressing the mixed slag and magnesite hastens the bonding of the bottom and never fails to save time on repairs where it can be used.

A magnesite bottom will absorb about 50 per cent of liquid slag. The quality of the slag is highly suitable for the job when it is dipped liquid hot before any of additions of silicon, manganese, coke, limestone, dolomite, etc. are made. Using a liquid instead of small or large particles results in a more uniform absorption.

On minor holes in this shop it has become customary for the helpers to use the explosion method for quick repair of places still retaining metal after the tap. This is an unsafe practice except at the hands of experienced and able operators. The usual practice is for the doorman to raise a door at an angle with the hole to be fixed; then the helpers soak a shovel of magnesite well in the water bosh and heave it directly in the metal. The resultant explosion, caused by the water soaked magnesite, cleans the hole instantly and still leaves the surrounding bottom hot enough so that the small amount of repairing materials will set to the rest of the furnace bottom material more rapidly than if some other method of cleaning the hole was to be used.

A liquid slag application upon a triple or quadruple shot of magnesite compared with the method of adding only a few inches of magnesite at a time with the usual mix of ground slag is of value on deep holes. It not only is a time saver but affords a more lasting patch.

A major problem facing the first helper in setting bottom in a deep crater is the fact that the level of the hole is always so much lower than the bottom of the taphole so that when the furnace is fired

to a temperature high enough to bond the added materials, the excess slag collecting in the bottom of the hole causes trouble. The operator must keep the bottom of the cavity as level as possible or pools of slag collect and high spots of magnesite are still not properly fused. Attempts to keep a gutter from the crater to the taphole is adversely affected by the depth of the hole. If magnesite is added fast enough to absorb all the slag that tends to run to the center of the patch, the walls of the original bottom often are left so dry that they may fail to bond properly. In either case, that is, with an excess or a shortage of slag, the patch is weakened and eventually fails with the consequent loss of time, materials and perhaps metal.

The procedure under the liquid slag dumping method is simple. When the hole is cleaned of steel it is given a shot of magnesite quickly before slag can gather and then a second and perhaps third dose of magnesite, if the hole is serious. Observation indicates that a safe dose of magnesite preceding the liquid slag application is not less than 5 nor more than 10 inches. This dose should bring the level of the repair job up to where most of the dumped slag will drain away through gutters in the bottom and out the tap hole. The last few doses of magnesite are added with care and caution is used to see that they are well set and rounded to conform to the curvature of the rest of the bottom.

Under this system the magnesite absorbs the correct quantity of slag and a higher temperature can be carried which is conducive to a firmer bond.

Bottom repair practice at various open-hearth shops differ somewhat from the method described by the author. The following comments cover the procedure employed by some Eastern operators.

THE EDITORS

I. For a "break through" job such as described, and for patching deep holes on the flat banks and breasts of the furnace and after the pan has been repaired and the chrome brickbats thrown into the hole, a wet grog of No. 695 plastic is poured over the brick bats until they are well covered. The rest of the hole then is filled completely with dry Hearth-Patch and this is covered with a couple of inches of dead-burned dolmite or magnesite. Slag, if necessary, is added and the patch is burned for 2 to 3 hours to set the top crust. After cooling for 10 or 15 minutes the furnace is ready for charging. The entire patch then would analyze around 65 per cent magnesium oxide and would be diluted with a little slag.

Hearth-Patch is a quick fusing magnesite containing approximately 65 per cent of magnesium oxide. It is sized through a No. 4 mesh screen with about 33 per cent minus 50 mesh, and packed in waterproof paper sacks containing approximately 100 pounds each. It can be stored on the open-hearth floor near the furnace where it is ready for immediate use.

The explosion method for cleaning out small holes seldom is employed by Eastern steelmakers. For such repairs a dead-burned dolomite is the most satisfactory material to use. Such shallow holes should be cleaned out as much as possible with a rabble or with air and the hole immediately filled with Magnefer. Burn the patch for half an hour or so, depending upon the depth and area of the patch, charge up, and go ahead.

II. Good success is to be had in getting a furnace back in production after a heat goes through the bottom by plugging the hole with chrome rock and pouring a slurry of No. 695 around the rock to insure that all small holes are plugged. This is followed by packing No. 695 mixed to a plastic state over the rock and tamping it with a frontwall spoon. After the hole is filled with this material within 8 inches of the original bottom, the fuel is put back and the furnace is brought up to heat as soon as there is sufficient slag over the No. 695 plastic. Washington magnesite then is added.

Another practice is to allow the material in the furnace to drain through the hole for some time. The objection to this procedure, however, is that the beams are softened. Moreover, the hole is enlarged so that it is impossible to hold the chrome rock and a large crop must be used to close the opening. This practice is not as safe as when chrome rock is employed.

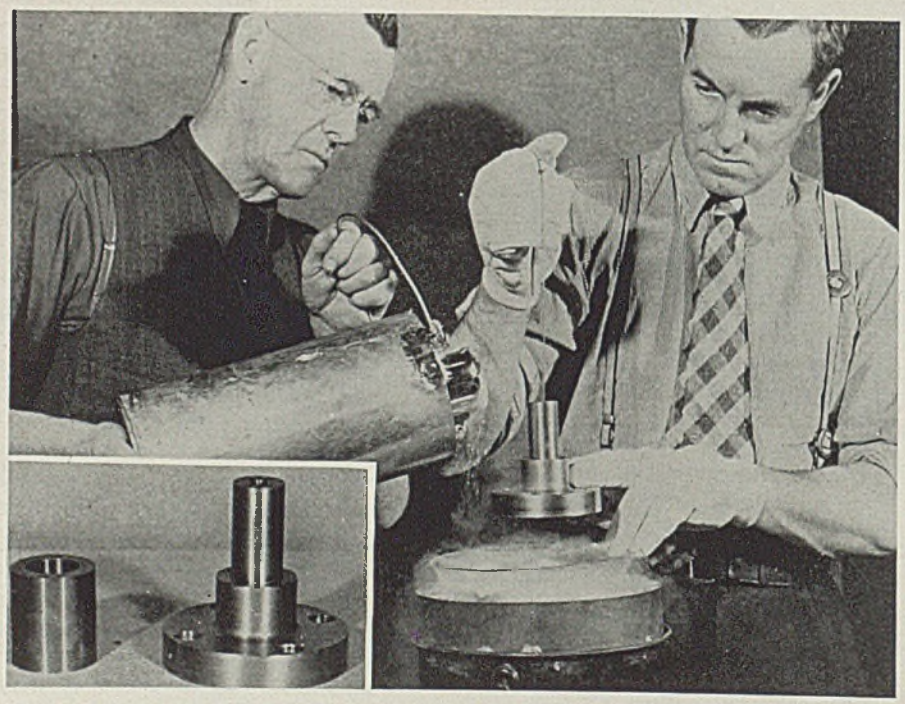
When the furnace is cool enough on the under side No. 695 plastic is packed in around the beams and plates with a hammer handle as a precautionary measure against any set holes and then a plate is welded over the opening.

Special effort is made once a heat goes through the bottom to close the hole immediately so as not to allow the furnace and bottom to cool. Expansion and contraction of the bottom as a result of such cooling down and heating up prevents a good bond between the new and old materials.

III. In case of a breakout, large pieces of chrome ore, or large magnesite brick bats or chrome bats, are used to plug the hole. A sufficient amount of

(*Please turn to Page* 139)

SHRINKING STEEL WITH LIQUID NITROGEN



LIQUID nitrogen, 410 degrees Fahr. below zero, is used by General Electric to shrink steel parts used in manufacturing wartime electric apparatus. The shrinkage, it is reported, allows a diameter clearance of slightly less than 0.002-inch between the steel part shown, right insert, and the hollow tungsten carbide cylinder which is later fitted over it to form a complete punch. Shrunken part quickly expands, forming a strong bond, and the assembled punch is ready for production

ARE *Critical Materials* DELAYING YOUR PIPING JOBS?

New "PIPING POINTERS" Give Helpful Ideas

SHORTAGES of materials challenge the ingenuity of piping men. To speed installations and keep pipe lines flowing, it's up to them to make safe and practical substitutions—and devise short-cuts at every turn!

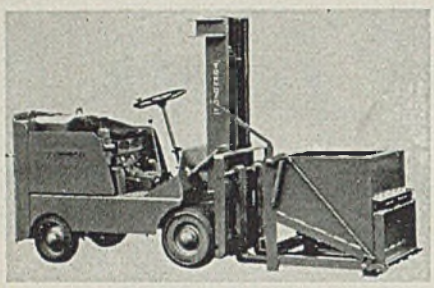
Just printed, Crane "Piping Pointers" Bulletin No. 6 is ready for you with valuable suggestions for using alternate materials. It gives handy hints for making emergency installations. It will help your men get jobs done faster—help you prevent delays in war production.

Sent Free on Request—"Piping Pointers" are designed to aid you in meeting three wartime responsibilities: (1) keeping pipe lines at peak efficiency, (2) training new maintenance workers, (3) conserving critical metals. They're based on Crane Co.'s 87-year experience in flow control engineering. Copies of Bulletin No. 6—as many as you need—are yours for the asking. Call your Crane Representative, or write to: **Crane Co., 836 South Michigan Ave., Chicago, Illinois**

CRANE VALVES

Hopper Attachment

Towmotor Co., Cleveland, is offering a new hopper attachment which converts a standard lift truck for specialized handling jobs. It makes possible the



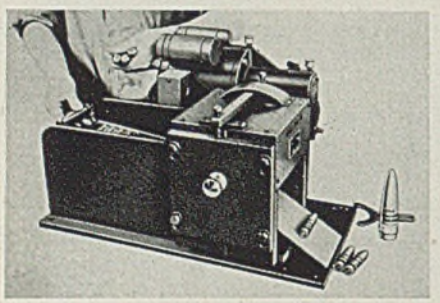
handling of hopper-contained bulk materials in a wide variety of production operations.

Designed for use with standard fork equipment, the hopper is available in various sizes. To provide a firm carrying position and permit rapid tilting in dumping hopper loads, the attachment is carried directly on the fork support bar of the lift truck by means of a hook arrangement which is an integral part of the hopper. As shown here, ample clearance beneath hopper allows handling without removal of forks.

Hopper gate is opened for discharge by pulling down a hand lever positioned within easy reach of operator, while complete emptying is assured by the slanting hopper bottom. The gate is closed by gravity and is secured by an automatic-catch latch. A 17½-cubic foot load can be handled by illustrated unit.

Marking Unit

Acromark Co., 398 Morrel street, Elizabeth, N. J., is offering a new model 12B marking unit for fast production work in diemarking shell, shot, tags, tubes, drills, bushings and other items of copper, brass or unhardened steel. It is suitable for all-

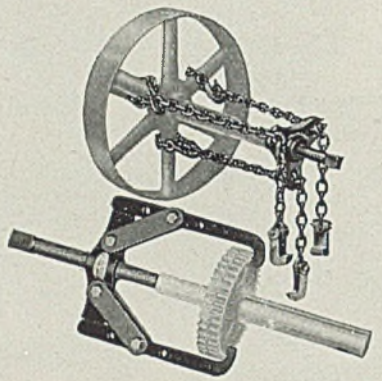


round service in industrial or ordnance work.

Driven by an ample size gear reduction motor, the marking device is said to insure a perfect impression with every die contact. The range spread of the marking speed depends upon the capacity of the feeder in loading the chute. Each shell or other product is fed automatically from the chute to the die by a positive arrangement. Machine shown is built for marking 20 millimeter shot.

Wheel Pullers

Armstrong-Bray & Co., 5364 Northwest highway, Chicago, announces new Steelgrip rigid-arm gear and wheel pullers designed to take care of a wide range of jobs, covering factory work, tank, tractor, truck and farm machinery maintenance, etc. These are capable of pulling spoked wheels, solid gears, pinions and sheaves whether close up or



at considerable distance from shaft end.

The units are of the same construction as the rest of the company's line; forged steel arms, forcing screw, etc., are heat-treated for strength. They are being offered in three sizes.

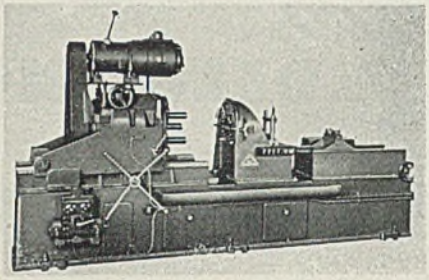
Drilling Machine

LeMaire Tool & Mfg. Co., Dearborn, Mich., is offering a new machine designed especially for those whose total volume of shafts produced, although large, might be made up of several different models requiring many short runs of various setups. It drills, reams, and taps holes in flanges of crankshafts. Its manufacturers regard it as a compromise between a single-spindle setup and one having fixed spindle drill heads, in addition to individual fixtures, for machining various models of crankshafts.

The machine features three horizontal spindles, spaced 120 degrees apart around a circle. These can be spaced on any bolt circle diameter from 5½ to 10 inches. By indexing the head in which these spindles are mounted, it is possible to drill flanges having 3, 6, or 12 holes.

Movement of spindle head while drilling and reaming is controlled by hydraulic circuit. For tapping, the hydraulic cylinder is disconnected and taps are fed into the work by manual operation of the star handles. With 4-speed transmission provided for drilling and tapping, a wide range of useful speeds is offered.

Spindles are driven through a couster

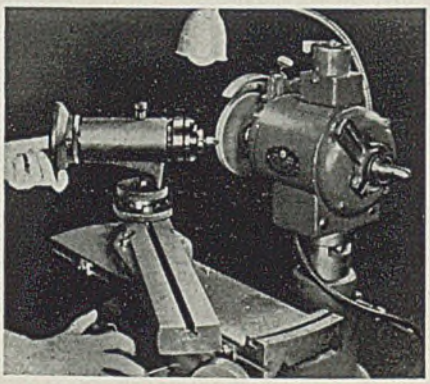


box, with connections to gears made by universal joints. Whole spindle drive is carried in a drum, rotated by a worm and worm wheel and provided with an index plate locked by a shot bolt. Right end of machine is equipped with a fixture with removable adaptors, V-blocks and drill plates. It can be set up to accommodate various models of crankshafts.

Grinding Fixture

Industrial Grinding Co., Los Angeles, recently introduced a new I-G-C relief grinding fixture, a countersink grinding fixture said to speed up grinding operations as much as 300 per cent. It handles countersinks of all types, center drills, integral pilot cutters and pilot-drills—either right or left hand; and with only two wrenches, the fixture can be quickly adjusted for correct relief and angle in relation to the grinding wheel.

The unit fits any standard grinder, and will handle work from ⅛ to 1-inch in diameter with the standard collets that



are available. The lift of the single cam is variable from 0.001 to ⅛-inch and adjustment pins are provided for 1, 2, 3, 4, 6 and 12-flutted cutter grinding.

Construction of the grinder is rugged. Its main housing is of cast iron, which supports a hardened and ground spindle on two large bearing surfaces that require

and I learned to run his Oster in a jiffy!"

Men leaving machines for military service. Experienced operators frozen to jobs. Only solution is rapid training of new operators. It's a serious problem with complicated machines. Not so with the Oster No. 601 "RAPIDUCTION" — the *SIMPLIFIED* Lathe now equipped with automatic indexing of its 6-station turret.

Capable of handling a wide variety of bar and chucking operations, including unusually heavy forming cuts, Oster "RAPIDUCTION" Turret Lathes have SIMPLIFIED the problem of training new operators rapidly to necessary standards of efficiency.

Does this seem to offer YOU at least ONE solution to YOUR problems of man-power shortage? If so, use the form below NOW!

No Time Out to Celebrate Our 50th ANNIVERSARY 1893-1943

OSTER

THE OSTER MFG. CO., 2037 E. 61st ST., CLEVELAND, OHIO, U. S. A.

We are seriously interested in the Oster No. 601 "RAPIDUCTION" Turret Lathe. Please send Catalog No. 601 at once.

NAME_____

ADDRESS_____

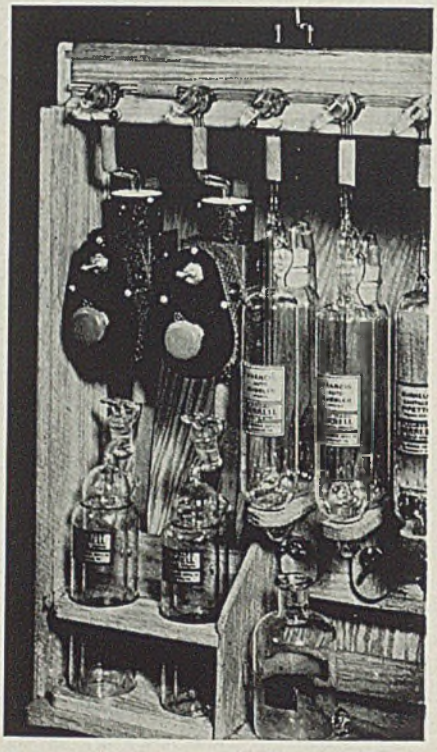
CITY_____ STATE_____

only periodic oiling. The cam is hardened tool steel, with steel adjustment pins. The fixture swings 90 degrees to the right or left and the base is calibrated in 5 degree increments.

Gas Analysis Apparatus

Burrel Technical Supply Co., Pittsburgh, announces development of a new manual method of gas analysis for installation on its build-up gas analysis apparatus, as well as on the new victory models.

According to the company, catalysis now supersedes slow combustion in standard gas analysis apparatus and provides



a faster, safer, more accurate method for the determination of the combustible components usually determined in the slow combustion pipette.

The new catalytic assembly substitutes a catalyst tube for the slow combustion pipette. Instead of employing the slow combustion method with its attendant hazards and slow technique, the gas mixture is passed comparatively rapidly through a heated catalyst tube; oxidation is completed in just a few passes. Manipulating technique is reduced to a simplicity which saves a substantial amount of time, increases accuracy and permits an inexperienced operator to proceed without the practice required by the slow combustion method it is reported.

Furnace for Magnesium

Selas Co., Philadelphia, announces a new furnace design for magnesium melting which uses a ceramic-cup radiant

The day the metal works went out of business

There was plenty of time to save the plant . . . even after the flames caught the edge of that puddle of oil.

But someone hit the blaze with a water stream. Ten minutes later you could see the flames all over town.

In your shop you should have men who can handle extinguishers . . . who can pick the *right* one when fire strikes. Training provides the answer. *The best training is a well-run demonstration, where men see extinguishers in action, learn how to use them.*

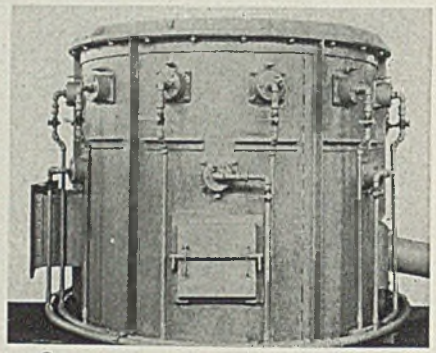
Walter Kidde & Company is preparing a booklet—"How to Teach Fire-Fighting." It tells how to handle demonstrations effectively, how to set up fire tests, how to explain extinguisher action. Write now. We'll mail you a copy.

Walter Kidde & Company, Inc.
332 West Street **Bloomfield, N. J.**

Kidde
HIGH PRESSURE GASES - FIRE PROTECTION
PROTECTS LIVES

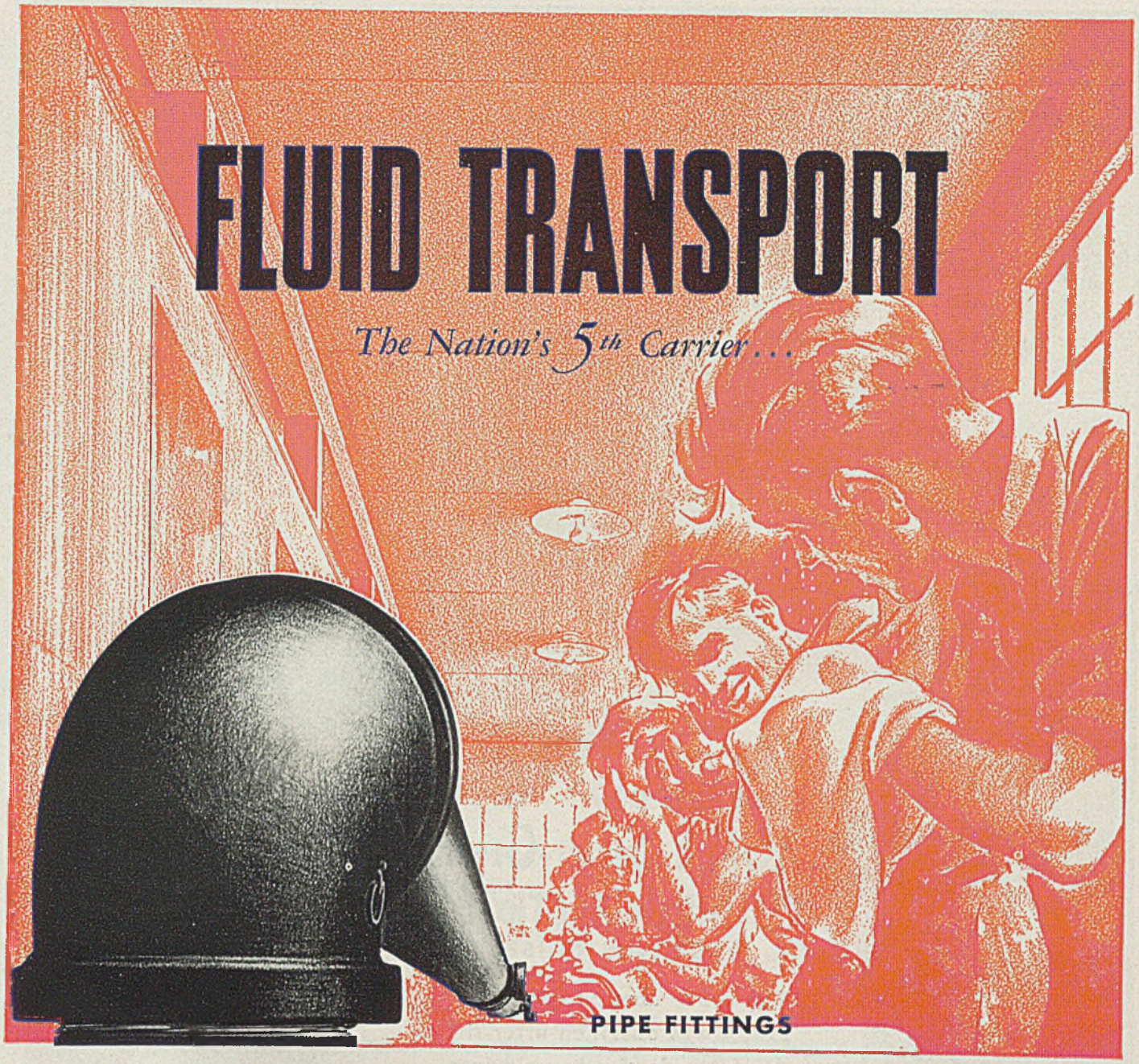
gas burner to obtain great uniformity of heat delivery. Unit shown holds 2000 pounds of metal in a pot slightly over 3 feet in both diameter and depth. In it provisions are made for ladling out 600 pounds of metal per hour although greater outputs from the same size pot can be easily obtained from the thermal standpoint if future magnesium casting practice permits.

Eighteen type-K-670 all-ceramic radiant-cup gas burners are employed in the furnace—12 in the top row, 6 in the bottom row—around the circular pot setting. Gas and air, premixed in correct ratio, is delivered to each burner through an individual line and manual valve. Thus, one may balance rates of heat input over the pot surface. Once balancing valves are set, single-valve two-point control, actuated by a thermocouple in the molten metal, operates to throttle or open the manifold mixture supply to all burners at once and automatically maintain a pouring temperature of 1350 degrees Fahr. in the pot at all times. An auxiliary thermocouple in the combustion chamber is connected into the control system so that a maximum outside pot temperature determined by the user can never be exceeded. Thus the maximum temperature gradient through the pot walls can be limited in the interest of safety, molten metal temperature uniformity and long pot life.



In operation, each refractory burner-cup attains uniform high incandescence and completes the air-gas combustion reaction entirely within the cup concavity. Thus the pot is literally immersed in an intense bath of blast-free radiant energy, rather than being subjected to the torches of flame characteristic of conventional pot firing.

Interesting design features of some 15 new furnaces recently installed include: Split manifolding, each of three manifolds being independently protected against backfire; two large opposed clean-out doors (with quick-action wedge-bar latches) for weekly inspections and scale removal; a refractory-lined emergency run-out spot with a 3-inch opening; bottom venting; burner view-holes for inspection of cup radia-



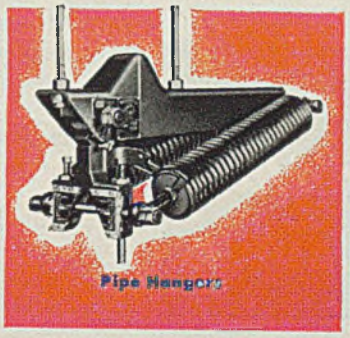
WASHING 50,000 FACES is a major job of FLUID TRANSPORT. Imagine the complexities of the piping systems for water, heat and sewerage in an army camp to house and train many thousands of recruits. Yet these systems have been installed on "impossible" time schedules.

Piping systems like that define the true function of Grinnell FLUID TRANSPORT, which includes the supplying of all the connecting links for converting a pile of pipe into a complete *piping system.*

For new war construction, or maintenance and repair of existing piping, call Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Plants and offices throughout United States and Canada.

GRINNELL

WHENEVER **PIPING** IS INVOLVED



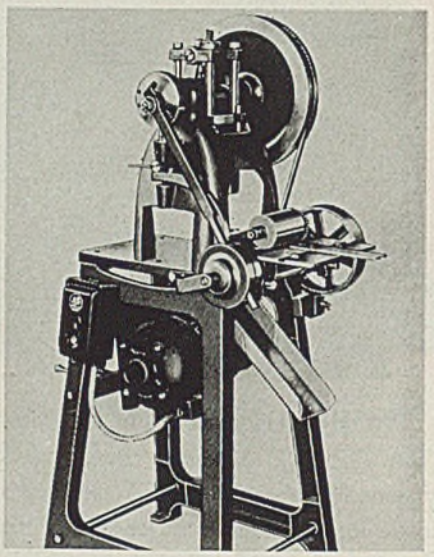
tion during burner operation; a split cast-iron top ring for long life; 2-inch fire extinguisher openings around the pot rim; and hard-burned refractory facing on the furnace floor and part way up the sidewalls to resist molten magnesium in case of pot rupture or leakage.

Consumption of natural gas is 750 cubic feet per hour, of manufactured gas 1400 cubic feet per hour, of producer gas 5000 cubic feet per hour. In several installations, pots are set so that the working floor level is 2 feet below the pot top—at the plane indicated by the horizontal reinforcing angles between the burner rows in the external furnace view. Overall height is slightly under 6 feet.

Stamping Press

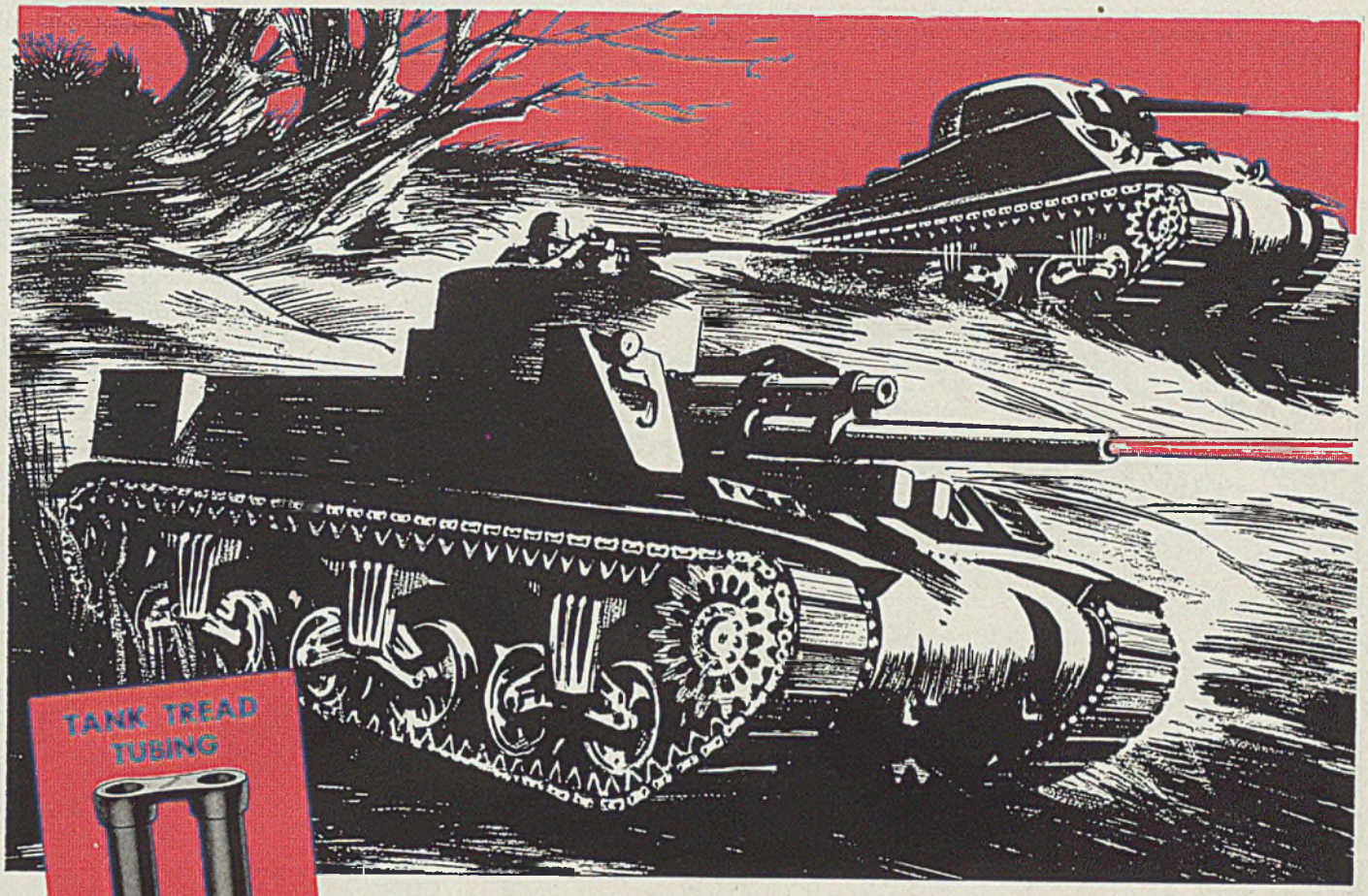
Di Machine Corp., 3654 Lincoln avenue, Chicago, is offering an improved high speed stamping press featuring a speed range between 180 and 550 strokes per minute to suit various punching requirements. It also embodies an arrangement for addition of spacers to provide a die space to 1¼ inches, provisions in the ram to permit boring it out for punch shanks to 1 9/16-inches.

The press takes die sets measuring



up to 6¼ x 8 inches. It includes an integral roll feed for strip stock up to 4½ inches in width. Drive is by a ¾-horsepower 1140 revolutions per minute, 60 cycle, 3-phase motor mounted under the bed. The head design includes a cylindrical ram measuring 4 inches in diameter and an inserted pitman screw.

The bronze pitman faces upward and carries a steel screw that engages adjustment nuts on the two sides of a 1-inch steel crank-pin assembled in a head which connects by four studs to the cylindrical ram. Stock feed is driven by an adjustable crankwheel on the end of the crankshaft. The wheel operates a reciprocating rack and one-way mechan-



ROUGH, TOUGH and NASTY ...ON NAZIS!

THE Germans in North Africa have discovered what hard-hitting engines of death American tanks and tank destroyers are. Every day the Nazis see more of them in action. Every day Hitler's army comes closer to the realization that nothing but unconditional surrender will prevent these "land battleships" from taking over Tunisia, perhaps Italy, and even the Fatherland itself.

It is our privilege, here at Standard Tube, to make an essential part of these tanks and tank destroyers—the WELDED STEEL TUBING that forms the foundation for the caterpillar treads. If any part of a tank has to be strong and tough, this does—for a tank with a broken tread is not much good.

We're putting our years of experience and all our skill as tubing manufacturers into making these tread tubes as sturdy and dependable as they can be built. We're doing a like job on a host of WELDED STEEL TUBING products for other war uses, plus Steel Forgings for Army and Navy shells.

We have capacity open for additional contracts. Maybe we can help solve your problem. Write, wire or phone for complete information.

THE STANDARD TUBE CO.

Detroit STANCO Michigan

Welded Tubing *Steel Forgings*

★ *Complete Tube Stocks Maintained by*

STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N. Y.
LAPHAM-HICKEY COMPANY, 3333 West 47th Place, Chicago, Ill.
UNION HARDWARE & METAL CO., 411 East First Street, Los Angeles, Calif.

ism connected to the 3-inch feed rolls. The press occupies a floor space of 20 x 32 inches. It is 54 inches high, weighs approximately 500 pounds.

Drum Carrier

Ernst Carrier Sales Co., 1456 Jefferson avenue, Buffalo, is offering a new 14-inch carrier with built-in brake for placing and removing 55-gallon drums on and off skids, scales and platforms. The built-in brake is reported to provide smooth, slower and easier lowering of the container from the top 14-inch position.

Container is raised by lowering the carrier handle from the up position to the horizontal position where it locks automatically. Unlocking of handle and applying the brake lowers the container to the floor.

Accidents are eliminated completely by the lifting device as the operator does not have to touch the container, it is said.

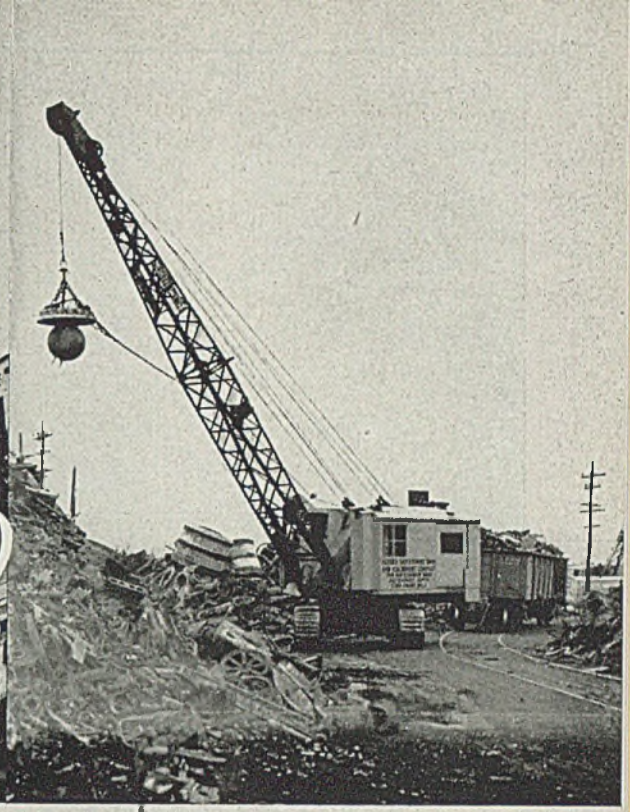
Steel Type Holder

New Method Steel Stamps Inc., 145 Jos. Campau street, Detroit, is offering an improved steel type holder for marking ends of shafts and other parts having a center hole. It may be used either with individual type or with logotypes made to specifications of the user, according to the company.

For hand stamping the holder is furnished with a knurled shank. With a turned shank it may be mounted in a press. A floating locating pin backed up by a light spring in the holder insures proper register of markings around the center.

Individual steel type or logotypes are made in tapered segments to form the proper radii. Each segment bottoms

A CRAWLER CRANE goes to WAR



THE design and operating advantages that made money in peace times can and are helping to speed defense in war times. And in reverse, the performance of machinery in war times can teach a lesson to peace time operators.

Take Northwest for instance—Northwest simplicity—few shafts, few gears, simple arrangement! This means easier assembly in far away ports, easier upkeep—easier understanding on the part of green men! There is a time coming when you will be able to get Northwest again! When that time comes, the competitive angle is going to be a little tougher.

Northwest simplicity and ease of upkeep is only one of the many features Northwest will have for you that will simplify future material handling problems.

Buy War Bonds, and watch and plan for a Northwest on that job after the "Duration."

NORTHWEST ENGINEERING COMPANY
1805 Steger Building, 28 E. Jackson Boulevard
Chicago, Illinois

After VICTORY Buy NORTHWEST

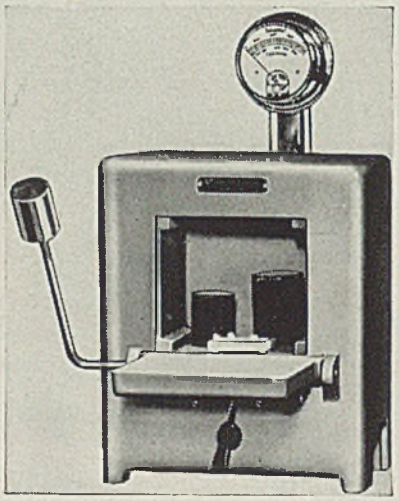
NORTHWEST

against a hardened and ground anvil. Segments are held firmly in position against shock loads by set screws and a heat-treated spring sleeve. When full capacity of holder is not used for type, blank spacers are supplied to fill the mortise.

Electric Furnace

Thermo Electric Mfg. Co., 332 West Sixty-ninth street, Chicago, announces a newly improved Temco electric furnace suitable for heat treating small parts such as tools, dies, gears, etc. It is a continuously operating unit—operating at temperatures up to 1500 degrees Fahr. and intermittently up to 1850 degrees Fahr.

The furnace works on either alternating or direct current and can be obtained for use with either 115 or 230 volts. Its heating chamber is 4 inches wide, 3¾ inches high and 3¾ inches



deep. The entire furnace body is a heavy, one-piece casting. Legs also are cast integral with the body. The door is counter balanced for easy operation. It fits snugly against the body to hold heat loss to a minimum and, when open, forms a convenient loading platform. Entire heating element of the furnace is connected in the electrical circuit over the complete heating range. To eliminate cold spots, another feature of the unit is a special refractory material which effects rapid heat diffusion yet retains its electric insulating qualities at high temperatures.

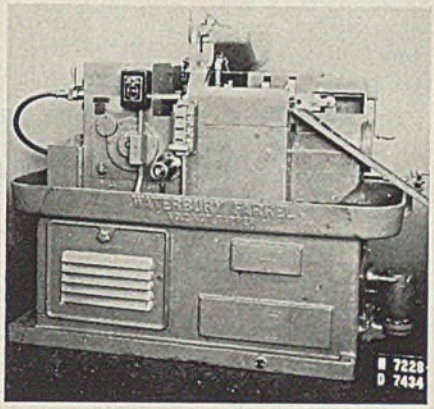
Nut Tapping Machine

Waterbury Farrel Foundry & Machine Co., Waterbury, Conn., reports the addition of several new features and devices on its redesigned line of automatic tap nut tapping machines. The design changes are claimed to increase productivity of the units besides making them

more versatile.

In each of the new machines the hopper feed mechanism was improved and a new selector mechanism provided that handles special work such as slotted and castle nuts, and delivers them to the stationary straight shank tap so they all face the same way. The hopper disk is rotated intermittently by a duplex ratchet pawl, which is said to assure adequate and correct feeding. The feed chutes and chute-ends are clamped in place, so the use of a wrench is not necessary; furthermore, each chute assembly is complete for each size nut and no adjustments are required.

The pusher mechanism which advances each nut into the work-holding jaws, is entirely new. The feed cam and change gears are located within a casing and are easily replaced by removing a cover plate. The pusher itself is arranged so it can



be instantly withdrawn from the cut-end when necessary. The mechanism is adjustable to accommodate nuts of various thicknesses.

Automatic safety throw-outs stop the machine. Both the tap holding and nut stripping mechanism were redesigned. Tap is held in place by two pairs of clamping arms which open and close alternately. Tapped nuts are intermittently pushed along the tap shank by a pair of vertical spring fingers and two horizontally-actuated claws, all assembled in a reciprocating slide.

The spring fingers first push the nuts along the tap shank until a few of them are located between the first of two pairs of stationary guide fingers, from which position they are then advanced by the claws. These claws fulcrum in the slide and are synchronized to operate with the opening and closing of the clamps. While the first claw is advancing nuts past the corresponding open clamp to a position between the second pair of stationary guide fingers, the second claw remains inoperative until the clamps have alternated their position, thus allowing the second claw to engage the nuts preparatory to completing the stripping action. The nuts then drop off the end of the tap into a trough.

Fatigue of Steels

(*Continued from Page 89*)

motes fatigue but is also susceptible to seizure and galling.

Internal stresses of the wrong kind are perhaps the most insidious of all fatigue hazards because we can seldom know their magnitude or the pattern in which they are distributed within the material or whether they are alike for all commercially identical machine parts. Internal stresses may be the result of operating conditions such as occur in brake drums, clutch plates or other friction surfaces where the instantaneous temperature in a thin layer is so great that, under thermal expansion, the surface layer is stressed beyond the yield point in compression. When the source of heat is removed, the heated surface layer is quenched by the adjacent cool metal, and, under thermal contraction, it is so severely stressed in tension that fractures often occur. This is, of course, the same thing that happens in grinding.

Residual Stresses from Processing: Internal stresses often result from the cooling of castings and forgings or from the vigorous heat transfer of heat treating. Many parts, such as crankshafts, axle shafts and camshafts, require straightening during processing. Since the straightening operation is usually done at room temperature, and since the part is rarely stress relieved after straightening, severe internal stresses result. In turning, milling and other machining operations, it is necessary that metal be removed at a minimum cost, and therefore the cutting tools must often take deep cuts at high feed rates. Since metal cutting is more accurately described as a metal tearing operation as far as stresses are concerned, we need not be surprised to find serious internal stresses to considerable depths after machining.

When metal cutting has been unusually severe or after operations such as punching and shearing, we often find that the surfaces are actually fractured. Finish machining or grinding rarely go deep enough to remove the internally stressed metal from previous rough machining, and of course these finishing operations add stresses of their own. Whenever it is economically practicable, internal stresses that produce tension in any surface layer subjected to cyclic tension stress should be reduced or removed or, better still, converted to compressive stress by suitable treatment because all fatigue failures are due to tension stresses.

In connection with machining damage, an interesting and perhaps important observation has recently been made which indicates that the layer "injured" by machining is deeper than is generally believed. It also shows that the "in-

jured" material does not recover by heating for long periods at high temperatures. A in Fig. 2 shows a bar of SAE 4615 steel as it appeared after rough machining on a shaper. This piece was then carburized for 8 hours at 1700 degrees Fahr., cooled in the box, reheated to 1500 degrees Fahr., quenched in oil and drawn at 300 degrees Fahr. for 1 hour. The machine surface was then ground in a direction at right angles to the shaper marks to a depth of 0.0055-inch below the last visible tool mark, after which it was polished as shown in B, Fig 2. Finally, the polished surface was shot blasted. Whereupon the machining marks (vertical lines) and the grinder marks (horizontal lines) reappeared as shown in C, Fig. 2, showing that the material is not uniform in resisting the shop blasting, notwithstanding the long period at elevated temperature. There is no evidence at present that the effect brought out by this experiment is significant in fatigue. It is presented here merely to emphasize that there is much that is not known about materials and processes.

The surfaces of repeatedly stressed specimens, no matter how perfectly they are finished, are much more vulnerable to fatigue than the deeper layers. It has long been appreciated that the vulnerability to fatigue increases as the surface roughness is increased, particularly if the roughness consists of sharp notches and more particularly if the notches are oriented at right angles to the principal stress. The practice of carefully finishing fatigue test specimens is, of course, a recognition of this vulnerability insofar as visible marks or scratches are concerned, even down to assuring that the final polishing marks are parallel to the direction of the applied stress.

These precautions are known to be effective in increasing the fatigue strength of the specimens, and specimens finished in this manner have, therefore, come to be known as "par" bars. This name implies that fatigue specimens approaching perfection in finish give the highest possible fatigue endurance for a particular material and that they accurately measure the ultimate fatigue properties of that material.

It can be shown, however, that the so-called "par" bars are not the best specimens but that influences akin to notches, as far as fatigue vulnerability is concerned, are retained by the "par" specimens. It seems that the specimen surface is highly vulnerable simply because it is a surface; that there is an extra hazard in the surface layer not shared by the deeper layers. This extra surface hazard may be due to submicroscopic notch effects or to the fact that the surface is a discontinuity since the outer crystals are not supported on their

outer faces. Whatever the reason for surface vulnerability, the evidence of its existence is strong.

Fatigue Life Increased: The fatigue strength of the most carefully prepared specimen will be increased if a thin surface layer of the specimen is prestressed in compression by a peening operation such as peen hammering, swaging, shot blasting or tumbling or by pressure operations by balls or rollers. This increase in fatigue strength resulting from the surface layer's being stressed in compression is clearly shown by the S-N curves, Fig. 8, which compare normally finished railway axles with axles subjected to a rolling operation. These and other tests show that the compression-stressed surface is effective whether applied to highly finished specimens or to specimens having rough surfaces.

First Use of Surface Compression: The idea of surface compression to improve the strength of steel is probably as old as steel itself. It has probably been discovered, forgotten and rediscovered many times. Certainly every village blacksmith knew and practiced the art in making wagon and buggy springs, axles and other heavily loaded parts. After these parts were forged into shape they were severely hammered to improve their strength, and no doubt the same procedure was followed by the ancient sword makers. Likewise, mill and ship shafts were cold worked by the application of small rollers at high pressure after machining because of the greater strength that was known to result.

The technical language contains many words vaguely describing properties or characteristics of materials or just symptoms that we do not understand. The oil technicians have the handy word "oiliness" for covering up many of the things they do not know about lubricants; the chemists have "catalysis", and the metallurgists have "cold work". We who are interested in fatigue have much to say about "cold work" without regard to the nature of the operation or to the effects produced. We often find that "cold work" and "work hardening" are used synonymously. These expressions serve well enough when applied to certain fabrication processes, but we must be much more specific when we wish to measure the effect of cold work on fatigue strength. Cold working increases the hardness of most metals including steel at least in the range of low hardness; it usually results in internal stresses of varying degrees and patterns; it alters the physical properties and sometimes fractures the material. With the known sensitivity of materials to fatigue, it is obvious we must learn how to control cold work just as we have had to learn how to control heat treatment in order to benefit from the good effects and to overcome the evil effects. We would not think of specifying a heat treatment without stating whether the temperature should be raised or lowered and in which order and to what extent, yet that is the way we now think of cold work. Cold working can be good or bad, depending upon how it is done and for what purpose.

Papers have been published showing that cold working of the surface so as to produce a layer stressed in compression increases the fatigue strength of the parts to which it is applied, but we are not told the amount of the prestress or the depth of the prestressed layer. Both of these values are presumably important in obtaining optimum results for any particular specimen, but it is probable that the values should not be the same for all sizes of specimens, for all materials, or for hard and for soft specimens.

When the compression-stressed layer is produced by applying sufficient pressure on the work by means of rollers or by peening to exceed the yield strength of the metal, the amount of prestress is presumably not less than the yield strength of the material. The depth of the stressed layer is probably roughly

proportional to the instantaneous area over which the pressure is applied as well as to the pressure intensity.

A simple and practical method for measuring the compression-stressed layer consists of a thin flat strip, B in Fig. 3, that is attached to a heavy base as shown in A, Fig. 3. This strip is rolled or peened with the same intensity that is given to the machine part. When it is removed from the base, it will be found to be curved as in A, Fig. 5, with the convex surface on the cold-worked side. The curvature of the strip may be measured by an indicator, as shown in Fig. 1, which can then be interpreted in terms of the depth of the stressed layer.

The chart, Fig. 7, records the stress magnitude and the depth of the stressed layer at constant cold work intensity of two such test strips. The cold-worked surfaces of these strips, the rockwell C hardness being respectively 64 and 40, were honed away in small increments, and the curvature was measured with the removal of each thin layer. The changing curvature as metal was removed provided data from which the compressive stress in each layer could be calculated with the results shown in the chart. As would be expected because of the higher yield point, the harder specimen was found to be more highly stressed than the softer specimen.

Also shown in this chart is the surface compressive stress in a nitrided specimen as a result of the nitriding. The procedure for this experiment was the same as for measuring the stress due to peening except that the face of the specimen that was in contact with the heavy base was plated to limit the nitriding to the outer face of the strip. On removal from the base after nitriding, the strip was curved convex on the nitrided side as is shown in A, Fig. 5. It seems, therefore, that the well-known resistance of nitrided specimens to fatigue is primarily due to the compressively stressed surface layer.

Residual Stress from Honing: While the above described peened specimens were being honed, it was found that the strips did not fully recover their original flat form. To determine if this residual curvature was due to a "set" in the material or was the result of honing, other flat strips that had not been peened were honed. These strips developed the same curvature as the residual curvature in the peened specimens, demonstrating that honing produces a comparatively stressed layer. The approximate magnitude of this honing stress is also shown in the chart, Fig. 7. This raises a question as to the state of surface stress in the carefully prepared fatigue specimens favored for laboratory fatigue tests since additional tests have shown that lapping also introduces surface compressive stress. The carburized layer in a carburized part is stressed in compression as is graphically shown in A, Fig. 4. Two opposite faces of this half-inch-square specimen were carburized while the other two faces were protected by copper plating. The specimen was quenched and tempered in the usual manner, after which it was split with a saw as shown in B, Fig. 4. Note that the parts are curved convex on the outer faces indicating compressive stresses in these faces.

The internal compressive stresses in the carburized layer may be a hazard for members stressed in tension because the tension stress in the core is equal to the working load plus the tension load due to the compressive preload of the case. For members stressed in bending and in torsion, the internal compressive stress in the carburized case improves the fatigue strength of the part except for the thin surface layer, which, after grinding, is severely stressed in tension. It is, however, a simple matter to convert this thin tension-stressed layer into stress in compression by suitable peen-

ing or rolling operations.

Elastic Deformation a Factor: A common cause of fatigue vulnerability is due to the belief apparently held by many designers and engineers that structural materials are rigid. Many fatigue failures can be traced to elastic deflection for which no allowance was made in the design. Elastic deformation of mating parts may be such as to concentrate the load in a small region.

Under operating conditions a crankshaft may be so elastically deformed in twisting and in bending that the bearings are only partially effective in supporting the load. The bearings are frequently found to be plastically deformed or worn "bell mouthed" to accommodate the elastic gyrations of the crankshaft.

(*Concluded in Early Issue*)

Blast Cleaning

(*Concluded from Page* 104)

The question of cost should be a negative factor in this vital problem. Yet it has been determined by actual comparative check over a period of time that sandblast cleaning of iron and steel, in addition to the benefits derived in reduction of maintenance and prolonging the structure's life due to the superior job of cleaning, costs only 50 per cent as much as an air-hammer-and-wire-brush job. This does not consider the added benefits of reduced maintenance and prolonged life of the structure.

By reducing upkeep needed, time out for maintenance and the need to keep reserves on hand are reduced. By prolonging the useful life of the equipment, replacements are proportionately reduced. Both of these factors reduce field requirements and thereby favorably effect steel conservation, help ease production shortages and give partial relief to shipping problems.

It is therefore suggested that before leaving the mills or fabricating points, all iron and steel be processed by sandblasting to thoroughly remove all mill scale and rust, then dehydrated by a clean and dry hot-air blast, followed by spraying with the best anti-corrosive solution obtainable. It is further suggested that this protective coating be maintained intact during processes of construction and operation by prompt touching up as required.

Physico-Chemistry of Coal and Coke Formation

Coke Formation Process and Physico-Chemical Properties of Coals, by W. Swietoslawski; 145 pages, 6½ x 9½ inches; published by Herald Square Press Inc., 233 Spring street, New York, for $3.50.

This volume by W. Swietoslawski, formerly professor of chemistry at the Institute of Technology of Warsaw, Poland, is the first of a series for the Polish Institute of Arts and Sciences in America. It is the outcome of investigations conducted over a period of years by fellows of the coal division of the Chemical Research Institute at Warsaw. The researches dealt with an examination of physico-chemical properties of coals and with explanation of physico-chemical phenomena which take place in the coke oven.

The author initiated and conducted these investigations, and most of the results were published in Polish in the Journal of Chemical Industry, which is not available in the United States. This led to the determination to publish a monograph in English. It was started just before the German invasion of Poland in 1939 but all the material was left in Poland. Writing of the monograph thus was done under difficult conditions.

As in Poland, as well as in many other countries and in some districts in the United States, there is lack of medium and low-volatile coals, numerous investigations have been made to examine the cases in which difficulties are encountered in transformation of coal into coke.

NE Alloy Steels

(*Continued from Page* 110)

have reported the NE-9420 acceptable for SAE-4120, but there has been much hesitancy in substituting it for NE-8620, NE-8720 or SAE-4620. A tremendous amount of work is in progress on this steel at the present time.

Hardening: For both oil and water hardening structural steels, a large tonnage of the NE-8600 and 8700 series has been used. In the manganese-molybdenum grades, NE-8339 and 8442, although now deleted from standard lists, have been used extensively. Also, the use of NE-9442 for a number of parts is increasing. In the hardness range of 200 to 400 brinell, the available physical properties show that all of these steels are satisfactory. They have good strength and toughness.

Fig. 11 shows physical properties for NE-9442. For studs, bolts, and cap-screws no trouble should appear.

NE-8630 has been substituted successfully for SAE-3130 and 4130. There has been considerably production experience on this steel for steering arms and knuckles; and a limited number of fatigue tests at 300 brinell hardness show that it is equivalent to the original steels.

NE-8744 has been used extensively for axle drive shafts in diameters up to 2¼-inches. They are quenched from 1550 degrees Fahr. into oil and give a hardness of 500 to 550 brinell. Tempering at 800 degrees Fahr. gives 400 to 444 brinell.

Quantities of shafts have been made of NE-8949. They have deep hardening qualities and show reverse torsional endurance limits in excess of those made from SAE-3240 and 4340.

Some trouble has been experienced in cracking of parts made of NE-8949. It is especially adapted to heavy sections and should not be used in parts where an NE-8700 steel will meet the hardenability requirements.

Welding: Considerable work has been done on different types of welding on a limited number of the NE steels. NE-8630 seems to be one of the best suited. It has replaced SAE-4130 in a number of applications. Aircraft tubing has been welded very successfully, both by oxyacetylene gas flame and metallic arc. The same general technique can be used for either steel.

The maximum hardness reached in the heat affected zone is approximately the same for both steels, using a mild steel rod. The warping and shrinking characteristics are similar, likewise the susceptibility to cracking. The tensile strength of welded joints, both as welded and heat treated, are equivalent for both steels. Both fail in the same manner. While NE-8630 is the only NE steel on which an appreciable amount of welding information is available, it is estimated that NE-9430 will show comparable results.

"Super" Steels: No discussion dealing with steels, poor in alloy, could be complete without considering the effects of special alloy addition agents (ladle additives). You have all heard the various names given to these steels, such as super duper, suped up, needled, vitalized, vitamized, intensified, a shot in the arm, Irish stew, and many others. Regardless of what we may think or say, these steels are going to be in the picture because they do show results. With their high ductility at high hardness, they have a combination of properties not equaled by any other alloy steels.

Without attempting to explain the exact mechanism of their action, I just want to report the results of a few tests made in our own and other laboratories. After about four years of experience with vanadium type additive treatment in the carburizing and structural grades of steel showing amazing results, we could not sit back and think of it all just as a memory. We have

continued the use of these specially treated steels and have tried many different types. We believe today that a proper alloy addition agent will give to the NE-9400 series the qualities which will make it a high grade steel.

We recently had one heat of a modified NE-9420 with an additive treatment which passed our maximum requirements on the dynamometer test when made into spiral-bevel rear-axle drive gears.

A very good report was received from a large automotive manufacturer on dynamometer testing of carburized and hardened transmission gears. The gears were 5 diametral pitch; pressure angle, 20 degrees; tooth width, 9/16-inch; ratio, 15 to 25; chamfer, none; gears were carburized, direct quenched and tempered at 380 to 400 degrees Fahr.; shot blasted; tested at pinion speed of 1200 revolutions per minute.

The number of cycles to cause failure at 100,000 pounds per square inch bending stress were as follows: NE-9420 Grainal treated, 819,000; NE-8620, 472,900; NE-9420, 204,100; NE-8124, 109,100.

These tests were made on a specially designed dynamometer to test the gears only and not the complete assembly. When treated steels show performance like this repeatedly, it is something we cannot overlook. Very capable committees are at work and programs are in progress for extensive tests. Now that we have the go signal for these special alloy addition agents we can expect greater developments.

In summerizing the data available on the NE steels, we must proceed with caution. The number of tests reported to date is not large and the results cannot be taken as too conclusive. While it is all preliminary and subject to change, a start must be made sometime; so we will be helping the war effort by using the NE steels. It is our duty to make tests and improvements and apply these steels wherever possible and conserve strategic alloy.

In the gear steels the NE-9420 is satisfactory as a substitute for SAE-4120 and probably for 4620. It is not quite the equivalent of SAE-4320 or 4820. For most applications reported, the NE-8720 has been satisfactory for these steels. In the water-hardening structural grades, NE-8630 can be substituted for SAE-3130 and 4120. Judging from physical properties it is reasonable to believe that NE-9430 will approach NE-8630. NE-9442 shows physical properties, including torsion, comparable to SAE-4140.

NE-8739 to 8749 have been very good substitutions for SAE-3135 and 4140 and their being deleted in favor of the

NE-8600 series, meaning only a reduction of 0.05 per cent molybdenum, should not make a great deal of difference.

But when the alloys are reduced to the minimum, 5 points of molybdenum are extremely important. We believe it is good judgment to retain NE-8720 for gears and a number of carburized parts.

From the very small amount of data available on the NE-9600 series, it appears to lack ductility. Fig. 9 shows physical properties for NE-9542 and Fig. 10 physicals for NE-9650. If it is used, it should be hardened between 200 and 400 brinell. Careful and improved heat-treating practice will have to make up for some of the weaknesses.

Some of you wonder why there has been so many changes in NE steel specifications. *It is merely due to making alloy steel with the materials available.* Regular alloy steels are still being made. There is a lot of work to be done yet on the NE steels, especially some of the last to be introduced, also on the steels treated with addition agents.

Open-Hearth Bottoms

(*Concluded from Page* 118)

plastic K-N or material known as No. 695 is used to fill the hole and make it air tight. Then magnesite is used to completely fill up the hole to conform with the regular contour of the bottom. Slag is added and after 30 to 45 minutes the furnace is ready for charging.

This, of course, is a temporary job, but with proper care will last until the furnace comes off at the end of the campaign, at which time the temporary plug is removed and a steel plate is fitted into position, and bricked over in the same manner as the original bottom.

Instead of the old way of using extremely wet materials to blast the metal from a puddle hole, all metal is blown out of the hole by compressed air before starting the repair job. This practice has been followed at various shops east of the Mississippi for the past 10 years with excellent results.

New Handbook Deals with Blind Riveting Methods

A new handbook, written especially to aid men who are concerned with riveting operations on aircraft and comparable work, is being offered by Cherry Rivet Co., Department 71, Los Angeles. It tells how to save time on difficult riveting jobs and gives complete information on the blind riveting process together with detailed instructions on the operation and care of special tools—both hard and pneumatic—used in this process.

Mathematics and Science Used in Machine Shop

Machine Shop Science and Mathematics, by Joseph J. Eaton and Albert V. Free; revised and enlarged edition; cloth or paper, 187 pages, 5½ x 7¾ inches; published by the Manual Arts Press, Peoria, Ill., for $1.48 in paper and $2 in cloth.

This book is designed for beginning and veteran machine shop workers, explaining simply the physical, chemical and mathematical fundamentals needed and used in the shop for proper comprehension, setup and operation of the lathe, drill press, planer, milling and other machines. Starting from the beginning, assuming no previous knowledge of the subject, it treats weights and measures; simple machines such as wheels, screws and levers; strength of materials; fits, tapers, force, work, energy, heat and its effects and motion.

The appendix, organized for ready reference, contains specialized formulas and equations. New formulas have been added, as well as problems on cutting speeds and feeds, reading of the micrometer caliper and information on the involute gear. Other changes have been made in this revised edition to strengthen and clarify the subject.

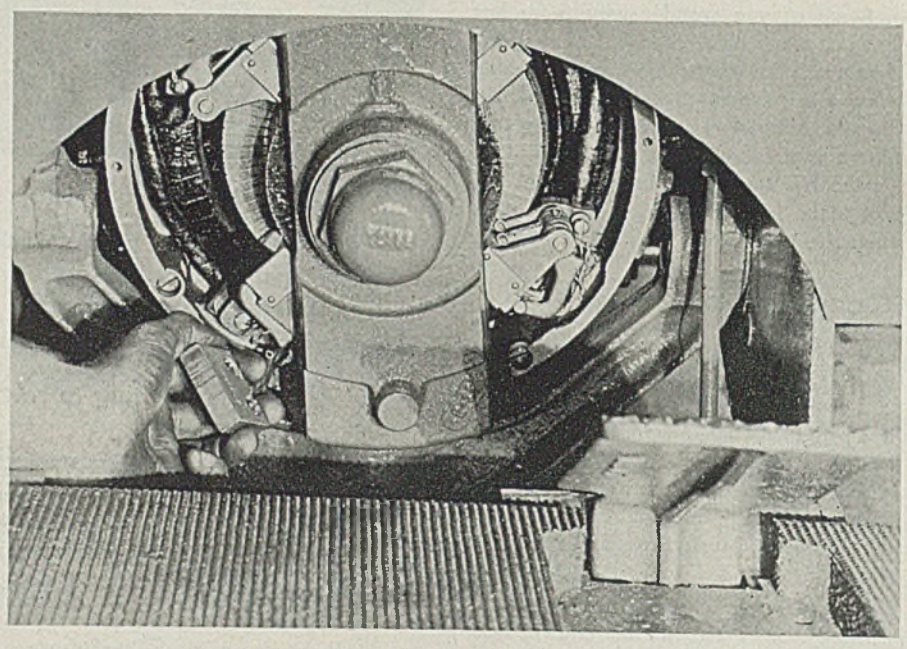
Industrial Truck Care

(*Continued from Page* 113)

Brushes should have at least 60 per cent bearing surface and be free in brush holder. See that pigtails do not bend or touch any part of motor and that connections are tight. Circumferential setting of brushes is very important and is made by jig at factory and should never be changed. If brush holder has been allowed to become loosened, check and reset. Blow out commutator and brushes with air to clean out any dirt or dust that may have collected or gotten into motor when removing cover.

Controller: Remove controller cover and see that controller fingers are making proper contact on copper segments on the drum. Test the binding screws on the terminal for tightness. Make sure that all finger tips are in exact line and evenly spaced on neutral center. Keep fingers adjusted to 1/16-inch below segment height, at neutral position, so fingers and drum will not pit. If, because of neglect, fingers and drum have pitted, they should be cleaned with a

Every month remove dust covers from the motors and inspect commutators and brushes. Here worker is making sure that brushes have at least 60 per cent bearing surface and are free in the brush holders



Advertisement

MARCH, 1943

COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by the Bridgeport Brass Co. "Bridgeport" *Headquarters for BRASS, BRONZE and COPPER*

Copper and Copper Alloy Tubing Finds Many New War Applications

Metallurgical and Manufacturing Progress Opens Fields of Utility in Aircraft Service and Ship Construction

Because of its excellent physical properties and adaptability to a wide range of uses, tubing of copper and copper alloys is playing a most important role in the war effort on land, sea and in the air. Although restrictions in strategic copper made it necessary to discontinue copper tubing for plumbing and fuel oil lines for civilian purposes, the demand for tubing in essential war products had resulted in a substantial increase in production.

Metallurgical progress, aided by the use of more powerful special machinery, such as the tube extrusion press and the tube reducing machine, has made feasible the production of many alloys which were not in use in the previous war. Vast quantities of alloys, such as cupro nickel, aluminum brass, aluminum bronze and copper silicon alloys, have been added to time-tried brass and copper to meet modern wartime engineering requirements. Mechanized warfare uses many labor-saving devices either electrically or hydraulically operated, which require tubing for electrical terminals and for hydraulic systems.

Tubing in Munitions

In munitions, yellow brass tubing is used for making primer bodies. In this case, the tubing is perforated with holes spaced at definite intervals. When filled with powder and fired, it serves to set off the charge in artillery cartridge cases. Copper and commercial bronze tubing is used for making shell bands, which are driven on the outside of projectiles and serve to direct the projectile accurately and without too much loss in power.

In fighter planes and bombers, we find that silicon bronze tubing, such as Duronze, is used for hydraulic pressure lines for finger tip operation of gun turrets and other apparatus. Here a tougher, stronger material than copper is needed, although copper is used for conveying oil and gas. Red brass tubing is also used for shielding ignition wiring systems on motors to reduce static interference.

In Ship Construction

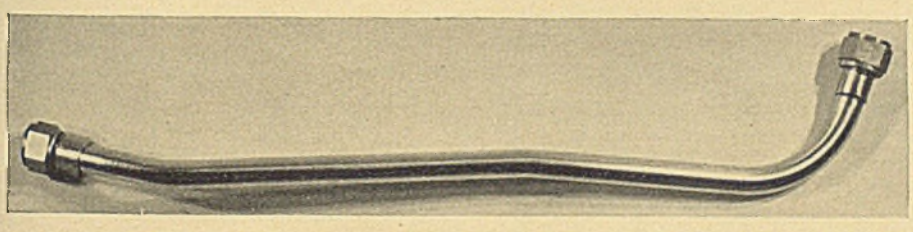
Probably most of the tubing manufactured goes into ships as condenser tubes or in the form of copper piping, which serves to convey liquids or gases in the plumbing, refrigeration, and smoke detector systems. Copper tubing with comparatively thin walls has replaced thick-walled pipe because connections are not made with threaded fittings, but of "Walseal" type fittings with Silfos solder, which permit strong, tight joints that can stand vibration. In the power plants of fighting ships and merchant marine, there are thousands of pounds of condenser tubing which must resist the action of circulating sea water. The United States Navy prefers cupro nickel, which contains 70% copper and 30% nickel. Bridgeport Cuzinal* (Aluminum Brass, with 76% copper, 2% aluminum and the balance zinc) is found in merchant ships. Copper tubing is also used for cooling systems of the powerful motors in PT boats, which performed so successfully in Bataan and the Solomons.

Oil Refining and Synthetic Rubber

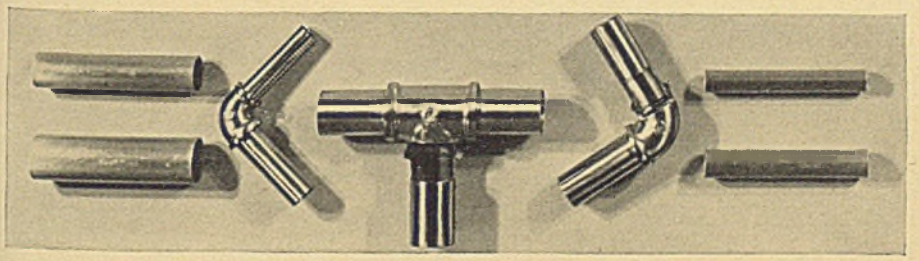
Because enormous quantities of gasoline, oil and other petroleum products are needed to operate planes, tanks, trucks, jeeps, and boats, the refining industry is unusually active and requires large amounts of condenser and heat exchanger tubing. For most conditions, Admiralty (approximately 70% copper, 1% tin and 29% zinc) is used. However, where sulphur in oil is exceptionally corrosive, Bridgeport Arsenical Muntz (approximately 60% copper, 40% zinc and a small percentage of arsenic) is giving a good account of itself. Where corrosive conditions are exceptionally severe, both on the oil and water sides, Duplex Tubing, containing steel on the oil side and copper or brass on the water side, is successfully used. Duplex Tubing is taking on increasing importance in connection with the manufacture of synthetic rubber. For conveying salt brine in salt refineries, an alloy such as Duronze IV (approximately 95% copper and 5% aluminum) stands up better than brass or copper.

*Trade-name

(Continued on page 2, column 2)



Duronze tubing for airplanes (above) and Navy Type copper tubing with "Walseal" fittings (below) are extensively used in the war program.



Memos on Brass—No. 36

When brass is subjected to cold working operations, internal stresses may occur due to the fact that one part of the metal is in tension and the other in compression. These stresses can be reduced by relief heat treatment. Heat treatment at relatively low temperatures (about 270° C. in the case of brass) decreases the stresses without softening the metal, and reduces the danger of season cracking. Specially designed furnaces, which permit circulation of heated air, should be used.

COPPER ALLOY BULLETIN

CAUSES OF CORROSION

THIN CORROSION FILMS

This article, dealing with the types of films that retard corrosion, is the fifth in a series of discussions by C. L. Bulow, research chemist at Bridgeport Brass Company, on some of the fundamentals of corrosion as applied to numerous common failures occurring in service. Previous issues of the COPPER ALLOY BULLETIN *are available on request.*

In the preceding two articles discussing the corrosion films which form on metal surfaces, it was stated that the cathodic areas were covered by the thinnest films. It follows from the nature and function of these films that the thinnest films are the most protective. The corrosion films on metals such as brass, bronze, nickel, silver, aluminum, and stainless steel are so thin that it is very difficult to measure them, yet they offer great protection against corrosion.

Thickness of Protective Films

It has been reported that a protective film, prepared by a special process on copper, measuring about 1/10,000,000 of an inch, gives considerable protection against tarnishing. The multi-colored films which form on metals heated in air have been measured by a number of different methods and have been found to range from 1/10,000,000 to 1/100,000 of an inch in thickness.

A large number of investigators have worked out ingenious methods for stripping these transparent and often invisible films from metal surfaces as thin flakes large enough to permit a study of their properties and a determination of their composition. A spectacular experiment which took many months to complete consisted of dissolving away the metal wall of a brass tube, leaving only a thin glossy to iridescent shell consisting of the two original tube surfaces.

Protection Given by Thin Films

The properties and compositions of these films have been found to vary with the corrosive environment (conditions of formation) and the metal composition. These film variations in turn control the corrosion rate of the metal in various corrosive media. A commercial application of the use of a protective film is illustrated by the blackish phosphate coating obtained on

(Continued in column 2)

Tubing in War Uses

(Continued from page 1, column 3)

Conservation of Materials

From a conservation standpoint, tubing is sometimes used to replace rod for the manufacture of items which require considerable drilling, with correspondingly large scrap production. An outstanding example is the manufacture of turnbuckles for airplane struts, which were formerly made from Naval Brass Rod. Solderless electrical wire and cable terminals, which were formerly made from brass or copper castings, are now made from copper tubing. No doubt there are a large number of parts, such as certain types of nuts and sleeve type cable connectors, now made from rod, which could very well be made from tubing at a considerable saving in scrap.

New applications for tubing, as well as the development of high-strength and corrosion resisting alloys necessary for the war effort, will be of great benefit in the post-war period. Companies that are working on future peacetime products would do well to determine how these new and better materials can be used to produce superior items for peacetime.

Causes of Corrosion

(Continued from column 1)

steel and iron articles when dipped in a hot phosphoric acid-iron phosphate solution. Two such phosphate treatments are known as Parkerizing and Bonderizing. Anodizing of aluminum parts by anodic treatment in chromic acid and other solutions produces a thin protective oxide film which is also in considerable use for increasing the corrosion resistance of aluminum. In addition to giving protection to the underlying metal, these films also serve as a basis for lacquer or paint.

Certain types of films, purposely developed on metallic surfaces, greatly influence the following: (1) the adhesion of rubber, lacquer, oil films, and electroplated coatings to metals; (2) the resistance of condenser tube alloys (aluminum brass and aluminum bronze) to impingement corrosion; (3) atmospheric corrosion; (4) corrosion by liquids and gases of all kinds.

These factors will be discussed in detail in subsequent articles. As more is learned about the nature of these films, many other practical commercial applications will result.

NEW DEVELOPMENTS

A new lubricant for metal cutting operations is described as especially suitable for high-speed machining operations on free-cutting alloys, where coolant requirements are relatively light and low cost of the coolant is a factor. It is claimed that this lubricant will not stain copper or brass. **(No. 420)**

A lathe attachment consists of a draw sleeve, the necessary bushings, and a collet closer. It is said to be suitable for converting a small lathe so that it can handle bar stock up to ½ inch. **(No. 421)**

Cleaning materials for brass and copper come in powdered form soluble in water. Two are reported to be available, one for use in still tanks and the other in washing machines and agitated tanks. After cleaning, the brass or copper can be rinsed with cold water to leave the surface free from film. **(No. 422)**

A dial indicator reads over- and under-variations on internal or external surfaces of circular work pieces, according to the manufacturer. Dial is graduated in .0001-inch divisions. Indicator is mounted on a housing carrying a V-shaped groove with three work contacts, one of which actuates the indicator. **(No. 423)**

A plumb bob consists of a brass body, brass head, and hardened steel point. Head is drilled from the back to fit a suspending cord and drilled hole is counterbored from stud end to accommodate a holding knot on the cord, it is reported. **(No. 424)**

New files are said to be specially designed for use on Naval bronze. Because this alloy is more difficult to file than most other copper alloys, the files are very sharp and have strong teeth, according to the maker. It is said that teeth are so shaped that they will not dig into the metal, thus resulting in a good finish. **(No. 425)**

An interchangeable holder is said to permit the use of a wide variety of figures, characters, and logotypes for marking parts with dates, drawing or serial numbers, symbols, and so on. It is reported that body of holder is substantial enough to assure equal pressure throughout its length for all character impressions, and that a single socket set screw holds all characters rigidly. **(No. 426)**

A new brush will clean out both bottom and side walls in the cavities of various machined, stamped, cast, or forged metal parts, it is claimed. They are said to remove scale, burrs, sharp corners, dirt, and chips in a single operation. **(No. 427)**

This column lists items manufactured or developed by many different sources, and does not mean that any items have been tested or are endorsed by the Bridgeport Brass Company. We will gladly refer readers to the manufacturer or other source for further information.

file or emery cloth and screws reset; if badly pitted, a light cut may be taken off the drum in a lathe. Lift each finger off controller drum individually to see that it works freely and snaps back quickly.

Contactor: Remove cover from contactors with controller lever in first speed, depress pedal and note whether contacts are closing properly. These contacts take all the arcing in making and breaking the contact and must be replaced when worn. The contacts should never be filled. Interlock or auxiliary should close just after main contacts touch and never ahead of them.

Limit Switches: Remove cover and inspect. See that proper contact is being made. See that binding screws are tight. Operate lever by hand to see that they are free. Operate controls to see that switches open at proper time.

Hydraulic Lift: The oil level in the hydraulic lift reservoir should be inspected once a month. Always make this check with platform down in its lowest position. Add required amount of proper grade of hydraulic oil. It is also well to check the cleanliness of this oil. If it has become dirty or acquired foreign matter, entire system should immediately be drained and refilled with new, clean oil.

Lubrication: The monthly lubrication covers most of the mechanisms involved and if slighted may develop into costly repairs. Therefore, it is well to exercise extreme care in the lubrication of these parts.

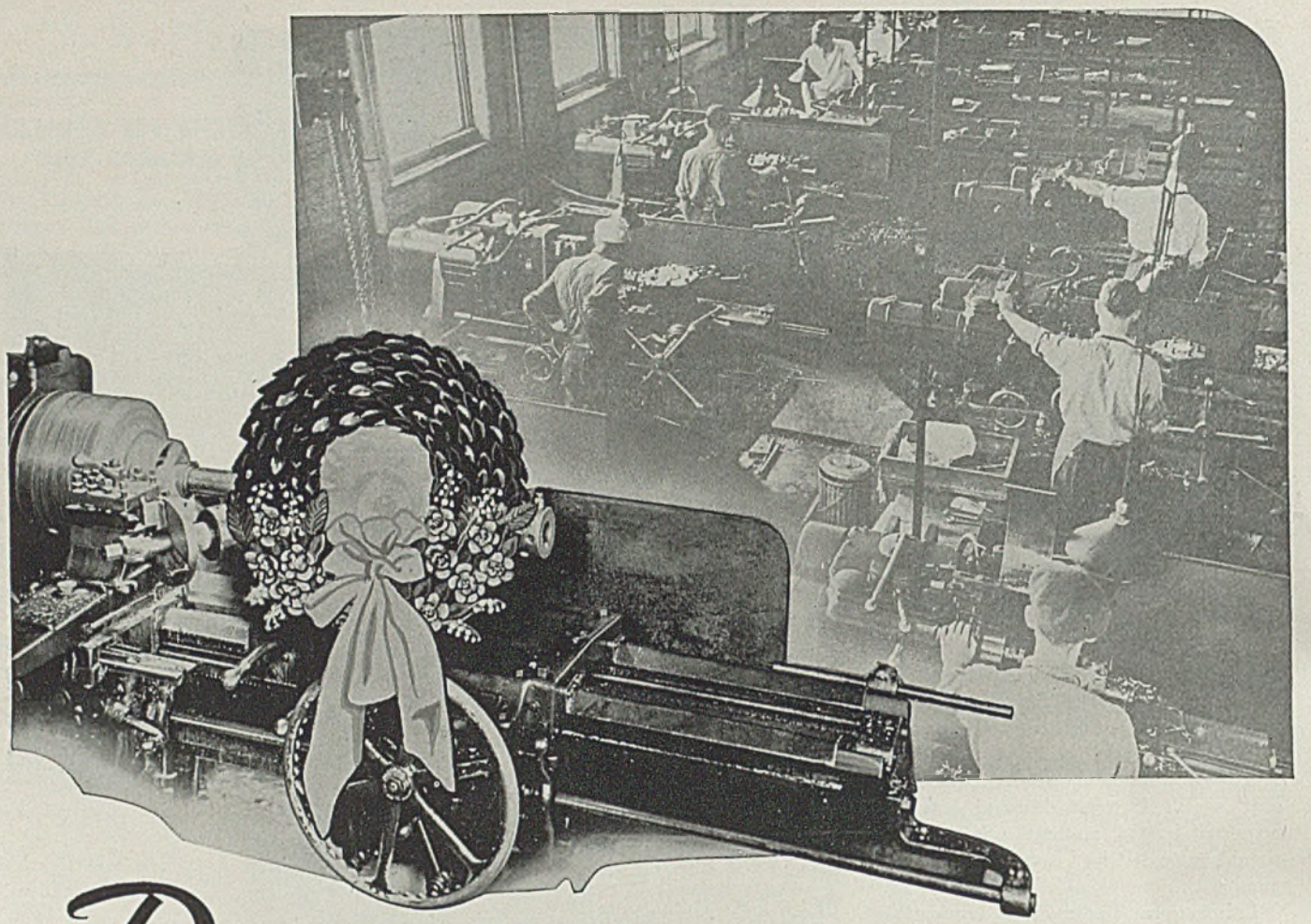
Every Six Months: Twice yearly the industrial truck should come in for complete checkup. This includes such things as changing the castor oil in the power axle, changing the hydraulic oil in the lift reservoir, taking out wheel bearings, cleaning and repacking them, if not done monthly.

Manual Compiled on Resistance Welding

Resistance Welding Manual; fabrikoid, 286 pages, 6 x 9 inches; published by Resistance Welder Manufacturers' Association, 505 Arch street, Philadelphia, for $2.50.

The aim of the organization has been to provide an accurate comprehensive and practical reference book in which factual data about resistance welding processes are made readily available.

Co-operation of the American Welding Society allowed inclusion of chapters from its 1942 handbook as a separate reference manual. The manual includes discussion of fundamentals of resistance welding, processes utilizing this class of welding, machines used, controls and timing devices, electrodes, holders and conductors, definitions and symbols.



Decoration...for INDIFFERENCE

No medals . . . no wound stripes . . . no citations for the men on the industrial casualty lists!

They are maimed or killed . . . just as surely as if by snipers' bullets or enemy bombs . . . by carelessness, or ignorance, or indifference. And the appalling fact is that day after day these home front casualties keep mounting . . . more, many times more than are reported from the fighting fronts.

For forty years, Youngstown has had an active Safety Program in all its plants. Today, facing increased hazards of war production on the one hand and the need for maximum effective manpower on the other, we have redoubled our efforts to educate and protect our workers. We subscribe to and give our fullest support to the work of the National Safety Council.

As customer, prospect or friend, we urge that you, too, get behind this work. Enroll in the cause of the National Safety Council. Send a subscription to National Chairman Wm. A. Irwin, 71 Broadway, New York City, for the War Production Fund to Conserve Manpower. Do all you can to help America win this war on the home front.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

Early CMP Orders Promise Better Steel Distribution

Record plate output expected in March. . . Bar deliveries slower. . . Structural activity continues decline. . . Scrap quotas being met. . . Preparations started for ore season

DEMAND
Increasing in all lines.

PRODUCTION
Steady at 99½ per cent.

PRICES
Unchanged.

EVOLUTION of the Controlled Materials Plan is proceeding and orders bearing its numbers are increasing. Considerable confusion continues in making out orders under the plan, expected to be clarified by issuance of regulation No. 7 and revision of regulation No. 1.

Steelmakers express satisfaction with the plan as it develops, seeing in its application a better balance in bookings, avoidance of the unwieldy backlogs formerly accumulated and more efficient use of equipment and labor.

Plate mills are being called on for increasingly large tonnage, shipbuilding being the main factor, with synthetic rubber and high-test gasoline plants adding materially. March is expected to set a new record in plate production.

• • •

Deliveries are tightening, especially in bars, large rounds and flats being promised no sooner than three months, some makers offering nothing before third quarter. Small rounds in general are promised in seven to nine weeks, with some makers bettering this slightly. Cold-drawn bars are offered for late May or June at best. Alloy bars are even more extended. In the latter class directives control most tonnage.

Pig iron distribution continues to meet requirements and in some cases consumer inventories are slightly larger. Because of the tight situation several months ago many melters have reduced the number of analyses formerly required and are not returning to former practice as the situation loosens. A New England consumer now is taking only one analysis where its normal requirements were for four. In many cases there is less pressure for shipment of delinquent tonnages. Makers of machine tool castings are ahead of demand and are limiting production somewhat.

For the third week steel production was at 99½ per cent, with slight expectation that this rate will be bettered. Pittsburgh went up ½-point to 99 per cent and Chicago dropped ½-point to 101. Wheeling advanced 1 point to 84½ and Cincinnati 1 point to 92. Cleveland was off 1 point to 92½ per cent. Rates were unchanged as follows: Buffalo, 93; St. Louis, 91; eastern Pennsylvania, 95; Birmingham, 100; Detroit, 91; Youngstown, 97; New England, 95.

Continued decline in fabricated steel production is shown in statistics of the American Institute of Steel Construction. Bookings in January fell to 57,865 net tons from 67,600 tons in December. In January, 1942, bookings were 183,387 tons. Shipments in January were 105,869 tons, compared with 145,280 in December and 167,753 tons in January, 1942.

Warehouse distributors of steel expect better conditions following restrictions on mill acceptance of small lots, believing this will provide larger business for them. A new regulation is expected, basing replacements on deliveries from stock rather than the present quota plan. Restriction of consumer inventory to 60 days supply is expected to cause greater reliance on warehouse stocks.

Consumption of steel and iron scrap in January is estimated by the Institute of Scrap Iron & Steel at 4,753,000 gross tons, fourth largest month in history. About 45 per cent of this was purchased scrap. Salvage Division of WPB reports scrap collections in last half of 1942 were 95.7 per cent of the 17,000,000-ton quota set for that period.

In general scrap supply is sufficient, though some pinch is encountered as a result of adverse weather and lack of yard manpower. In some instances melters are dipping into reserves to maintain high production.

• • •

Steelmaking capacity was increased 1,098,140 net tons during last half of 1942, to 90,292,660 tons, nearly half the world's total. Since January, 1940, the industry has added facilities for 8,700,000 tons, equal to half Great Britain's. Pig iron capacity during the last half of last year was expanded to 63,933,530 tons.

Preparations for opening channels through upper lakes ice to allow as early start as possible for the iron ore season are on a larger scale that last year, but weather conditions are not favorable for an earlier opening than in 1942, which broke all records. First attack on the ice in the Straits of Mackinac is expected to be made by March 15, or earlier if possible. Last year first ore carriers moved into Lake Superior March 23.

Average composite prices of steel and iron products hold steadily at levels prevailing for some time under Office of Price Administration frozen schedules. Finished steel composite is $56.73, semifinished steel $36, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Mar. 6	Feb. 27	Feb. 20	One Month Ago Feb., 1943	Three Months Ago Dec., 1942	One Year Ago Mar., 1942	Five Years Ago Mar., 1938
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.00
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	22.92
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.40

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

COMPARISON OF PRICES

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

Finished Material

	Mar. 6, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Mar. 6, 1943	Feb., 1943	Dec., 1942	Mar., 1942
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.19
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.365
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	26.24
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	31.54
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.39

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	20.00

Coke

Connellsville, furnace, ovens	$6.50	$6.15	$6.00	$6.00
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. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

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, 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.
(Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co. $41, Sterling, Ill.; Laclede Steel Co. $34, Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives.)

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. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila. del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.)
Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced in its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.82c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.55
		(.20-.30 Mo)	0.60
2300	1.70	4340	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.70	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit, del. 3.47c.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.72c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.27c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del. 2.27c; Gulf ports, dock 2.52c, all-rail 2.61c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.22c; Phila. del. 2.28c; New York del., 2.35c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.17c; New York del. 3.41c; Phila. del. 3.39c; Pacific ports 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.68c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c; zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage.

base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.22c; Pacific ports 2.75c. (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.92c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.30-2.55c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.47c. (Granite City Steel Co. may quote carbon plates 2.35c, f.o.b. mill. Central Iron & Steel Co. may quote plates at 2.20c, f.o.b. basing points.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.72c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.28c; Phila., del., 2.22c; Gulf ports, 2.47c; Pacific ports, 2.75c. (Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points and 2.50c, Pheonixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	.67
Do., 11 gage and heavier	.70
Barbed wire, 80-rod spool, col.	.70
Twisted barbless wire, col.	.70
Single loop bale ties, col.	.59
Fence posts, carloads, col.	.69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

	Butt Weld Steel Blk.	Galv.		Iron Blk.	Galv.
In.			In.		
⅛	56	33	½	24	3½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

	Lap Weld Steel Blk.	Galv.		Iron Blk.	Galv.
In.			In.		
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
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.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices; wasters 75%, waste-wasters 65%, except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

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.

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 ¾ 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	*6.50
Connellsville, foundry	7.50- 8.00
Connellsville prem. fdry.	7.75- 8.10
New River, foundry	8.50- 8.75
Wise county, foundry	8.00
Wise county, furnace	7.00
By-Product Foundry	
Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $7.00, effective Feb. 3, 1943. †$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. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	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	24.00	25.00	24.50
St. Paul, del.	26.75	26.26	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	21.50	.....	.....
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.

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

(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.)

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn. $28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

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

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $64.60

First Quality

Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Ohio	43.00

Second Quality

Pa., Ill., Md., Mo., Ky.	46.55
Alabama, Georgia	38.00
New Jersey	49.00
Ohio	36.00

Malleable Bung Brick

All bases $59.85

Silica Brick

Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30

Ladle Brick

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

Dry press	$31.00
Wire cut	29.00

Magnesite

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

Basic Brick

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

Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00-28.00
Do., barge	25.00-28.00
No. 2 lump	25.00-28.00

(Prices effective Nov. 23, 1942)

Ferroalloy Prices

Ferromanganese: 78-82%, carlots, gross ton, duty paid, Atlantic ports, $135; Del. Pittsburgh $140.65; f.o.b. Southern furnaces $135; Add $6 per gross ton for packed carloads $10 for ton, $13.50 for less-ton and $18 for less than 200-lb. lots, packed.

Spiegeleisen: 19-21%, carlots per gross ton. Palmerton, Pa. $36.

Electrolytic manganese: 99.9% plus, less ton lots, per lb. 42.00c. Ton lots 40.00c. Annual contracts 38.00c.

Chromium Metal: Per lb. contained chromium in gross ton lots, contract basis, freight allowed, 98% 80.00c, 88% 79.00c. Spot prices 5 cents per lb. higher.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, f.o.b. Niagara Falls, N. Y. $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: 66-70%; per lb. contained chromium in carloads, freight allowed, 4-6% carbon 13.00c; ton lots 13.75c; less-ton lots 14.00c; less than 200-lb. lots 14.25c. 66-72%, low carbon grades:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50c	20.25c	20.75c	21.00c
1% C.	20.50c	21.25c	21.75c	22.00c
0.20% C.	21.50c	22.25c	22.75c	23.00c
0.10% C.	22.50c	23.25c	23.75c	24.00c

Spot is ¼c higher

Chromium briquets: Contract basis in carloads per lb., freight allowed 8.25c; packed 8.50c; gross ton lots 8.75c; less-ton lots 9.00c; less 200-lb. lots 9.25c. Spot prices ¼-cent higher.

Ferromolybdenum: 55-75%, per lb. contained molybdenum, f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Calcium Molybdate (Molyte): 40-45%, per lb. contained molybdenum, contract basis, f.o.b. Langeloth and Washington, Pa., any quantity, 80.00c.

Molybdic Oxide Briquets: 48-52%, per lb. contained molybdenum, f.o.b. Langeloth, Pa., any quantity 80.00c.

Molybdenum Oxide: 53-63%, per lb. contained molybdenum in 5 and 20 lb. molybdenum contained cans, f.o.b. Langeloth and Washington, Pa., any quantity 80.00c.

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

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrophosphorus: 23-26%, based on 24% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Mt. Pleasant, Tenn.; contract price $75, spot $80.

Ferrosilicon: Contract basis in gross tons per carload, bulk, freight allowed; unitage applies to each 1% silicon above or below base.

	Carloads	Ton lots
50%	$ 74.50	$ 87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

Spot prices ¼-cent higher.

Silicon Metal: Contract basis per lb., f.o.b. producers plants, freight allowed; 1% iron; carlots 14.50c, ton lots 15.00c, less-ton lots 15.25c, less 200 lbs. 15.50c.

Silicon Metal: Contract basis per lb.; 2% iron; carlots 13.00c, ton lots 13.50c, less-ton lots 13.75c, less 200 lbs. 14.00c. Spot prices ¼-cent higher.

Silicon Briquets: Contract basis; in carloads, bulk freight allowed, per ton $74.50; packed $80.50; ton lots $84.50; less-ton lots per lb. 4.00c; less 200-lb. lots per lb. 4.25c. Spot ¼-cent per lb. higher on less-ton lots; $5 per ton higher on ton lots and over.

Silicomanganese: Contract basis freight allowed, 1½% carbon; in carloads per gross ton $135; ton lots $147.50. Spot $5 per ton higher.

Silico-manganese Briquets: Contract basis in carloads per pound, bulk freight allowed 5.80c; packed 6.05c; ton lots 6.30c; less-ton lots 6.55c; less 200-lb. lots 6.80c. Spot prices ¼-cent higher.

Ferrotungsten: Carlots, per lb. contained tungsten, $1.90.

Tungsten Metal Powder: 98-99%, per lb any quantity $2.55-2.65.

Ferrotitanium: 40-45%, f.o.b. Niagara Falls, N. Y., per lb. contained titanium; ton lots $1.23; less-ton lots $1.25. Spot 5 cents per lb. higher.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20%. Contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Ferrovanadium: 35-40%, contract basis, per lb. contained vanadium, f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80; highly-special grade $2.90.

Vanadium Pentoxide: Technical grade, 88-92 per cent V_2O_5; contracts, any quantity, $1.10 per pound V_2O_5 contained; spot 5 cents per pound higher.

Zirconium Alloys: 12-15%, contract basis, carloads bulk, per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot $5 per ton higher.

Zirconium alloy: 35-40%, contract basis, carloads in bulk or package, per lb. of alloy 14.00c; gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼-cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) Contract basis, f.o.b. Niagara Falls, N. Y., per lb. 7.50c; ton lots 8.00c. Spot ½-cent higher.

Simanal: (Approx. 20% each silicon, manganese, aluminum) Contract basis, freight allowed, per lb. of alloy; carlots 10.50c; ton lots 11.00c, less ton lots, 11.50c.

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	AISI hot bars 2300 series	AISI hot bars 3100 series
Boston	3.98[1]	3.85[1]	3.85[1]	5.66[1]	3.71[1]	4.06[1]	5.06[1]	5.11[14]	4.68[14]	4.13[21]	3.46	7.75[23]	6.05[23]
New York	3.84[1]	3.75[1]	3.76[1]	5.56[1]	3.58[1]	3.96[1]	3.96[1]	5.00[13]	4.60[1]	4.09[21]	3.51	7.60[23]	5.90[23]
Philadelphia	3.85[1]	3.55[1]	3.55[1]	5.25[1]	3.55[1]	3.95[1]	4.45[1]	4.90[10]	4.63[25]	4.06[21]	3.31	7.56[23]	5.86[23]
Baltimore (city)	3.85[1]	3.70[1]	3.70[1]	5.25[1]	3.50[1]	4.00[1]	4.35[1]	5.05[17]	5.00[20]	4.04[21]	....	....	....
Baltimore (country)	3.85[1]	3.70[1]	3.45[1]	5.25[1]	3.25[1]	4.00[1]	4.35[1]	4.75[17]	5.00[20]	4.04[21]	....	....	....
Washington, D. C.	3.95[1]	3.80[1]	3.80[1]	5.35[1]	3.60[1]	4.10[1]	4.45[1]	5.15[17]	5.10[20]	4.03[21]	....	....	....
Norfolk, Va.	4.00[1]	4.05[1]	4.05[1]	5.45[1]	3.85[1]	4.10[1]	4.10[1]	5.40[17]	4.50[24]	4.15[21]	....	....	....
Bethlehem, Pa.°	3.45[1]	....	....	....	....	....	....	....	....	....	....	....	....
Claymont, Del.°	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Coatesville, Pa.°	....	....	3.45[1]	....	....	....	....	....	....	....	....	....	....
Buffalo (city)	3.35[1]	3.40[1]	3.62[1]	5.25[1]	3.25[1]	3.82[1]	3.82[1]	4.75[15]	4.30[10]	3.75[21]	3.52	7.35[23]	5.65[23]
Buffalo (country)	3.25[1]	3.30[1]	3.62[1]	5.25[1]	3.15[1]	3.82[1]	3.82[1]	4.65[15]	4.20[10]	3.65[21]	....	....	....
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[13]	4.00[24]	3.65[21]	....	7.45[23]	5.75[23]
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[13]	4.00[24]	3.65[21]	....	....	....
Cleveland (city)	3.25[1]	3.58[1]	3.40[1]	5.18[1]	3.35[1]	3.50[1]	3.50[1]	4.62[13]	4.05[24]	3.75[21]	3.20	7.55[23]	5.85[23]
Cleveland (country)	3.25[1]	3.58[1]	3.30[1]	5.18[1]	3.25[1]	3.50[1]	3.50[1]	4.62[13]	3.95[24]	3.65[21]	....	....	....
Detroit	3.43[1]	3.65[1]	3.60[1]	5.27[1]	3.43[1]	3.43[1]	3.68[1]	4.84[13]	4.30[24]	3.80[21]	3.40	7.67[23]	5.97[23]
Omaha (city)	4.10[1]	4.15[1]	4.15[1]	5.75[1]	3.85[1]	4.20[1]	4.20[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Omaha (country)	4.00[1]	4.05[1]	4.05[1]	5.65[1]	3.75[1]	4.10[1]	4.10[1]	5.52[10]	4.77[24]	4.42[21]	....	....	....
Cincinnati	3.60[1]	3.68[1]	3.65[1]	5.28[1]	3.42[1]	3.67[1]	3.67[1]	4.92[10]	4.37[24]	4.00[21]	3.45	7.69[23]	5.99[23]
Youngstown, O.°	....	....	....	....	....	....	.	4.40[13]	....	....	....	....	....
Middletown, O.°	....	....	....	....	3.25[1]	3.50[1]	3.50[1]	4.40[13]	....	....	....	....	....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	4.85[10]	4.10[24]	3.75[21]	3.50	7.35[23]	5.65[23]
Chicago (country)	3.40[1]	3.45[1]	3.45[1]	5.05[1]	3.15[1]	3.50[1]	3.50[1]	4.75[10]	4.00[24]	3.65[21]	....	....	....
Milwaukee	3.63[1]	3.68[1]	3.68[1]	5.28[1]	3.38[1]	3.73[1]	3.73[1]	4.98[10]	4.23[24]	3.88[21]	3.54	7.33[23]	5.88[23]
St. Paul	3.75[2]	3.80[2]	3.80[8]	5.40[2]	3.50[8]	3.85[2]	3.85[2]	5.00[8]	4.35[3]	4.34[21]	3.83	7.70[23]	6.00[23]
St. Louis	3.64[1]	3.69[1]	3.69[1]	5.29[1]	3.39[1]	3.74[1]	3.74[1]	4.99[10]	4.24[24]	4.02[21]	3.61	7.72[23]	6.02[23]
Indianapolis (city)	3.60[1]	3.70[1]	3.70[1]	5.30[1]	3.45[1]	3.75[1]	3.75[1]	5.01[10]	4.25[24]	3.97[21]	....	....	....
Indianapolis (country)	3.35[1]	3.45[1]	3.40[1]	5.05[1]	3.20[1]	3.50[1]	3.50[1]	5.01[10]	4.00[24]	3.97[21]	....	....	....
Memphis, Tenn.	3.90[5]	3.95[5]	3.95[6]	5.71[5]	3.85[5]	4.10[5]	4.10[5]	5.25[11]	4.66[24]	4.31[21]	....	....	....
Birmingham (city)	3.50[5]	3.55[5]	3.55[5]	5.83[5]	3.45[5]	3.70[5]	3.70[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
Birmingham (country)	3.40[5]	3.45[5]	3.45[5]	5.83[5]	3.35[5]	3.60[5]	3.60[5]	4.75[10]	4.78[24]	4.43[21]	....	....	....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	3.95[4]	4.20[4]	4.20[4]	5.25[26]	4.95[10]	4.60[22]	5.00	....	....
New Orleans (country)	4.00[4]	3.80[4]	3.80[4]	5.75[4]	3.85[4]	4.10[4]	4.10[4]	5.15[26]	4.95[10]	4.60[22]	....	....	....
Houston, Tex.	3.75[2]	4.25[6]	4.25[6]	5.50[9]	3.75[2]	4.30[2]	4.30[2]	5.25[26]	5.43[10]	4.50[22]	....	....	....
Los Angeles	4.35[4]	4.60[4]	4.90[4]	7.15[4]	4.95[4]	4.90[4]	6.70[4]	5.95[16]	7.15[6]	5.70[23]	....	9.55[23]	8.55[23]
San Francisco (city)	3.95[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	4.50[7]	6.60[19]	7.55[19]	5.55[23]	....	9.80[9]	8.80[9]
San Francisco (country)	3.85[1]	4.25[7]	4.55[7]	6.25[7]	4.45[7]	4.40[7]	4.40[7]	6.50[19]	7.45[19]	5.45[23]	....	....	....
Tacoma	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.25[6]	5.45[6]	5.70[6]	6.63[24]	5.75[23]	....	....	....
Seattle (city)	4.20[6]	4.45[6]	4.75[6]	6.50[6]	4.65[6]	4.35[6]	5.45[6]	5.70[6]	6.63[24]	5.75[23]	....	....	8.00[5]

°Basing point cities against which warehouses equalized freight as of April 16, 1941, and which must now be used in calculating lowest combination prices.

NOTE—All prices except cold-rolled strip and AISI hot-rolled bars fixed by Office of Price Administration in amendment No. 10 to Revised Price Schedule No. 49.

BASE QUANTITIES

[1]—400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 3999 pounds; [6]—300 to 1999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, any quantity is base.

Ores

Lake Superior Iron Ore
Gross ton, 51½%
Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore
Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	13.00

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
(Equivalent OPA schedules):
Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharging; dry basis; subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transvaal)	
44% no ratio	27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (f.o.b. Columbus, Mont.)	
48% 3:1	43.50
less $7 freight allowance	

Manganese Ore
Including war risk but not duty, cents per gross-ton unit, dry, f.o.b. cars, New Orleans and Mobile; 5 cents higher at Norfolk, Baltimore, Philadelphia, New York; adjustments for analysis variations. (Based on OPA schedules.)

Brazilian, 48%	73.8c
Brazilian, 46%	71.8c
Caucasian, 51%	75.3c
Caucasian, 50%	74.8c
Chilean, 48%	73.8c
Indian, 50%	74.8c
Indian, 48%	73.8c
South African, 48%	73.8c
South African, 46%	71.8c
(Duty Free)	
Cuban, 51%	86.5c
Cuban, 48%	85.0c
Cuban, 45%	82.0c
Philippine, 50%	85.0c
Domestic, 48%, f.o.b. mines	96.0c

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

NATIONAL EMERGENCY STEELS (Hot Rolled)

Designation	Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Basic open-hearth Bars per 100 lb.	Basic open-hearth Billets per G T	Electric furnace Bars per 100 lb.	Electric furnace Billets per G T
	Chemical Composition Limits, Per Cent									
NE 1330	.28-.33	1.60-1.90	.20-.35	.....	.....	.....	$ .10	$2.00	...	.....
NE 8020	.18-.23	1.00-1.30	.20-.35	.....	.....	.10-.20	.45	9.00	$.95	$19.00
NE 8442	.40-.45	1.30-1.60	.20-.35	.....	.....	.30-.40	.90	18.00	1.40	28.00
NE 8613	.12-.17	.70- .90	.20-.35	.40-.60	.40-.70	.15-.25	.75	15.00	1.25	25.00
NE 8720	.18-.18	.70- .90	.20-.35	.40-.60	.40-.70	.20-.30	.80	16.00	1.30	26.00
NE 9255	.50-.60	.75-1.00	1.80-2.20	.....	.....	.....	.40	8.00	...	.....
NE 9262	.55-.65	.75-1.00	1.80-2.20	.20-.40	.....	.....	.65	13.00	...	.....
NE 9415	.13-.18	.80-1.10	.40-.60	.20-.40	.20-.50	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.50	.08-.15	.85	17.00	1.35	27.00
NE 9587	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.70	.15-.25	1.20	24.00	1.70	34.00
NE 9630	.28-.33	1.20-1.50	.40-.60	.40-.60	.....	.....	.80	16.00	1.30	26.00
NE 9642	.40-.45	1.30-1.60	.40-.60	.40-.60	.....	.....	.85	17.00	1.35	27.00

Extras are in addition to a base price of 2.70c, per 100 lb., on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semifinished. No prices quoted on vanadium alloy.

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, ACID OPEN-HEARTH AND FOUNDRY GRADES													
					Low Phos. Grades									
	OPEN HEARTH GRADES*	Mixed Bor., Turn., Machine Turnings	Cast Iron Borings	Shoveling Turnings	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Foundry Steel 2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$15.00	$16.00	$17.00	$25.00	$22.50	$21.50	$22.00	$22.50	$21.50	$22.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Bethlehem	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Buffalo	19.25	14.25	15.25	16.25	24.25	21.75	20.75	21.25	21.75	20.75	21.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	14.50	15.50	16.50	24.50	22.00	21.00	21.50	22.00	21.00	21.50	17.50	19.00	20.50
Detroit	17.85	12.85	13.85	14.85	22.85	20.35	19.35	19.85	20.35	19.35	19.85	15.85	17.35	18.85
Toledo	†15.35	12.85	13.85	14.85	.	.	.	.	.	.	.	.	.	.
Chicago	18.75	13.75	14.75	15.75	23.75	21.25	20.25	20.75	21.25	20.25	20.75	16.75	18.25	19.75
Kokomo	18.25	13.25	14.25	15.25	23.25	20.75	19.75	20.25	20.75	19.75	20.25	16.25	17.75	19.25
Duluth	18.00	13.00	14.00	15.00	23.00	20.50	19.50	20.00	20.50	19.50	20.00	16.00	17.50	19.00
St. Louis	17.50	12.50	13.50	14.50	22.50	20.00	19.00	19.50	20.00	19.00	19.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	12.00	13.00	14.00	22.00	19.50	18.50	19.00	19.50	18.50	19.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	11.50	12.50	13.50	21.50	19.00	18.00	18.50	19.00	18.00	18.50	14.50	16.00	17.50
Seattle	14.50	9.50	10.50	11.50	19.50	17.00	16.00	16.50	17.00	16.00	16.50	12.50	14.00	15.50

RAILROAD SCRAP

				Scrap Rails		
	Heavy Melting Steel	Scrap Rails	Rails for Rolling	3 ft. and under	2 ft. and under	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	15.50	16.50	17.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

*Open Hearth Grades refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. †Toledo open-hearth grades cover only No. 2 busheling.

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 $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."

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.

Plates . . .

Plate Prices, Page 147

A new all-time record in steel plate production is anticipated for March, exceeding the 1,150,000 tons rolled in January. February tonnage was lower, because of the short month. Increased shipyard requirements will be the main factor, and more railroad tonnage will be rolled, with increased material for synthetic rubber plants. Plates for high-test gasoline plants will not increase and may be lighter than in recent months, though these needs are expected to increase again in coming months, as a new phase of the program is started. The synthetic rubber program also is expected to be increased shortly.

Second quarter plate requirements of shipyards will be heavier. The shipbuilding program is supplemented by new contracts for small craft, on which deliveries are stressed. One award in New England for landing boats requires approximately 16,000 tons, mostly plates, and, while contracts were not placed until last month, deliveries are wanted starting in March. Orders for steel, plates, sheets and shapes, are being allocated among a large number of suppliers. Needs for steel for escort vessels are also growing through wider subcontracting.

While March plate deliveries are already growing heavier, April and May tonnage will be even larger. Ship hull plates account for most tonnage but increase in high tensile, flange quality and high finished material is relatively large. Flame-cutting of special shapes mounts; expansions in capacity outside of shipyards are outstanding. Women are operating equipment in some instances. Fully 75 per cent of the work is on heavier material with better than AA-1 rating. Tightness in plates contributed to cancellation of some tonnage and tank fabrication.

Direct mill buying of floor plates is heavy with demands on warehouses active. Floor plate tonnage is under allocation. Jones & Laughlin Steel Corp., recently started production of floor plates.

Shippers with tonnage for export have great difficulty obtaining cargo space. In some cases on tonnage for South America shippers have had to go through the process of figuring on three and four ships before finally getting space.

Bars . . .

Bar Prices, Page 146

Deliveries generally are tightening on all classes of steel bars. On small and medium size hot carbon rounds most sellers are offering seven to nine weeks. Some can do a shade better but this is the exception. On large rounds and flats three months and beyond appear the general rule, with certain producers claiming they can offer little before third quarter. These schedules are all predicated on top ratings. On cold-drawn late May and early June appear about the best that can be done. This is indicated by the fact that hot bars for cold drawing placed now would not be specified much before March 25 and would be for rolling in May under the present alternating system by which cold drawers get their hot material.

Deliveries on cold-drawn alloy bars are even more extended, for hot alloy bars specified late this month would not likely be rolled before June at the earliest and some producers are so loaded with directives that they could not even approach that. If extra annealing and other processing has to be done still more time would have to be allowed.

Mild movement in cold-finished and some alloy bar deliveries is limited to warehouses mostly and reflects smoother scheduling under production directives with some mills. This has extended shipments on hot-rolled carbon bars, notably larger sizes, and schedules under directives covering the latter are somewhat more confused. Eight weeks is possible on small carbon rounds, but directive quotas weaken the effect of ratings as high as AA-1 on large sizes, although less so on small rounds. Mills rolling heavier sizes are frequently operating 75 per cent on directives and delivery promises on AA-1 volume are often broken; some undelivered tonnage dates three and four months back.

Demand for forging material is slightly heavier with shops operating on aircraft contracts at capacity; also most producing marine hardware. An outstanding new contract for alloys, includes 3000 tons for forged linked chain, Boston Navy Yard, went to a Midwest mill.

Sheets, Strip . . .

Sheet & Strip Prices, Page 146

Sheets are more sensitive to the flow of war contracts than most steel products and demand is irregularly heavier. Purchases are based mainly on ability to deliver and producers vary widely as to prompt shipment. Substantial cold-rolled tonnage for shipbuilding has been placed under directive on five weeks delivery, although rated tonnage is more extended with other producers, averaging eight to 12 weeks. Hot-rolled is also slower, six to eight weeks.

Sheet production is becoming concentrated, hot and cold-rolled as well as galvanized, the latter by WPB order. The tendency is toward channeling sheet tonnage through fewer producers, to the benefit of those still able to make better deliveries, though these are lengthening.

Fabricators are working less on straight line schedules, demand centering more on special engineering projects involved in new war contracts. As a result sheet buying fluctuates more frequently on direct mill volume, with most warehouses in better position to meet fill-in demand, which is mainly for heavier gages.

Galvanized sheet deliveries on high ratings range from six to ten weeks. Hot-rolled sheets are available at six to eight weeks, and in some instances slightly better can be done. Cold-finished shipments of heavier gages are possible at eight to ten weeks and down to six weeks on lighter gages, in some cases.

Pipe . . .

Pipe Prices, Page 147

Demand for butt weld steel pipe has slackened; jobber stocks are in better balance and quotas are filled by some mills against directives and extended higher ratings. Lap weld deliveries are slightly longer than butt weld and some fair direct shipment volume is out.

Buying of pipe and tubing for certain types of ships in New England yards has been centralized with one shipyard and the total of purchases is impressive. Two engineer-contractors have placed good orders for rubber and refinery plants, one for lend-lease. Distributors in non-defense areas are dependent mostly on directives, lacking high ratings for tonnage under extensions. Scattered price shading is also reported. July delivery is the best promised a railroad on bids for seamless boiler tubes; cold-drawn seamless mechanical tubing extends five to six months. Prefabricators are active and maintain pipe purchases, notably for ships.

Lack of demand has lowered cast pipe foundry operations and deliveries have improved, two to three weeks on four and six-inch, with fittings one week longer. On the limited volume requiring pipe, WPB restrictions and specifications favor non-metallic material.

Rails, Cars . . .

Track Material Prices, Page 147

Manufacturers of freight car accessories are encouraged by release of car-building orders for first-half construction, aggregating some 20,000 units. Some effect also is being felt by steel mills, mainly in sheets, light plates and structurals. It is understood a larger car-building program will be authorized for last half.

American Locomotive Co., New York, is reported to have booked an order from the Chesapeake & Ohio for forty 2-8-4 steam locomotives and the New York, Chicago & St. Louis has placed 15 locomotives of the same type with Lima Locomotive Co., Lima, O.

Structural Shapes . . .

Structural Shape Prices, Page 147

Structural fabricators with large facilities have succeeded in obtaining war contracts outside their usual lines and are able to maintain a good rate of production, although fabrication for buildings is at a low mark. Smaller shops have been less successful in obtaining war work and are operating at restricted rate while seeking further contracts.

Wide spread in quotations on substantial subcontracts for ships, notably escort vessels, features structural activity; a range of 100 per cent prevails for some work, much of an engineering nature. Awards are mainly on ability to deliver. For some contracts approximately 50 per cent of the steel required is plate and sheets. Structural releases by shipyards are heavier, part of the volume directly allocated; second quarter requirements will be ahead of the first.

Considerable tonnage has also been

booked for Canadian yards by one Pennsylvania mill. Deliveries are somewhat tighter, six to eight weeks on AA-3, and heavier allocations, including 1000 tons to one producer have lowered small inventories several mills had built up on ship sizes. Demand for larger and heavier shapes is small, reflecting the stoppage of construction and bridge building.

Bookings of fabricated structural steel continue to decline, totaling 57,865 tons, according to the American Institute of Steel Construction. This compares with 67,600 tons in December and 183,387 tons in January, 1942. Shipments in January were 105,869 tons, compared with 145,280 tons in December and 167,753 tons in January, 1942. Tonnage available for fabrication within the next four months is 489,320 tons.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 147

Despite the fact that distributors of new billet reinforcing bars have to draw largely on stocks because of limitations on production of this grade of bars, they have no difficulty in meeting light current demand. Most inquiry is for light tonnages, 15 to 20 tons in most cases and seldom above 25 to 30 tons. Producers are permitted to roll new billets only into ¼-inch rounds and 1⅛ and 1¼-inch squares, but stocks are not badly unbalanced and with demand at present level distributors are not concerned over ability to obtain supplies for some time.

Pig Iron . . .

Pig Iron Prices, Page 148

March allocations of pig iron were close to quantities requested by melters and indications are that April distribution will be on a similar basis. Enlarged production follows blowing of several new stacks in the past few months and total iron available is well matched to requirements.

Stove manufacturers have received permission to operate through March on the recent basis and April status will depend on weather conditions and need for heating devices. Orbon Stove Co., Belleville, Ill., has been awarded a contract for 7500 steel coal ranges for defense homes by Defense Housing Corp. and priorities have been given for materials. The company has capacity for 100 ranges per day.

According to some trade interests more than 80 blast furnaces will be suspended this year for relining and repairs, a total about twice as great as for last year. Certain others, however, regard this as a high figure, although admitting that many stacks have been subject to excessive wear.

Pig iron allocations for March delivery in New England about equal February tonnage. Supply sources have been revised slightly, with several thousand tons of basic to be delivered to Worcester, Mass., by Buffalo furnaces. In one instance 1300 tons in excess of the amount requested was allocated to one supplier. Production by the district furnace will be largely absorbed. Some melters of foundry grades are asking for less tonnage, but the basic and malleable melt is holding. Less pressure for shipment is apparent on delinquent tonnage as some consumers are carrying larger inventories. Foundries supplying castings to the machine tool industry are ahead of demand. As a result of tightness in pig iron supply some months back melters frequently have reduced the range of analyses specified. A Providence machine tool foundry normally specifying four analyses has gone to one.

Tin Plate . . .

Tin Plate Prices, Page 147

Tin plate consumers are specifying more freely and most producers can maintain schedules fairly full, although their order books do not contain as large backlogs as usual at this season. Less concern is expressed as to the situation later in the year, as the present rate of increase indicates no production time will be lost. Canmaking for food packs for the army and lend-lease is expected to be active.

Manufacturers of milk cans have been authorized to increase production 75 per cent in first half, although the highest rating granted so far, AA-3, will not obtain sheets from mills.

Warehouse . . .

Warehouse Prices, Page 149

Steel distributors expect to benefit from the CMP restriction limiting consumer inventory to 60 days. Since mills may not handle orders below certain

tonnages, varying with the product, more consumers may be forced to rely on warehouse stocks.

It is understood a new regulation will allow replacements on the basis of deliveries from stock rather than quotas. Orders of $10 or less and orders for limited deliveries on certification are expected to be replaced, as well as sales on preference ratings of AA-5 or higher, during second quarter, and allotment numbers.

In an effort to solve delivery difficulties in the San Francisco district WPB has requested warehouses in that area to place in operation a plan whereby less-than-carload replacement orders may be grouped by WPB and placed with mills for shipment to one or more of the participating distributors in carlots, to be held for the account of the various owners or distributed to them, as may be desired.

Iron Ore . . .

Iron Ore Prices, Page 149

Government operations to clear upper lakes channels for passage of the ore fleet will be started between now and March 15, with more ice breakers than were used in 1942 with great success. The fleet will include the carferry GREAT SAINTE MARIE and tugs of the Great Lakes Towing Co. and the Roen Steamship Co., Sturgeon Bay, Wis., which were used last spring. These will be assisted by the coast guard cutters ALMOND, ARROWOOD and CHAPPARAL and the former Detroit river carferries LASALLE, CADILLAC and HALCYON, which were acquired by the government last year and reconstructed at Toledo for coast guard work.

Last year ice breaking was started March 19 and by March 23 the Straits of Mackinac and Whitefish Bay had channels broken to allow waiting freighters to pass. Ice conditions at the Buffalo end of Lake Erie are worse than last year, 18 to 20 inches thick to 1½ miles outside the breakwall and 8 to 10 inches thick over a large area. The first ship leaving the Buffalo harbor last year started March 28, two weeks after the first sailed from Cleveland.

Steel in Europe

London — (*By Radio*) — Greater demand is being felt in Great Britain for locomotive steel and boiler tubes. Steel sheets are active but tin plate is quiet. Black sheet mills are fully employed. Heavy forward bookings have been made for plates for armaments and shipbuilding.

Canada . . .

Toronto, Ont. — While shortage continues in some lines of finished steel materials, in most lines supply and demand are gradually swinging to better balance. Canada's war production program, however, is undergoing some important changes which will require considerable increase in steel requirements. According to government sources this additional requirement will be taken care of by increased allocations from the United States. The most important change in the war production program will be the increased production of fighting ships, with curtailment in output of some lines of motorized vehicles. Production of war tanks now is being centralized in a government plant in Quebec and it is stated that railway shops will discontinue production of this nature. Special attention will be given to providing the more important war materials and supplies under the new lend-lease program, which will involve an outlay over the next twelve months of upwards of $1,000,000,000.

Financial statements of the various steel producers and war contractors that have started to make their appearance show production figures exceeding all previous high records, but due to the excess profits taxes and other levies, net profits are at about the same level as in the year immediately preceding.

Primary steel producers report a continuous flow of new orders of widely diversified nature, and backlogs are mounting at a rapid rate. With most heavy lines of steel under direct allocation by the steel controller, mills are accepting new orders, but are shipping chiefly against the controller's orders. Demand for plates, sheets, bars and pig iron have been strongly featured recently and mill representatives report orders on some of these materials that will run beyond the middle of the year, while on plates and sheets the only limit to new sales appears to be the problem of supply.

While the proposed enlarged shipbuilding campaign is and will continue to absorb all domestic production of

plates, to which will be added large imports from the United States, arrangements have been made to allocate some tonnage to other vitally important consumers, including rolling stock builders and the base metal mines. It is stated that upwards of 8000 tons of plates will be required this year for the synthetic rubber plant going up at Sarnia, Ont., in connection with which deliveries already have been made of more than 3000 tons.

Ordering of sheets for second quarter was more active during the past several days, with several orders reported from local sources running from 20 to 50 tons. Electric equipment makers were active buyers during the week. Polymer Corp. Ltd., the government owned company formed to manufacture synthetic rubber, is taking most of the available sheet supply, and is disposing of any surplus it accumulates to less important consumers.

Bar sales developed more action and mill representatives reported a rush of small lot buying, into which was mixed a number of large tonnage contracts. While the bar shortage that appeared three weeks ago, has been relieved and war plants are receiving enough bar steel for immediate needs, it is stated that most plants are low on inventories and any slowing down in shipments would hamper operations. While mill representatives state there is no actual shortage of carbon and alloy bars, mill stocks are comparatively light. Sufficient tonnage is being made available to the top-ranking war users, but only occasional lots are procurable by some of the smaller plants. Bar mills are operating about 75 per cent capacity, which is the extent of their steel supply.

Structural shape lettings continue to drag, and with the exception of some bridge construction jobs fabricators see little hope for any large volume of business for the duration as far as construction work is concerned. The most important tonnages on bridge work is for the British Columbia area.

Demand for wire is somewhat specialized, with delivery dates on current orders about six weeks into the future. Mills report no large stocks and rollings are indefinite, due to the fact that wire rods come under allocation scheduled through the steel controller. Most current buying is from manufacturing concerns. Farmers are under restrictions with regard to fencing and demand from this source is spotty and light. Nail sales also are below normal, most buying being from consuming plants and only small volume from building trades.

Merchant pig iron sales showed some recovery during the week, reaching a total of approximately 8000 tons and including about 1500 tons of basic iron. Melters now are placing orders for April delivery and are receiving schedule delivery on old orders. Inquiries also have reached the market for foundry and malleable iron for delivery as far ahead as May and June, but consumers are not permitted to take delivery on stocks for long term use.

Government salvage organizations are preparing for early spring drives and in some centers it is expected that collections will start before the end of this month, while the rural communities and farming districts will not be open to scrap collection until late in April or early May. Dealers report receipts at about 50 per cent of requirements, almost exclusively from local sources. Shipments to steel mills and other consumers also are well below normal, with little prospect of much direct betterment until about the middle of May.

Scrap . . .

Scrap Prices, Page 130

Movement has slowed perceptibly in the eastern Pennsylvania district, accounted for in part by lighter tonnage coming to yards because of manpower shortage and adverse weather. Substantial government allocations of steel mill scrap from northern New Jersey and New England are being made to the Midwest, at least as far as Youngstown, O. Normally much of this scrap would flow to eastern Pennsylvania. In general eastern mills are still comfortably situated, although one mill has used up two-thirds of its stocks since the first of the year. Heavy breakable cast continues scarce in the East, with non-integrated mills taking all they can obtain. Foundry grades are plentiful with little interest shown.

Buffalo dealers have encountered some relief from the situation in turnings, a number of carloads being absorbed by electrochemical plants at Niagara Falls. This buying was shared by only a few dealers and others are

embarrassed by their holdings, as steelmakers continue their ban on this grade. Movement of light material from yards has decreased and dealers are reluctant to purchase some items, due to refusal of mills to accept them.

Mills in the St. Louis district are not receiving sufficient material to meet current needs and are dipping into inventories. Decline in shipments is noted from all sources but is most marked in country scrap. Lack of manpower is the prime cause. Commercial yards have large stocks which can not be prepared for this reason. Cast scrap is being taken more freely from city sources but melters refuse to pay high freight charges on this material from distant sources.

Last Half Scrap Quota Nearly Met

Iron and steel scrap collections during last half of 1942 were 95.7 per cent of the national quota of 17,000,000 net tons, Paul C. Cabot, director of WPB's Salvage Division, stated last week.

In that period 14,800,000 tons were shipped to consuming mills and nearly 1,500,000 tons were in hands of suppliers, ready for shipment. Total available stocks of purchased scrap Dec. 31, 1942, were 6,160,000 tons and home scrap stocks were 1,600,000 tons, making visible stocks 7,760,000 tons, substantially above the 7,000,000 tons set as an objective last summer.

Vermont topped the list of states in shipments and suppliers' inventories, during last half, at 162.9 per cent of quota. New Jersey, with 136.8 per cent of quota, led in terms of actual shipments to consuming mills.

Total receipts and consumption by all melters of purchased scrap during 1942 are as follows, in net tons, based on Bureau of Mines reports:

	Receipts	Consumption
January	1,856,000	2,134,000
February	1,992,000	2,065,000
March	2,326,000	2,265,000
April	2,467,000	2,237,000
May	2,611,000	2,293,000
June	2,454,000	2,237,000
July	2,395,000	2,214,000
August	2,353,000	2,202,000
September	2,271,000	2,109,000
October	2,773,000	2,308,000
November	2,597,000	2,134,000
December	2,398,000	2,258,000
Total	28,493,000	26,456,000

New York-New Jersey Scrap Quota Set at 1,422,000 Tons

Industrial salvage quota for first half of 1943 has been set at 583,000 tons for New York and 328,000 tons for New Jersey, a regional total of 911,000 tons, it is announced by R. Merrill Decker, regional chief for the New York-New Jersey area. Total quota from all sources in that district will be 1,422,000 tons.

In the latter half of 1942 plants in this region salvaged 1,502,225,092 pounds of industrial scrap, including metals, rubber, rags, etc. Plants in Greater New York salvaged 205,243,448 pounds; in New York state outside the metropolitan area, 745,527,409 pounds; plants in New Jersey 551,454,235 pounds.

WPB Tightens Control Over Copper-Beryllium Scrap

To assure that copper scrap containing beryllium will be remelted into beryllium copper products, WPB has ordered that copper scrap and copper base alloy scrap containing 0.1 per cent or more beryllium be delivered only to persons specifically authorized by WPB to receive such scrap.

January Scrap Consumption Fourth Largest in History

Consumption of steel and iron scrap in January is estimated at 4,753,000 gross tons by the Institute of Scrap Iron & Steel Inc. This compares with 4,693,000 tons in December and 4,590,000 in January, 1942. This is the fourth

largest monthly consumption in history. About 55 per cent of the January tonnage was home or recycled scrap and the remainder dealer or purchased material.

"Copper Most Important Salvage Problem in 1943"

Although copper scrap will be the most important salvage problem in 1943, collection of steel and iron scrap must be maintained at a high rate, Hamilton W. Wright, chief of the Industrial Salvage Branch, WPB, told a conference of his regional chiefs in Washington. Industrial salvage must provide a large percentage of the scrap needed by industry, he said. Paul C. Cabot, director of WPB Salvage Division, asserted 13,000,000 tons of purchased iron and steel scrap will be needed by steelmakers in the first half of this year. Dormant scrap must fill a large part of this need.

The regional chiefs received explanation of the objectives, methods, operation of field men and the system of reporting progress in the vertical projects of the Industrial Salvage Branch, which includes railroads, petroleum, mining, public utilities, chemicals and motor transportation. Information also was given on the government's program in shipyards, Army and Navy and governmental agencies.

Scrap Contracts Signed with Latin American Countries

Board of Economic Warfare has signed contracts for scrap with a number of Latin American countries, including Columbia, Costa Rica, Cuba, Dominican Republic, San Salvador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Puerto Rico and Venezuela.

Some scrap already is coming to the United States, especially from Venezuela's oil fields. Other material is coming from dismantled shortline railroads, bridges, and sunken ships. A barge loaded with 2000 tons of railroad scrap sunk in a Caribbean port since has been raised.

Work is in charge of Benjamin Schwartz, former director general of the Institute of Scrap Iron and Steel and vice president of Schiavone-Bonomo Corp. The work is being financed by the Reconstruction Finance Corp.

Eight U. S. Plants To Be Exported by Lend-Lease

Eight industrial plants operating in the United States have been acquired for lend-lease shipment abroad and negotiations are pending for the acquisition of three additional plants.

Total value of seven of the eight plants acquired is less than $12,000,000. The eighth plant was requisitioned with the consent of the owner and its value is now being determined.

Three of the plants so far acquired are for Australia, three for Russia and two for India. Two of the plants for Australia were specifically requested by Gen. Douglas MacArthur. They will make cans for food supplied to our forces by Australia through lend-lease in reverse.

Largest factory acquired for lend-lease shipment is the Ford Motor Company's tire making plant which cost $8,000,000. This plant was not in production. In Russia it is expected to produce 1,000,000 military truck tires annually.

Other plants acquired are as follows: Drummaking, cost $218,722; canmaking plant, cost $52,469.04; canmaking plant, cost $86,000; sawmill, cost $334,497.05; oil refinery, cost $1,900,000; machine shop, cost $138,651.05; power plant, cost to be determined.

You save fuel oil with an I.B. Crane . . .

With the fuel oil shortage becoming more acute each day it is vital that every industrial plant squeeze the last drop of energy out of every drum. And that's just where Industrial Brownhoist Diesel Cranes are doing a fine job—by saving oil. One plant operating a 30 ton I. B. Crane reports an average fuel consumption of only 1.675 gallons per hour. Another reports only 1.61 gallons per hour. Both cranes were operating under fast, continuous, heavy duty service. These are not isolated cases. Those users who keep an eye on their fuel consumption invariably find that I. B. Cranes are easy on fuel.

Whether you handle heavy materials with magnet, hook or bucket you, too, can save fuel with an Industrial Brownhoist Crane. Industrial Brownhoist Corporation, Bay City, Michigan. District offices: New York, Philadelphia, Pittsburgh, Cleveland, Chicago.

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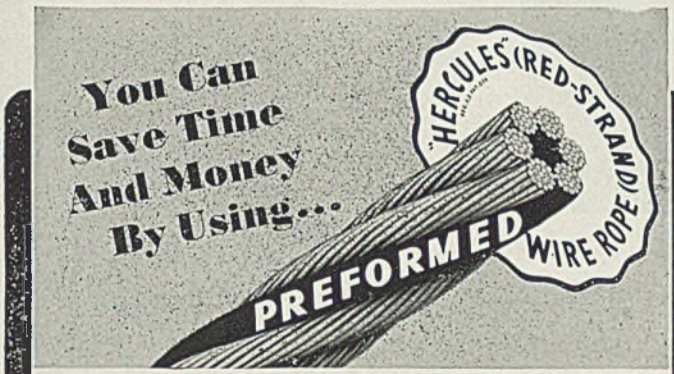

NOW that continuous and efficient production is more important than ever, are you cashing in on the advantages of Preformed "HERCULES" (Red-Strand) Wire Rope? Actual records show that its easy handling, smooth spooling and long life means a definite saving in both time and money.

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Why not take advantage of the time and money saving possibilities of Preformed "HERCULES"? Try it, then compare its performance record with that of any other rope you have ever used.

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THE ORIGINAL BLACK OXIDE FINISH FOR IRON AND STEEL

JETAL, in the fore rank of wartime finishes, is widely acclaimed as a substitute for nickel, zinc, cadmium and tin plating. Its hard, dense black finish, quickly applied on iron and steel by immersion, resists abrasion and corrosion. Its speed and simplicity of application . . as well as economy . . meet perfectly today's needs for efficient, increased production.

JETAL is the original, patented, black oxide finish. It has no equal in speed, penetration or durability. Available for immediate delivery, any quantity.

Our research staff will gladly help you with your protective coating problems. Consultation service without obligation. Samples JETALized without charge.

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PROVIDENCE, R. I. TEL. WILLIAMS 3000

The JETAL process Patented

Nonferrous Metal Prices

Mar.	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
1-4	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.20	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc

Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum

Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead

Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
[illegible]	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

MAGNESIUM
(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

Publish Data on Dolomite In Refractory Manufacture

To speed up the wartime mine-to-metal cycle, the Bureau of Mines has published a circular, *Dolomite-Base Refractories,* describing recently developed methods for the manufacture of basic refractories used in steelmaking from high-grade dolomite deposits found in several eastern states, according to Dr. R. R. Sayers, director.

The process would eliminate the necessity for expensive transportation of refractory magnesite from western states to the steel-producing centers of the East, the director stated.

Magnesite either must be imported from abroad or brought most of the way across the country from domestic deposits in California, Washington, and Nevada. Refractory dolomite, although produced at a lower cost than refractory magnesite, has been used for the maintenance and repair of open-hearth bottoms.

"The abundance and the proximity of dolomite deposits to the steel industry afford every incentive to enhance the desirable physical properties of dolomite refractories and ameliorate certain of their less desirable characteristics," the author explains. The bulletin may be obtained from the bureau without cost.

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A complete report of the first Pan-American Congress of Mining Engineering and Geology has been issued by the Bureau of Mines, Washington, as a special supplement of *Mineral Trade Notes.* The bulletin contains a copy of the provisional statutes of the Pan-American Institute of Mining Engineering and Geology, which is abbreviated as "IPIMIGEO." It also contains a list of the agreements and resolutions adopted by the congress, which was held in Santiago, Chile, Jan. 15-23, 1942.

NEW BUSINESS

Plant Expansion, Construction and Enterprise, Government Inquiries, Sub-Contract Opportunities, Contracts Placed and Pending

SUB-CONTRACT OPPORTUNITIES

Data on subcontract work are issued by regional offices of the War Production Board. Contact either the office issuing the data or your nearest field office. Write, don't telephone, and mention key letters and numbers appearing before each item to assure prompt attention and avoid delay.

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

S-8-9806: Gear cutting. A New York City concern seeks subcontracting facilities to make 12,000 sets of gears for adjusting operating tables to various positions. Tolerances, commercial. Materials, plastic or fiber. Dimensions, pinion 1⅜-inch diameter, and worm 1¼-inch diameter, 1¼-inch long, ½-inch face. Delivery, 1000 per month.

S-8-17012: A Long Island City manufacturer seeks a subcontractor with a Gridley four-spindle screw machine for making a large run of bolts and nuts. Quantity required, 1,000,000 per day. Size up to ¼-inch diameter.

S-8-17011: A New York City concern seeks a subcontractor to make nickel silver screws. .1272-inch longest, in No. 52-90, No. 46-90 sizes. Quantity desired, 500,000 of each size. AA-2X rating.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Job No. 4977: Standard hex nut, blank, six month production. Material, 7/8-inch hex steel furnished. Equipment, automatic screw machine. Dimension, 1¼-inch long. Tolerance, plus .004, minus .000.

Job No. 4982: Camshaft gear, 2500 pieces. SAE 1020. Equipment, hand screw machine, broach, surface grinder, hobber, Chapmanized. Dimensions, 2⅝ O.D. x 5/8 inch thick. Tolerance, plus or minus .0005.

Job No. 4983: Crank shaft gear, 2500 pieces. Material, steel. Equipment, hand screw machine, sensitive drill, key cutter, spur gear hobber, Chapmanized. Dimensions, 1⅝-inch O.D. x ¼-inch thick. Tolerance, plus or minus .001.

Job No. 4984: Bushing, 100,000 pieces. Material, stainless steel. Equipment automatic screw machine tapper. Dimensions, ¾-inch O.D. x 1¼-inch long. Tolerance, plus or minus .002.

Job No. 4987: Nut, 30,000 pieces. Stainless steel. Equipment, automatic screw machine, sensitive drill, tapper. Dimensions, ½-inch hex x 5/32-inch thick. Tolerance, plus or minus .001.

Job No. 4988: Washer, 15,000 pieces. Stainless steel. Equipment, hand screw machine, polish stand. Dimensions, 1/8-inch O.D. x 3/64-inch thick. Tolerance, plus or minus .0025.

Job No. 4994: Nut, 15,000 pieces. Stainless steel. Equipment, hand screw machine, horizontal or hand mill, tapper. Dimensions ⅝-inch O.D. x 17/32-inch long. Tolerance, plus or minus .003.

Job No. 5010: Clutch cover, 1200 pieces. Material, cast iron. Equipment, turret lathe, lathe, H.D. drill, sensitive drill. Dimensions, 10-11/32 O.D. x 5/8-inch thick. Tolerance, plus or minus .0005.

Job No. 5012: End cover, 1200 pieces. Material, cast iron. Equipment, vertical boring mill, lathe, H. D. drill, tapper, vertical mill, radial drill. Dimensions, 24½ O.D. x 8-15/16-inch thick. Tolerance, plus or minus .0005.

Job No. 5109: Mandrel, 20,000 to start. Steel, furnished. Equipment, small lathe with collet, small hand screw machine. Dimensions, 1¾-inch long. Tolerance, plus .000, minus .0015.

Job No. 5110: Torque rod ball, 1000 per week. Steel, furnished. Equipment, hand screw machine, external grinder. Dimensions, 3¾-inch O.D. x 3-13/32-inch long. Tolerance, plus or minus .002, 20-25 micro inch.

Job No. 5120: Clutch drum, 5000 per month starting in May. Material, stainless steel. furnished. Equipment, hand screw machine, sensitive drill, external grinder. Dimensions, 1⅛-inch O.D. x23/32-inch long. Tolerance, plus or minus .00025.

Job No. 5126: Loading spring collar, 5000 per month starting in May. Material stainless steel, furnished. Equipment, hand screw machine, sensitive drill, tapper. Dimensions, ⅞-inch O.D. x 3/8-inch thick. Tolerance, plus or minus .0005.

Job No. 5112: Torque rod ball, 350 per week. Steel, furnished. Equipment, hand screw machine, broach, lathe, external grinder. Dimensions, 2¾-inch O.D. x 2 1/4-inch long. Tolerance, plus or minus .001, 20-25 micro inch.

Chicago office, Contract Distribution Branch of WPB, 226 West Jackson Boulevard, is seeking contractors for the following:

Ainsworth Mfg. Corp., 2200 Franklin street, Detroit, attention Charles L. Miller. Priority AA-1. Cable assembly, ball end and ratchet tube, to be made by subcontractor, cable and eye bolt to be purchased and entire job assembled by subcontractor. Quantity, lots of 10,000, 25,000 and 50,000, beginning April 1. Equipment, ⅝-inch capacity single-spindle automatic screw machine, universal horizontal band saw, plain No. 2 horizontal milling machine, open-back inclinable press. Tolerance, .005.

American Perforator Co., 625 West Jackson boulevard, Chicago, attention J. R. Below. Milling cutters, six of each of two types. To be used in gangs of six and diameters must be the same. Equipment, 12 x30-inch heavy duty engine lathe, universal No. 2 horizontal milling machine, 10 x 17-inch tool and cutter grinder. Tolerance, .001.

Automatic Transportation Co., 101 West Eighty-seventh street, Chicago, attention J. J. Elliott. Three items, center fork for lift truck is typical. Material, steel castings, to be furnished by contractor, who also supplies fixtures for planing. One item to be delivered at 100 per month, others at 200 per month. Equipment, 36 x 48-inch open-side planer, plain No. 4 horizontal milling machine, 48-inch arm radial drill, portable grinder. Tolerance .010.

Carbide Tool Co., 816 North Kostner avenue, Chicago, attention Frank E. Walko. Job covers grinding of carbide tipped tools with silicon carbide or diamond wheels. Contractor supplies tools ready for grinding. Quantity, 100. Size, 1½ x 4 inches. Equipment, 6-inch carbide tool grinder.

Casco Products Co., Bridgeport, Conn., attention D. J. McCarthy. Priority AA-1. Job involves 30-calibre bullet cores, 150,000,000 to be subcontracted. Prime contractor recommends work be done on No. 00 Brown & Sharpe machine and any one subcontractor should have at least five machines available for the job. Prime contractor will provide engineering assistance as well as furnishing material, tools, fixtures, gages, shipping cartons, etc., enabling subcontractor to start production immediately. Equipment, ⅜-inch capacity single-spindle automatic screw machine. Tolerance, .004.

Crane Co., 4100 South Kedzie avenue, Chicago, attention H. T. Samuels. Priority AA-1. Large valve bonnets and large valve bodies in various sizes. Contractor will supply discs for the latter, to be seated in bodies by subcontractor. Castings will be supplied by contractor. Equipment, 42-inch vertical boring mill, 30-inch arm radial drill. Tolerance .005.

Federal Electric Co., 8700 South Federal street, Chicago, attention W. F. Moorhouse. Priority AA-1. Coupling for plastic tubing. Can be made of steel tubing, cast or malleable iron. Requirements, 7500 per month. Subcontractor supplies material. Quantity 75,000. Size, 3 x 3 inches. Equipment, 3½-inch bar capacity turret lathe. Tolerance .0015.

Fox Co., Cincinnati, attention Milford G. Fox. Job covers furnishing and machining of bushings. Subcontractor does entire job, including furnishing of material. Quantity, 220,000. Dimensions, ⅜ x ½-inch. Material, brass. Equipment, ⅝-inch capacity single-spindle automatic screw machine.

Whiting Corp., 157th and Lathrop avenue, Harvey, Ill., attention W. DeVries. Job includes cylinder for jack and large ram. Inside diameters to be honed on cylinder boring machine. Subcontractors within 100 miles of Chicago preferred. Contractor supplies tubing. Equipment, 5 x 49-inch cylinder boring machine, 12 x 54-inch cone-head engine lathe.

Tuttle & Kift Inc., 1823 North Mortimer avenue, Chicago, attention H. G. Knuth. Priority AA-1. Bearing. Requirements, 1000 per month for 10 months, present contract will be placed for 3000 pieces. Material aluminum, furnished by contractor. Dimensions, 1¼ x 1½-inch. Equipment, 2½-inch bar capacity turret lathe. ¼-inch dr. capacity two-spindle bench drill.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-73: Fabricating and welding facilities on aluminum. Various sizes and shapes up to maximum outside dimension of 24 inches. Both spot and gas welding. Material supplied by prime contractor. Continuous work on small quantities of each item. Reference, 1-A-601.

SC-75: Single-spindle automatic screw machine work for machines having ¼-inch diameter bar capacity. Tolerance .004. Material, cold-rolled steel FXS318 supplied by prime contractor. Tools available for B & S No. 00 and No. 0 and No. 2 machines.

Continuous production required for several machines. Reference 1-J-128.

SC-76: Thread grinding machine work for machines having 9/32-inch diameter capacity. Overall length of part approximately 4¾ inches. Threaded end centered. Other end ⅜-inch diameter, ¾-inch long. Blanks supplied by prime contractor, completely finished, ready for grinding. Fixture will be provided to permit grinding on centers, if desired. Rating, AA-1. Quantity, 18,000 at 1000 per week. Reference, 1-J-132.

SC-77: Gear-cutting machine work for machines suitable for cutting cast iron worm gears 2-inch circular pitch, 36 teeth, and bronze worms to match 7½-inch outside diameter, right-hand single thread. Facilities for handling the necessary turning operations also. Material supplied by prime contractor. Delivery urgent. Reference, 1-A-837.

SC-78: Planing machine work for machines having table 6 feet wide, 15 feet long or over, rail head 5 feet high and equipped with four heads. Tolerance, .0015. High rating. Iron castings supplied by prime contractor. Several sizes. Continuous production. Reference, 1-C-109.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Buescher-6-1: Pennsylvania concern requires subcontracting facilities for machining reciprocating steam engine cylinders. Equipment required, six-foot radial drill; vertical boring mill 146-inch swing, 73½ inches under bar; planer 104-inch width with side and top heads. Overall dimensions, 93½ x 104 x 73½ inches high. Cylinder bore diameter 70 inches, depth 52⅝ inches. Material, semi-steel. Castings will be furnished.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 341: Suspension lug. Facilities, milling machines. Operations, machining, if bar stock; if forging, contour machine also will be needed. Quantities, very large. Deliveries, 65,000 to 100,000 per month. Tolerance, .008-inch. Material, cold-finished rectangular bar stock or rough forging. Drawings and specifications available.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

516 to 2176 tons, seventeen wing wall trusses for floating drydocks, Morgan City, La., and Eureka, Calif., for navy, Chicago Bridge & Iron Co., Chicago, prime contractor; bids Feb. 27. Vierling Steel Works reported low bidder.

REINFORCING BARS . . .

REINFORCING STEEL PENDING

225 tons, infirmary, Veterans' Hospital, Coatesville, Pa.; bids at Washington, March 23.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Chesapeake & Ohio, forty 2-8-4 type steam locomotives, with 21,000-gallon tenders, reported placed with the American Locomotive Co., New York.

New York, Chicago & St. Louis, fifteen 2-8-4 type locomotives; to Lima Locomotive Co., Lima, O.

CONSTRUCTION AND ENTERPRISE

ILLINOIS

BELVIDERE, ILL.—National Sewing Machine Co. has given contract to Linden & Sons Inc., Rockford, Ill., for one-story factory addition.

CHICAGO—Henry Valve Co., 1019 North Spaulding, has under way an expansion program.

CHICAGO — Di-Cesare Offset Propeller Co., newly organized to manufacture airplane propellers, is now in operation.

CHICAGO—Celotex Corp., 910 North Michigan avenue, plans expanding some of its plants now manufacturing new products.

CHICAGO—Onsrud Machine Works Inc., 3910 West Palmer, is operating a second plant acquired by Defense Plant Corp. to increase company's output.

CHICAGO—Harper-Wyman Mfg. Co., 8362 South Vincennes avenue, manufacturer of gas range supplies, has switched to production of war material which has required a new building for expanded business under the Army program.

CHICAGO—Herbert H. Davis Co. Inc., 4146 South Western avenue, has acquired second plant which will be devoted to production of direct-fired industrial unit heaters of the Dravo Corp., Pittsburgh. The new operation will be located at Sixteenth street and Fifty-second avenue, Cicero, Ill.

CICERO, ILL.—American Phenolic Corp. is having plans prepared for factory to have about 250,000 square feet of floor space. Burnham & Hammond, 160 North LaSalle street, Chicago, architects.

JOLIET, ILL.—American Steel & Wire Co., 208 South LaSalle street, Chicago, has let general contract for one-story addition and alterations to rod mill No. 8, to Sumner S. Sollitt Co., 307 North Michigan avenue, Chicago.

ROCHELLE, ILL.—Highway Equipment Co.,

Rockford, Ill., has purchased the Hamaker Machine Shop here for rebuilding and reconditioning of equipment. Main office will continue to be at Rockford.

CONNECTICUT

BRIDGEPORT, CONN.—Black Rock Mfg. Co., 189 Osborn street, has awarded contract for altering and building addition to machine shop to Hewlett Construction Co., 1385 Iranistan avenue. Estimated cost $40,000, including equipment.

NORWALK, CONN. — Dilik Experimental Laboratories, Norwalk, plans factory, including office and warehouse. Estimated cost $40,000.

RHODE ISLAND

PROVIDENCE, R. I.—United States Rubber Co., 355 Valley street, has given contract for one-story addition to its plant to H. V. Collins, 7 Dyer street.

NEW JERSEY

JERSEY CITY, N. J.—Metro Glass Bottle Co., 135 West Side avenue, plans two-story factory, at estimated cost of $40,000.

OHIO

CINCINNATI—Robin Machine Products Inc. has been organized by Harold R. Greenwald, Stanley Phillips and Alvin H. Brackman, to manufacture, buy and sell machines and tools of all kinds. Mr. Greenwald, 1139 Clearbrook avenue, is handling legal details.

CLEVELAND—Hickok Electric Instrument Co., R. D. Hickok, president, 10514 Dupont avenue, has asked bids for two-story factory addition, costing $40,000. H. M. Morse Co., 1500 Superior avenue, engineer.

CLEVELAND — May-Fran Engineering Inc., 1701 Clarkstone road, is increasing facilities by adding factory and office space to present plant. Cost estimated at $28,000. G. A. Mayfarth is owner.

CLEVELAND—Cleveland Electric Illuminating Co., W. H. Hartman, purchasing agent, 75 Public Square, will spend approximately $195,000 for electric substation on 3180 Quigley road Southwest.

NEWARK, O.—City, A. D. Lockwood, mayor, plans electric light plant improvements, including installation of new turbine, transformers. Estimated cost $90,000.

PENNSYLVANIA

CRAWFORD COUNTY, PA. — United States War Department, district engineer's office, Federal building, Pittsburgh, will erect factory buildings to be operated by General Chemical Co., F. Scherizinger, purchasing agent, 40 Rector street, New York. Cost under $3,000,000.

ERIE, PA.—Tanner Brass Works, 1604 West Twelfth street, is planning alterations and improvements to its foundry.

MARYLAND

BALTIMORE—Consolidated Engineering Co., 20 East Franklin street, has contract for warehouse at 1208 Wicomico street for Standard Gas & Equipment Corp. Cost estimated at $30,000.

BALTIMORE — Air Reduction Sales Co., Seventeenth street and Allegheny avenue, Philadelphia, has awarded contract for acetylene plant here to Heverstick Borthwick Co., Schaaf building, Philadelphia. Cost will exceed $50,000.

ALABAMA

ANNISTON, ALA.—A. K. Adams Co., 542 Plum street Northwest, Atlanta, Ga., has contract for central disposal plant in Calhoun county for United States Engineer office, Atlanta, Ga.

GEORGIA

CHATHAM COUNTY, GA.—Higgins & Gaines, Greensboro, N. C., has contract for sewage treatment works extension. United States Engineer office, Savannah, in charge.

LOUISIANA

NEW ORLEANS—Gervais F. Favrot, Balter building, has contract for extension to electric shop and seven tool warehouse shacks for Delta Shipbuilding Co. Inc. O. O. Carpenter is plant facilities engineer.

WISCONSIN

MILWAUKEE—Crucible Steel Casting Co. has let contract to Charles Maier & Son Co. for one-story factory addition.

MILWAUKEE—Erie Mfg. Co. has been incorporated by H. F. Alfery, Clarence Wantz and Rudolph L. Forrer, 135 West Walls street, to manufacture and deal in machinery.

WAUKESHA, WIS.—Alloy Products Corp. has given contract to Permanent Construction Co., Milwaukee, for a part 1 and part 2-story factory, and boiler house. Zagel, Sherman & Zagel, 424 East Wells street, Milwaukee, architects.

MINNESOTA

MINNEAPOLIS—Butler Mfg. Co. has begun construction of one-story addition, to be used for welding shop. John Nelson is vice president and manager.

MINNEAPOLIS—Pioneer Engineering Works Inc. has given contract to Dean L. Witcher, Builders' Exchange building, for one-story plant addition.

MINNEAPOLIS—Midwest Machine & Tool Works, Henry E. Scherling, owner, has given contract to Naugle-Leck Inc., Roanoke building, for addition and alterations to factory.

MINNEAPOLIS—Mid-Continent Tool & Die Co., 1420 South Seventh street, has been incorporated by Walter R. Nelson, Lloyd R. Peterson and J. O. Anderson, to manufacture tools, dies and stampings.

ST. PAUL—American Hoist & Derrick Co. has given contract to William Baumeister Construction Co. for alterations and im-

provements to foundry to permit installation of additional machinery and equipment.

TEXAS

BASTROP COUNTY, TEX.— Leland Fikes, Dallas, has contract for additional units for sewage disposal plant, costing between $100,000 and $499,999. United States Engineer office, San Antonio, Tex., in charge.

BROWN COUNTY, TEX.—C. H. Harrison, Waco, Tex., has contract for addition to sewage disposal plant. United States Engineer office, San Antonio, Tex., in charge.

DALLAS, TEX.—Universal Corp., 2227 Cedar Springs, will build plant on five-acre site at Denton drive and Maple. Walter W. Ahlschlager, Southland Life building, architect.

HOUSTON, TEX.—Defense Plant Corp., 811 Vermont avenue Northwest, Washington, has awarded contract for oxygen plant to F. H. McGraw & Co., 51 East Forty-Second street, New York. Plant will be leased to Air Reduction Sales Co., 2005 Collingsworth street, Houston.

NEBRASKA

LINCOLN, NEBR.—Chicago, Burlington & Quincy Railway Co., 547 West Jackson boulevard, Chicago, will soon start construction of modern "hump" yard containing 36 tracks to speed movement of war freight traffic, to cost about $1,300,000.

IOWA

CEDAR RAPIDS, IOWA—Iowa Mfg. Co. has given contract to Loomis Bros. for one-story machine shop.

MUSCATINE, IOWA—Defense Plant Corp. has given contract to Weitz Co. Inc., Fleming building, Des Moines, for grain alcohol plant, to cost about $1,000,000. Plant will be operated by Grain Processing Co. Smith, Hinchman & Grylls, 800 Marquette building, Detroit, architects and engineers.

WEBSTER CITY, IOWA—McCollough & Sons Inc., manufacturer of metal products, plans to rebuild factory destroyed by fire recently. George McCollough is president and manager.

CALIFORNIA

LOS ANGELES—Hughes Aircraft Co. will build factory at 6235 South St. Andrews place.

CANADA

ESQUIMALT, B. C.—Department of Public Works, Hunter building, Ottawa, J. M. Somerville, secretary, is receiving bids until March 12 for additions to H. M. C. Drydock here, and installation of electrical equipment. Estimated cost about $100,000.

VANCOUVER, B. C.—North Vancouver Ship Repairs Ltd., 171 West Esplanade, is having plans prepared for plant addition to include erection of crane and installation of equipment, to cost about $130,000.

VANCOUVER, B. C.—Dominion Steelweld Ltd., 1571 Main street, has given general contract to Carter-Halls-Aldinger Co. Ltd., 700 Taylor street, for plant addition to cost about $25,000, equipment extra.

GUELPH, ONT.—Griffin Foundry Co., Huskisson street, has given general contract to William Parker, 14 Lucan street, for repairs and addition to foundry, estimated to cost about $10,000.

KINGSTON, ONT.—Kingston Shipbuilding Co. Ltd., Ontario street, is having plans prepared for addition to plant here, estimated to cost about $25,000, with equipment.

MALTON, ONT.—Victory Aircraft Ltd., N. Wagner, chief engineer, in association with Department of Munitions and Supply, will have plans prepared at an early date for further addition to aircraft plant here, estimated to cost about $100,000, with equipment.

ST. CATHARINES, ONT.—Foster Wheeler Ltd., 81 Eastchester street, plans further addition to plant estimated to cost about $25,000, with equipment.

ST. CATHARINES, ONT.—English Electric Co. of Canada Ltd., George street, is having plans prepared by T. H. Wiley, 186 St. Paul street, for plant addition to cost about $20,000.

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 171 Eastern avenue, J. A. Kilpatrick, president, has given general contract to R. G. Kirby & Sons Ltd., 539 Yonge street, for plant addition to cost about $10,000.

ST. JOHN, N. B.—Saint John Dry Dock & Shipbuilding Co. Ltd., Bayside drive, is having plans prepared for further plant addition estimated to cost $20,000, with equipment.

MONTREAL, QUE.—Crane Ltd., 3800 St. Patrick street, will let contracts soon for plant addition to cost about $35,000, with equipment.

MONTREAL, QUE.—Montreal Dry Dock Co. Ltd., 1151 Mill street, has given general contract to Alphonse Gratton, Reg., 3440 Shuter street, and work will be started early this month on construction of forge shop addition, to cost about $30,000.

—USED and REBUILT EQUIPMENT—

CRANES

FOR DEFENSE PLANTS

We own—spot shipments:

1 Shepard 5 ton 46′6″ DC
2 Niles 7½ ton 40′0″ DC
1 P & H 20 ton 42′0″ AC

Spotted, NOT in any legitimate war work, already inspected by us, and GOOD cranes:

1 P & H 10/5 ton 78′0″ DC
1 P & H 25 ton 78′0″ DC
1 P & H 25/5 ton 60′0″ DC
1 Northern 25/5 ton 60′0″ DC
1 Morgan 25/5 ton 85′0″ DC
1 Niles 30 ton 50′0″ DC
1 P & H 40 ton 51′0″ DC

4 GANTRY CRANES

Various types and sizes

3 LOCOMOTIVE CRANES

Steam, standard gauge

GIRDERS

1 Set F.B. Box type, 100 ft. C to C, 50 tons.

ELECTRIC HOISTS

We are now warehouse Distributors for Shaw-Box Budgit hoists, etc.

HYDRAULIC
PLATE SHEAR

2″ Cold capacity x 215″. Only slightly used or would rebuild.

A. J. HOFMANN
Main Office—Narberth, Pa.
Cranes—Mill Equipment—Machinery

NOTE: Our clients have the benefit of information and specifications from SEVEN (7) branches.

COLD ROLLED COMMODITY STRIP STEEL

19,000 lbs.	#4	temper — .062	x	5.062
24,000 lbs.	#4	temper — .035	x	4.218
12,000 lbs.	#4	temper — .035	x	7.156
5,500 lbs.	#4	temper — .0375	x	7.000
5,000 lbs.	#4	temper — .0375	x	6.218
19,000 lbs.	#4	temper — .035	x	5.25
13,500 lbs.	#4	temper — .035	x	6.25
13,000 lbs.	#4	temper — .062	x	4.968
5,000 lbs.	#4	temper — .0375	x	2.062

SNEAD & COMPANY
Foot of Pine St. Jersey City, N. J.

RAILS AND ACCESSORIES

RELAYING RAILS — Super-quality machine-reconditioned—not ordinary Relayers.

NEW RAILS, Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates, and all other Track Accessories.

Although our tonnages are not as large as heretofore, most sizes are usually available from warehouse stocks.
Every effort made to take care of emergency requirements. *Phone, Write or Wire . . .*

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

WANTED
10-FOOT POWER SHEAR

¼-inch capacity. State make, date, general condition and price.

PENN METAL CORPORATION of PENNA.
26 Oregon Avenue Philadelphia, Penna.

RAIL-ACCESSORIES RAILWAY EQUIPMENT

• BOUGHT • SOLD •

WRITE—WIRE—PHONE
DULIEN STEEL PRODUCTS, INC.
414 First Ave., So. Seattle, Wash. 2280 Woolworth Bldg. New York, N. Y.

WANTED

12—28″ Diameter Chilled Iron Rolls for Hot Sheet or Tin Mills.

FRANK B. FOSTER
829 Oliver Bldg. Pittsburgh, Pa.

AT BIG SAVINGS

We can furnish rails; spikes; bolts; tie-plates; angle bars, and other track accessories. Steel equipment of all kinds. Write, wire or phone for prices.

SONKEN-GALAMBA CORP.
108 N. 2nd St. Kansas City, Kans.

FOR SALE

1—Detroit Rex Products Company Degreaser, for degreasing wire in coils. Automatic operation.

THE SENECA WIRE & MFG. COMPANY
FOSTORIA, OHIO

FOR SALE

STEEL BUILDINGS
AND TANKS
PIPE AND BOILER TUBES

JOS. GREENSPON'S SON PIPE CORP.
National Stock Yds., Illinois

FOR SALE

Loudon Electric Overhead Tramrail, Automatic Dispatch equipment.

1—No. 3 Waterbury Farrel Rotary Swager.

Reply Box 833
STEEL, Penton Bldg., Cleveland

FOR SALE
RAILROAD SCALES, CRANES, ETC.

One—BUDA 80 ton railroad scale, 46 ft.; One—Fairbanks-Morse type E 150 ton railroad scale, 50 ft.; one 15 ton Brownhoist locomotive crane. Also several overhead electric travelling cranes; railroad steam locomotives; relaying rails; spikes and bolts. Write for complete information.

SONKEN-GALAMBA CORP.
108 N. 2d Street Kansas City, Kansas

OFFER APPROXIMATELY A CARLOAD OF SHERADIZED SEAMLESS TUBING RANGING IN SIZES FROM 1¼ INCHES TO 3½ INCHES. WRITE FOR PRICES AND QUANTITY DESIRED.

Address Box 831
STEEL, Penton Bldg., Cleveland

BUY — SELL — RENT

CARS, LOCOMOTIVES, CRANES
STEEL SHEET PILING, PILE HAMMERS
HOISTS, DERRICKS, TANKS, COMPRESSORS
BOILERS, TURBINES, DIESEL ENGINES, ETC.

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503 Locust St. St. Louis, Mo.

SELLERS—BUYERS—TRADERS

More for Your Dollar! **IRON & STEEL PRODUCTS INC.** 38 Years' Experience
13462 S. Brainard Ave. Chicago, Illinois

"Anything containing IRON or STEEL"

WANT TO PURCHASE

4 inch O.D. Boiler tubes; steel pipe of all sizes; Valves; Fittings; Industrial plants; Mills; railroads; trackage, etc. Write, wire or phone

SONKEN-GALAMBA CORP.
108 N. 2d St. Kansas City, Kans.
We buy and sell. *Get our quotations.*

GEAR CUTTERS, Spur 30″, 36″ & 40″, G & E
GEAR PLANERS, Bevel 36″ & 54″ Gleason, M.D.
GRINDER, Cyl. 18″x30″x96″ Norton, M.D.
HAMMER, Steam Forging 1100 lb. N-B-P
HAMMER, STEAM Forging 2000 lb. Morgan
LATHE, Geared Head 43″x23′ N-B-P, M.D.
STRAIGHTENER, 12-roll Kane & Roach, M.D.
STRAIGHTENER, Wire Shuster, cap. 5/8″

LANG MACHINERY COMPANY
28th Street & A. V. R. R., Pittsburgh, Pa.

—REBUILT—
BLOWERS - FANS - EXHAUSTERS

Connersville-Roots positive blowers. Centrifugals for gas and oil burning. Sand blast, grinder and dust exhausters. Ventilating fans and roof ventilators.

GENERAL BLOWER CO.
404 North Peoria St. Chicago, Ill.

WHEN THERE IS SOMETHING

you want to buy or sell, use the classified pages to tell other readers. Rates are moderate. Write STEEL, Penton Bldg., Cleveland.

CLASSIFIED

Representative Wanted

AGENTS WANTED

Established manufacturer of machine units closely allied with industrial ball and roller bearings desires representation in valuable territories now open. Attractive commission arrangement in cooperation with distributors in these territories. Line has excellent reception in trade and deliveries are extremely prompt. The possibilities are unlimited in both war work and domestic production after the war. Write giving full details of previous activities. Address Box 858, STEEL, Penton Bldg., Cleveland.

Accounts Wanted

ESTABLISHED MANUFACTURERS AGENCY, now handling service, engineering sales and expediting problems for responsible clientele, will accept one new industrial account. Compensation on a fixed monthly fee or commission basis. Our small but select staff operating from Connecticut to Virginia should be valuable to manufacturers of castings (all kinds), stampings (medium and heavy), or plastics. Familiar with detail government contract negotiations. Correspondence confidential. Reply Box 862, STEEL, 110 East 42nd St., New York City.

Positions Wanted

AMERICAN, AGE 57 WITH 20 YEARS EXperience as superintendent of structural and plate shops available at once. Address Box 853, STEEL, Penton Bldg., Cleveland.

Opportunities

FOR SALE
STEEL MELTING PLANT

Equipped with modern ELECTRIC FURNACE—9 tons per heat capacity—rapid top charge swing type roof. 5 Electric Cranes—3 bottom pour hot ladles 22,000 pounds capacity—ingot molds, etc., located in steel brick constructed building—approximately 45,000 square feet floor space—plant site about 5 acres. Suitable for production of Alloy Steel Ingots for Gun Barrel Forgings, Castings, smelting, etc. Low power rates—insurance and taxes. Available immediately for production operations.

LEBANON STEEL & IRON CO.
LEBANON, PA.

EXPEDITING

National — on the spot expediting and material procurement service where you *want it* when you *need it.*

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Employment Service

SALARIED POSITIONS—This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Send for details. R. W. BIXBY, Inc., 110 Delward Bldg., Buffalo, N. Y.

Help Wanted

WANTED

Competent foremen for large structural steel shop located in the South. Must be experienced and capable of handling men. Reply Box 851, STEEL, Penton Bldg., Cleveland.

SMALL MANUFACTURER OF LIGHT EQUIPment desires research engineer to develop new products for the post war period. There is a permanent position in our western Pennsylvania plant for a man with mechanical and electrical experience. Applicant must be citizen, 35 to 50 years of age, and a graduate mechanical engineer. When replying, give education, experience, references, age and salary desired. Reply Box 857, STEEL, Penton Bldg., Cleveland.

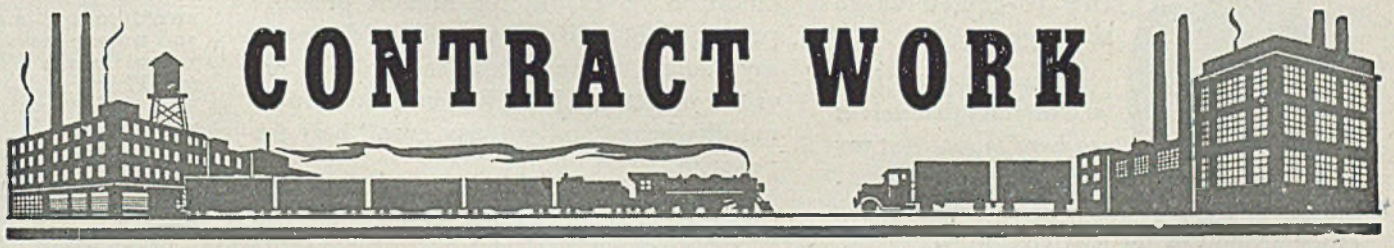
STEEL FOUNDRY FOREMAN

Desire foreman or assistant foreman with previous experience. However, man with steel moulding experience or background and capable of rigging, gating or risering jobs would be considered. Reply Box 849, STEEL, Penton Bldg., Cleveland.

GENERAL SHEET AND STEEL PLATE FABricators in need of Mechanical Engineer capable designing, making detailed shop drawings and bills of material. Excellent future, right party. Growing concern. Dallas Tank & Welding Company, Inc., P. O. Box 5351, Dallas, Texas.

WANTED: FIRST CLASS LAYOUT MAN FOR sheet and steel plate products, also first class fitters and welders. Reply Box 846, STEEL, Penton Bldg., Cleveland.

WANTED: GALVANIZING SUPERINTENDENT —job galvanizing shop in Metropolitan area. Reply Box 863, STEEL, Penton Bldg., Cleveland.



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Castings

KING FOUNDRIES, INC., NORTH WALES, Pa. Grey Iron and Semi Steel Castings, also alloyed with Nickel, Chrome, and Molybdenum. Wood, Iron, Brass, and Aluminum Pattern work.

SUB-CONTRACT WORK

is being given out daily. Put yourself in line to receive your share of this business by listing your services in this section. Write STEEL, Penton Bldg., Cleveland.

CUSTOM GRINDING

OF ORES, CAST IRON BORINGS
MILL SCALES, OXIDES, ETC.
from 10 mesh to 325 mesh

AMERICAN MINERAL & CHEMICAL CO.
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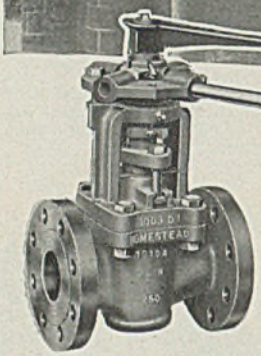
Send your inquiries for
SPECIAL ENGINEERING WORK
to the
A. H. NILSON MACHINE COMPANY, BRIDGEPORT, CONN.
designers and builders of wire and ribbon stock forming machines.
We also solicit your bids for cam milling

KIRK & BLUM

WELDED MACHINE BASES, PEDESTALS and FRAMES
LATHE PANS
GEAR and BELT GUARDS
Pressed Steel Louver Panels and Cover Plates
THE KIRK & BLUM MFG. CO.
2822 Spring Grove Ave., Cincinnati, Ohio

Don't get caught with your plants down!



Here's *plain talk* about the so-called valve shortage.

From the start let's face the fact that valves are *hard to get.* But *you* have to get them . . . and *we're* working the clock around to see that you do.*

On time? When you want them? That's a different story . . . *and the happy ending is up to you!*

Positively there is *no valve shortage* . . . only a shortage of *time* to fill everyone's requirements *at once.* Ask us to fill immediately an order for ten or a thousand special specification valves, on the highest possible priority (not a directive), and we'd have to say "sorry." Give us the same order for valves you know NOW will be needed some months hence and we may even "beat the promise."

The answer to the "valve shortage" problem is this simple: *your* purchasing practices may need to be revised as much as *our* production procedure has been! The decades-old habit of ordering valves, pipe and fittings *last* must be *reversed.*

Until the valves are in the line the plant stays "down." Order at the blueprint or construction stage... not when the roof's on!

*(*Production increased nearly 800% in 12 months*).

Maritime's two-flag, highest production award to our men and women making valves for the Victory Fleet.

Reference Book No. 38 shows standard types, sizes, and uses of Homestead Valves. Write for your free copy now.

HOMESTEAD VALVE MFG. CO.

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ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.

(Continued on next page)

ADVERTISING INDEX

*Advertisements appear in previous issues.

Where-To-Buy Products Index carried quarterly.

4 WAYS to get more service from WIRE ROPE

Yes, wire rope is tough. It can stand up to the most rigorous service—and ask for more.

But that's no reason to abuse it. With a little care, by applying a few simple rules, you can get a tremendous amount of extra service from your rope.

1 Break it in with light loads

For example, when breaking in a new rope, don't slam on full power and speed right off the bat. Begin with fairly light loads. Operate at moderate speed. Give the strands of the rope a chance to seat down snugly and uniformly upon the core, so that each strand is carrying its fair share of the load. This way, the rope will assume its proper "constructional stretch" without damage, and you'll be assured of better spooling and easier handling throughout the entire life of the rope.

2 Treat it with consideration

After the rope is broken in, you can safely use whatever speeds and loads it was designed for. But don't be unnecessarily rough, even then. A smooth, gradual application of power is just as efficient as slamming into the load with a jerk. The same is true of braking. It's the heavy jerks and surge loads that beat the guts out of a piece of rope. Nine times out of ten these can be avoided without losing time.

3 Know your rope

For example, if you're using a flexible 8-strand rope for high-speed work, don't overload it. This rope is built to withstand bending fatigue and fast operation—not for heavy hogging lifts. The opposite is true of heavy-duty 6-strand rope. Lift with it—but don't try to break speed records.

4 Right maintenance means plus service

Don't neglect the few simple maintenance precautions which require so little time yet return so much in extra service. Keep your rope properly lubricated. Don't operate it over sheaves that are abraded, damaged, or out of line. Fasten clips in the approved manner. Cut off a short length from the drum end of your rope from time to time so that "grief spots" are relocated over sheaves and drums.

Wire rope is now a war weapon. Its proper use is a service to your country and to yourself. If you want good, dependable rope, and friendly service, get in touch with the Bethlehem Wire Rope distributor in your territory. He's always ready and willing to serve you.

Bethlehem Manufactures Wire Rope for all Purposes

THEY COULD USE THIS

THAT HALF-TRACK can be mighty useful, on a farm or construction job. It can save time and back-breaking work, in a hundred and one ways. The men in our armed services realize it. They're waiting for a chance to use it, back home.

OTHERS SEE the utility of planes, jeeps, powerful trucks for peacetime pursuits. Homemakers will clamor for better equipment for comfort and convenience. And they'll have the money to buy, invested in War Bonds or otherwise.

BUT they'll be cagey shoppers, we think. They won't be satisfied with the old. They'll be looking for manufacturers to apply the lessons of war to peacetime goods. The pressure now is for deliveries. The postwar demand will be for more over-all utility, at a fair price.

WE DOUBT that this country's present machinery will do the job. Much of it is years old, depreciated even before the War. Heavy loads and long hours have reduced the value of new machines. New developments will cause a high degree of obsolescence, even of equipment still in good order.

SO, the manufacturer will be a jump ahead of his competitors, who starts now to study his postwar facilities. He'll find out what machinery he can use, what is outworn or outmoded. He'll plan to use the most productive machinery he can obtain.

TAX AUTHORITIES CAN HELP, by considering the rapid rate of depreciation and obsolescence, and by permitting the reservation of "seed money" so that funds will be available when new equipment is obtainable.

WE SHALL LOSE MUCH of the value of our native ingenuity if we are not ready to apply it to peacetime pursuits. Only the production of more goods for more people, by means of modern machinery, can bring us work, contentment, and lasting freedom.

back on the FARM

BEHIND THE SCENES

Too Late Now

■ If by the time your good eye focuses on this 8-point Caledonia type you haven't yet filed your 1942 income tax return, about our only suggestion is that you quick start developing an acute case of amnesia and have your brother-in-law notify the Bureau of Missing Persons that you haven't been seen for six weeks.

Blood From A Turnip

■ Of course, when they start this new withholding tax that is being churned up in the House it's going to be as painless as extracting an impacted wisdom tooth, provided there's anything left to withhold after all the other deductions which even now leave just about enough for a short beer every other pay day. Personally, we're in favor of that single tax idea which someone or other is sponsoring. Then you can just endorse your whole check over to the man with the whiskers and not have to worry about all the gory details.

Wartime Suspension

■ Last Thursday, March 11, STEEL's contemporary or sister paper, *Daily Metal Trade*, suspended publication for an indefinite period after a continuous appearance five days a week since 1909. As a matter of fact, the relationship between STEEL and the *Daily* was originally even much closer than that of brother and sister, for it was as a daughter of STEEL that the *Daily* first saw the light of day.

By 1909 STEEL (then *Iron Trade Review*) had been serving the metalworking and metalproducing industries every week since the French had first begun the Panama Canal in 1882. It was a time of rapid development of the age of steel and metals. The open hearth was replacing the bessemer as a volume producer of steel and improved refining methods for the nonferrous metals were being developed. A great new industrial era was at hand and into it was born the *Daily Edition of Iron Trade Review* under the editorship of the late J. F. Froggett, for those companies requiring daily market information.

STEEL's child matured rapidly and won its independence in a few short years, dropping its last name to become *Daily Iron Trade* and after the war, *Daily Metal Trade*—"The Newspaper of the Metal Industries".

Suspending the *Daily* cannot help but bring a tug to its mommy's heart as well as its thousands of friends who have read it with such avid appreciation that it has long enjoyed one of the highest, if not the highest, subscription renewal rates of any publication audited by the Audit Bureau of Circulations.

But notwithstanding this appreciation, which is and has been most gratefully acknowledged, the operation of a daily newspaper imposes a heavy strain upon publishing facilities in wartime. It is the studied opinion of the publishers of STEEL, *The Foundry*, *Machine Design* and *New Equipment Digest* that their contribution to the war effort can be increased substantially by transferring the talent, skill and facilities heretofore devoted to the *Daily* to more fully serve the readers of these four publications.

After the pressure of wartime conservation has eased, the possibility of resuming the *Daily* on a better and broader basis will be carefully considered.

Thus STEEL will continue its weekly coverage of the metalmarkets and its news reports on the industry on an expanded basis, utilizing the full facilities of the *Daily* to give you the most complete information service available.

Say It with Wrenches

■ Women in war plants create many a new problem as we have pointed out here from time to time but one which had escaped our operative's eagle eye until he was visiting down at Westinghouse is the modern version of the stage-door Johnny. Call him what you will—Plant Gate Jerry or Swing Shift Sam, here he is in all his glory, tenderly holding

a beautiful pipe-wrench bouquet and ready to whisk his lady love away to see his etchings just as soon as she gets the grease out from under her fingernails.

War Production Handbooks

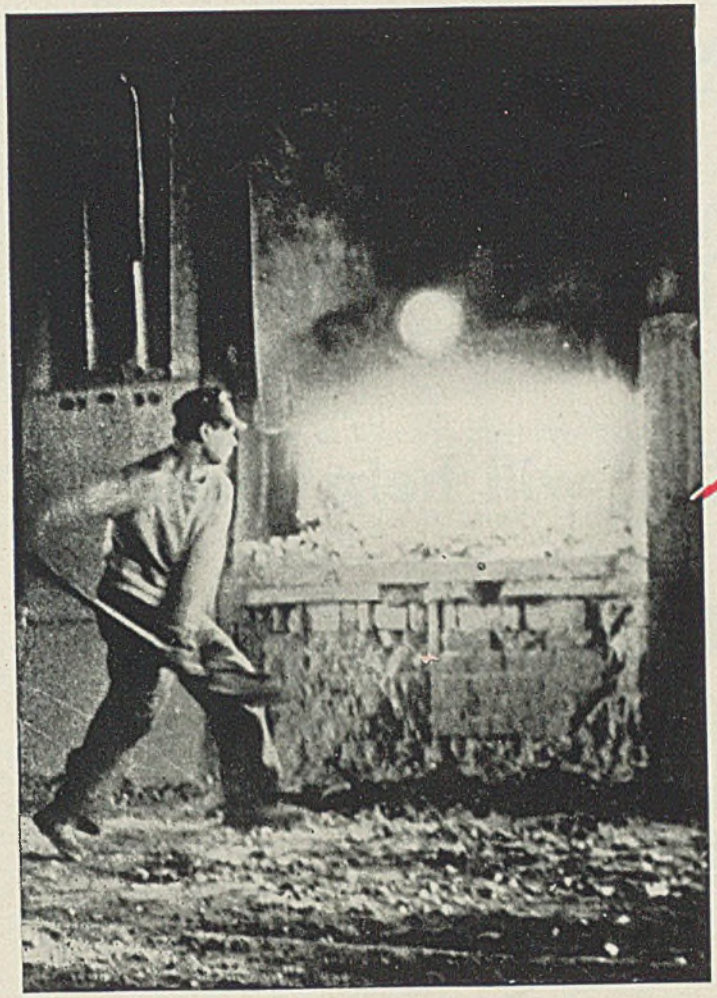
■ The following reprint handbooks are still available from STEEL's Readers Service Department and will be sent promptly. Altogether, over 15,000 copies are now in use throughout the industry and in the district ordnance offices:

Modern Shell Production	**$1.50**
Modern Gun Production	**1.00**
Modern Small Arms	**1.00**
How To Improve Your Welding	**2.00**
Improved Forging Technique	**1.00**

The three ordnance handbooks are available as a set at $3.00, and soon to be ready will be the NE Steel Handbook and NE Steel Selector at $1.50. Advance orders are piling up for delivery early in April.

Vol. 112, No. 11, March 15, 1943, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at the post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents—Page 51



STEEL FOR 57 MORE FIGHTER PLANES

★

from a single
HEARTH PATCH
bottom repair

WHEN you repair a large, deep hole in an open hearth bottom with Hearth Patch, you may save 10 to 12 hours—most of the time it would take to burn in layer upon layer of magnesite.

In that time saved, the furnace can make an extra heat of steel—enough steel from a 200-ton furnace, for example, to produce 57 fighter planes.

Every month more steel plants are using Hearth Patch for emergency repair work. Over 40 shops have ordered it since Pearl Harbor. Some average a carload or more per month.

Hearth Patch is a dense, fine-grained, quick-setting magnesite refractory that you simply shovel or dump into the hot furnace. You mix no slag with it. Just clean out the bottom hole carefully, fill it level full of Hearth Patch. Dress the repaired area with two inches of burned dolomite or magnesite, and the entire patch consolidates quickly into a solid repair.

Hearth Patch has its limitations. Don't put it in a cold furnace. And if you use it for bank repairs, mix slag with it.

Basic Service Engineers, who are helping many shops to save hours of production time with Hearth Patch and other Basic Refractories' products, will be glad to aid you, too. Think of these long-experienced, practically trained men as your refractories specialists.

BASIC HEARTH REFRACTORIES

BASIC REFRACTORIES, INCORPORATED
CLEVELAND, OHIO

PRODUCERS OF MAGNESITE AND DOLOMITE HEARTH MATERIALS FOR STEEL FURNACES

Your **Scrap**

will help speed

VICTORY

Scrap is needed to make steel. Steel, more steel, is needed by the Armed Forces to bring Victory.

If you have old machinery that can't be used to produce War Materials, turn it over to your local Scrap Dealer. He will see that it reaches the steel producers. All trimmings and short ends of steel you have left over should be collected and stored until such time as you have a full load. Then call your Scrap Dealer. Make sure he picks it up, at once. In this way you can aid the steel producers, our Armed Forces and yourself.

Keep the Scrap coming.

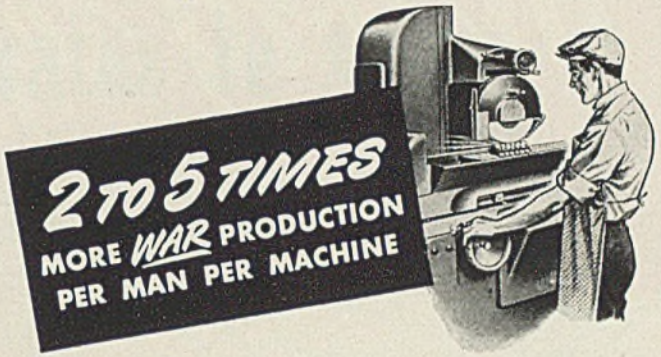
WEIRTON STEEL COMPANY—WEIRTON, WEST VIRGINIA

Sales Offices in Principal Cities

division of NATIONAL STEEL CORPORATION

Executive Offices, Pittsburgh, Pa.

IMPORTANT NOTICE TO WAR PLANTS CONCERNING POR-OS-WAY DELIVERIES



WE MUST BE FRANK. When we first announced the Por-os-way precision grinding wheel a little more than a year ago, we were ready with a plant far exceeding our previous one in size, equipment and man-power. It was, we felt, big enough to meet all demands. But two things have happened. First, the war. Then Por-os-way, making good its promise to increase grinding production 2 to 5 times per man per machine, has literally sky-rocketed in demand. Hundreds of grinder foremen and grinding machine operators want to prove Por-os-way can up production 2 to 5 times for them, want to see what makes it different from other wheels, how its cool action practically eliminates burning, how it takes cuts double or more than previous wheels and grinds in fewer passes, how it can cut faster producing an even *better finish using a finer grain*, why it resists loading, holds its corner, reduces dressings necessary.

ORDERS INCREASED 700%

Orders have poured in. Not at a steady pace but at an ever increasing rate. Our production is now forging ahead—yet is still not enough to satisfy the full demand for Por-os-way.

RELIEF IS IN SIGHT

Working 'round the clock was not enough. We needed more plant, more equipment, more men. Work on expanding our facilities is now completed. Greatly increased production is now under way. Again we believe it will be amply big enough to take care of all your demands. Naturally we want every war plant to know the exceptional advantages of Por-os-way wheels. And so, we're doing all we humanly can to keep up on delivery. In the meantime, write A. P. de Sanno & Son, Inc., 436 Wheatland Street, Phoenixville, Penna. for a booklet "Facts About Por-os-way". It gives a complete story.

POR-OS-WAY* *a new* **RADIAC* PRODUCT**

A. P. DE SANNO & SON, INC.
NEW YORK, CHICAGO, PITTSBURGH,
CLEVELAND, DETROIT, LOS ANGELES

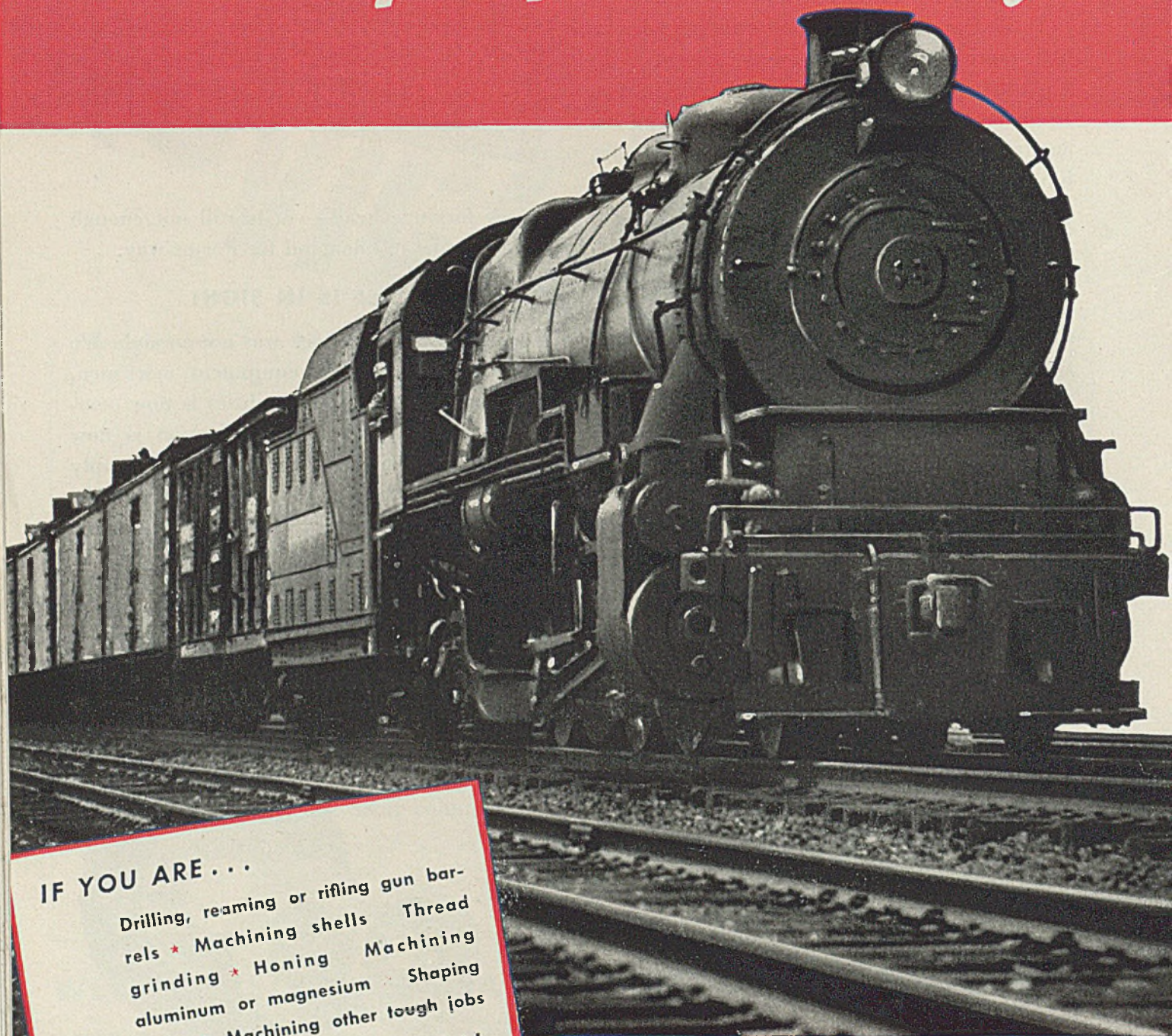
PHOENIXVILLE, PENNA.
Western Gateway to
VALLEY FORGE

*T. M. Reg. U. S. Pat. Off.

1917 - 1943

AGAIN ---

History repeats itself



IF YOU ARE . . .

Drilling, reaming or rifling gun barrels ★ Machining shells ★ Thread grinding ★ Honing ★ Machining aluminum or magnesium ★ Shaping gears ★ Machining other tough jobs

Consult Houghton on Cutting Fluids

USE HOUGHTON'S CUTTING

Once more industry turns to cutting concentrates to save needed shipping space

Buy the BASE and SAVE the SPACE

During the dark war days of 1917 the railroads, sorely pressed, were forced to place embargoes on many materials. Some way had to be found to keep machine shops supplied with the cutting oils they required in increasing quantities for war production.

It was then that the Pressell patent (1367428) was granted to E. F. Houghton & Co., on a cutting oil base which contained the necessary extreme-pressure ingredients to increase film strength, oiliness and heat absorbency. This base was shipped to the user's plant and mixed there with blending oil obtained locally.

Down through the years this method of making superior cutting oils has continued. We have supplied thousands of tons of cutting concentrates, high in the right type of sulphur, saponifiable and E. P. properties.

This means that one drum will make from two to ten drums of mixed oil, ready to cool the operation and make tools last longer.

Today history repeats itself. The common carriers—railroads and trucks—have done a marvelous job to meet war demands thus far.

But the time has come when shipping space is probably America's greatest shortage . . . when every possible car must be conserved to move the materiel of war and the food and fuel for our home front.

By buying the treated base oil and mixing it with a locally available straight-run refinery product, shipments of cutting oils can be cut to one-third or even one-fifth of the present volume. Too, metal drums are getting scarce —which is another reason for conserving.

"BUT, WHAT BASE?"

This company, with a quarter-century record on cutting fluids, has long since proven its right to speak. We make our own ready-to-use oils the same way and supply both these oils and the concentrates to American industry for every conceivable type of tough machining.

Why not ask the Houghton Man for his recommendation—buy the base material made as only Houghton knows how to make it—and thereby save time and shipping space for other materials vitally needed for Victory?

E. F. HOUGHTON & CO.

Industrial Oils and Heat Treating Products

Chicago • PHILADELPHIA • Detroit

San Francisco • Toronto

CONCENTRATES

at threats to stud setting speed and efficiency!

HERE's an Apex stud setter of brand new design, with the smallest O.D. we know of. It works close to shoulders, projections, etc., drives easily and accurately in tight spots normally hard-to-reach. Proves to be a simple, effective tool for either hand or power operation. *Important:* It's an ideal tool for "green" hands. It's easy to adjust, and once set for desired length of thread on stud, *stays adjusted.*

Four sizes supplied for studs up to 1¼" in diameter. Your choice of Morse taper shanks, hex drive, T-handle combination with female square for torque wrench.

Stud setters are only one branch of the Apex family of fine production tools. Write for any of these catalogs listed below.

Chuck and tool holders: Catalog No. 14; Power bits and hand drivers for Phillips screws: Catalog No. 15; Power bits for slotted head screws: Catalog No. 16; Power bits and hand drivers for clutch head screws: Catalog No. 17; Stud setters: Catalog No. 101.

APEX

THE APEX MACHINE & TOOL CO., DAYTON, OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Drill Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

Control...

THE CRITICAL FACTOR IN MINESWEEPER OR STEEL CASTING

UNGLORIFIED . . . rarely mentioned by headlines unless it is to record her destruction . . . the minesweeper goes quietly and methodically about her task of clearing from ship channels the hidden terror whose touch is death. Officers and men of these forgotten ships must handle their craft faultlessly . . . for their first mistake may easily be their last. Only their rigid control of the minesweeper's navigation brings success in her perilous task.

The modern production of instruments of war must be as closely controlled as the minesweeper's navigation. The Lebanon Steel Foundry—producer of castings for America's armed forces—employs every production control that furthers approved foundry practice. Human control is provided by inspectors chosen for alertness of mind and vision . . . trained until they see with "camera eye" sharpness. Exhaustive chemical and mechanical tests are regularly conducted. To develop sound castings, Lebanon uses two of modern industry's most scientific tools—the x-ray (illustrated) and the gamma ray.

There is a premium on control—and Lebanon pays it to assure American fighting men and American industry of castings of Circle Ⓛ integrity . . . castings that are specified by such acknowledged leaders as Darling Valve and Yale & Towne.

Lebanon foundry engineers and metallurgists have had close contact with war production requirements since the beginning. Their experience in solving today's type of industrial problems is available to interested organizations.

LEBANON STEEL FOUNDRY • LEBANON, PA.

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON *Stainless and Special Alloy* **STEEL CASTINGS**

GLAMOURLESS?

Maybe—

But indispensable to the WAR EFFORT

SHEARED STEEL PLATE

Unsung and unheralded — yea, cold and lifeless, . . . prosaic, and truly "unbeautiful" to the eye . . .

Yet, what would we do without *Steel Plate*? . . . no ships, — no boilers, — no tanks, — no locomotives, or cars, — no landing cargoes, — no oil transportation cars, — no storage tanks, — no lighthouses, — no buoys, . . . and so on.

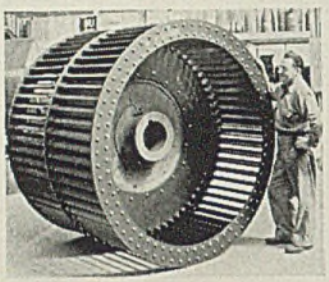
WORTH

WORTH STEEL CO. CLAYMONT, DEL.

STEEL


LEWIN-MATHES
ROTATING SHELL BANDS
and
SEAMLESS TUBING
of Pure Copper or Gilding Metal
Our refinery and tubing mill have all the modern equipment and facilities required for wartime precision standards.
LEWIN MATHES
LEWIN-MATHES COMPANY • • SAINT LOUIS, MISSOURI

American Blower Products in the



Wheel of the Sirocco Fan extensively used in the plants of America's vital steel industry.

The prophecy, "Liberty for the World," is being written in steel made in America!

With shattering eloquence, steel is squelching the boasts of the tyrants. More than ever before in the history of America, the future of America and the future of the world depend upon the ability of this nation's steel producers to supply the enormous quantities needed.

America's war goods producers are well aware of the all-important war job being done by the Steel Industry.

American Blower has had the privilege of supplying Air Handling Equipment of many types, as well as Fluid Drives, for many of the steel plants working for Victory.

We feel that the dependable, uninterrupted operation of these American Blower products, in war as in peace, is evidence of the sincerity of our efforts to build only the best equipment of its kind for steel and other vital American industries.

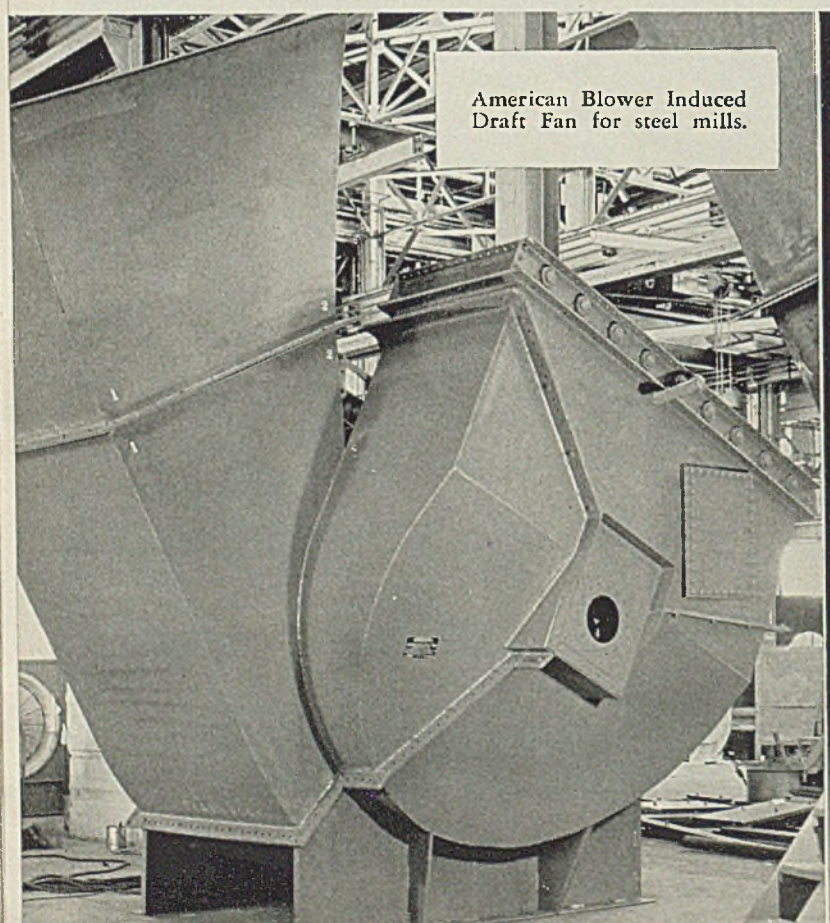
American Blower plants fly the Army-Navy "E."

AMERICAN BLOWER

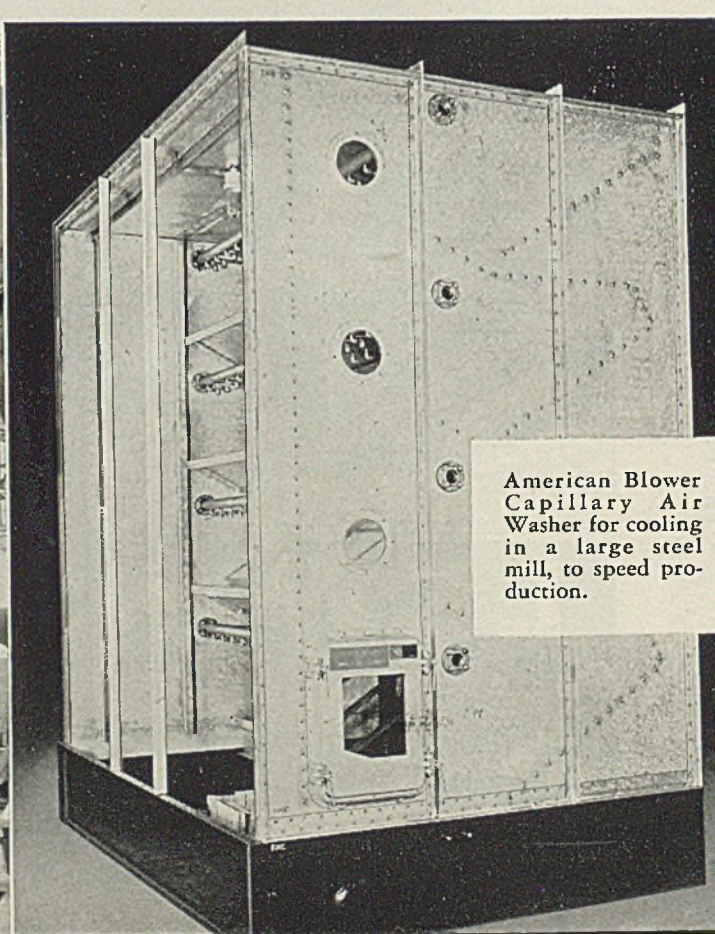
AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN

In Canada: CANADIAN SIROCCO COMPANY, LIMITED, WINDSOR, ONTARIO

Division of American Radiator and Standard Sanitary Corporation

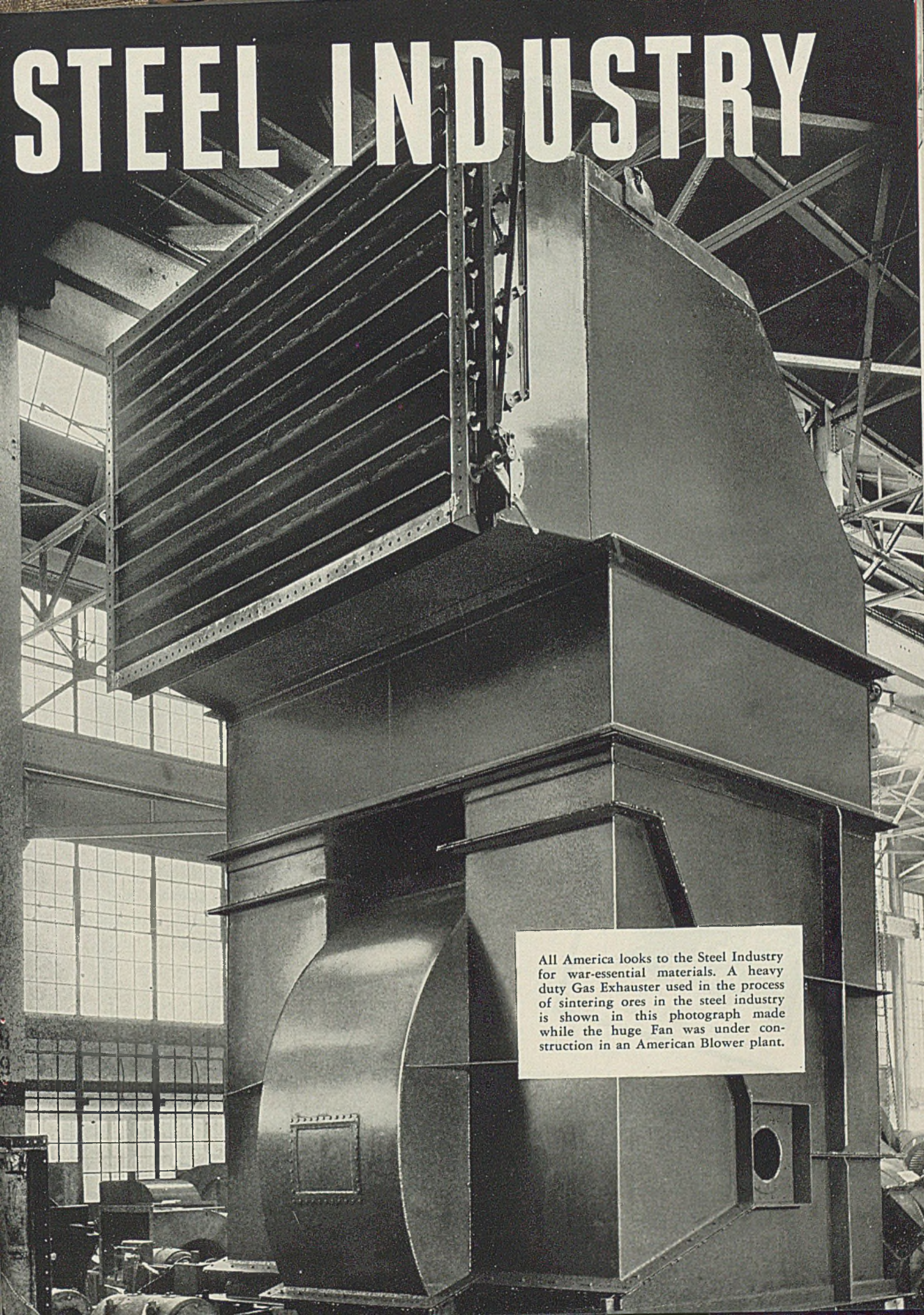


American Blower Induced Draft Fan for steel mills.

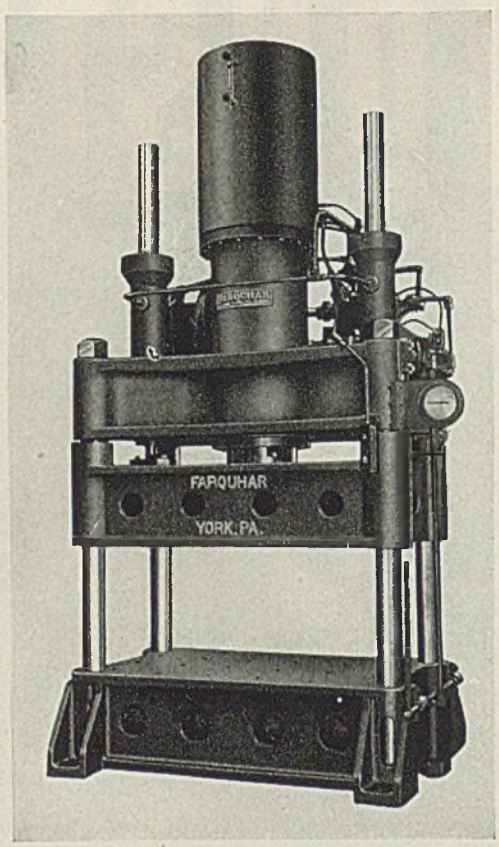


American Blower Capillary Air Washer for cooling in a large steel mill, to speed production.

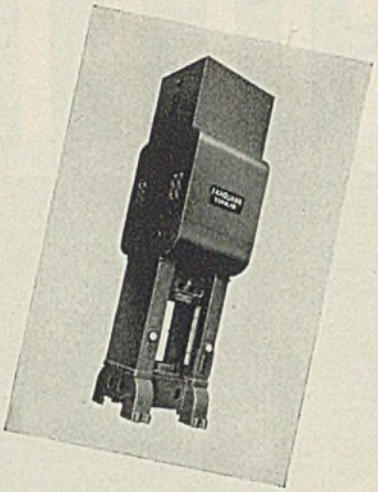
STEEL INDUSTRY



All America looks to the Steel Industry for war-essential materials. A heavy duty Gas Exhauster used in the process of sintering ores in the steel industry is shown in this photograph made while the huge Fan was under construction in an American Blower plant.



Cartridge case drawing and tapering press. From 75-ton up to 250-ton capacities and larger. Double pump unit with two 60-HP motors, push-button control, adjustable strike. Manual and semiautomatic operation.

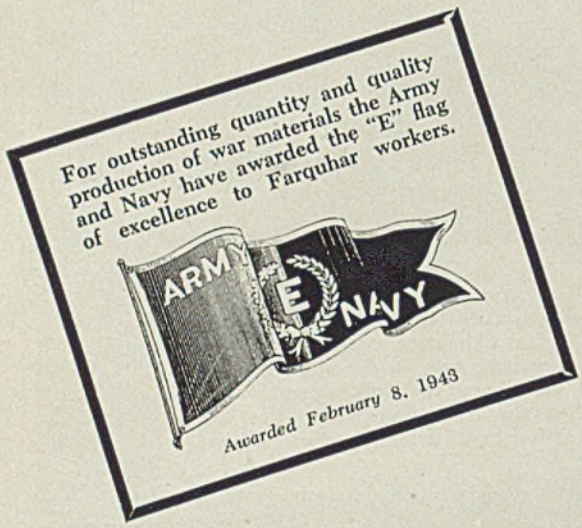


150-ton metal-forming press
Bed 36" x 58½"
Stroke 24"
20-HP pump unit

Hydraulic Presses
go to war

Farquhar has built hundreds of hydraulic presses now serving in war production, all types and capacities from three to 7,200 tons. Large numbers of smokeless-powder presses bearing the Farquhar name are helping to provide the munitions of the United Nations.

Farquhar builds hydraulic presses for smokeless-powder blocking, graining, and finishing; forging and drawing presses for shell and cartridge cases; shell-nosing presses and straightening presses for gun barrels—all designs for all jobs.



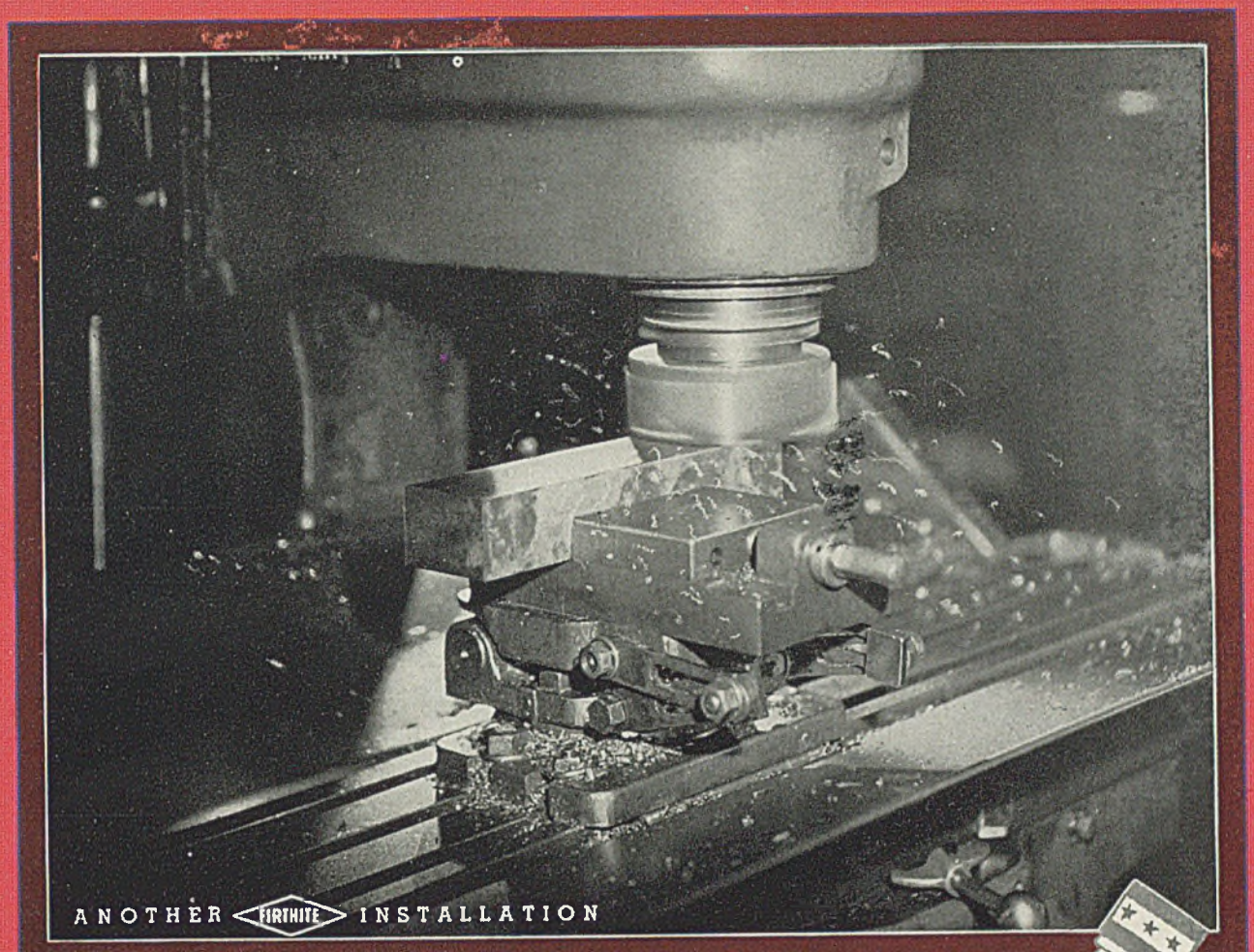
Farquhar

HYDRAULIC PRESSES

A. B. FARQUHAR CO., Limited, York, Pennsylvania

FOR FASTER, BETTER MILLING

A "HYPER-MILL"



A NEW DESIGN AND AN IMPROVED CARBIDE

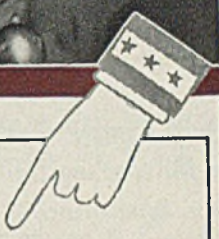
that . . .

Perform at extraordinarily high cutting speeds;
Permit the milling of heat-treated alloy steels;
Produce highly burnished surfaces;
Result in a high production rate.

The new design and the improved carbide are described in our "Hyper-Milling" Bulletin FE-106, which is yours for the asking.

Firth-Sterling
STEEL COMPANY

Offices: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA
CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES



Use Tungsten-Titanium Carbide

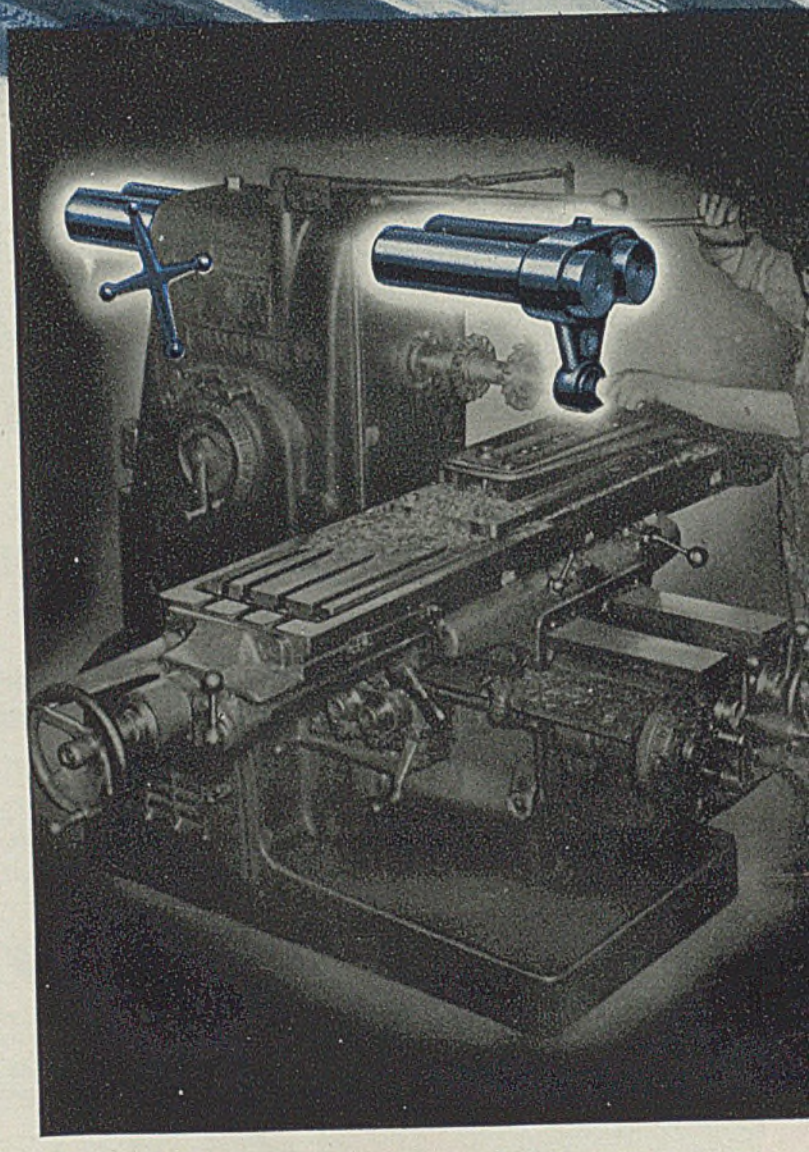
The selection of Firthite Tungsten-Titanium Carbide for milling and almost all other **STEEL-CUTTING** operations avoids the use of Tantalum—a "scarce" and "critical" material.

FIRTHITE

FIRTHITE

THE "HYPER-MILLING" CARBIDE

THIS SEA-GOING KILLER PACKS A Double Punch!



Streaking through the water at speeds of 60 miles an hour, PT Boats pack more speed and hitting power for their size than any other naval craft afloat. Their capacity to deal death and destruction — like a thunderbolt — makes them one of Uncle Sam's most feared killers of the sea.

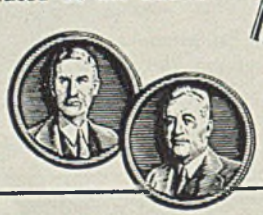
★ ★ ★

Double Over-Arms Provide A *Dual Advantage* In Milwaukee Milling Machines

Rigidity and convenience — the Milwaukee double over-arm — scores heavily on both counts.

No other means of arbor support is quite the equal of the double over-arm in *rigidity* — an indispensable quality in any milling machine.

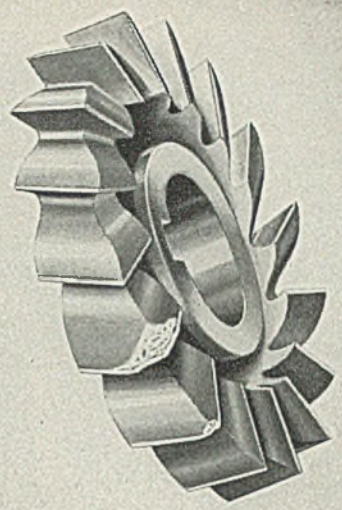
No other means of arbor support affords quite the same quick and easy access to the milling cutter — just a few simple motions and both cutter and arbor are free — an important convenience to the operator at all times.



KEARNEY & TRECKER
CORPORATION
MILWAUKEE, WISCONSIN

Buy Victory with at least 10% in War Bonds!

Milwaukee MACHINE TOOLS



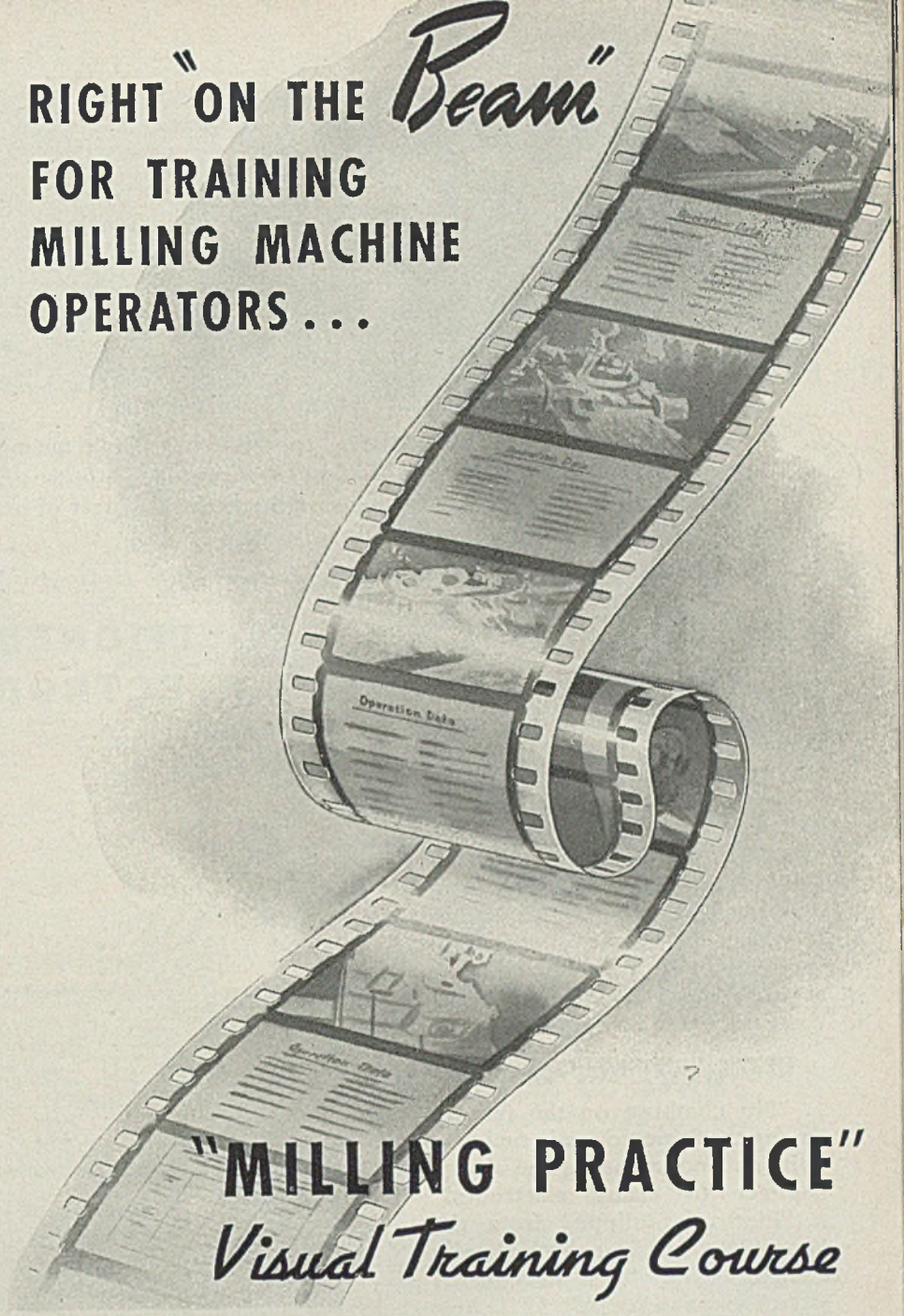
"Breaks" LIKE THIS ARE NO "BREAK" FOR PRODUCTION

Broken tools—mechanical troubles — caused by improper care and operation of machine tools, are no help in production for Victory. Practically every machine tool manufacturer offers valuable advisory service — "care and operation" handbooks — technical bulletins — on better methods of operation that help green men as well as speed and improve production of skilled workers.

Put full information in the hands of the men who operate your machine tools — teach them the "know how" to get the most in production with the least waste of time, effort and materials.

Buy Victory with at least 10% in War Bonds!

RIGHT "ON THE Beam" FOR TRAINING MILLING MACHINE OPERATORS . . .



"MILLING PRACTICE" *Visual Training Course*

This Visual Training Program, consisting of five sound-slide films dealing with the fundamentals of milling practice, continues to prove highly popular with technical instructors and industrialists everywhere. Interestingly arranged, the films show many types of operations such as T-slotting, angular and straddle milling, circular milling, dovetailing, boring and end milling.

Many shop training directors report unusually successful results with this visual course. It is available on a rental basis at nominal cost. We invite you to write for full information to our Department of Industrial Education.

Kearney & Trecker *Products* CORPORATION
MILWAUKEE, WISCONSIN
Subsidiary of Kearney & Trecker Corporation

Kearney & Trecker
CORPORATION
Milwaukee, Wisconsin

"More Important DEVELOPMENTS THAN ALL OTHERS"

"The Hydro-Arc Furnace Corporation has shown me more outstanding developments in Electric-Arc Melting Furnaces than all other organizations put together in the past twenty years", says the Chief Engineer of one of the largest users of Electric-Arc Melting Furnaces.

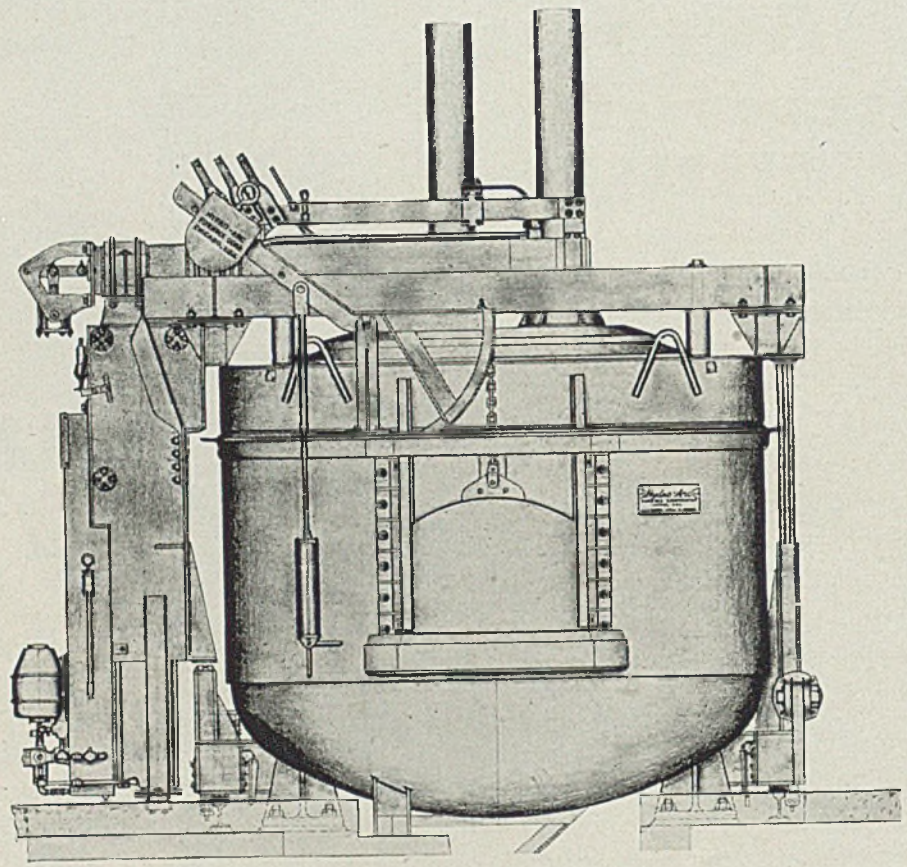
Two outstanding features of the Hydro-Arc Furnace are:

(1) HYDRAULICALLY POSITIONED ELECTRODES.
(2) POWER OPERATED ELECTRODE CLAMPS.

The Hydro-Arc Furnace uses low inertia air for counter-balancing to cooperate with a simple, accurate, hydraulic control to operate each electrode. The few moving parts of this combination have no stretchable steel cable nor limit switches to watch. Low upkeep—less surging—less electrode wash and more accurate metal making at lowest costs are being accomplished.

HERE'S WHAT MELTERS SAY:

1. "No climbing on the furnace among the flames to strain on burnt bolts and no swinging the sledge hammer to clamp electrodes!" 2. "Electrodes slipped from the floor!" 3. "Look at the hydraulic control!" 4. "No steel cable stretch, none to break!" 5. "Fastest electrodes I ever saw, but good control!" 6. "Simple isn't it? Can change any part in a few minutes!" 7. "Blows dust off of the electrodes as they are slipped." 8. "No troublesome limit switches on the electrode arms." 9. "Larger roof ring diameters—saves burning out flanges."



Hydro-Arc engineers will cheerfully study your Electric Melting Furnace problems and make complimentary suggestions.

HYDRO-ARC FURNACE CORPORATION

561 HILLGROVE AVENUE, LA GRANGE, ILL. (*A suburb of Chicago, Ill., U. S. A.*)
Telephones: La Grange 4545 and 4546 Chicago Line: Enterprise 1068

Associated with Whiting Corporation

Above: Pump liners for marine service.

Below: Special castings.

Variety of maintenance parts

SHENANGO-PENN

Centrifugal Castings

. . . an improved process for many products

BECAUSE it is an extremely flexible process, the use of centrifugal castings has multiplied many times under wartime production demands.

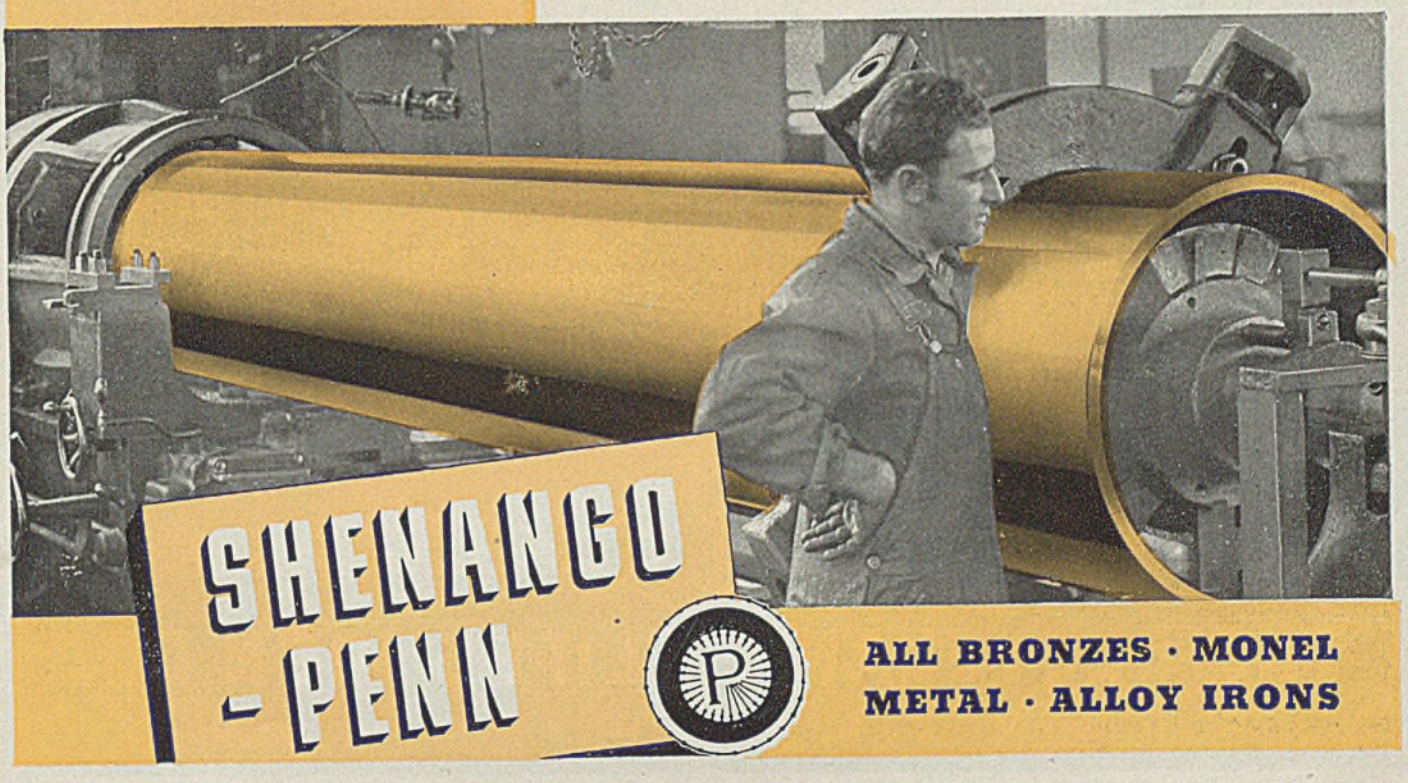
Wherever wheels turn, or corrosion or wearing problems exist, Shenango-Penn castings can probably be used. In marine service and the aviation industry, for example, parts formerly forged, are now cast centrifugally, and in many cases are giving better service.

Shenango-Penn castings have unusual advantages in strength and purity, and actually save production time because less machining is required on the finished product. Why not send for a copy of our new Bulletin No. 143 which describes the Shenango-Penn process and products, and gives a complete table of alloys available?

SHENANGO-PENN MOLD COMPANY

411 WEST THIRD STREET, DOVER, OHIO

Executive Offices: Pittsburgh, Pa.



ROEBLING "Blue Center" helps them set the pace!

They start with a cow pasture and in a few hours have it ready for fighter planes taking off to battle . . . with the aid of "swiss cheese" steel strips woven into an all-weather emergency landing field! That's the kind of problem the Corps of Engineers thrive on.

We know, because "Blue Center" goes along on so many of their assignments . . . from tractor cranes to mobile cableways, from river dredges to motorized winches. And whether it's lifting the face of Mother Earth for the Army or passing the ammunition for war plants, you'll find Roebling "Blue Center" Steel Wire Rope on the job wherever the going is tough.

Roebling is learning every day the ways to make "Blue Center" better than ever before. Roebling development engineering, facilities and experience give it the extra stamina to meet unusual as well as routine jobs . . . to give extra service wherever extra service is called for . . . toward Victory.

It's your wartime duty to use wire ropes EFFICIENTLY!

Whatever your big job is, you've got a small but important job to see that wire rope is properly cared for on your *equipment*. To help you, Roebling has assembled a wealth of conservation data on convenient tags that operating men can fasten right on to reels and equipment. It's a simple, handy way to remind and instruct them about such vital precautions as:

1—PROPER INSTALLATION
2—CORRECT SPOOLING
3—PROPER USE OF CLIPS
4—REGULAR LUBRICATION
5—FREQUENT INSPECTION
6—CAREFUL OPERATION

Our nearest office will gladly furnish as many copies of this tag as you need. Ask for Tag "A".

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, NEW JERSEY *Branches and Warehouses in Principal Cities*

"COLD STEEL" *has no place here!*

A forging press or a rolling mill is no place for "cold" steel. The delivering of billets uniformly heated to the right temperature calls for skillful furnace engineering and well-designed burners.

Let Bloom Engineering show you how the proper application of modern burners can produce ideal results. In many cases, greatly improved heating conditions are obtained through relatively simple alterations, and with little or no disturbance to present operations.

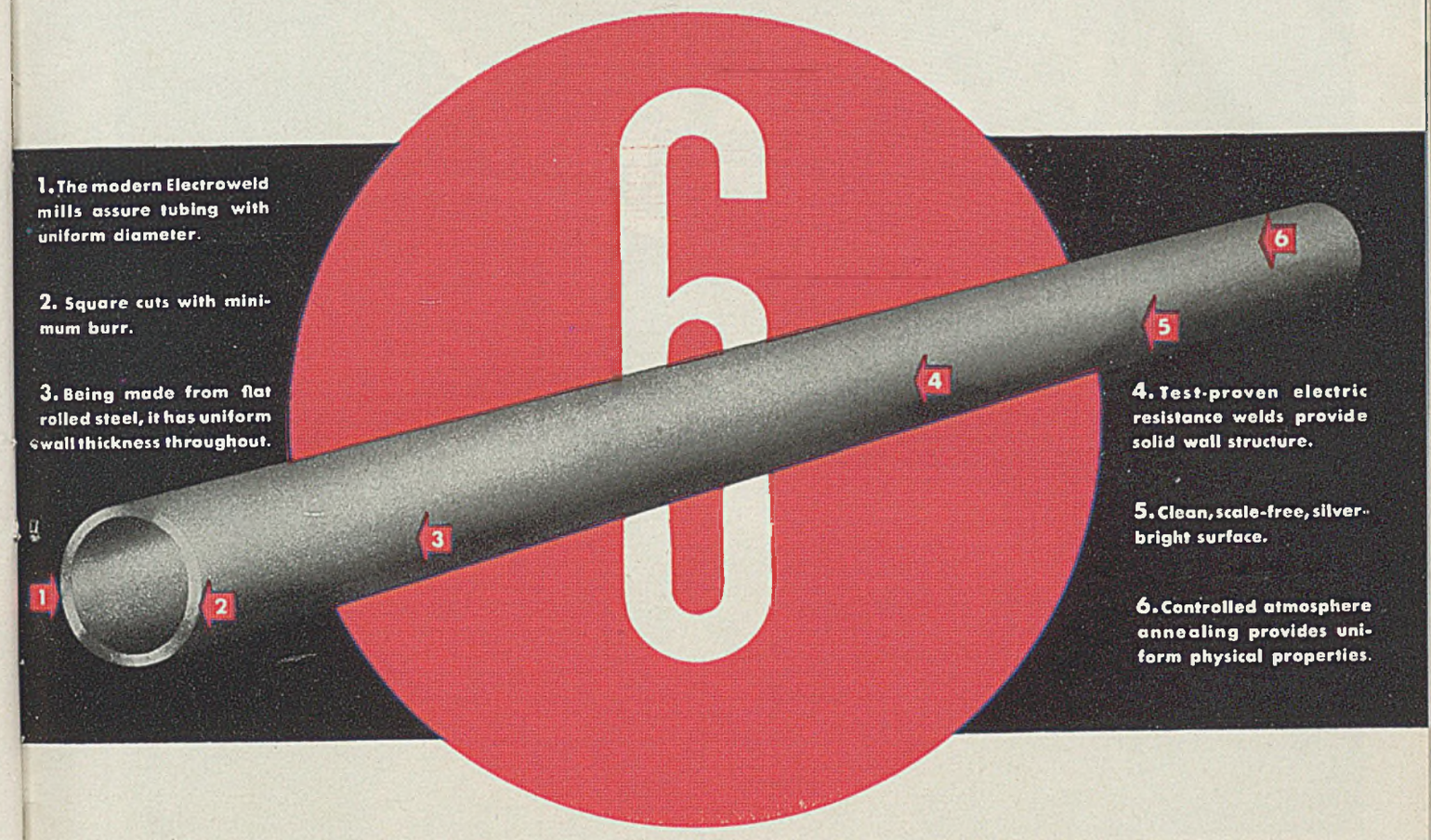
Furthermore, with BLOOM LONG-FLAME BURNERS you can convert INSTANTLY from gas to oil or oil to gas.

To conserve fuel, improve your heating results, reduce costs, call Bloom!

BLOOM ENGINEERING COMPANY

857 WEST NORTH AVENUE · PITTSBURGH, PA.

SIX Electroweld FEATURES TO MEET YOUR RIGID REQUIREMENTS



Electric resistance weld tubing provides economical and dependable results for most pressure and mechanical applications. And since Electroweld Tubing is made on America's most modern electric resistance weld mills, no other make of welded tubing has greater uniformity and dependability. You can be assured of uniform wall thickness, uniform diameter, solid wall structure at the weld, uniform physical properties, and clean, scale-free silver-bright surface as well as a lathe cut with minimum burr. Best of all, Electroweld can maintain this uniform and dependable production to your specifications.

The entire facilities of the Electroweld Steel Corporation are now devoted to the war effort, however, when peace be ours, we would appreciate serving you with our high quality product.

Electroweld

Electroweld STEEL CORPORATION · OIL CITY · PENNA.

Manufacturers of pressure and mechanical steel tubing

Our production effort is on the beam! Bill and his *top flight* welders—Jim and his *first team* machinists—Tom and his *winning* forgers . . . we'll all *keep* our Army-Navy "E" *flying!*

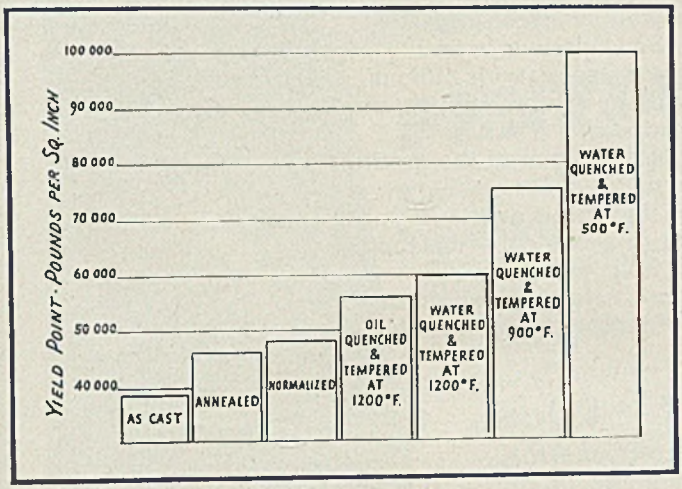
We at Struthers Wells are highly pleased that our collective skills—reflected in our regular peacetime production (Pressure Vessels, Kilns, Rotary Dryers, Mixing Equipment, Heat Exchangers, Evaporators, Crankshafts, Propeller Shafts, Heavy Forgings, Marine Auxiliary Equipment, Heating Boilers, as well as complete fabrication of Alloy and Stainless Steel Equipment)—can now be of *so great value, to so many,* in this world encompassing war.

After Victory is won, every ounce of accumulated knowledge, skill and production of Struthers Wells' large resources now hurled into vital war production, will be even better qualified and ever-alert to serve your peacetime requirements.

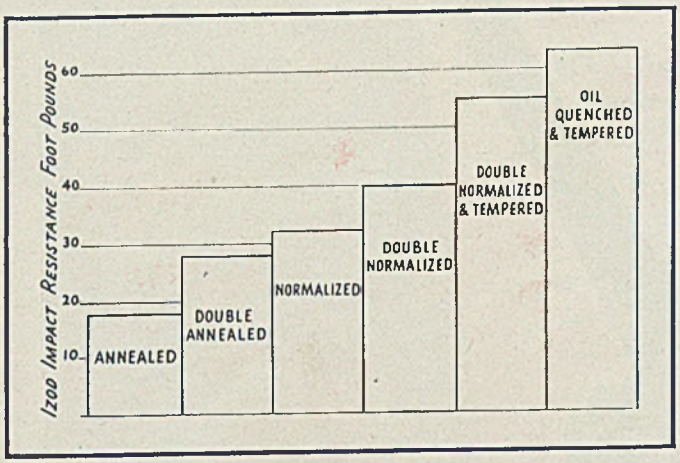
STRUTHERS WELLS CORPORATION

TITUSVILLE, PENNA. AND WARREN, PENNA.

SPECIFY THE MATERIAL THAT FULFILLS ALL OF YOUR REQUIREMENTS ...NO MATTER HOW SEVERE THE CONDITIONS



Showing how the Yield Point of carbon cast steel may be increased by heat-treating.



Showing how Impact Resistance of an alloy cast steel may be increased by heat-treating.

Cast steel is a versatile material.

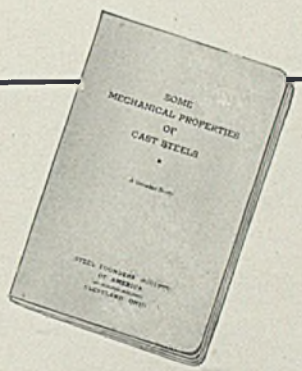
If you must have great strength and toughness, or extreme rigidity, or extra hardness, or resistance to wear, temperature, stresses, or fatigue, you can write your own ticket.

Cast alloy steels are produced with all of these characteristics, in any combination, and their desirable mechanical properties are readily enhanced by heat-treating.

Special alloys may be specified in limited quantities without the delay or extra cost of small mill runs—an important factor in war production.

Complicated shapes may be had in close to final form, yielding big savings in machining, finishing and assembly.

The charts on the left indicate the wide range of properties that may be obtained by heat-treating typical commercial cast steels.



This new booklet gives information on the mechanical properties of cast steel compared with other cast ferrous metals.

Address the Steel Founders' Society, 920 Midland Bldg., Cleveland, Ohio. Enclose 10c postage.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

WHEN THE LAST SHOT IS FIRED...

WHEN the smoke of destruction has cleared, and America returns to peace, what of victory will be ours? What will be left?

Here is one thing: A greater production plant than men even dreamed possible, and the war-learned efficiency to handle that plant under the most drastic circumstances of change-over and production.

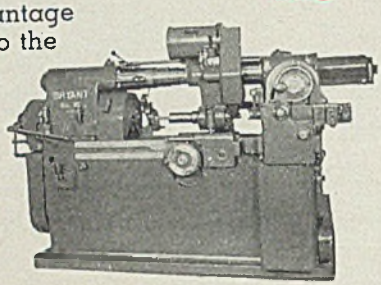
Here is another: New techniques, new skills, new and better and cheaper materials, and more abundant sources of supply than ever before, with a new price structure based upon *full* production by small plants as well as large.

And here is another thing that will be left, when this war is finally over: One of the greatest consumer markets this country has ever seen, with billions in savings from war bonds and restricted buying, needing millions of automobiles, appliances, homes, and the countless new products that will appear.

For the last gun to be fired in this war will be the starting gun of the greatest era of peacetime advancement this world has ever known.

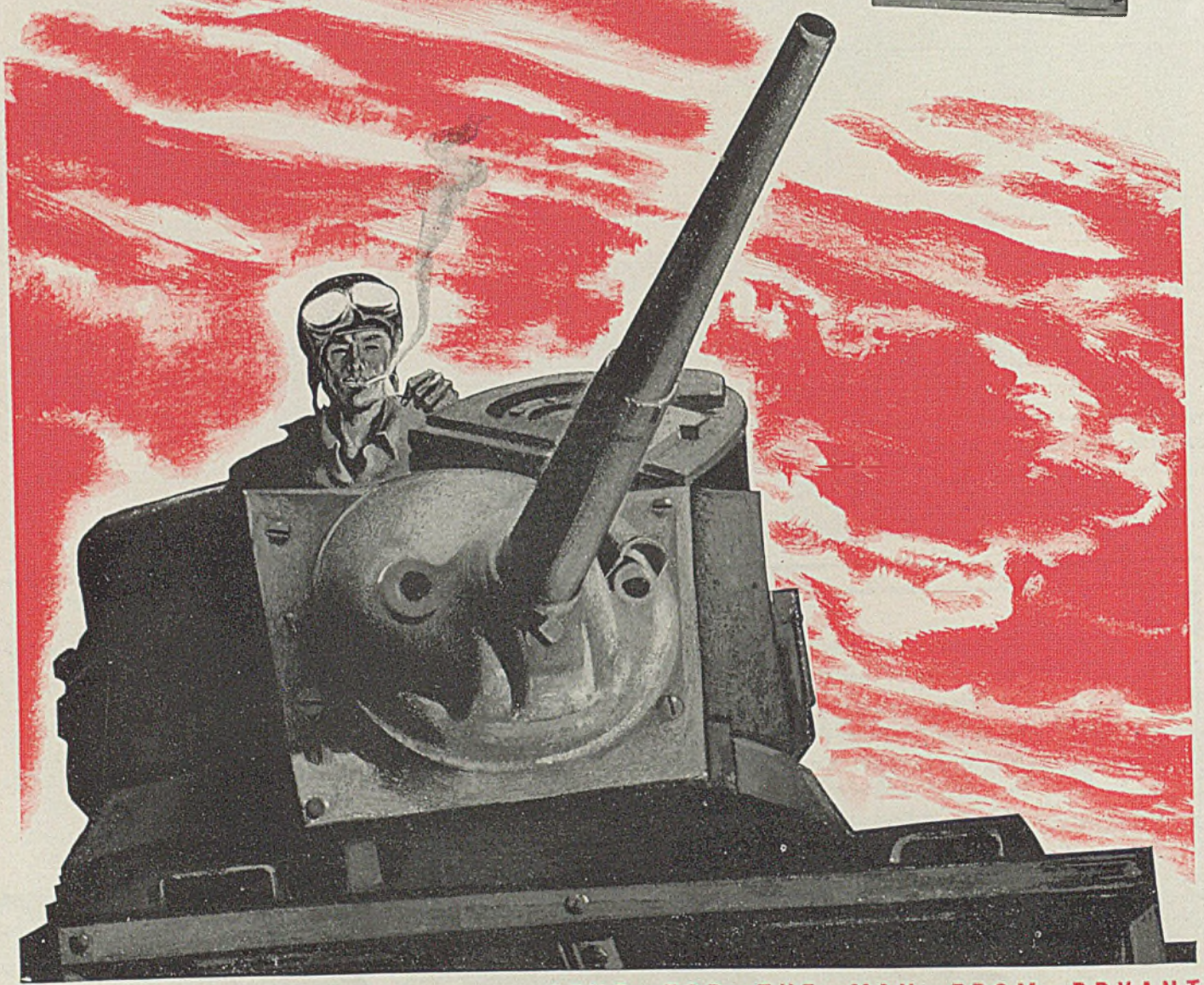
If you are to share in the future of the new world, after this war is over — if you are to successfully compete for the new peacetime markets of America — the time to start production planning is *now* . . . and in this we can help you:

Write to Bryant! Send us your internal grinding problems, and take advantage of the work that our engineers can do *now* to convert your plant and its tools to the profitable job that lies ahead!

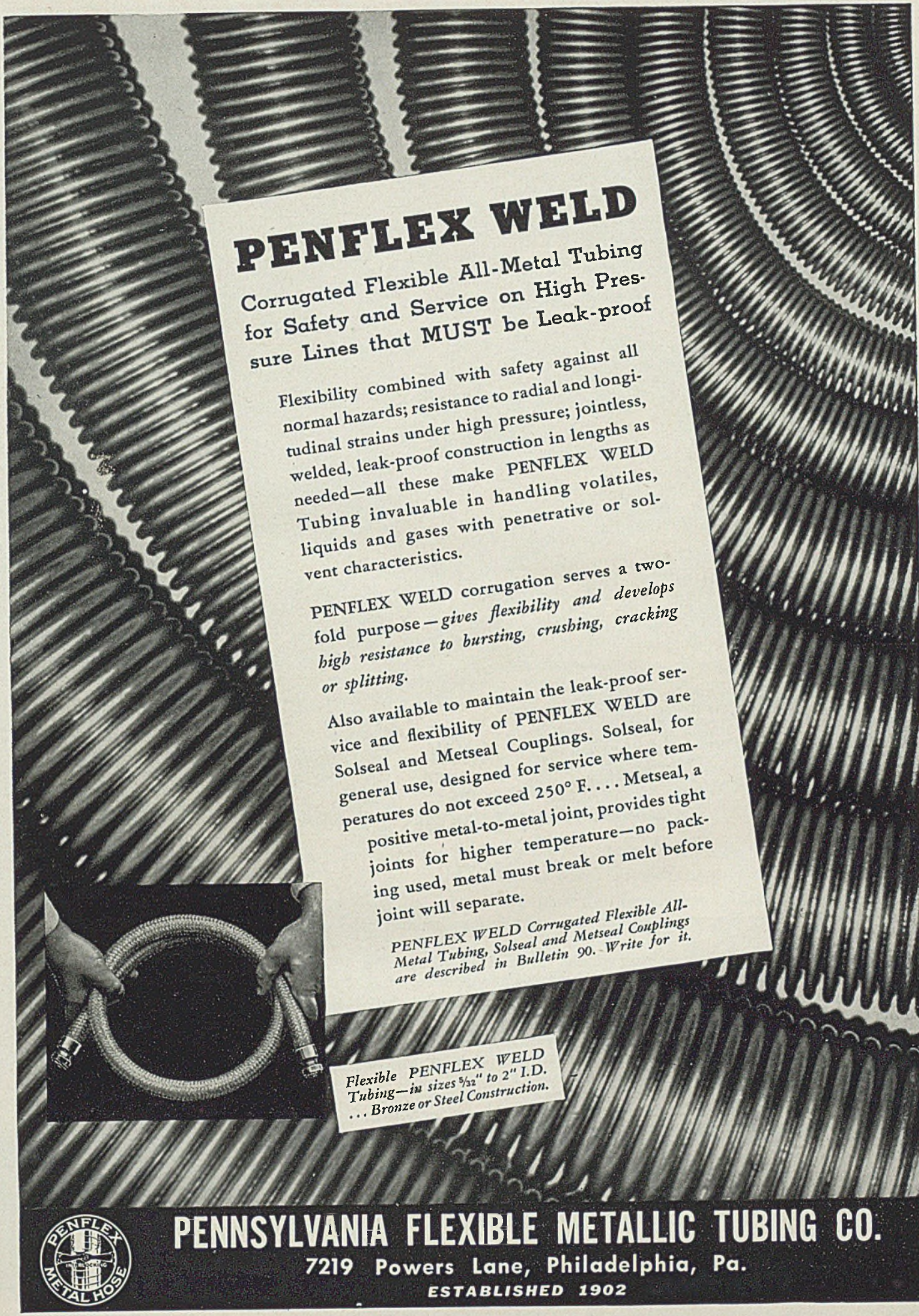


BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U.S.A.



SEND FOR THE MAN FROM BRYANT


PENFLEX WELD
Corrugated Flexible All-Metal Tubing for Safety and Service on High Pressure Lines that MUST be Leak-proof
Flexibility combined with safety against all normal hazards; resistance to radial and longitudinal strains under high pressure; jointless, welded, leak-proof construction in lengths as needed—all these make PENFLEX WELD Tubing invaluable in handling volatiles, liquids and gases with penetrative or solvent characteristics.
PENFLEX WELD corrugation serves a two-fold purpose—*gives flexibility and develops high resistance to bursting, crushing, cracking or splitting.*
Also available to maintain the leak-proof service and flexibility of PENFLEX WELD are Solseal and Metseal Couplings. Solseal, for general use, designed for service where temperatures do not exceed 250° F. . . . Metseal, a positive metal-to-metal joint, provides tight joints for higher temperature—no packing used, metal must break or melt before joint will separate.
PENFLEX WELD Corrugated Flexible All-Metal Tubing, Solseal and Metseal Couplings are described in Bulletin 90. Write for it.
Flexible PENFLEX WELD Tubing—in sizes 5/32" to 2" I.D. . . . Bronze or Steel Construction.
PENFLEX METAL HOSE
PENNSYLVANIA FLEXIBLE METALLIC TUBING CO.
7219 Powers Lane, Philadelphia, Pa.
ESTABLISHED 1902

McKAY ELECTRODES SPEED PRODUCTION IN EVERY WAR INDUSTRY

War and *necessity* are one . . . and necessity is the "mother of invention."

When war demanded new conceptions of production, *revolutionary applications of welding* were "invented" to meet the need.

In no small measure McKAY Shielded-Arc Electrodes contribute to the total accomplishment.

For it is only natural that a manufacturing policy, which merited the title "the researched line," should likewise rise to meet the requirements of this emergency. Thus new analyses, new coatings, new sizes, new ranges of adaptability . . . plus ever growing volume . . . have caused McKAY Electrodes to help speed production in every type of war industry.

THE McKAY COMPANY · PITTSBURGH, PA.

PACIFIC COAST SALES OFFICES: 125 S. Santa Fe Ave., Los Angeles · 100 Howard St., San Francisco

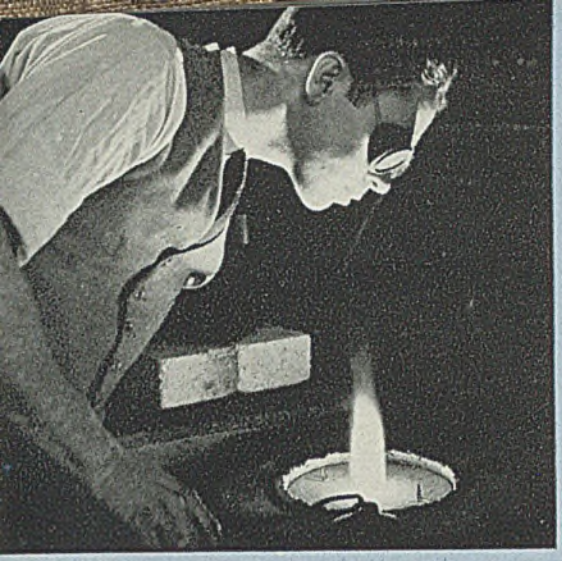
The McKay line includes regular carbon steel, stainless, and alloy steel electrodes for every welding purpose. Literature on request.

Among the first honored with the Navy "E", The McKay Company is proud of the broader award of the Army-Navy "E".

McKAY WELDING ELECTRODES

AND INDUSTRIAL, MARINE AND AUTOMOTIVE CHAINS

"KEEP ON BUYING U. S. WAR BONDS"



LOOKING *into the Future* NOW

If the history of metals in this war is ever written in full, the contribution of laboratory technicians will be revealed.

Most of the alloys now in use were first melted in a small AJAX-NORTHRUP furnace. The fast melts, perfect control, ability to vary or duplicate and the comfortable working conditions are known to most of the university and industrial metallurgical laboratories in the country.

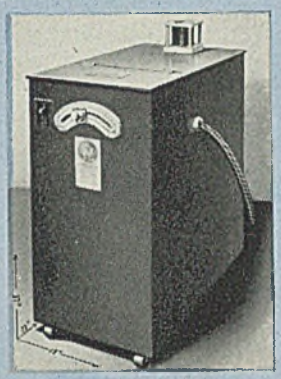
But as these men now work to solve war problems they get glimpses of the future too. The tremendous increase in the use of high frequency for testing, pilot plants, large scale melting, heating and brazing, are like handwriting on the wall.

They see the vision of duplicating laboratory discoveries in future quantity peace time production with a certainty as to results, timing and cost.

Only a few of the smaller AJAX-NORTHRUP furnaces are shown on this page.

AJAX furnaces range from 1 oz. to 8 tons and from 60 to 1,000,000 cycles. Oscillators, tube converters, and motor generators provide the power. AJAX also provides the experience that has successfully solved hundreds of unusual problems from brazing fuse-seat liners to hardening razor blades or melting special alloys at the rate of 44 tons in 24 hours.

Catalogs on heating, melting, or laboratory units will be sent on request.



3 to 6 Kw.
Converter with 3P4 Furnace and Truck

20 to 40 Kw.
Converter with 17 pound Furnace

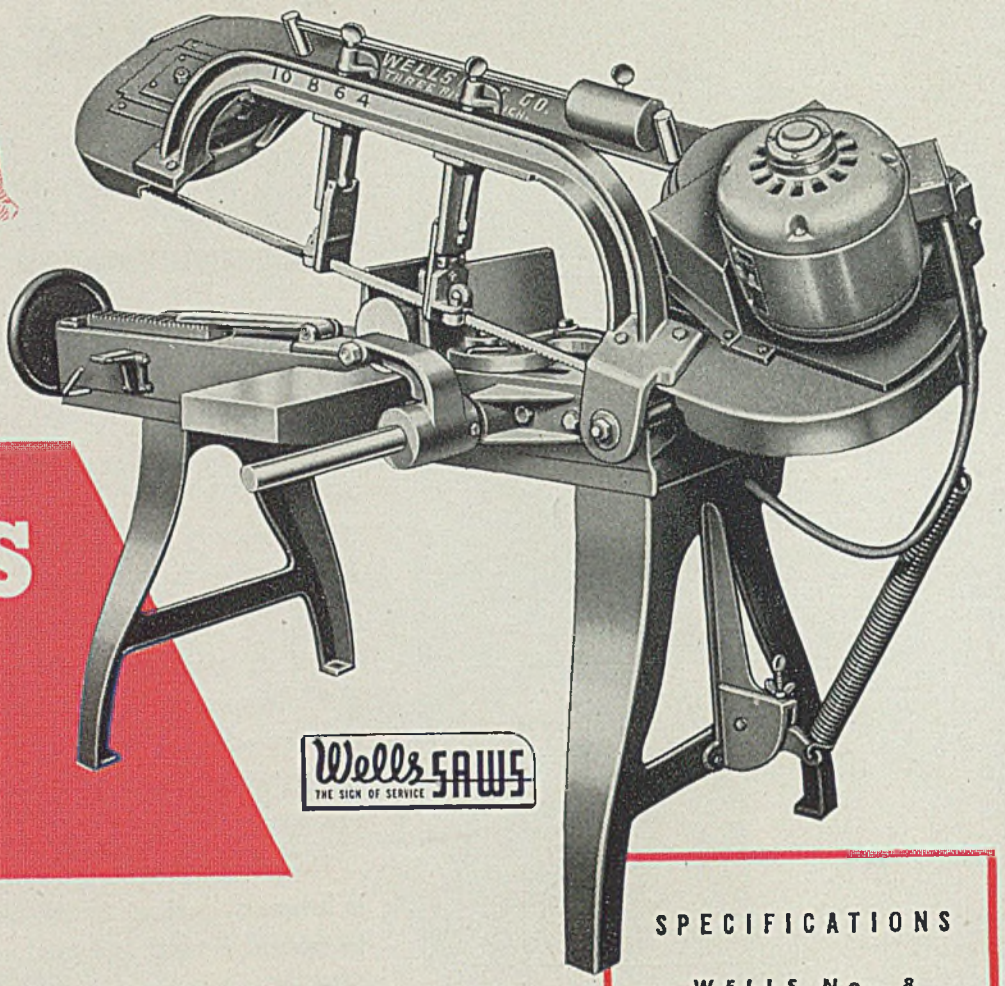
15 to 60 Kw.
Tube Converter

AJAX HIGH FREQUENCY FURNACES

NORTHRUP AJAX ELECTROTHERMIC CORPORATION, AJAX PARK, TRENTON, N.J.

ASSOCIATE COMPANIES: THE AJAX METAL CO. *Non-Ferrous Ingot Metal for foundry use.*
AJAX ELECTRIC FURNACE CORPORATION. *Ajax-Wyatt Induction Furnaces for melting.*
AJAX ELECTRIC CO., Inc. *Ajax-Hultgren Salt Bath Furnace and Resistance Type Electric Furnaces.*

WARTIME, PEACETIME—KEEP 'EM CUTTING *The Wells Way!*



WELLS No. 8

THE SAW WITH THOUSANDS OF FRIENDS IN INDUSTRY!

A fast and accurate metal cut-off saw able to handle most all types of metals in various shapes and forms as applied to industry. It wanted a versatile, simple unit for odd jobs or production work. The Wells No. 8 was the answer — and that is why so many plants, large and small, have Wells Saws.

Today's war production program and tomorrow's peace-time competition will emphasize the advantages Wells Engineers have built into their products. If you have metal cutting problems look for the answer in a Wells. Call your distributor or write direct.

Wells Has Established Leadership

SPECIFICATIONS

WELLS No. 8

Capacity: Rectangle.....8" x 16"
(spec. bowed guides)... 5" x 24"
Rounds .....8" dia.
Speeds: ft. per min. 60, 90, 130
Motor.....Specifications optional

WELLS No. 5

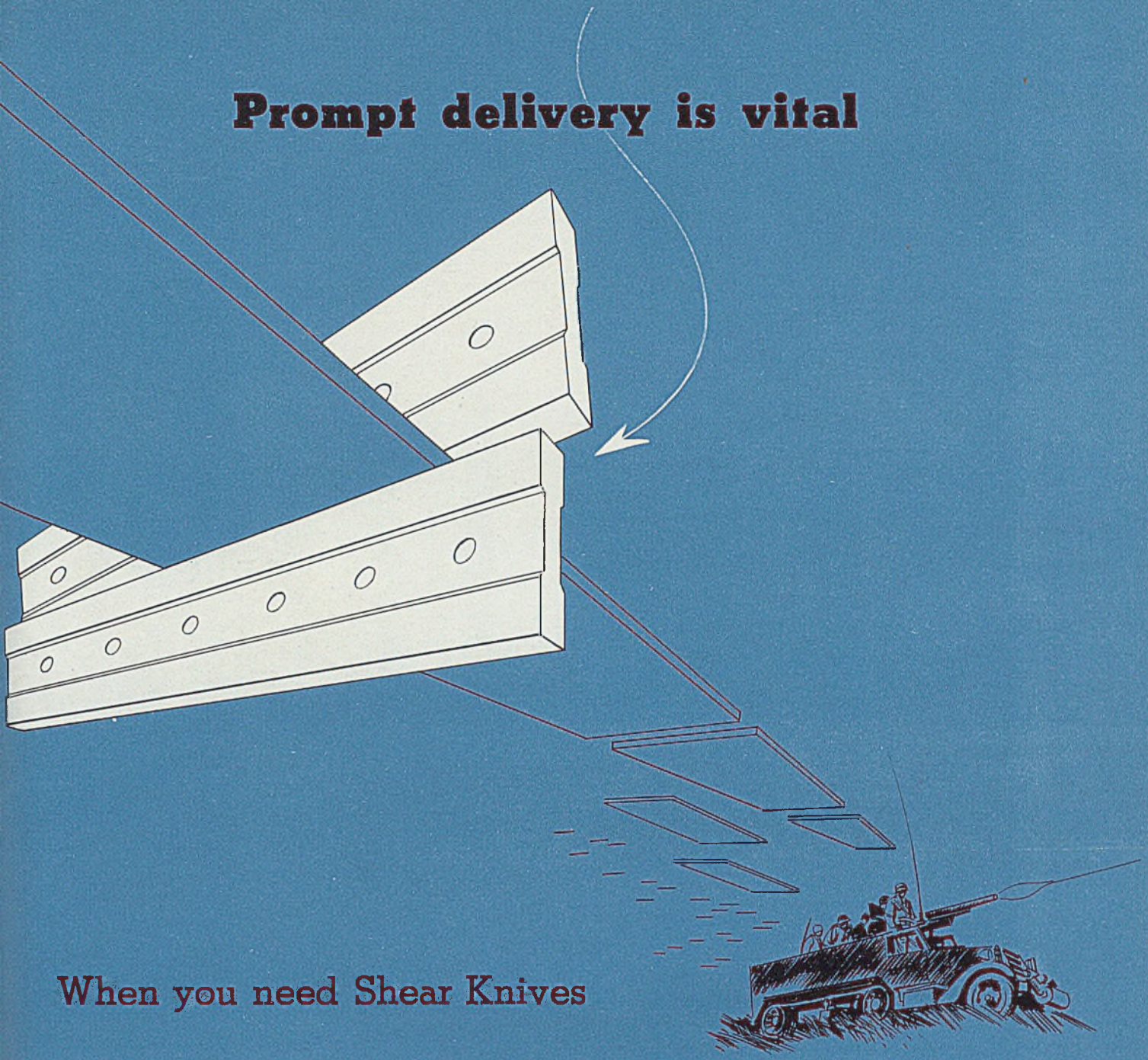
Capacity: Rectangle... 5" x 10"
(spec bowed guides)
Rounds .....5" dia.
Speeds: ft. per min. 60, 90, 130
Motor: .... Specifications optional

WELLS MANUFACTURING CORPORATION

Wells METAL CUTTING BAND SAWS

1515 FILLMORE STREET • THREE RIVERS, MICHIGAN

Prompt delivery is vital



When you need Shear Knives

for a war job

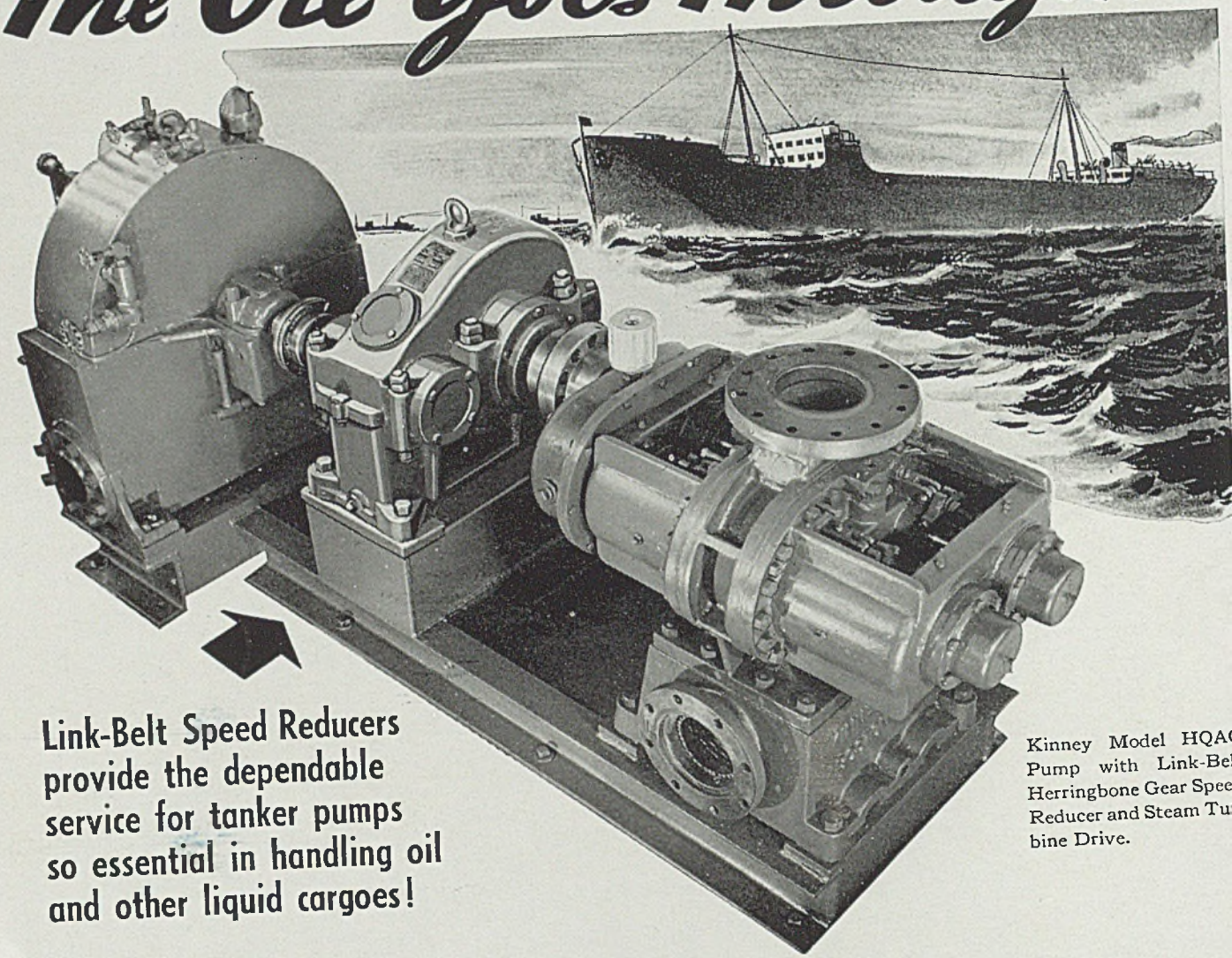
Because we make our own E.I.S. alloy steel and have greatly expanded facilities, you can be sure of prompt delivery at a lower rating when you specify Heppenstall Shear Knives. You can be sure of precise manufacture, too . . . their production is controlled by advanced methods, modern equipment, and the skill of many years of experience. *Order Heppenstall Knives, and when you do let us know the shearing job for which they are intended. Let our engineers help specify the proper knife. It's usually false economy to use a knife to cut a thickness or a steel for which it was not designed.*

Heppenstall

PITTSBURGH • DETROIT • BRIDGEPORT
EDDYSTONE

Forging Fine Steels for Fifty-Three Years

The Oil Goes Through!



Link-Belt Speed Reducers provide the dependable service for tanker pumps so essential in handling oil and other liquid cargoes!

Kinney Model HQAC Pump with Link-Belt Herringbone Gear Speed Reducer and Steam Turbine Drive.

Tankers and oil-fueled ships, a most important part of our shipping today, depend heavily on their pumping equipment. Important to pumping efficiency are positive drives such as the Link-Belt herringbone reducer, as used on Kinney Manufacturing Co.'s model HQAC pump, shown here, driven by a Whiton turbine. How important this pump builder considers the speed reducer can be told in their own words: "Independent herringbone speed reducers have important advantages, as they offer a wider selection of speeds and horsepowers; are manufactured by specialists in gear design and construction; and since they are independent both reducer and pump are more easily accessible for inspection and repair. In general, sound engineering suggests purchase of speed reducer with pump for compact mounting."

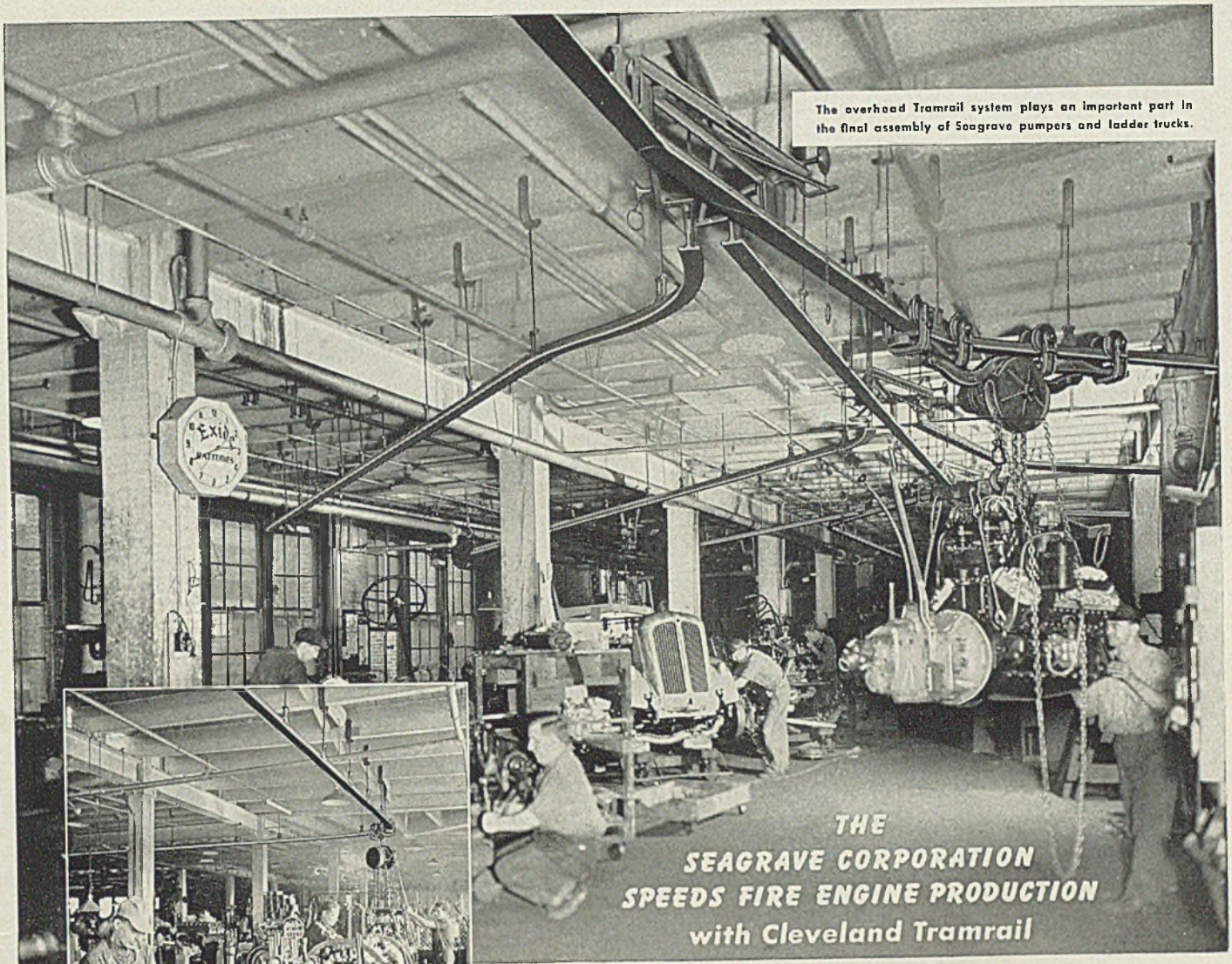
Link-Belt herringbone gear speed reducers with anti-friction bearings, pinions integral with shafts, continuous herringbone gears totally enclosed in rigid housings, are especially suited for heavy duty shock load and where single, double or triple reduction is required in limited space.

9008-A

LINK-BELT COMPANY

Indianapolis, Chicago, Philadelphia, Atlanta, Dallas, San Francisco, Pittsburgh, Cleveland, Detroit, Toronto
Offices, Warehouses and Distributors in Principal Cities

LINK-BELT SPEED REDUCERS



The overhead Tramrail system plays an important part in the final assembly of Seagrave pumpers and ladder trucks.

Parts are fed to this assembly line and the completed 12-cylinder motors are hauled away by the overhead Tramrail route. The hoist is two tons capacity.

THE SEAGRAVE CORPORATION SPEEDS FIRE ENGINE PRODUCTION with Cleveland Tramrail

In the 60 years that have ensued since The Seagrave Corporation, Columbus, Ohio, first began making horse-drawn fire-fighting equipment, hundreds of improvements have been made and many radical changes brought about. In appearance, in performance, in fire-fighting capability, there is no resemblance between their present modern apparatus and that of the early days.

Likewise have their manufacturing methods been changed to keep up with the times. Their shops are equipped with the finest tools to do exacting work quickly. Cleveland Tramrail is provided throughout the plant to speed materials handling, make heavy lifts, facilitate assembling, fitting and setting-up.

Materials handling methods like fire engines have also gone through a great development period, and this development is still continuing at a rapid pace. Cleveland Tramrail is continually working on new methods and advancing ideas for handling materials faster, safer, easier and at lower cost.

GET THIS BOOK!

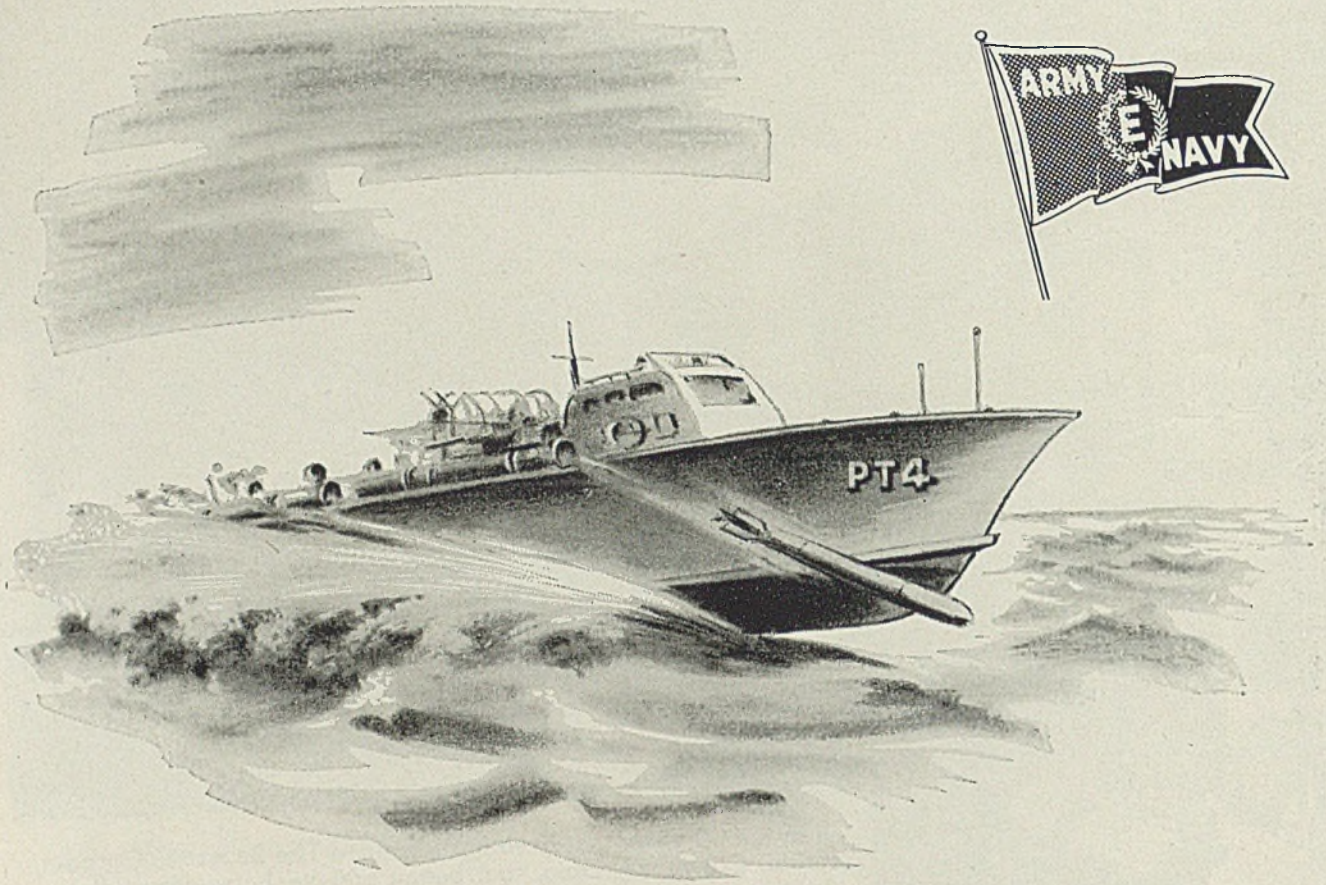
BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
1125 EAST 283RD ST. WICKLIFFE, OHIO.

CLEVELAND TRAMRAIL

OVERHEAD MATERIALS HANDLING EQUIPMENT

Hell-bent-for-election



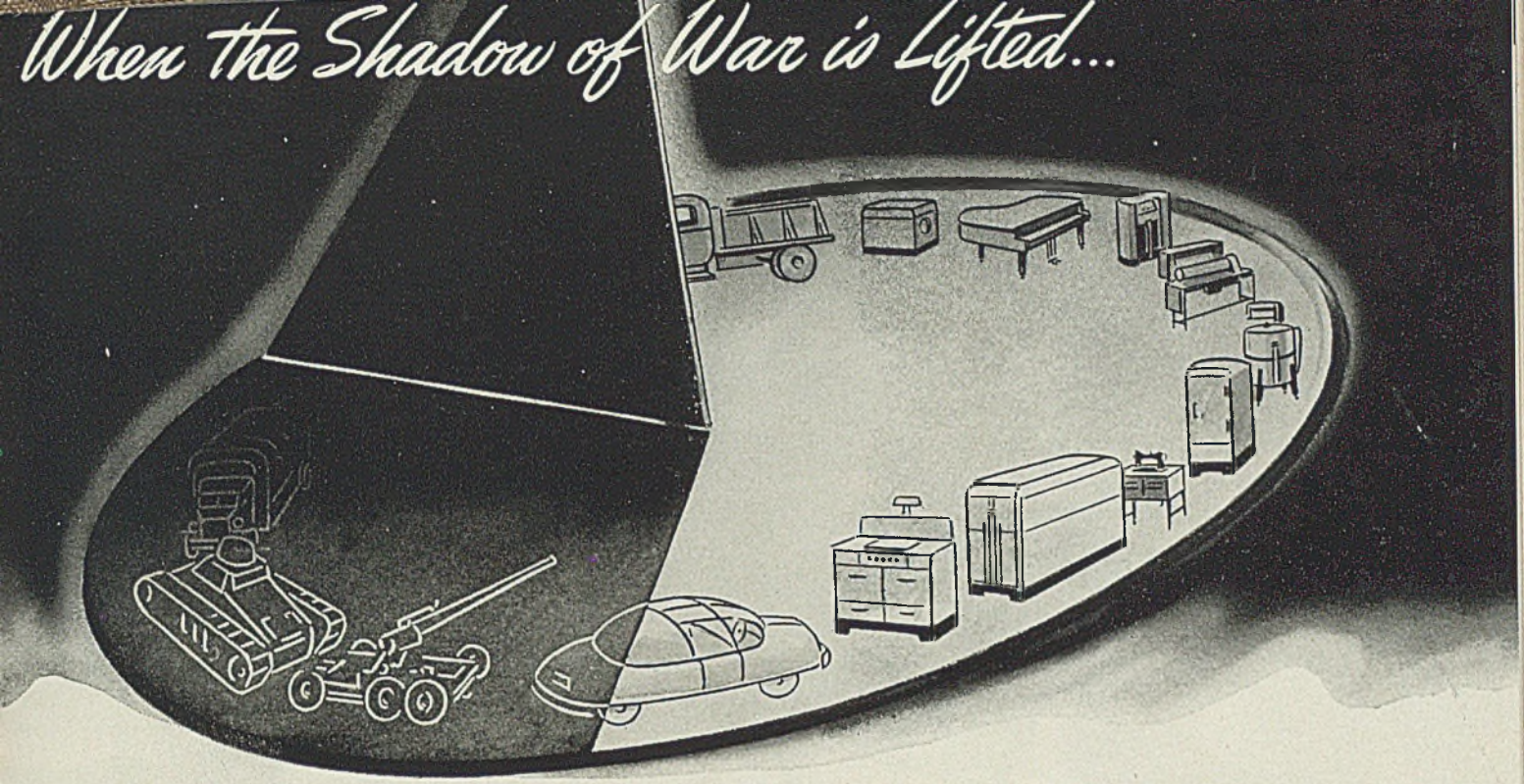
THESE flying water-scats were designed almost beyond the power of men to control. As it is, the men must be heavily padded, lashed to their positions, to take the pounding of terrific speeds in rough weather.

Every part of these mosquito boats from gun to galley has been specified and manufactured to withstand the hard use that make the boats a powerful weapon of attack.

For rugged service in the heavy duty machines of war—and for delicate duty in the sensitive instruments of science go Barnes-made springs in endless streams from mass production lines, controlled by the engineering skill of veteran springmakers.

Wallace Barnes Company
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT, U. S. A.

Barnes-made Springs *for Victory*

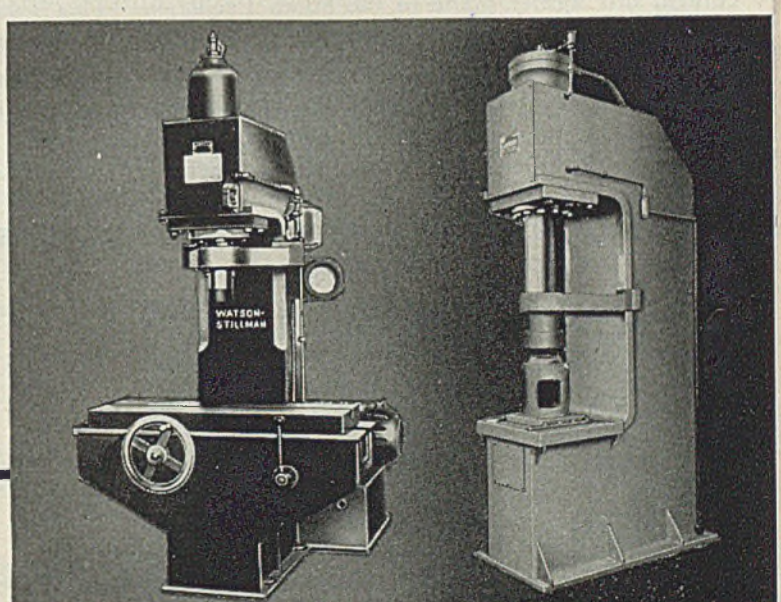


War Busy Presses will do NEW JOBS HYDRAULICALLY

Some day victory will bring the "cease-firing" order. But it needn't mean "cease-producing" for industries now doing war jobs hydraulically with Watson-Stillman presses. These machines will be adaptable to post-war metal-working operations, and in effecting a rapid, efficient change-over, W-S engineers will be available for special advice.

Their services will put at your disposal hydraulic experience which dates from the eighteen forties. Their suggestions will draw on original research now being carried on. These Watson-Stillman research activities are being expanded in enlarged facilities already under construction.

Watson-Stillman has the modern automatic machinery and the engineering personnel to give practical assistance in planning to meet future requirements. In the post-victory years, the pooled experience of its entire organization can help industry to anticipate its needs correctly. It is not too early now to consult a W-S engineer. The Watson-Stillman Co., Roselle, New Jersey.



To lift war's shadow more quickly Buy

U.S. WAR BONDS

WATSON-STILLMAN

Engineers and Manufacturers of Hydraulic Machinery and Equipment— Hydraulic Presses, Pumps and Jacks, Forged Steel Valves and Fittings

SAVED BY 1/10 OF A HAIR'S BREADTH!

But for a vital replacement part accurately machined, this fighter plane in the South Pacific might be grounded—useless in defending against enemy attacks.

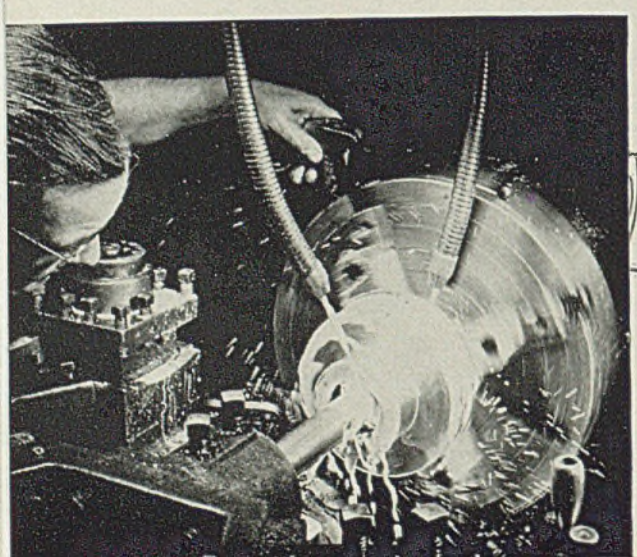
Here is where precision counts! Mass production, with interchangeable parts turned to extremely close limits of accuracy, insures quick replacement and efficient performance.

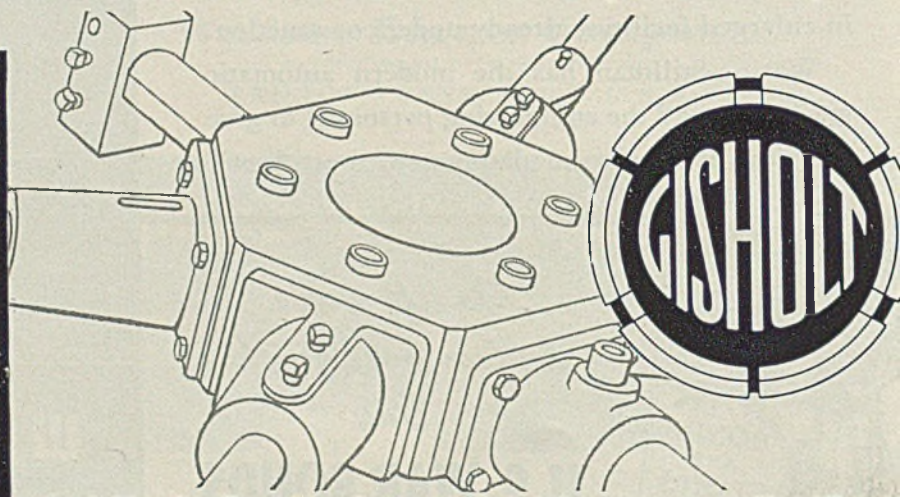
This is the kind of work which Gisholt Turret Lathes are doing every day—in thousands of machine shops throughout the United Nations—to help supply Allied forces with the equipment they need . . .

And to keep it running!

The Army-Navy "E" and the Treasury Flag fly side by side at Gisholt

GISHOLT MACHINE COMPANY, 1217 EAST WASHINGTON AVENUE, MADISON, WIS





Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turnin

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINE

ARMY-NAVY "E"
PRODUCTION AWARD
★ ★ PRESENTED ★ ★
TO THE D.O.JAMES
MANUFACTURING CO.
February 27, 1943

IN APPRECIATION . . . It is very gratifying to publicly acknowledge our appreciation of receiving the Army-Navy "E" Production Award . . . this ensign and lapel insignia is a testimonial to the mutuality of the cooperation with . . . and the understanding of . . . our employees and management. This cooperative understanding has been productive of successful attainments that have resulted in a schedule maintenance and a quality to our products that make us proud in knowing that after 55 years of making all types of gears and gear reducers that we have again been given the opportunity of serving our country. Lastly . . . may we express extreme appreciation of the combined efforts of our employees, our suppliers, our executive control and management . . . and we solemnly pledge to do all possible to maintain and perpetuate this record of successful achievement during and after this emergency.

POWER SAVING PRODUCTS

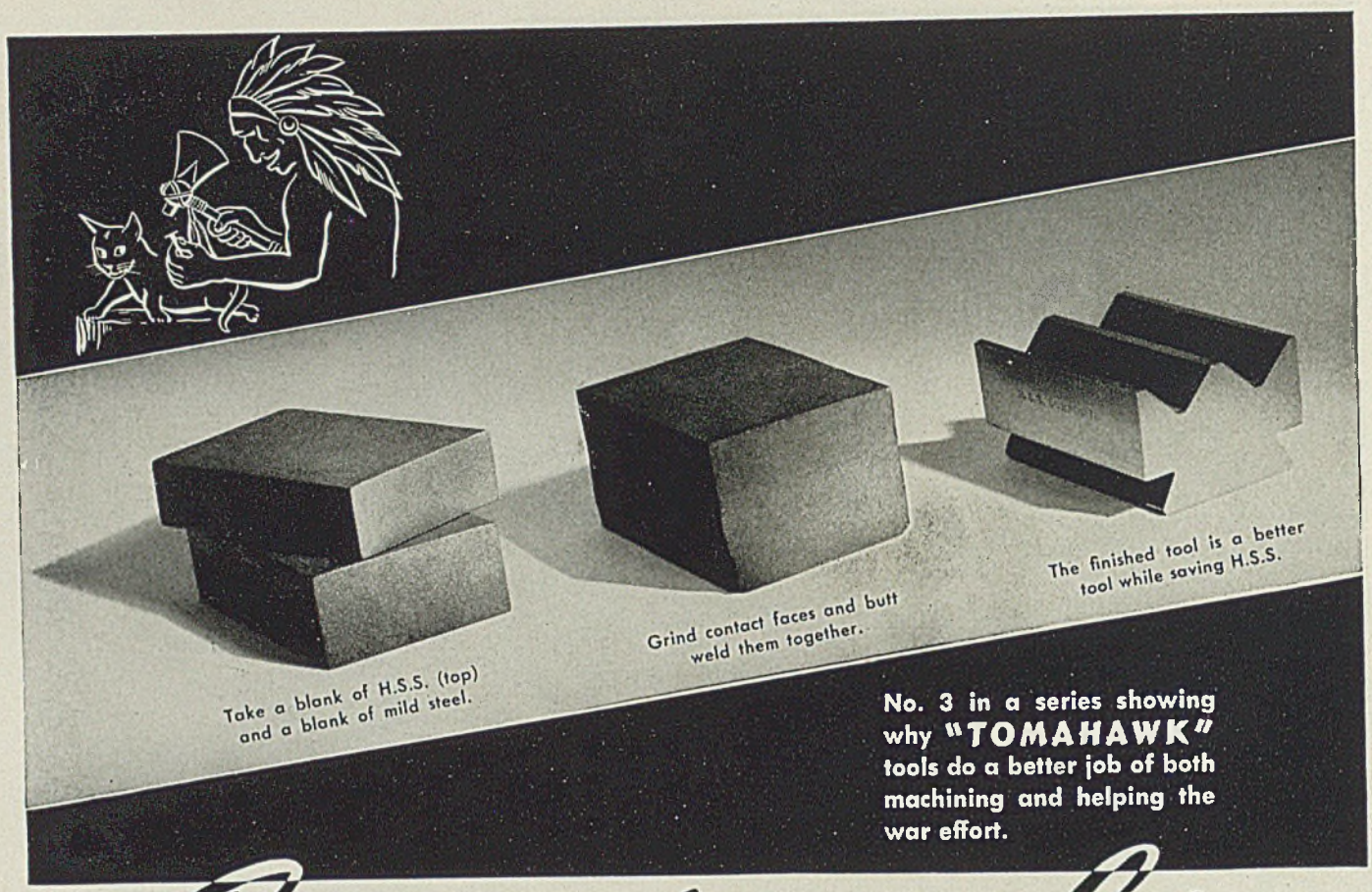
Planetary Spur Gear, Medium and Heavy Duty Worm Gear, Generated Continuous-Tooth Herringbone Gear and Motorized Speed Reducers, in types to drive up, down, horizontally or at an angle, Cut Spur, Straight and Spiral Bevel, Mitre, Spiral, Worm, Internal, Helical and Herringbone Gears in all sizes and of all materials, Sprocket Wheels, Racks, Flexible and Universal Couplings.

D.O.James MANUFACTURING CO.

ESTABLISHED
1888

1140 W. MONROE STREET CHICAGO

Over 55 Years Making All Types of Gears and Gear Reducers



Putting skin on a Cat ----- or on a Tool -----

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete **TOMAHAWK** tool type★ shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The **TOMAHAWK** tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel **TOMAHAWK** tools are now in use in war production industries.

★Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc.
Send for "streamlined" catalog No. GT-42-S

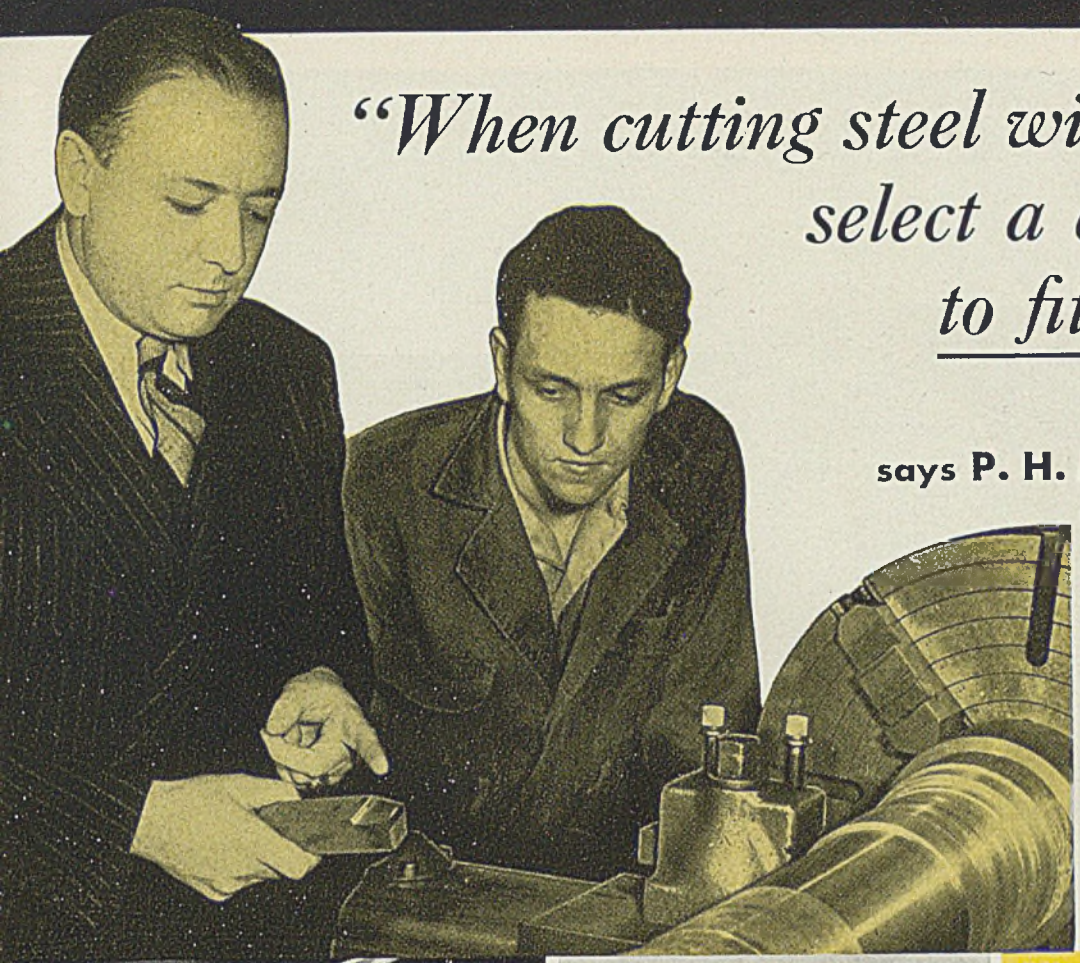
GENESEE TOOL COMPANY

FENTON, MICHIGAN

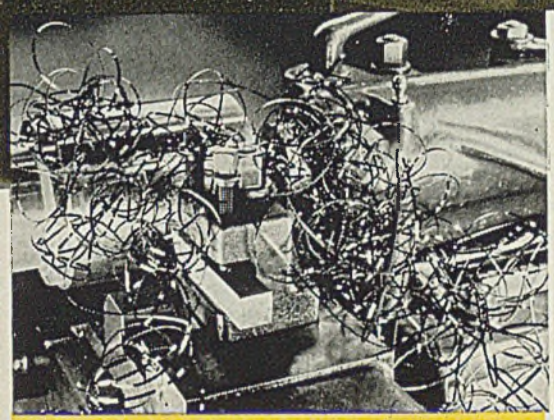
★ Registered Trade Mark

"When cutting steel with carbides... select a chip breaker to fit the job!"

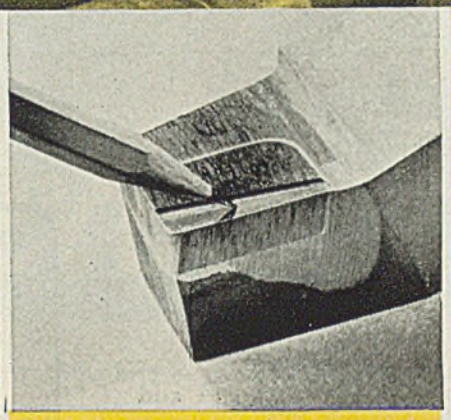
says **P. H. MILLER, Chief Engineer**
Carboloy Company, Inc.
Detroit, Michigan



BECAUSE OF its high tensile strength, steel normally produces a continuous chip during machining operations. These chips are awkward to handle even at the slower cutting speeds of high-speed steel tools and present a real problem in safe economical disposal at the high speeds common with cemented carbide tools. To get maximum results, chips must be controlled by the use of a suitable chip breaker.



"THERE'S NO TIME for making 'hay' on steel cutting jobs today! Chips like these are a hazard to the operator, slow down production and often mar the finish of the work. They are easy to eliminate with the right type of chip breaker."



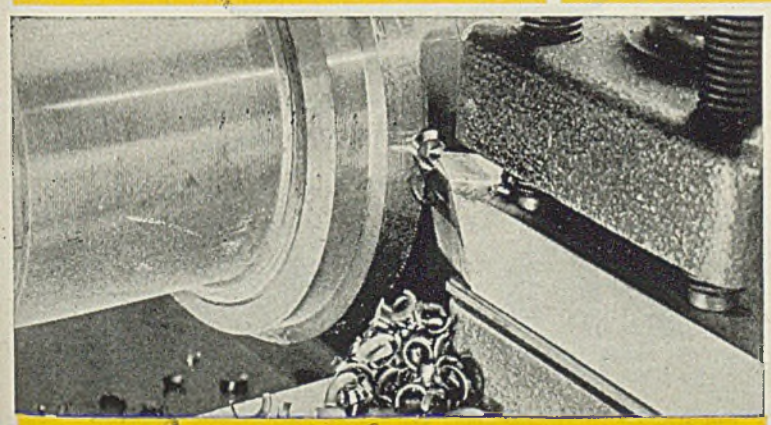
"THE GROUND-IN STEP CHIP BREAKER is the most widely used type. Recommended for practically all steel cutting jobs, this chip breaker can be adjusted to meet individual conditions, in most cases, simply by varying the width."

RECOMMENDED WIDTH OF CHIP BREAKER (W)

Depth of Cut Inches	FEED In. Per Rev. .008-.012	.013-.017	.018-.022	.023-.027	.028-.032
1/64 - 3/64	1/16	5/64	3/32	7/64	1/8
1/16 - 1/4	3/32	1/8	5/32	11/64	3/16
5/16 - 1/2	1/8	5/32	3/16	13/64	7/32
9/16 - 3/4	5/32	3/16	7/32	15/64	1/4

NOTE: A chip breaker depth of .020 is satisfactory for most types of steel.

"THIS TABLE is a general guide to proper widths for ground-in step chip breakers. They represent starting points from which adjustments can be made to produce the most satisfactory chip, as determined by the breaking characteristics of the steel being cut."



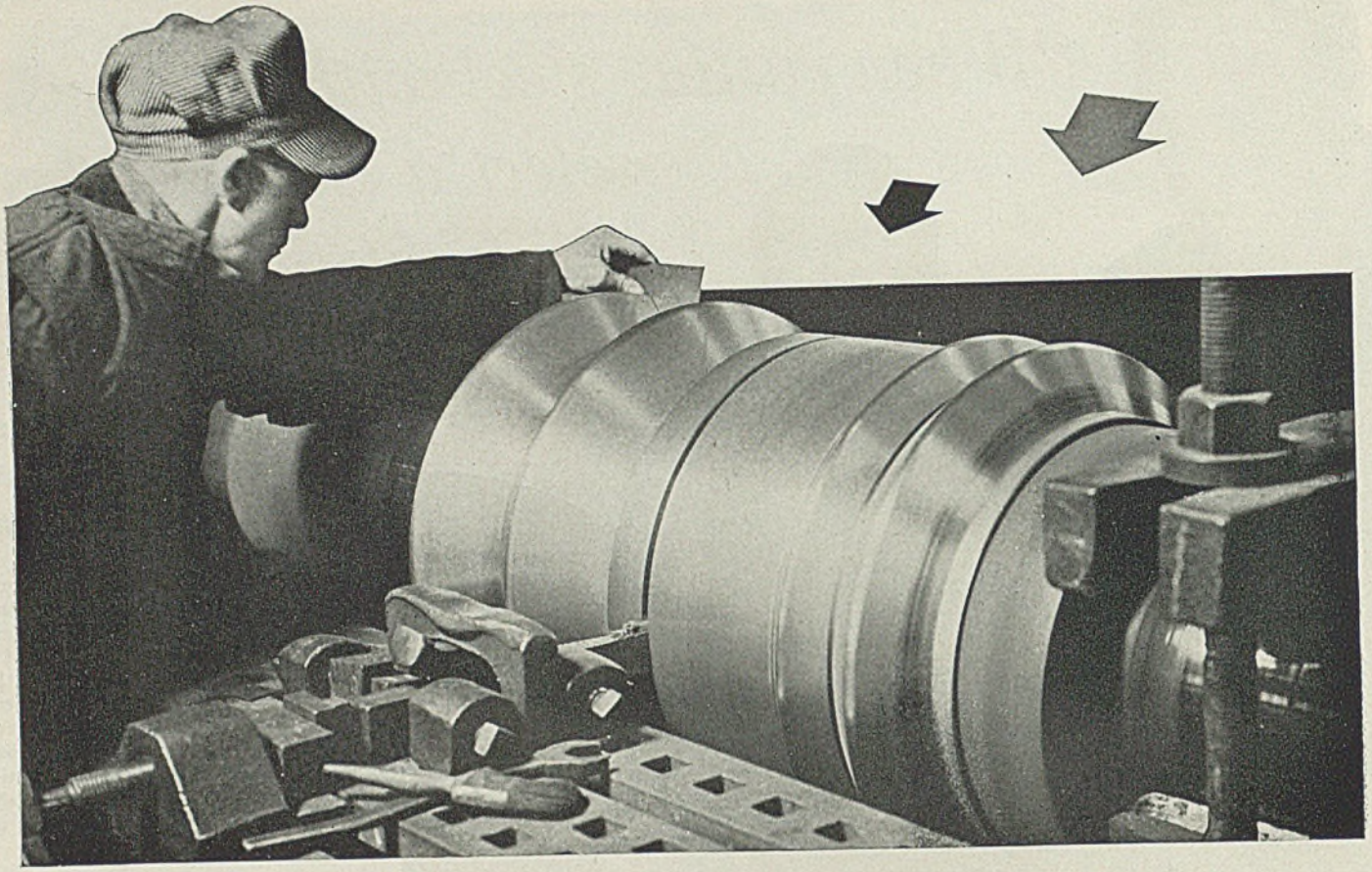
"AS THE ABOVE PHOTOGRAPH SHOWS, when the chip breaker is right, you get a chip easy to handle and easy on the tool. There are no dangerous spirals of steel 'hay' to injure the operator. When the chip breaker selected fits the job, chips peel off work uniformly and safely."

The selection of a proper cutting oil is as important as the selection of the right chip breaker. That's why Shell has developed a control technique that "balances" the oil to the machine, the application and the tool. Call in the Shell man now for details.

SHELL

SHELL LATA OILS

FOR METAL WORKING



made to meet your needs

• Every Birdsboro "Special" Roll is individually engineered to meet the exact needs of the user. No hit or miss methods.

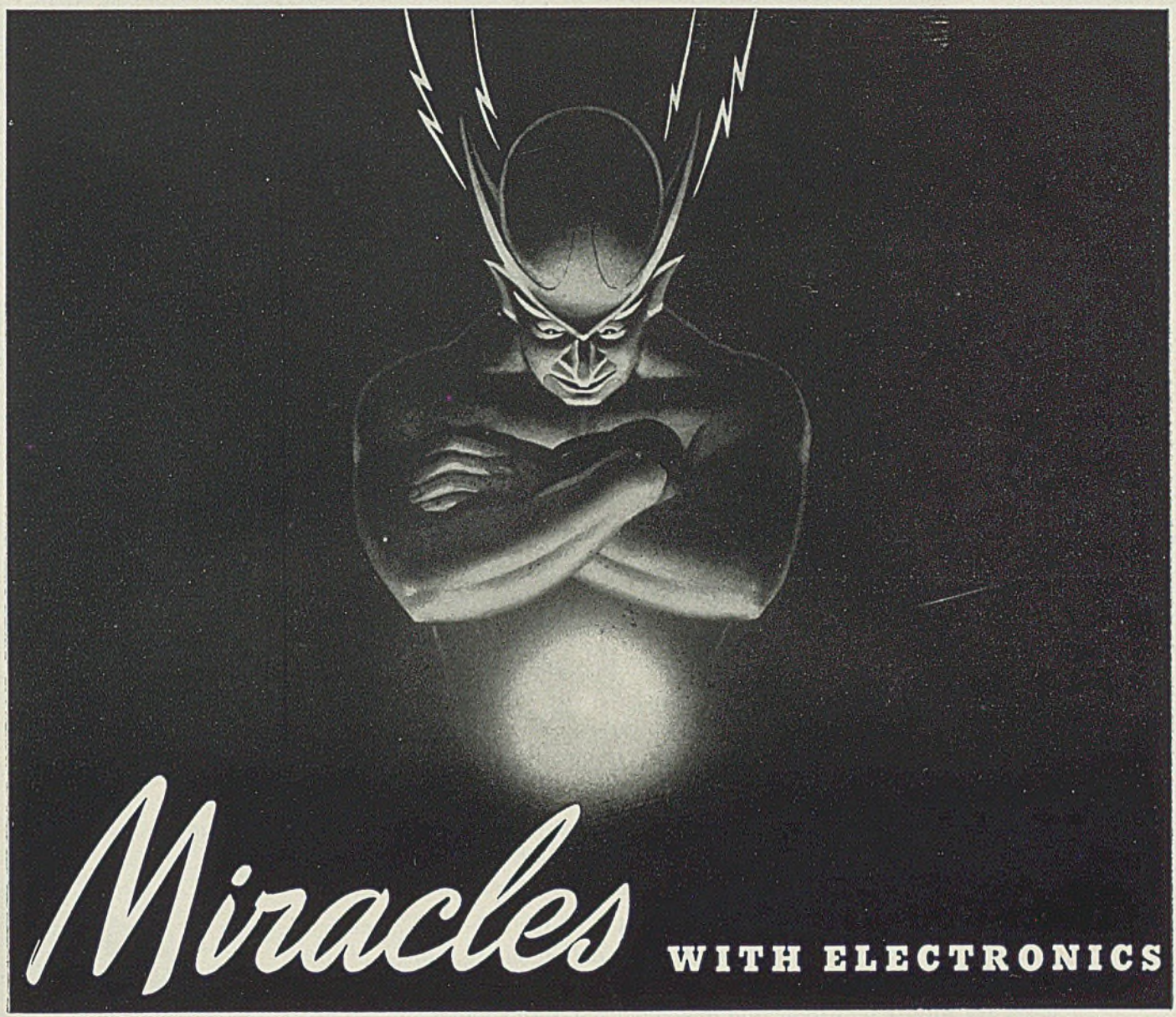
Your roll requirements are carefully analyzed and your Birdsboro Roll is made *specially* for you — to assure you longer roll life, greater tonnage and more rolling accuracy. If yours is a roll problem, it will pay you to consult Birdsboro.

For blooming mills, billet mills, structural mills, bar mills, rolling mild, structural, shell, gun barrel, seamless tube and special alloy steels. Also for 4-high strip mill back-up rolls and 3-high sheet rolls.

BIRDSBORO STEEL FOUNDRY & MACHINE CO. • BIRDSBORO, PA.

BIRDSBORO

ROLLS



ELECTRONICS bids fair to revolutionize our every day living after the war.

When Brown and Minneapolis-Honeywell placed experience and manufacturing resources at the call of our government, the result of several years of research in Electronics was immediately applied to instruments — for Testing airplanes in flight — for Controlling production of high octane gasoline — for Treatment of special alloy steels for tanks, guns and armor plate — for Manufacture of synthetic rubber — and for many other purposes entering directly into the war effort.

Extending this peacetime experience to the technique of war, will bear fruit when Peace comes again, in startling new developments in the Electronic control of industrial processes — busily engaged in peacetime production.

Instruments by **BROWN** *and Controls by*

MINNEAPOLIS-HONEYWELL

THE BROWN INSTRUMENT COMPANY, 4462 WAYNE AVENUE, PHILADELPHIA, PENNSYLVANIA
DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.
MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA
Wadsworth Road, Perivale, Middlesex England
Nybrokajen 7, Stockholm, Sweden

TERROR FROM THE SKIES

On many fronts our air-borne invaders are striking terror in the hearts of our enemies. For war today is three-dimensional, and mountains, deserts, seas and fortifications offer no obstacles to U. S. Paratroops.

Transporting armies through the air is a big job—a job that calls for big planes and big engines. Today, engines of 2,000 horsepower are commonplace. Already on testing blocks, in manufacturing departments and on drawing boards, in engine plants throughout the country, is the promise of engines that will dwarf even these giants.

And transmitting the power from these engines are gears of such light weight—of such extreme precision, metallurgically and dimensionally, that engineers marvel that they could be produced by mass production methods.

How the problems that were presented in their design and manufacture were overcome is a military secret. But the mounting figures of our aircraft production is proof that here at Foote Bros. these precision gears are rolling off production lines in an amazing volume.

When the war is won, these same gears give promise of revolutionary advantages in the design of machinery—advantages that will mean "better power transmission through better gears."

FOOTE BROS. GEAR AND MACHINE CORPORATION
5225 South Western Boulevard
CHICAGO

To assist Paratroops in recognizing arms, ammunition and supplies instantly, colored parachutes are used. Pictured here are men and equipment descending upon a foreign airfield.

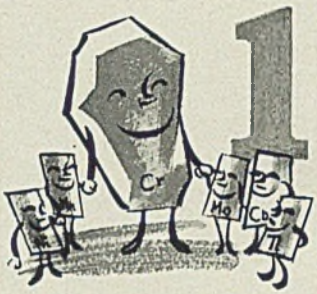
FOOTE BROS.

Better Power Transmission Through Better Gears

Basic Facts about

STAINLESS STEELS

A STAINLESS STEEL PRIMER



STAINLESS STEELS

are corrosion-resistant steels containing at least 12 per cent chromium with or without other alloying elements, such as nickel, manganese, molybdenum, columbium or titanium. They are supplied in a wide range of analyses.

The stainless steels vary in corrosion resistance, workability, wear resistance, and physical properties according to the amount of chromium, carbon and other modifying elements present.

VALUABLE PROPERTIES INCLUDE:

Good corrosion and oxidation resistance . . . varying almost in direct proportion to the amount of chromium present.

High strength-weight ratio in some cold-rolled types permitting fabrication of strong, light-weight trains, aircraft, and other structures.

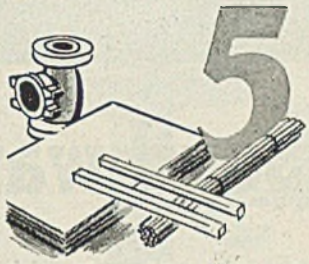
MAINTENANCE

of stainless steels is simple. Washing with soap, water, and a cleanser recommended for stainless steel will keep the surface bright and free from surface deposits.

P-13068-2

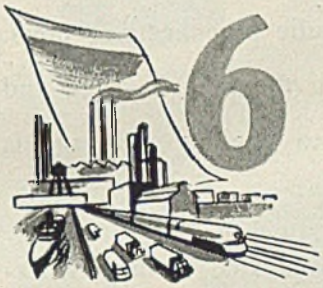
FABRICATION

is accomplished by almost all common methods. They can be machined, spun, deep-drawn, forged, punched, stamped, and otherwise mechanically-worked. They can be welded by all the common welding methods. If the austenitic steels are stabilized with columbium or titanium, and columbium-bearing welding rod is used, no annealing is necessary after welding.



MANY FORMS

are available in the common analyses including sheet, plate, strip, tubing — both seamless and welded — bars, wire, cable, welding rod, and a variety of cold-rolled shapes. Stainless steel is also supplied as foundry castings.



APPLICATIONS

of stainless steel are numerous. Because of their resistance to corrosion and oxidation, as well as their high strength and bright surface, stainless steels have been used in hospitals, chemical plants, oil refineries, railroad trains, aviation equipment, and power plants. In the present emergency, they are available only for those industries participating in war production.

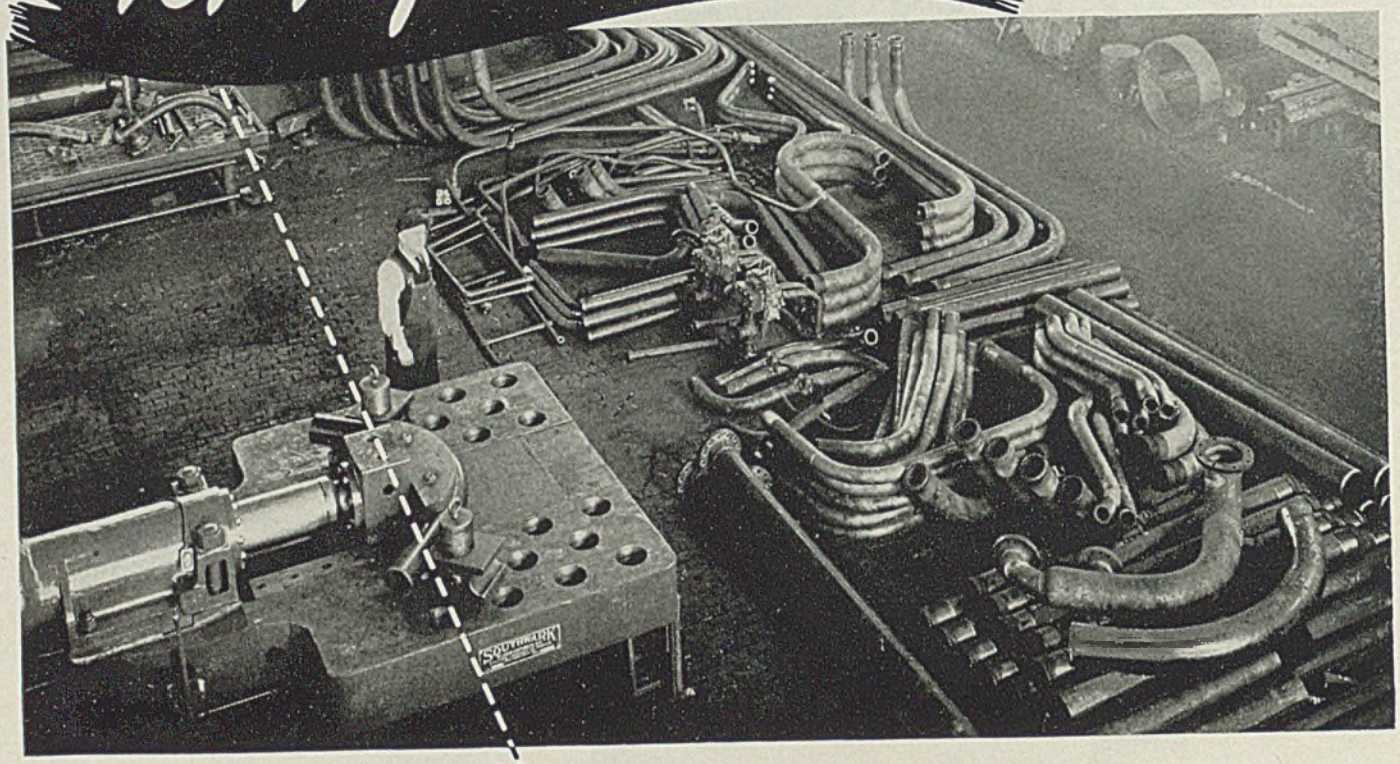
. . .

Although we do not make steel, we have for more than 35 years produced "Electromet" ferro-alloys and metals used in making steel. With the knowledge accumulated from this experience, we are in a position to give impartial advice. If you have a specific problem concerning the manufacture, fabrication, or use of stainless or other alloy steels, consult us without obligation.

Electromet
Trade-Mark.
Ferro-Alloys & Metals

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
30 East 42nd Street — New York, N. Y.
In Canada, Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

for Pipe Bending



Southwark Hydraulic Presses

Most bends can be made cold on this powerful 200-ton Southwark hydraulic pipe bending press. Time required for heating the pipe is saved and distortion of bend due to cooling shrinkage is eliminated.

Self-contained, this oil operated Southwark hydraulic press is under perfect control of the operator at all times—a feature particularly valuable during difficult bends. Southwark pipe bending presses are time and money savers.

Southwark builds a complete line of shipbuilding machinery including bending rolls, plate planers, keel benders, sectional flanging presses and joggling presses. New designs in these hydraulic presses and power tools are helping shipbuilders do a better job faster. Write for Bulletin K-160 which illustrates many of these products.

Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia; Pacific Coast Representative, The Pelton Water Wheel Co., San Francisco, California.

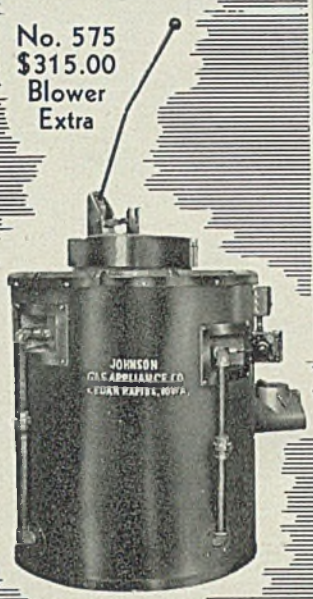
THE BALDWIN GROUP

BALDWIN SOUTHWARK

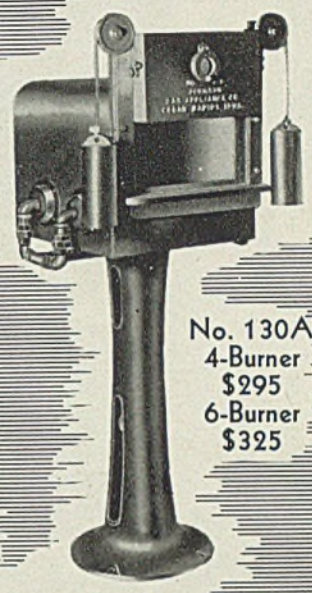
Division THE BALDWIN LOCOMOTIVE WORKS, Philadelphia, Pa.

2 WEEKS' DELIVERY

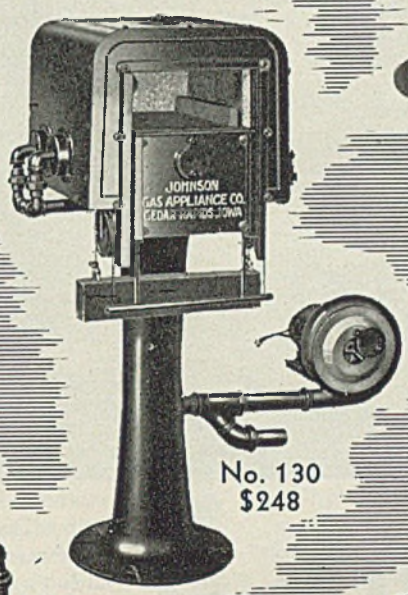
Johnson FURNACES



No. 575
$315.00
Blower
Extra

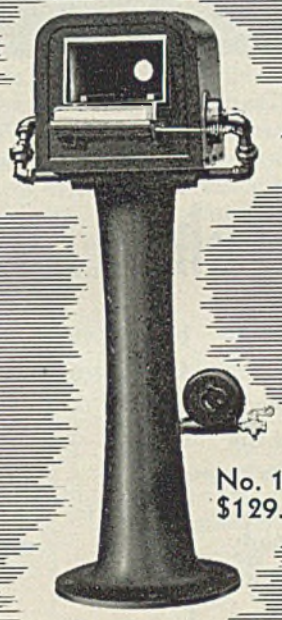


No. 130A
4-Burner
$295
6-Burner
$325

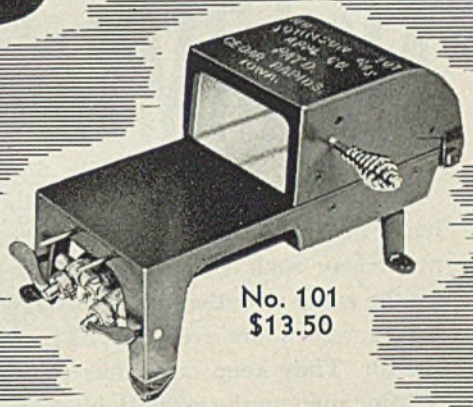


No. 130
$248

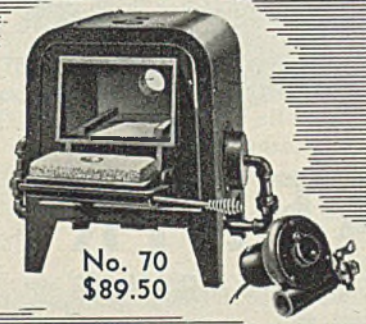
No. 2014
$240.00



No. 120
$129.50



No. 101
$13.50



No. 70
$89.50

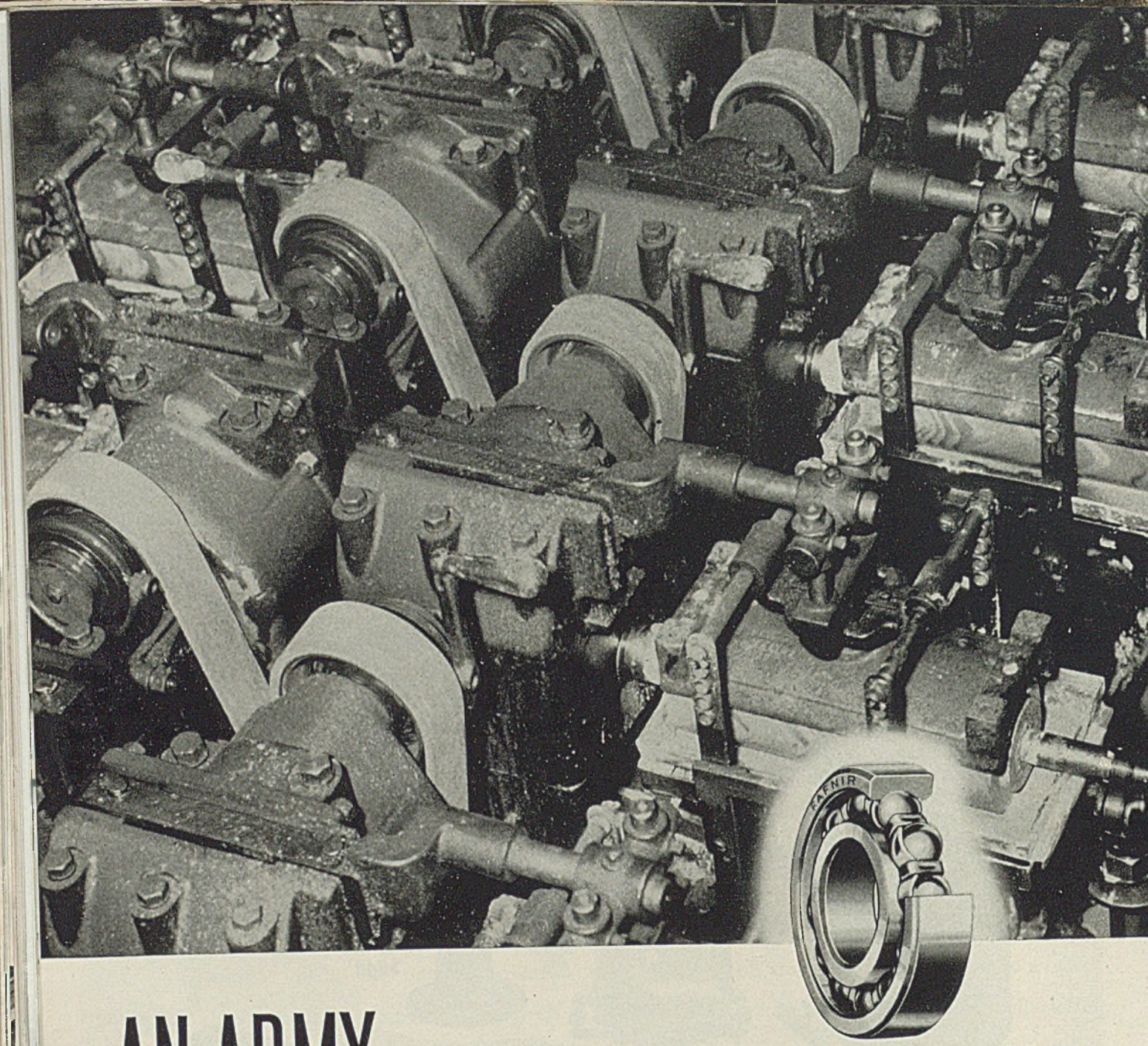
All Prices
F.O.B. Factory

Sales Offices in Principal Cities

No. 575 Pot Hardening and Melting Furnace
No. 2104 Oil Tempering Furnace
No. 70 Heat Treating Furnace
No. 130 A Hi-Speed Steel Heat-Treating Furnace
No. 130 Hi-Speed Steel Heat-Treating Furnace
No. 120 Hi-Speed Steel Heat-Treating Furnace
No. 101 Bench Furnace

Write today for FREE catalog of complete Johnson line.

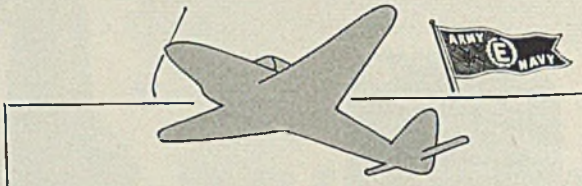
JOHNSON GAS APPLIANCE CO. 591 E Ave. N.W. CEDAR RAPIDS, IOWA



AN ARMY that marches on a Factory Floor

Imagine! . . . you surely can . . . the prodigious number of industry's "marching" machines. These machines never hear such a command as, "at ease"! They keep up the same relentless pace through one shift and the next . . . 24 hours every day. They keep our pilots in the air. They keep our tanks rolling. They keep our fighting men on the go, with blazing guns. Their steady whirring, humming, clicking, pounding is the Victory song of the nation!

The Fafnirs working here . . . 7 of them in each gearbox, 28 more on the shafting of this 100-foot machine . . . are built to *stay on the job* under tough, abrasive conditions. Like the millions of Fafnirs serving with the fighting forces, and the millions in other industrial machines here at home . . . these Fafnirs are "taking it". Their service records can already be stamped, "far beyond the call of normal duty"! The Fafnir Bearing Company, New Britain, Connecticut.



FAFNIR

BALL BEARINGS

THE BALANCED LINE - FOR ORDNANCE, AIRCRAFT AND INDUSTRIAL MACHINERY

This Year Rubber Is Tapped from Test Tubes

Synthetic Rubber Already Is Working for Users of Mechanical Rubber Goods

War production is up threefold. But the vital rubber stock pile is dwindling fast. This is the year of crisis in rubber.

There is only one solution . . . the production of synthetic rubber in steadily increasing tonnages . . . synthetic rubber to take over jobs once handled by natural rubber . . . to perform new tasks, serve in new applications created by wartime need.

One of the first synthetic rubber plants in the Government's program was built and is being operated by United States Rubber Company . . . another soon will be in production.

Our engineers have been working with synthetic rubber since 1921. During this period they have learned that no one synthetic should be used for all types of mechanical rubber goods. They have found where and how synthetic is superior to natural rubber, where it is equally as good, where it falls short. They know what uses each of the five basic commercial types of synthetic rubber is best suited for — Neoprene, Buna-S, Buna-N, Butyl, or Thiokol—and how to compound the specific synthetic rubber for the specific task. U. S. Rubber has used all five types and knows which one to select for the performance required.

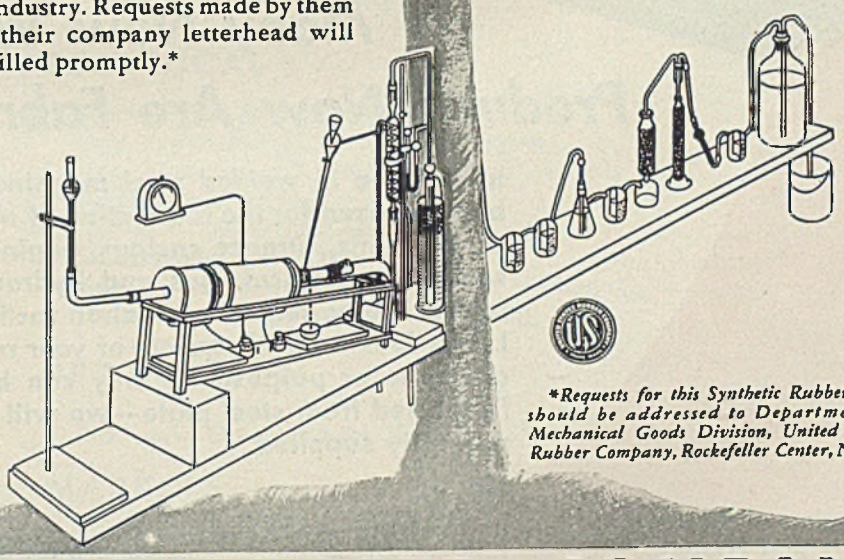
Information based on the results of vast experiments and practical applications of synthetic rubber has been incorporated in a new comprehensive book, *The Five Commercial Types of Synthetic Rubber.*

This informative book traces the history of synthetic rubber from the earliest experiments of Michael Faraday to the present. It discusses each of the basic types of synthetic rubber, tells where it has been used successfully in United States Rubber Company products, and compares its properties with natural rubber. It tells how synthetic rubber is made. It is a detailed answer to the most vital question of the day.

We feel that *The Five Commercial Types of Synthetic Rubber* is a publication of real importance to men of industry. Requests made by them on their company letterhead will be filled promptly.*

The successful use of synthetic rubber in mechanical rubber goods and the insurance of fully dependable service depend largely upon the skill of the manufacturer and compounder. Each of the five basic commercial types of synthetic permits a myriad of variations.

The United States Rubber Company has been developing and improving rubber products for one hundred years. Today, the same vast resources for research and development that resulted in some of the most spectacular achievements in the rubber industry are being devoted to the problem of synthetic rubber. A great backlog of knowledge already has been built. More is being constantly added.



**Requests for this Synthetic Rubber Book should be addressed to Department 25 Mechanical Goods Division, United States Rubber Company, Rockefeller Center, N. Y. C.*

UNITED STATES RUBBER COMPANY

Mechanical Rubber Goods Division • Rockefeller Center • New York

In Canada, Dominion Rubber Co., Ltd.

MAHON *Weldments*

Unusual work like this massive Multiple Unit Drilling and Tapping Machine Base demonstrates Mahon welding skill.

Many New Welded Steel Plate Products Now Are Fabricated by Mahon

In addition to welded steel machine bases, Mahon welding skill is being utilized for the fabrication of many new and different products. Gun mounts, furnace casings, engine frames and crankcases, pump supports, electrical, gas and hydraulic equipment, comprise but a few of many items that Mahon facilities are called upon to produce. Let us look over blueprints of *your* requirements. Regardless of size or shape or purpose—if they can be practically and economically fabricated from steel plate—we will advise you. Quotations will be promptly supplied.

Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products.

THE R. C. **MAHON** COMPANY

DETROIT
CHICAGO