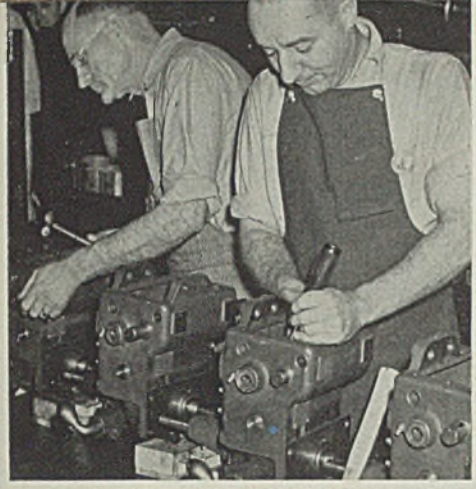

"Half-Shift" Plan for war plants taps new manpower reservoir. Page 22

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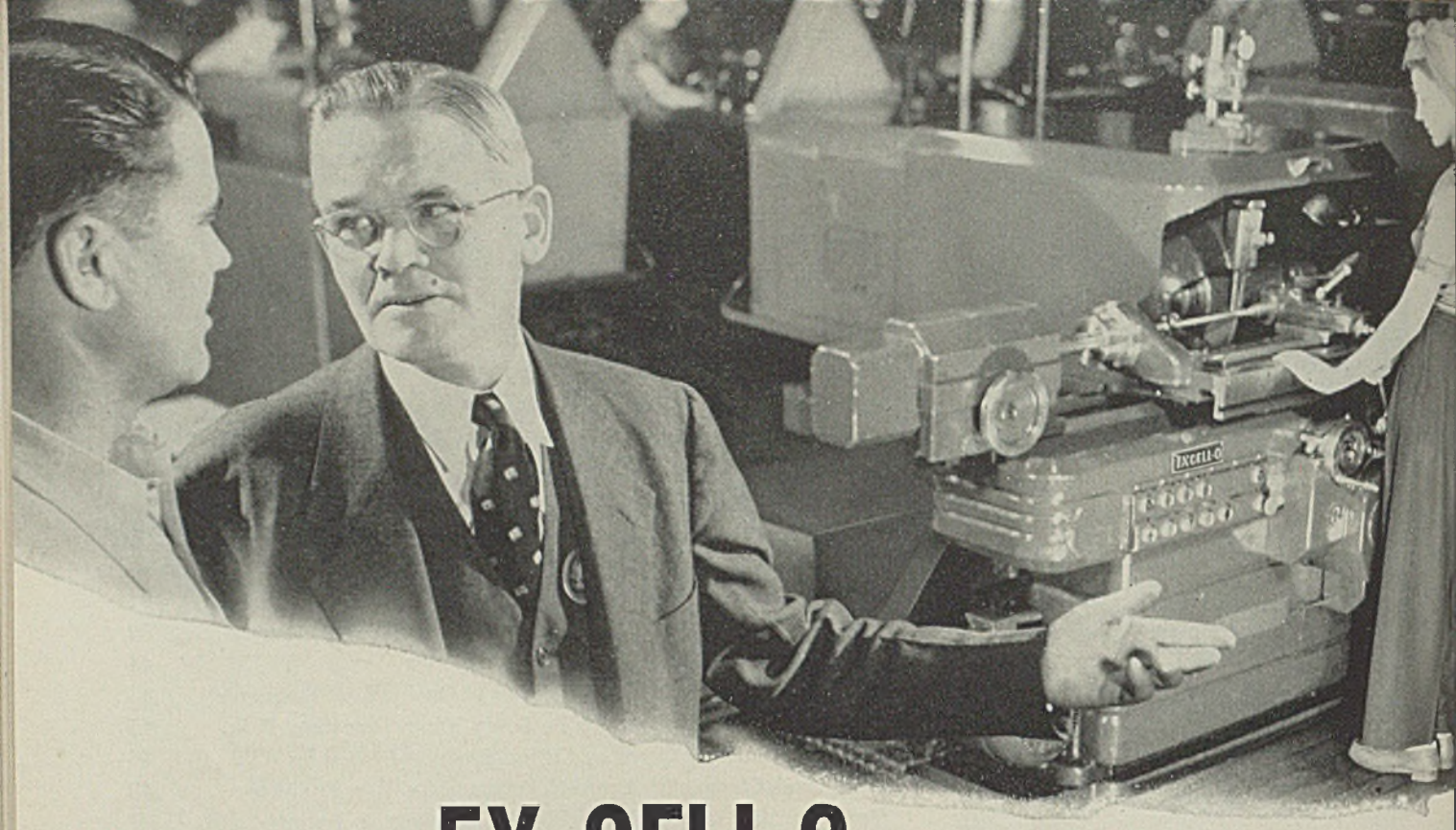


They're EX-CELL-O *Machines*

. . . KEEP THEM GOING ALL THREE SHIFTS

UNINTERRUPTED production is industry's most urgent job today—'round all the hours on the clock every machine that can "take it" must be kept going if the vast volume of work that war demands is to be produced without delay. . . . Wherever Ex-Cell-O precision machine tools are in use, there's no problem as to continuous service. They're designed and built to "take it", every hour of the day, every day of the week. The Ex-Cell-O name on a machine tool means not only a *precision-built* machine to do *precision* work, but a machine that gives the utmost in efficiency with a minimum in maintenance attention. . . . To get the best use out of any Ex-Cell-O equipment you have in your plant, you should have available the practical information in the Ex-Cell-O Instruction Book applying to the particular Ex-Cell-O machine you have. If you do not have one now, just write to Ex-Cell-O in Detroit, stating the type and the style of the Ex-Cell-O machine tool you're using, and a copy will be mailed immediately . . . without any cost to you, of course.

Over each of the four plants of Ex-Cell-O in Detroit fly three flags . . . the Stars and Stripes, as always, the Army-Navy "E" pennant, and the *first* U. S. Treasury "Bull's-Eye" War Bond flag.

EX-CELL-O CORPORATION • DETROIT

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PRECISION PARTS

XLO

EX-CELL-O *means* PRECISION

HIGHLIGHTING

this issue of STEEL

PRODUCTION While steel in ingot and semifinished form is piling up here and there, this phenomenon does not bother War Production Board officials who think it better to have a cushion rather than run the risk of a shortage. Reasons for this development include cancellation or deferment of lend-lease shipments, the discontinuance or curtailment of production of certain military items, and reduction of tonnage going into structural shapes, tin plates, pipe and reinforcing bars (pp. 32 and 103). In discussing the Controlled Materials Plan, Ernest C. Kanzler says the whole production program is being set at a "doable" level (p. 31), so that there will be enough materials to go around. This situation, although easier, will not permit release of steel in large amounts for civilian production. But some shifts in this direction are expected for the reason production and military leaders are convinced that civilian production has been stripped down too far and that a bad situation will develop after present inventories are exhausted—unless corrective action is taken.

Co-ordination of technical information has been improved. The War Production Drive Headquarters, Hotel Raleigh, Washington, has listed a large number of additional ideas which have led to increased production and will furnish details to any manufacturer who will refer to them by number (p. 32). More extensive information is available concerning shop capacity that is available at plants making and repairing gages (p. 42). Exchange of information between the automobile and aviation industries is to be made more effective.

Zinc now is the most critical metal and ways to reduce its consumption, as in painting sheets rather than galvanizing them, are being sought (p. 103).

MANPOWER Outstanding development along the labor front is the new "half-shift" plan of the Warner & Swasey Co. It opens up a large and so far untapped manpower reservoir. By this plan two men work four hours each after they have taken care of their regular daytime jobs. One works from 4 to 8 p. m. and the other from 8 to midnight. Those so far recruited are business men and school teachers who enjoy the half-shift work and regard it as a recreation (p. 32).

Regional War Labor Board officers have been authorized to approve certain types of wage requests, thereby setting the stage for quick decisions (p. 23). The board also has adopted an important basic policy; it will not approve wage increases for the purpose of influencing or directing the flow of manpower.

After years of research the International Harvester Co. has developed a successful cotton picking machine. It is hailed as a help to the manpower problem through release of many cotton pickers for other work (p. 25).

OTHER NEWS No private citizen is to concern himself with espionage. He should go no further than to report facts or suspicions to the Federal Bureau of Investigation (p. 37)

Steel Recovery Corp. requests immediate reports on all steel inventories in excess of 1000 pounds (p. 37).

Manufacturers of military weapons now are engaged in studies to determine how they can be improved, a job normally left to Army and Navy officers (p. 42).

The Controlled Materials Division of the War Production Board now is holding meetings in various cities to instruct contractors how to operate under the Controlled Materials Plan which will come into full force next year (p. 31).

TECHNICAL In discussing a wage policy for the metal producing and metalworking industry, John W. Roberts recommends a combination of straight time wages plus extra pay based on performance. He says this works well provided the extra pay is based upon accurately measured standards of effective work output (p. 54).

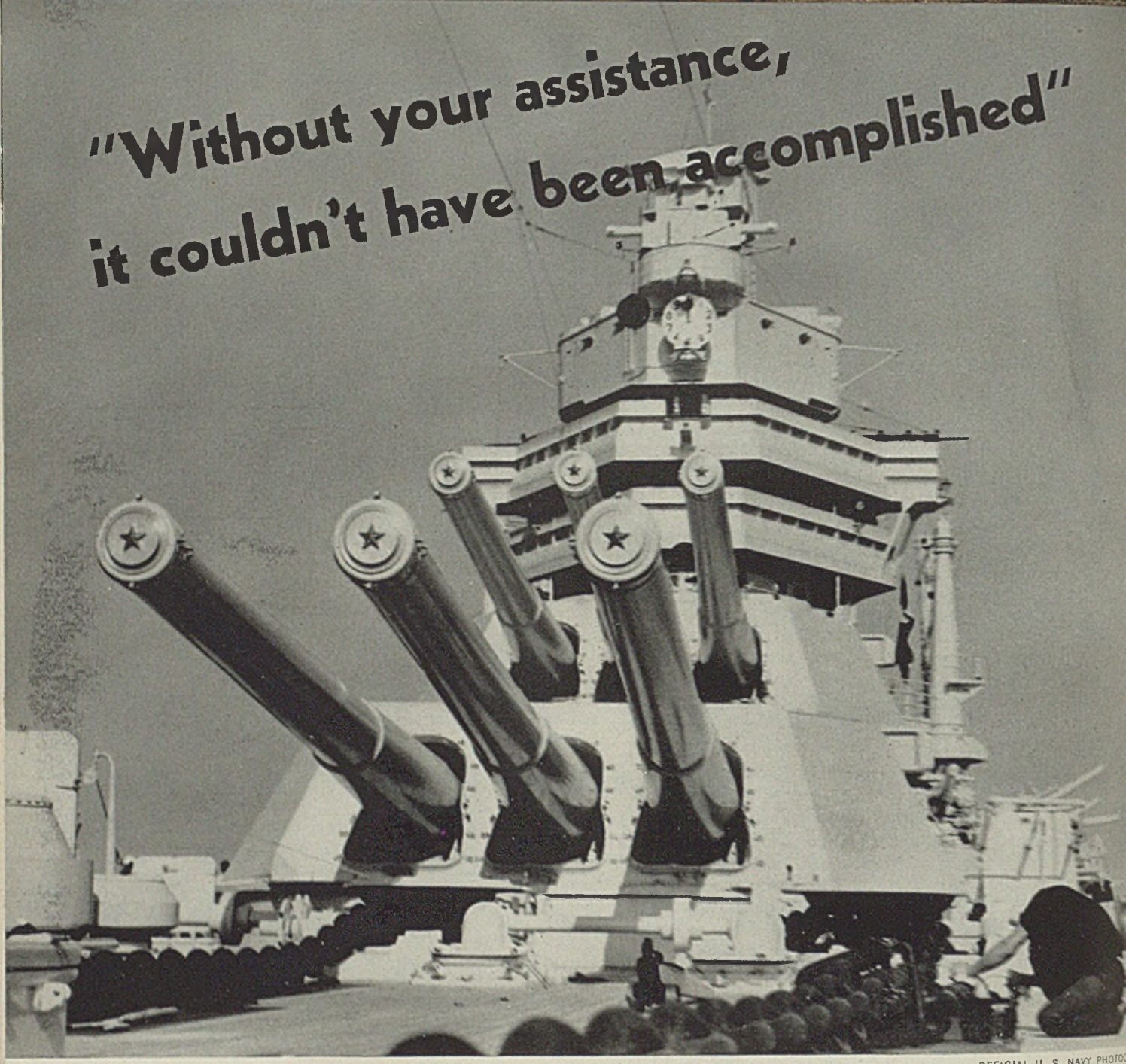
The processes by which the extremely accurate gages used to make parts of military equipment perfectly interchangeable are described by Gerald E. Stedman as he points out developments in gage manufacture at Suprex Gage Co., Ferndale, Mich. (p. 56). Air-conditioned rooms for final manufacturing steps and final inspection are one feature.

W. J. Diedrichs reports on the experience of an automotive parts manufacturer on his company's tests and applications of NE steels (p. 62). This is the third in a series of reports on experience of users of NE steels.

The Sendzimer mill that cold rolls strip true to 0.0001-inch across its width and reduces strip down to 0.003-inch, or thinner, is explained by its originator, T. Sendzimer, (p. 64). This unusually efficient mill has high output, produces flat strip that needs no roller-leveling and has many other important advantages.

An oil handling system that appears unusually well planned features central storage and distribution facilities through pipe lines (p. 70). A number of important economies are obtained.

"Without your assistance, it couldn't have been accomplished"



OFFICIAL U. S. NAVY PHOTO

Record-breaking service on an important Navy order, made possible by Ryerson co-operation on steel! "Without your assistance, it could not have been accomplished," writes the contractor—and again Ryerson teamwork scores.

Cases like this—in which quick Ryerson steel-service has speeded up war production—run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are *depending* on Ryerson for steel. An important order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"—and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program—There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

JOSEPH T. RYERSON & SON, INC. · Chicago · Milwaukee · St. Louis · Cincinnati
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RYERSON STEEL-SERVICE

STEEL
November 30, 1942

Cut Out the Red Tape

If a poll of manufacturers engaged in war work were taken to ascertain what steps the government could pursue to expedite war production a large proportion of the replies would emphasize the necessity of cutting down on the paper work, reducing red tape, or simplifying the rules and regulations under which manufacturers operate.

We have yet to find a holder of a government contract who thinks that the questionnaires, reports and red tape he has to contend with in connection with a government order are necessary. On the contrary, the contractor in almost every instance states emphatically that he could perform his duties much more efficiently if he were freed from unnecessary reports.

Fortunately, many of the higher officials in WPB realize that the tremendous volume of red tape is a nuisance. They are trying in several ways to eliminate as much of it as possible. For months a detail of experts has been working on government questionnaires in an effort to cut out duplications, standardizing certain questions and otherwise simplifying necessary requests for information.

This and similar efforts are in the right direction, but they cannot hope to solve all phases of the red tape problem. The entire plan of war production must be simplified. Also, the rules and regulations governing the administration of this simplified plan should be written by men who know how manufacturers operate. Thirdly, lawyers, while passing upon these rules and regulations, should not be permitted to clutter them up with technical legal phraseology which in the past has been responsible for needless red tape and confusion.

There are signs that WPB is working toward a simplified plan. In New York, last Tuesday, Ernest C. Kanzler told 3000 manufacturers that WPB is finding it necessary "to deal with American industry as one tremendous integrated production unit."

Do this, and reduce paper work and red tape accordingly, and production will run much more smoothly.

E. L. Shaner

Editor-in-Chief

"Half-Shift" Plan Taps New Manpower Reservoir

Two-man teams of white collar workers divide turns in war production plant, each working four hours. Experiment in machine tool factory indicates program may solve a shortage problem

FORMAL inauguration by the Warner & Swasey Co., Cleveland, of what is called the "half-shift" plan, is outstanding news on the employment front. This follows several weeks of experimental testing of the system, utilizing five two-man teams. Personnel authorities—including B. C. Seiple, manager of the Cleveland office of the United States Employment Service—regard this as one of the most hopeful breaks in the industrial manpower situation since the beginning of all-out production of war materiel. It is estimated that in the Cleveland area alone, the plan taps a reservoir of workers—hitherto disregarded by industry—possibly totaling 20,000 men.

Charles J. Stilwell, president, Warner & Swasey Co., heard some academic discussion of some such plan during a business trip in the East about two months ago. The idea grew in his mind to such an extent that upon his return to Cleveland he was determined to give it a full trial. Here briefly is the plan as worked out by Mr. Stilwell with his employment department and as it now is operating on what is expected to be a constantly growing extent.

Two men—one, let us say, a bank executive, the other a college professor—are mechanically inclined. Both are eager to contribute to the war effort over and beyond what they are doing in connection with their regular and by no means unimportant daytime occupations.

Two Work as "Team"

Having been accepted after due investigation by the employment department of the Warner & Swasey Co., under the half-shift plan, these two men are organized as a "team" on some such work as gear box assembly. Ordinarily their work will be confined to the second shift, on which one of them will report at 4 p.m. and will work until 8 p.m., when the second member of the team will take over and will carry on until 12 midnight.

This routine regularly will be followed six days a week. Thus, the two-man team will be doing the work of one full-time mechanic in the shop, while at the same time each member of the team goes on with his own regular daytime occupation. While at first this may seem to constitute an unduly long day as compared to that of the typical white collar worker in ordinary times, actually it is not found to be either tiring or irksome.

Extra Hours Not Tiresome

Those individuals constituting the original experimental teams set up by Warner & Swasey discovered that the long hours "do not seem like long hours." There is a break in the continuity and a complete change in environment and in mental and physical activity which gives to the four hours work on the industrial half-shift a recreational quality which results in a lift rather than a letdown.

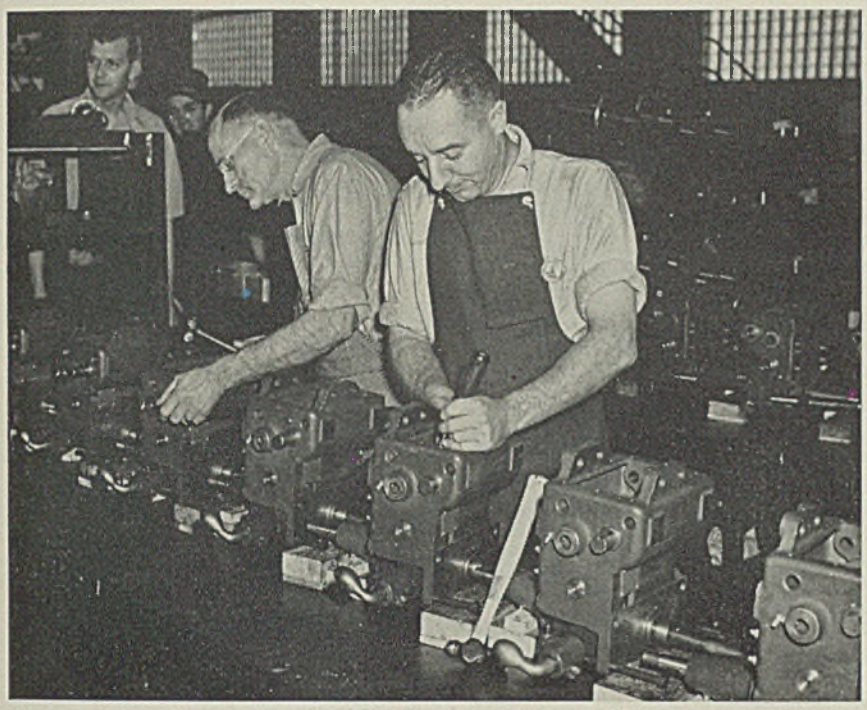
Some of those engaged in it compare its effect to the mental and physical stimulation enjoyed by the hobbyist who puts in several hours after work each day in a home workshop in his basement. Then too, there is the satisfaction which comes from having a direct part in boosting vital war production.

The caliber of men who today are ready and willing to participate in a project of this kind is indicated by a roster of the personnel of the five original two-man teams who about seven weeks ago went to work for Warner & Swasey to try out the half-shift plan on an experimental basis. These men—all of whom continue to carry on with unabated enthusiasm—are: J. Atlee Schafer, president of a large retail coal company, and Harry Jones, who is one of his daytime business associates; Edward Klee, a Cleveland Heights public school teacher, and Elmer Rocker, proprietor of a printing establishment; Arthur Mattox and Gardner Earle, both Cleveland Heights public school teachers; Morton Sand, a food salesman, and Wilfred Maschen, electrical products salesman; Bernard Singerman, cartoonist, and William Libby, electrical products salesman.

Incidentally, Mr. Schafer himself long has been a proponent of the half-shift idea and has been promoting it through articles in national publications. Still another who is playing an active role in this plan is Dr. Henry W. Taeusch. Dr. Taeusch, who is professor of English at Western Reserve University, is active in recruiting white-collar workers for the half-shift work. He "practices what he preaches" by serving as a Warner & Swasey timekeeper on the assembly line.

Of this initial band of "half-shifters,"

Professor of English at Western Reserve University by day, and timekeeper on the Warner & Swasey production line by night, Henry W. Taeusch is active in recruiting white-collar workers under the "half-shift" plan. Cleveland Press photo



J. Atlee Schafer (right), coal company president, and Arthur Mattox, Cleveland Heights high school teacher, do their bit after hours as "half-shifters" on the Warner & Swasey gear box assembly line. Mr. Schafer was an early and vigorous proponent of the half-shift idea. Cleveland Press photo

Warner Seely, secretary of the company, has this to say:

"They are conscientious men who are more interested in doing something to help win the war than in pay envelopes. We have had such a completely satisfactory experience with them that we are now going ahead with the hiring of a considerable number of additional half-shift workers—although no mass hiring of such workers is an immediate possibility. At the present time we are especially interested in pairs of men of suitable qualifications who make application together as working teams.

"If anyone had asked us two or three months ago whether we might have to resort to anything of this kind to cope with the manpower situation, we probably would have laughed it off. By the same token, had we been asked a few months before that whether or not we contemplated the employment of women as mechanics—our reaction undoubtedly would have been the same. Today we have more than 700 women on mechanical work in our plant."

Adoption of the plan by the company is called by officials of the United States Employment Service "the first major break in manufacturers' resistance to the half-shift idea."

Regional WLB Officers May Approve Certain Requests for Wage Increases

IN a move to facilitate the handling of requests for wage increases which conflict with the wage stabilization order, the War Labor Board has granted authority to the directors of its ten regional offices to make final rulings on certain cases. Such ruling will be sufficiently binding to permit the parties concerned to proceed immediately in accordance with the decision rendered.

This decentralization will make it unnecessary for employers and labor to present their cases to Washington and is expected to save time and travel in the majority of instances.

Regional WLB directors are empowered to make final rulings on wage increase petitions to correct inequalities when the following conditions prevail:

1. The applicant states no price relief will be sought in the event higher wages are granted.

2. The number of employes affected by the petition, plus those whose rates have been adjusted since Oct. 3, does not exceed 5 per cent of the plant's total.

3. The wage increase sought does not exceed 5 cents per hour.

In addition, the regional director may correct maladjustments in which straight-time wage rates do not exceed 15 per cent of the level prevailing on Jan. 1, 1941. Adjustments granted under this formula must be plant-wide and are confined to a selected list of industries. The latter include, among others, the iron and steel, nonferrous metal, metalworking, aircraft, automobile, machinery, mining, railroad equipment, rubber and petroleum industries.

Cases to be handled by the WLB regional offices are only those in which an agreement has been reached by the employer and his workers on the wage adjustment to be sought and do not cover annual salaries of more than $5000. Wage disputes continue to go to the U. S. Conciliation Service for mediation.

All inquiries and applications for approval of wage adjustments must first be made to the nearest office of the Wage and Hour Division, Department of Labor, which serves as information center and local office for the WLB in its wage stabilization activities. Assistance will be provided in filling out required forms for transmission to the Board.

Advisory boards have been set up in each of the ten regions to advise the regional director. These boards consist of 12 members, equally divided among representatives of labor, industry and the public.

230 Buffalo-Area Employers Accept Ban on Labor Piracy

Leroy Peterson, area director of the War Manpower Commission, reports that 230 employes in the Buffalo-Niagara region have now signed the pact banning labor piracy. This brings the total number of workers covered by the agreement to 144,500.

Under an agreement for full utilization of manpower, signed by employers, workers seeking to transfer to another plant must present their cases for review before the United States Employment Service.

NWLB Censures Wage Raises To Influence Manpower Flow

"The National War Labor Board has announced as a matter of policy that it will not, on its own initiative, 'approve wage increases for the purpose of influencing or directing the flow of manpower.'"

This statement, forming a new

cornerstone in the wage policy of NWLB, was incorporated by Wayne L. Morse, public member of the board, in an opinion on the board's recent six-to-three decision disapproving a wage agreement between Staley Mfg. Co., soybean processor of Painesville, O., and the Chemical Workers Union, AF of L. The agreement called for a 6-cents-an-hour general wage increase to halt further defections among its personnel for more profitable work elsewhere.

The opinion also pointed out that if the board should attempt to remedy manpower shortages by granting wage increases, the effect would be to accelerate a spiral movement of inflationary wage increases.

Wage Increase Denied to Woodward Iron Co. Workers

National War Labor Board last week denied the request of the United Mine Workers of America for a wage increase amounting to 5 per cent for about 200 employes at the Woodward Iron Co., Woodward, Ala.

In denying the request, the board acted upon the recommendation of its referee, Prof. Peter A. Carmichael. Carmichael recommended, however, that an increase granted by the company July 23, 1942, be made retroactive to June 24 for those employes who had not received a 15 per cent increase in their earnings between Jan. 1, 1942, and June 24, 1942. Such retroactive pay also was denied by the board.

The company has granted four general increases since January, 1941, including the one of July 23, 1942, which followed the board's Little Steel decision. The latter increase amounted to 44 cents an hour, less a 5 per cent increase which had been granted in December, 1941. Professor Carmichael said that the parties had submitted no data on inequalities, and stated that the company pays rates higher on the average than the rates of its competitors in the area. Its present minimum is 60½ cents an hour.

Recounts the Grand Job "Organized Labor" Is Doing

Labor Production Division of the War Production Board issues a weekly multi-page press release (20 pages last week) recounting the achievements of organized labor in the war effort.

The emphasis by a government agency on trade unions is made more remarkable when it is remembered that only one-fifth of the total gainfully employed people are even claimed by unions as dues-paying members. Of the other four-fifths, the government-financed publication makes no mention.

Typical excerpts from the release:

"Organized workingmen in the United States in a single year have given a powerful answer to the Axis assault on freedom throughout the world."

"U. S. trade unions mark one year of record-shattering production for victory."

"Unions purchased millions of dollars worth of War Bonds. In countless instances they initiated their own scrap collection drives. They instituted rubber conservation programs and rationing plans; they raised special funds for the purchase of civilian defense equipment and for planes, tanks and submarines."

"Labor organizations inaugurated their own war relief agencies, bought ambulances and medical supplies for our armed forces and those of our allies."

Another section is headed: "650 vessels in year is shipworkers' answer to Pearl Harbor."

Still another: "Workers streamline war production through 1749 labor-management committees."

The release points out that at first certain sections of the labor movement were suspicious that the plan was an attempt at company unionism and that some management spokesmen feared it was an attempt of labor to run industry. Workers and employers soon resolved the War Production Drive was only an effort to increase war production.

WORK IN "ARCTIC" AND "TROPICS" AT FT. KNOX

TESTS to determine the reactions of tank crews to temperature extremes are conducted by Armored Force Medical Corps in a laboratory at Ft. Knox, Ky. This photograph shows them at work on a "battlewagon" in one room where the mercury is 30 degrees below zero. In a nearby room the temperature is held at 120 degrees Fahr. Each room is large enough to house tank, crew, living and testing facilities. Men eat, sleep, exercise, work on the tanks, from a few days to a month for each test. NEA photo

Labor Department Speaker Advocates Unions for Women

Employment of millions of women workers in war production must not be permitted to cut basic work standards, Miss Elizabeth Christman of the Labor Department's Women's Bureau declared recently before a conference of Illinois and Wisconsin Women's Trade Union Leagues. She emphasized that the emergency "must not be used as an excuse for destroying sound labor policies."

"Equality of opportunity must have meaning for women in the shop," Miss Christman stated. "Their pay rates must be based on their jobs without artificial discrimination based on sex. Our democratic way of life must reach into the everyday experience of millions of men and women through organization of the workers into strong unions, through collective bargaining and the democratic methods of self-government in the shop.

"In all of this, women must carry their full share of the load—do more than pay dues—serve on grievance committees, negotiate wage contracts and work on labor-management committees."

Cotton Picker "Success at Last"

Tests show International Harvester's device equals 50 to 80 manual workers

ANNOUNCEMENT that the International Harvester Co. has now developed its mechanical cotton picker to the point where, should the government desire, the machine could be utilized as an important wartime labor-saving factor in the manpower situation, was made last week by Fowler McCormick, president.

For generations, the harvesting of cotton has required proportionately more human labor than any other agricultural crop. Now, when the nation's need for manpower is the greatest it ever has been, millions of men, women and children must work for several months each year to harvest the cotton crop.

"International Harvester Co. has been experimenting with mechanical cotton pickers for approximately 40 years," Mr. McCormick said. "It has proved to be the most difficult designing and engineering job in the modern history of agricultural machinery. Up to now we have never said that we had a successful cotton picker.

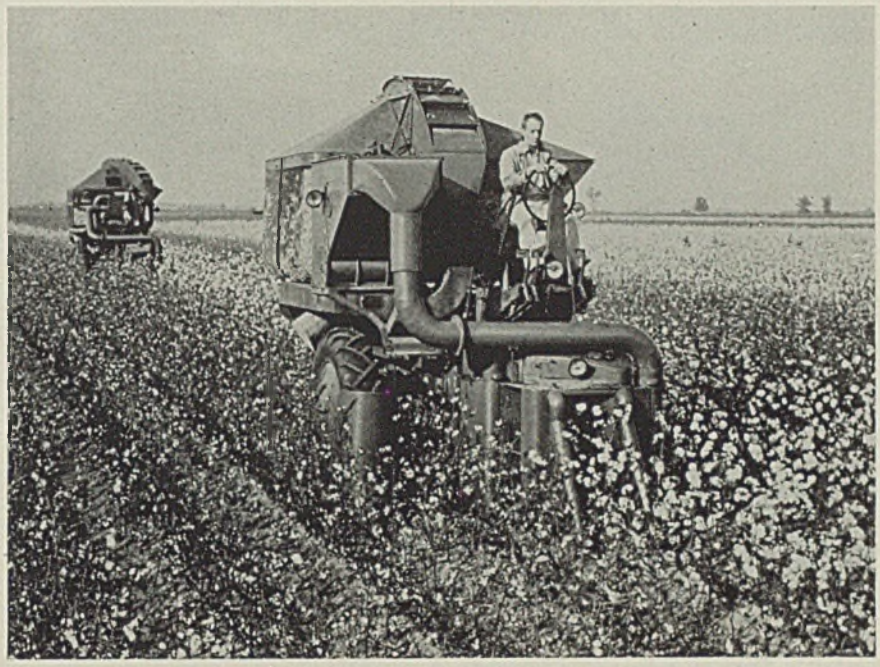
"We are now ready to state that our particular type of mechanical cotton picker has been tested exhaustively, and we know that it will pick cotton profitably under the conditions prevailing in the principal cotton growing areas of the country. We do not claim that it will pick cotton profitably throughout all the varying conditions to which the growing of cotton is subject in this country.

A Few Reservations

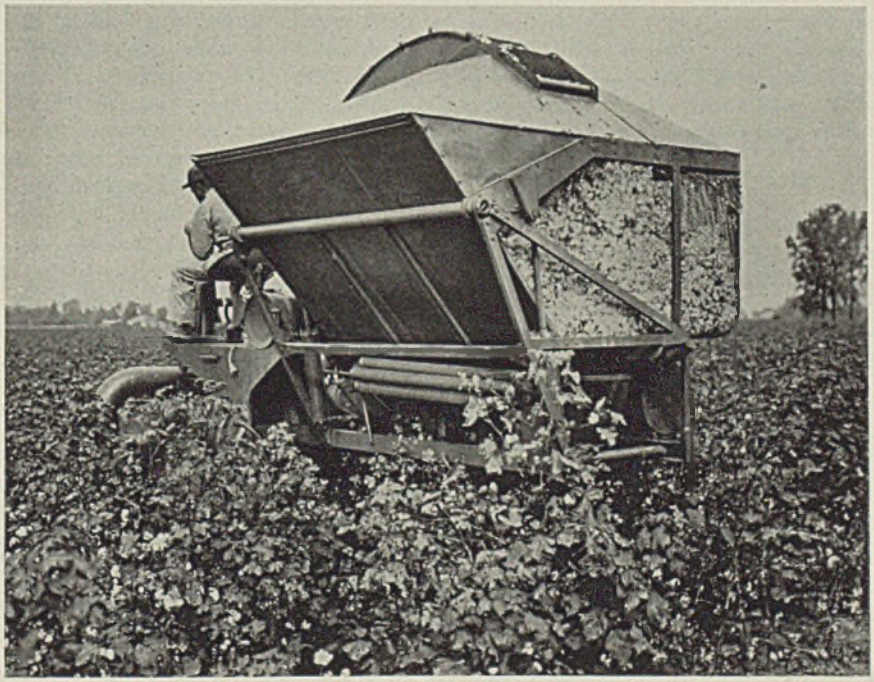
"For the present, the operation of the machine should be restricted to districts where neighboring cotton gins have been equipped with cleaning and drying machinery selected for the processing of machine-picked cotton. Some such equipment has now been developed and is in use, and more of it is procurable from manufacturers of drying, cleaning and ginning equipment. Likewise, the picker should be operated where proper service for it is available.

"In its present state the cotton picker represents a rather large capital investment for the owner of a small cotton tract. But if used on several such tracts, thereby providing sufficient total acreage to keep the machine occupied, it would be economically advantageous. Such has been the history of most of the more complicated farm machines. At first they were economical only for the owners of individual larger farms, or for groups of smaller farms where the machine was used by the whole group. We know that the basic mechanical principle of our picker is sound and that it works. Naturally, additional refinements will come with time, but we are certain that it is a commercial machine right now in its present form.

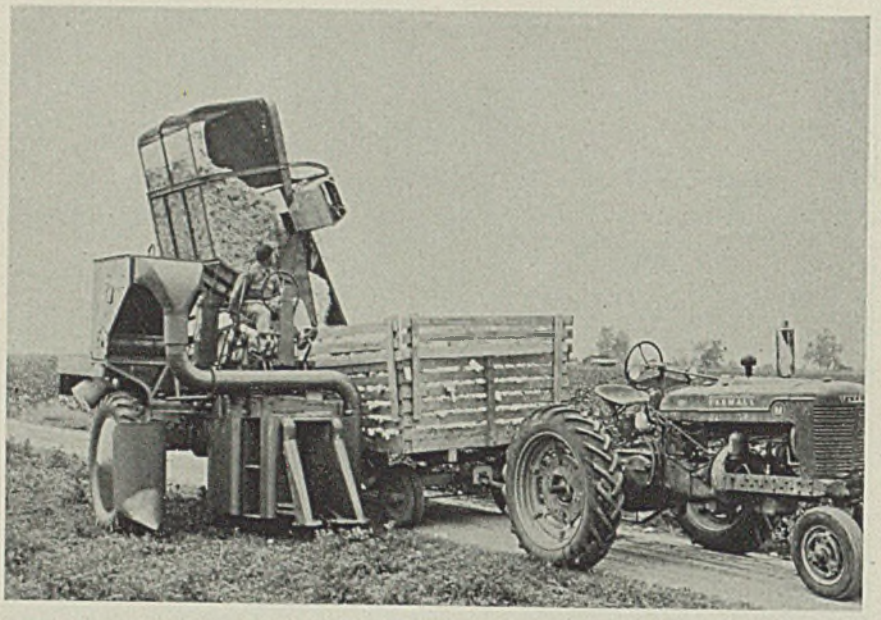
"The machine can now be put to use where the size of the operation justifies, and where the proper ginning equipment



Two of the pickers at work on a Mississippi plantation. Effectiveness of the machine is illustrated by contrast between picked and unpicked rows. Driving the first picker is Fowler McCormick, president of International Harvester Co., whose company has been experimenting on the project for 40 years



This three-quarter side-rear view shows the location of the driver's seat with respect to the metal basket



Picked cotton is dumped from metal basket into farm trailer to be hauled to gin. Basket is lifted by means of a hydraulic power lift. Only 30 seconds are required for dumping

is available. The machine has been fully tested in the lower Mississippi delta in the states of Mississippi and Arkansas, in some sections of Texas, and in the long-staple cotton growing section of Arizona. The machine fits the needs of those areas, and can be used now in any other similar areas where proper ginning facilities are available and the size of the cotton plants ranges from 2 to 4½ feet in height.

"In all such areas the machine could be an important factor in the wartime manpower situation. We regard it as fortunate that perfection of the picker has coincided with the great present wartime need to solve a critical agricultural manpower situation.

Does Work of 50-80 Hands

"It is difficult to make an accurate specific statement on the amount of cotton the machine will pick in comparison with hand pickers, because of widely differing conditions under which cotton is grown, differing yields per acre, size of plants, type of fiber, etc. From the tests we have made, however, we know that the machine will pick as much cotton in a day as can be picked by from 50 to 80 hand pickers in the same field.

"Because this is a machine not previously produced, we have no government allocation of materials to build any for sale in 1943. We fully recognize that the government must allocate critical materials where they are most needed today for the war effort. Therefore, we have planned to ask only for materials to make a dozen or so pickers for next year unless the government should feel that greater quantities were needed. In that case we would, of course, do everything possible to carry out whatever program the government suggested."

The cotton picker is a machine attachment designed for mounting on the Harvester company's medium-size tractor, which provides the power for the picking operation.

Travels in Reverse Direction

The picking element of the machine consists of a drum box housing two drums, each containing a series of vertical shafts. On these shafts a large number of revolving spindles, which gather the cotton, are mounted. These gathering spindles enter and retract in the cotton plants at the same forward rate of travel as the tractor itself.

As the spindles enter the plant they contact the open bolls of cotton and spin the cotton out of the boll without disturbing the unopened bolls or otherwise injuring the plants. After the cotton fleece is wound on the spindles, it is removed by rubber strippers or doffers.

After removal from the spindles, the cotton is conveyed by vacuum to a separating chamber, and then by air pressure produced by fan equipment to a large wire netting basket supported on a light framework on top of the machine, where it is held until ready to be dumped for trucking to the gin.

When the tractor is used with the picker the high rear tractor wheels become the front wheels of the machine and the customary forward speeds of the tractor are available for traveling in the reverse direction.

The driver is the only attendant required to operate the machine. He sits comfortably above the drum box where he has a full view of the row of cotton being picked, which flows continuously through the drum box.

Tests made with the International Harvester mechanical picker this year not only showed a quality of picking satisfactory to the plantation owners who cooperated in the tests, but they were also convinced by conservative crop accounting that machine-picked cotton, processed in modern gins, represents a considerable saving over cotton picked by the hand-picking method. A number of planters, faced next year with a shortage of field labor, have urged the company to supply them with mechanical pickers for use on their next year's crop.

Excess Steel Stocks Held by Car Builders To Be Distributed

Excess inventories of steel and other materials accumulated in 1941 and early 1942 by railroad car builders are being absorbed in the equipment program for 1942 and 1943 by controlled redistribution of the surpluses under WPB Limitation Order L-97-A-1, which has been amended by a supplementary order broadening the scope of existing inventory controls.

Restriction which previously applied only to inventories of freight car builders are now extended to include those of passenger-car producers, while excess inventories of car shops in both branches of the industry also are made available to locomotive builders.

No passenger cars were included in authorized equipment which the carriers may order for 1943 under a program determination by the Requirements Committee of WPB, announced Nov. 19. Inventories of materials now in the hands of passenger-car builders hence cannot be put to use for that type of manufacture.

Heretofore, the excess inventories of freight car builders could only be sold and delivered to other builders in the same branch of the equipment industry. The amended order, however, permits sales and deliveries either by freight or passenger-car builders to any one of three classes of consumers. These are: (1) other freight-car builders, (2) locomotive builders, or (3) manufacturers of parts for freight cars and locomotives.

Civilian Defense has produced a new weekly newspaper for home-front fighters entitled "Civilian Front." Publishers work closely with national OCD office.

One Stack Idle, but Gary Sets New Pig Iron Records

Despite the fact only 11 of its 12 blast furnaces were in operation, more pig iron was produced at Gary Works of Carnegie-Illinois Steel Corp. in the week of Nov. 9 than in any other week in the history of the plant. Output was 84,082 tons, 245 tons over the best prior weekly high, established in June with all 12 furnaces operating. The idle stack is being rebuilt and enlarged.

An important factor was a new 24-hour record, Nov. 14, when output was 400 tons above the best mark previously made with all furnaces smelting.

American Steel & Wire Co. plants in October set 83 new production records, a total of 718 since Pearl Harbor. Worcester, Mass., plants led with 33 new marks and Donora, Pa., plants second with 29. The plant at New Haven, Conn., set 10 new highs, Cleveland plants eight, Joliet, Ill., six, Waukegan, Ill., 5 and Trenton, N. J., and Rankin, Pa., one each.

Five production records were made in October by Columbia Steel Co. plants at Pittsburg, Calif. Hot metal for ingots and castings increased 7.4 per cent, drawn wire 3.6 per cent, and welding wire for West Coast shipyards 6.5 per cent. The plant foundry, engaged almost entirely on ship castings, made shipments of 12.6 per cent more tonnage than in any prior month and actual production was up 8 per cent. A small increase in nail production also was noted.

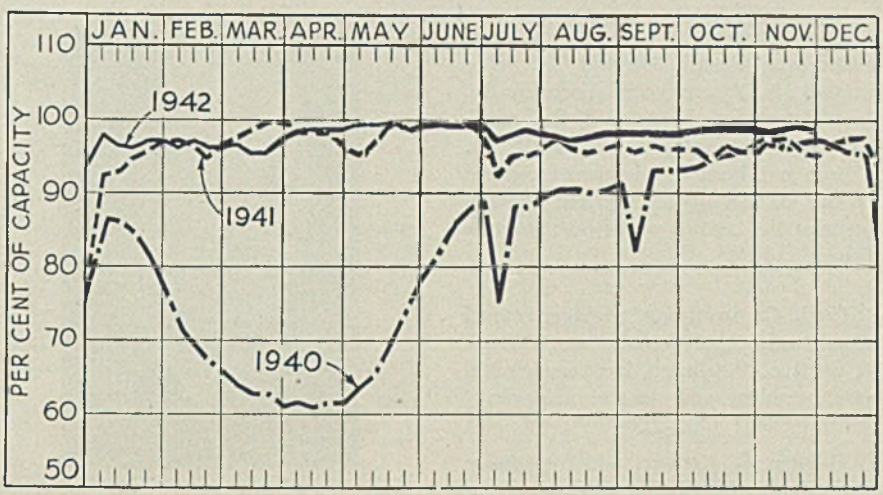
Iron, Steel Inventories Higher in September

September index of the value of iron and steel manufacturers' inventories was 136.3 in September, compared with 134.3 in August and 126.0 in September of last year, according to the monthly survey of the Department of Commerce.

Index of the value of iron and steel manufacturers' shipments, taking an average month of 1939 at 100, was 217 in September, compared with 215 in August, and 216 in September, 1941.

New orders for iron and steel received by manufacturers was 257 in September, 222 in August, compared with 249 for September, 1941.

Production of tin in the 1000-year-old mines of Cornwall, United Kingdom, is reported to be increasing despite labor and machinery shortages, according to the Department of Commerce. The British Ministry of Supplies and mine owners are endeavoring to compensate in part for loss of Malayan mines.



STEEL . . . . . DOWN

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week receded ½-point to 99 per cent. One district advanced, five declined and six were unchanged. A year ago the rate was 95 per cent; two years ago it was 97 per cent, both computed on the basis of capacity as of those dates.

Chicago—Down 1½ points to 100½ per cent as furnaces were taken off for repairs. Carnegie-Illinois Steel Corp. blew out its "E" stack at South Chicago, Nov. 20 for relining.

Youngstown, O.—Three bessemers and 77 open hearths were in production, the rate being steady at 97 per cent.

Birmingham, Ala.—Unchanged at 95 per cent, with 23 open hearths operating. Republic Steel Corp. has blown out its No. 1 Gadsden furnace for relining.

St. Louis—Held at 94 per cent, with the same rate probable for this week.

Cincinnati—Two open hearths idle for repairs held production to 91 per cent.

Buffalo—Production continued at 90½ per cent last week, four open hearths being out of service for relining.

New England—Removal of an open hearth reduced production 5 points to 95 per cent.

Central eastern seaboard—Steelmaking was steady at 96 per cent, a rate which has held since the final week of September.

Pittsburgh—Return of some repaired equipment to service caused production to advance ½-point to 98½ per cent.

Wheeling—Dropped 5½ points to 81 per cent.

Cleveland — Need for furnace repairs caused a drop of 2½ points to 92½ per cent.

Detroit—Dropped 3 points to 91 per cent because of furnace repairs.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week ended Nov. 28	Change	Same week 1941	Same week 1940
Pittsburgh	98.5	+0.5	96	97
Chicago	100.5	—1.5	99.5	99.5
Eastern Pa.	96	None	90	91
Youngstown	97	None	88	93
Wheeling	81	—5.5	92	98.5
Cleveland	92.5	—2.5	95.5	89
Buffalo	90.5	None	79	95.5
Birmingham	95	None	90	100
New England	95	—5	100	82
Cincinnati	91	None	87.5	91.5
St. Louis	94	None	93.5	87.5
Detroit	91	—3	95	97
Average	99	—0.5	*95	*97

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

Foundry Equipment Sales Index Rises in October

Foundry Equipment Manufacturers' Association, Cleveland, reports index of net orders closed on new equipment in October was 552.2 compared with 452.4 in September and 536.7 in August.

Total sales index was 540.6 in October, 446.4 in September and 510.8 in August. Index for repairs in October was 505.5, in September 428.4 and in August 433.0.

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

Indicating the increased tempo of Liberty ship construction, American Hammered Piston Ring Division of Koppers Co., Baltimore, recently made a single shipment to a western shipyard of enough piston rings for 50 vessels.

MEN of INDUSTRY

Harry Crump, the past 26 years associated with General Electric Co., Schenectady, N. Y., has joined Carboloy Co. Inc., Detroit, as assistant to **K. R. Beardslee,** sales manager. Since 1929 Mr. Crump has been development engineer on carbide tool applications and development at the central works laboratory in Schenectady.

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Hugh C. Armstrong, manager, monel metal and nickel department, Williams & Co. Inc., Pittsburgh, has been elected vice president and general manager.

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Herman C. Frentzel, chief engineer, and **Charles G. Eisenberg,** chief of the Body and Hoist Division, Heil Co., Milwaukee, have been appointed works manager and chief inspector, respectively.

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A. F. Waltz, president, Advance Pressure Castings Inc., Brooklyn, N. Y., was elected president of the American Die Casting Institute at its annual meeting in Cleveland, Nov. 18. **H. H. Weiss,** president, Superior Die Casting Co., Cleveland, was elected vice president.

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John Wyeth II has been named assistant treasurer, Wyeth Hardware & Mfg. Co., St. Joseph, Mo.

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Carl D. Schooley has been named branch manager of the Portland, Oreg., branch of Union Wire Rope Corp. He was formerly northwest representative for the company at Minneapolis.

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J. E. Adams, general manager, Merchandising Division, Toledo Steel Products Co., Toledo, O., has been elected vice president.

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W. P. Hopkins, the past 14 years associated with the purchasing department, Illinois Central railroad, Chicago, has been appointed purchasing agent, Tuthill Pump Co., Chicago.

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Karl Landgrebe has been named vice president, Goslin-Birmingham Mfg. Co., Birmingham, Ala. Mr. Landgrebe retired recently as vice president, Tennessee Coal, Iron & Railroad Co., Birmingham, after 43 years of active service.

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Philip M. Morgan, president, Morgan Construction Co., Worcester, Mass., and **David G. Baird,** vice president, Marsh & McLennen, New York, have been elected directors, Wickwire Spencer Steel Co., New York.

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F. R. Cashner has been appointed chief production engineer, Portsmouth works,

HARRY CRUMP

A. F. WALTZ

Wheeling Steel Corp., Portsmouth, O. Heretofore he had served in an executive capacity at the Benwood, W. Va., works. Mr. Cashner succeeds **H. L. Johnston,** who has become assistant to **John Fenton,** manager of the Beechbottom works, Beechbottom, W. Va.

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Edward C. Acree, for many years general assistant to the treasurer, Marshall Field & Co., Chicago, has been appointed budget director, Green River plant, Stewart-Warner Corp., Dixon, Ill.

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F. G. Gurley, vice president in the executive department, Atchison, Topeka & Santa Fe railroad, Chicago, has been elected a director to succeed **Clarence M. Woolley,** resigned.

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H. L. Harvill has organized his own company, the H. L. Harvill Co., which will specialize in centrifugal, pressure and die castings as well as permanent molds. Associated with Mr. Harvill are **R. C. Beck,** chief engineer; **Adolph Oswald,** permanent mold design; **S. I. Gleason,** metallurgist; **Dale Norton,** casting foreman; **L. W. Johnson,** office manager, and **M. C. Goodfellow,** purchasing agent. The company is located at 2223 East Thirty-seventh street, Los Angeles.

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Chester V. Nass, the past 14 years associated with Fairbanks, Morse & Co., Chicago, the last six years as assistant general superintendent of the Beloit, Wis., foundries, has joined Pettibone Mulliken Corp., Chicago, as manager of the Foundry Division.

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W. T. Burgess has been appointed advertising manager of Denison Engineering Co., Columbus, O. He joins the Denison company after seven years experience in Ohio and Pennsylvania industrial advertising and publicity circles, and two years of newspaper advertising and agency work in Pittsburgh.

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John Pugsley, comptroller, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., has been elected to active membership in the Controllers Institute of America, New York.

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Felix Doran Jr., general manager of the Fleet Division, General Motors Corp., Detroit, has been appointed assistant chief of the tank and vehicle section of the Supply Branch of the Tank-Automotive Center of the Ordnance Department in that city. He has been associated with General Motors 22 years, and in his new work will assist **Lieut. Col. W. K. Ghormley,** chief of the tank and vehicle section.

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P. A. Ravelt, who since 1916 has served in sales and technical capacities with Willys-Overland, and as advertising consultant to Ford, Pontiac and Chrysler motor companies, and Goodyear Tire & Rubber Co., has been named automotive specialist for the Detroit regional office of the War Production Board.

H. B. Harper, formerly associated with Ford, Willys-Overland and Studebaker, has been named automotive specialist in the Toledo office of WPB.

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Sterling Morton, secretary, Morton Salt Co., Chicago, has been nominated for reelection as president of the Illinois Manufacturers' Association. **H. G. Myers,** Gardner-Denver Co., Quincy, Ill., is the nominee for first vice president; **Howard Goodman,** Goodman Mfg. Co., Chicago, second vice president; and **E. F. Mansure,** E. L. Mansure Co., Chicago, treasurer.

Nominees for directors include: **John H. Collier,** Crane Co., Chicago; **Charles S. Davis,** Borg-Warner Corp., Chicago;

Burton F. Peek, Deere & Co., Moline, Ill.; **C. W. Senseabaugh,** Wester-Austin Co., Aurora, Ill.; **L. G. Sever,** Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.; **D. P. Sommer,** Keystone Steel & Wire Co., Peoria, Ill.; and **Wilfred Sykes,** Inland Steel Co., Chicago.

Election will be held at the association's annual meeting at the Palmer House, Chicago, Dec. 8.

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H. A. Erickson has been appointed sales engineer for Watson-Standard Co., Pittsburgh, maker of paints, industrial finishes and protective coatings. Mr. Erickson will be in charge of industrial technical service in northwestern Pennsylvania and central and western New York. His headquarters will be at 148 Newton avenue, Jamestown, N. Y.

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Jerome L. Klaff, H. Klaff & Co. Inc., Baltimore, has been elected president, Seaboard chapter, Institute of Scrap Iron and Steel Inc., succeeding **Hyman H. Block,** N. Block & Co., Norfolk, Va., who has been president the past two years. **John D. Schapiro,** Boston Iron & Metal Co. Inc., Baltimore, has been elected vice president, while **Nathan Brenner,** Joseph Brenner & Son, Baltimore, has been re-elected secretary-treasurer.

Sam H. Bassow, Bassow Bros., Bronx, N. Y., has been elected president, New York chapter of institute. **Charles J. King,** Charles J. King Scrap Iron & Steel Corp., Brooklyn, N. Y., has been elected first vice president; **Arnold Weinstein,** Independent Scrap Iron Corp., Brooklyn, second vice president; **Al Spritzer,** Mt. Vernon Iron & Steel Co. Inc., Mt. Vernon, N. Y., re-elected secretary; and **Al A. Gerson,** Harlem Metal Corp., New York, re-elected treasurer.

Safety Council Names Sectional Officers

Sectional officers of the National Safety Council, Chicago, have been selected for 1943. General chairman is R. H. Ferguson, Republic Steel Corp., Cleveland. John P. O'Rourk, Bethlehem Steel Co., Sparrows Point, Md., and Earl Fyler, Carnegie-Illinois Steel Corp., Gary, Ind., are vice chairmen.

Secretary and news letter editor is Jacob L. Ridinger, Inland Steel Co., East Chicago, Ind.

Committees include:

Contest: Chairman, H. L. Rebrassier, Wheeling Steel Corp., Wheeling, W. Va.; D. V. Medalie, Interlake Iron Corp., Chicago; P. R. McMahon, Superior Steel Corp., Carnegie, Pa.; Clarence A. Miller, Chase Brass & Copper Co., Waterbury, Conn.

Engineering: Chairman, F. O. Miller, Carnegie-Illinois Steel Corp., Pittsburgh; J. P. Gathenum, Great Lakes Steel Corp., Ecorse, Mich.; F. R. Henderer, Carnegie-Illinois Steel Corp., Pittsburgh; C. S. Phillips, Revere Copper & Brass Inc., Rome, N. Y.

Foundry: Chairman, John P. Leonard, Blaw-Knox Co., Pittsburgh; H. S. Simpson, Caterpillar Tractor Co., Peoria, Ill.

Health: Chairman, Dr. A. G. Kammer, Inland Steel Co., Indiana Harbor, Ind.; Dr. J. H. Chivers, Crane Co., Chicago; Dr. T. Lyle Hazlett, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Membership: Chairman, C. D. Dorworth, Alan Wood Steel Co., Conshohocken, Pa.; T. O. Armstrong, Westinghouse Electric & Mfg. Co., Springfield, Mass.; J. N. Mahan, Continental Steel Corp., Kokomo, Ind.

Poster: Chairman, N. B. MacHose, Bethlehem Steel Co., Lackawanna, N. Y.; C. A. Bianchi, H. H. Robertson Co., Ambridge, Pa.; F. J. Conroy, Union Carbide & Carbon Corp., Niagara Falls, N. Y.; T. R. Smith, Republic Steel Corp., Youngstown, O.

Program: Chairman, Frank W. Kelsey, Jones & Laughlin Steel Corp., Aliquippa, Pa.; J. F. Collins, Youngstown Sheet & Tube Co., Youngstown, O.; E. E. Greene, The Timken Roller Bearing Co., Canton, O.; H. G. Hensel, Youngstown Sheet & Tube Co., Chicago.

Publicity: Chairman, E. A. Ellis, Wheeling Steel Corp., Wheeling, W. Va.; M. W. Dundore, Beloit Iron Works, Beloit, Wis.; W. J. Hoofe, Chase Brass & Copper Co., Cleveland; Homer L. Rogers, Sheffield Steel Corp., Kansas City, Mo.

Railway Car Builders: Chairman, P. J. Brand, Pullman-Standard Car Mfg. Co., Chicago.

Statistics: Chairman, H. H. Henry, Jones & Laughlin Steel Corp., Cleveland; J. M. Brooks, Miehle Printing Press & Mfg. Co., Chicago; J. A. Coltrin, The National Radiator Co., Johnstown, Pa.

Members at Large: C. M. Allen, The American Rolling Mill Co., Middletown, O.; F. G. Bennett, The Buckeye Steel Castings Co., Columbus, O.; E. F. Blank, Jones & Laughlin Steel Corp., Pittsburgh; Irvin A. Brinkman, Mackintosh-Hemphill Co., Pittsburgh; R. A. Chaffin, Continental Steel Corp., Kokomo, Ind.; J. E. Cullimey, Bethlehem Steel Corp., Bethlehem, Pa.; H. W. Darr, Bethlehem Steel Corp., Johnstown, Pa.; John P. Eib, American Steel & Wire Co., Chicago; George T. Fonda, Weirton Steel Co., Weirton, W. Va.; H. J. Griffith, Jones & Laughlin Steel Corp., Pittsburgh; S. E. Hawkes, Macwhyte Co., Kenosha, Wis.; F. A. Lauerman, Republic Steel Corp., Youngstown, O.; J. A. Northwood, Bethlehem Steel Corp., Sparrows Point, Md.; J. A. Oartel, Western Pennsylvania Safety Council, Pittsburgh; Robert L. Schmitt, Louisville Car Wheel & Railway Supply Co., Louisville, Ky.; H. J. Spoerer, Youngstown Sheet & Tube Co., East Chicago, Ind.; J. A. Voss, Republic Steel Corp., Cleveland.

OBITUARIES . . .

Frederick Van Voorhees Lindsey, 64, vice president and general sales manager, Driver-Harris Co., Harrison, N. J., died Nov. 16, in New York. Prior to joining Driver-Harris in 1925, he was vice president and general manager, Electrical Alloy Co., Morristown, N. J.

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Frank J. Weschler, 59, vice president, Chain Belt Co., Milwaukee, and general manager of Baldwin-Duckwork, a division of Chain Belt at Springfield and Worcester, Mass., died Nov. 10 in Worcester.

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T. L. Taliaferro, 62, general manager, Phoenix Metal Cap Co., Chicago, died in LaGrange, Ill., Nov. 17. Before joining Phoenix Metal Cap Co. in 1913, then the Phoenix-Hermetic Co., he was associated with American Can Co., Continental Can Co., and Hazel-Atlas Glass Co.

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Addison P. Parker, 63, head of the personnel department at General Electric Co.'s Lynn, Mass., plant, died in that city recently.

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W. K. Stuart, 72, former vice president and general manager, Koppel Division of Pressed Steel Car Co., Pittsburgh, died Nov. 14.

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Harlow Bradley, 50, since April, 1941, supervisor of foreign dealers, Allis-Chalmers Mfg. Co., Milwaukee, died Nov. 15. In 1920 Mr. Bradley went to the company's Paris office as a sales engineer and in 1929 became European manager for the tractor division. He returned to Milwaukee in 1936.

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Berry Turtle, 61, president, Turtle & Hughes Inc., New York, died Nov. 17, in that city. Born and educated in New York, he founded his own company in 1923.

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William H. Fenley, 66, since 1922 western manager, with headquarters in Chicago, Kerite Insulated Wire & Cable Co., New York, died in Riverside, Ill., Nov. 22.

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Douglas Edmund Price, 42, associated with Koppers Co., Pittsburgh, 22 years, died Nov. 18, at his home in Claridon, O. He was contract manager of the Tar and Chemical Division when he retired in 1939 because of ill health.

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Thomas J. Laurence, 65, heat treating furnace engineer for Chrysler Corp., died in Detroit, Nov. 20. He had been associated with Chrysler 20 years, and consulted on the design of furnaces installed throughout the company's numerous plants.

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Roy H. Mabey, 46, chief of the ordnance inspection department, West Pullman works, International Harvester Co., Chicago, died in that city, Nov. 22.

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Robert H. Watson, consulting metallurgist for Hanna Furnace Corp., Ecorse, Mich., died in Syracuse, N. Y., Nov. 21. He was in charge of first operations of the Hanna blast furnaces on Zug Island, near Detroit, 25 years ago. Later he was consulting metallurgist for Semet-Solvay Co. for a number of years.

PRIORITIES–ALLOCATIONS–PRICES

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

M ORDERS

M-1-i (Amendment): **Aluminum,** effective Nov. 20. Limits use for deoxidizing steel for cartridge cases and boxes to a maximum of four pounds of aluminum per ton of steel and for castings to 2.5 pounds per ton of metal charged into the furnace. Removes the provision restricting use of aluminum in zinc base alloy to 2 per cent by weight.

M-21-d (Amendment): **High Chromium Steel,** effective Nov. 18. Prohibits delivery and use of corrosion and heat resistant alloy iron or alloy steel containing 4 per cent or more chromium except on rating of AA-5 or higher or on rating of A-1-k, if material was acquired prior to Nov. 18. Restriction does not apply to fully fabricated articles.

M-63 (Amendment): **Imports of Strategic Materials,** effective Nov. 23. Moves metallic mineral substances in crude form and not otherwise classified from List I (materials which may not be imported by persons other than Government agencies without special WPB authorization; imports may continue under existing contracts but special authorization to process or move the commodities, once imported, must be secured) to List II (materials which do not require special authorization to process or move.)

L ORDERS

L-1-g (Amendment): **Motor Truck and Trailers,** effective Nov. 19. Prohibits manufacture of truck trailers of all sizes for non-military use. L-1-h Amendment, effective Nov. 19, extends the time within which 4000 heavy trucks authorized under the order may be produced to the period Aug. 1, 1942, to March 31, 1943.

L-30-d: Household Utensils, effective Nov. 23. Prohibits use of metal in kitchen gadgets, cooking utensils and housewares, except as specifically provided in the order or in other orders of the L-30 series.

L-92 (Amendment): **Fishing Tackle,** effective Nov. 18. Prohibits use of metal, plastics or cork for repairing non-commercial fishing tackle or for production of repair parts for such tackle. Replacement parts fully fabricated on Nov. 18 and repair parts using iron or steel which had been partly fabricated on Nov. 18 to the point where they could be used for no other purpose are exempt from the restriction.

L-154 (Amendment): **Power, Steam and Water Auxiliary Equipment,** effective Nov. 21. Prohibits use of copper, copper-base alloys, or alloys containing nickel, chrome or tin in tubing or tube sheets for feed water heaters. Materials needed for repair of an actual breakdown which involves replacement of not more than 25 per cent of the tubing in a heater are excepted from the order.

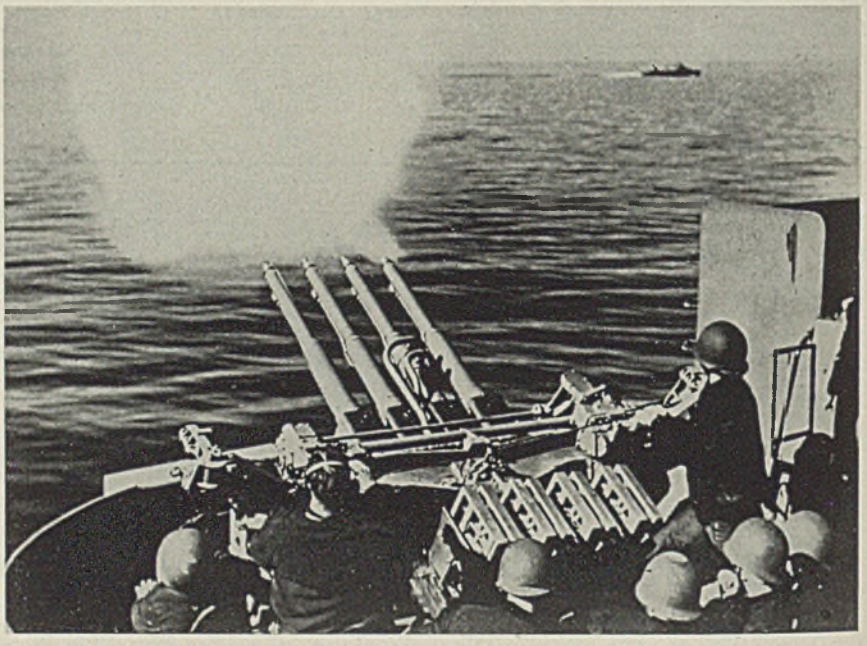
L-217: Construction Machinery, effective Nov. 17. Provides for application of conservation and simplification measures to various types of equipment. Schedule I. denies use of alloy steel in manufacture of scrapers, other than those listed on production schedules approved by Director General, and for those it may be used only until Dec. 15, 1942. After Dec. 15, no manufacturer shall use alloy steel in production or assembly of scrapers or repair parts, except for use in power control units, prime movers, and anti-friction bearing.

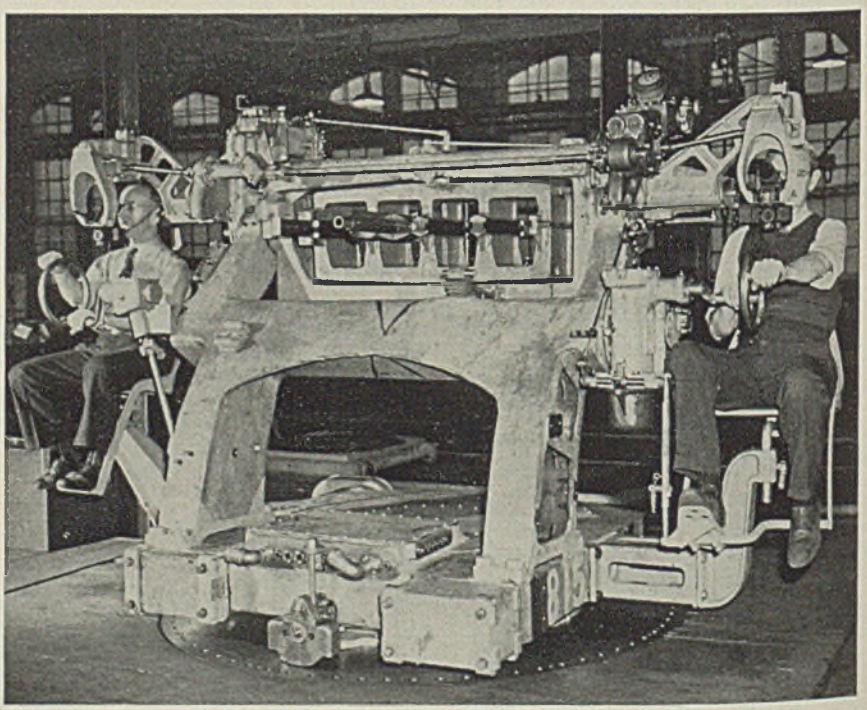
L-230: Military Arms, effective Nov. 16. Prohibits sale, transfer or delivery of all military arms, except to a governmental agency; for export on an authorized export license; with specific authorization of WPB; or non-operating arms to a scrap dealer who in turn may sell to a smelter. Rifles, pistols and shotguns are not covered unless they are of a type that fires automatically.

PRICE REGULATIONS

General Maximum Price Regulation (Amendment): Effective Nov. 18, imported metalliferous ores and concentrates and imported and domestic blister copper and lead bullion are excluded from the regulation.

No. 12 (Amendment): **Brass Mill Scrap,** effective Nov. 19. Specially prepared brass mill





MULTIPLE ACK-ACK IN ACTION

OFFICIAL U. S. Navy photo shows the 1.1-inch gun now in service on every type of American fighting ship. This unit, firing hundreds of shells a minute, played a significant role in recent battles. Record-breaking production of the gun mounts by Westinghouse Electric Elevator Co., was disclosed last week. Lower photo shows inspectors testing gun sights for alignment with grooves in which gun barrels are inserted. Westinghouse is reported to have cut cost of each unit from $27,000 to $12,000, and work on each from 8500 man-hours to 2100

scrap buyers, other than brass mills, ingot makers and copper smelters and refiners may apply for and OPA may grant in writing a special maximum price.

PRIORITIES REGULATIONS

No. 13 (Amendment) Effective Nov. 17, sellers of copper or copper base alloy items which have been previously reported to WPB must send copy of the invoice to WPB, care of Copper Recovery Corp., 200 Madison avenue, New York City. Sellers of steel or steel base alloy items which have been reported to the WPB must send copy of the invoice to WPB, care of Steel Recovery Corp., 5835 Baum boulevard, Pittsburgh. Makes some revisions in ratings allowed buyers of certain products.

CMP Provisions Explained; Time Flow Chart of Operations Issued

STEEL mills may refuse to accept orders if booked to capacity, but must report such refusal and the reasons therefor to Controlled Materials Plan Division of WPB. This was brought out at a regional meeting in New York last week when the Controlled Materials Plan was explained to several thousand manufacturers. Similar meetings are scheduled for other cities.

In case of such refusal, the Controlled Materials Plan Division will accept responsibility for meeting the consumer's requirement, provided the latter is under allotment and is included in the production schedule.

Each mill producing any of the three materials under control—steel, aluminum and copper—will be told what and how much of a given product may be rolled each month.

Warehouses will be allocated earmarked stocks, it was explained.

It was re-emphasized that when CMP becomes effective, none of the three controlled materials may be purchased without an allotment number. Priority ratings will be of no value in obtaining the controlled products.

Other Materials Under Priorities

However, priority ratings still will be used for buying other materials. All other materials needed to go with the copper, steel and aluminum must be bought only in such amounts as needed and must be delivered in line with the deliveries of the controlled materials.

To further aid manufacturers to understand the plan, the Controlled Materials Plan Division last week issued a time flow chart of progressive operations. Various steps listed are:

Claimant agencies complete the collection of bills of material and estimate requirements, pursuant to instructions from Requirements Committee, Nov. 1 to Jan. 1.

Claimants submit requirements to Controlled Materials Division with a copy to Requirements Committee, showing controlled materials required, by months, broken down as between (a) production, (b) construction and facilities, and (c) maintenance, repair and operating supplies. These must be submitted by Jan. 1.

Controlled Materials Division and Office of the Vice Chairman analyze requirements submitted by claimant agencies and make preliminary reconciliation to the extent possible between requirements and supply, Jan. 1 to 15.

Claimant agencies and prime consumers proceed to develop information necessary in making final allotments, in order to be in readiness for distribution of allotments when made by Requirements Committee, Dec. 1 to Feb. 1.

Requirements Committee makes allotment of controlled materials to claimant agencies for second quarter of 1943, by Feb. 1.

Claimant agencies distribute allotments to prime consumers, Feb. 1 to March 1.

Prime consumers divide up allotments authorized by claimant agencies between secondary consumers and consumers; place authorized orders with suppliers, starting Feb. 1.

Controlled Materials Divisions watch placement of orders on mills and mills' shipments and render assistance in placing orders for consumers of controlled materials who are unable to obtain mill acceptance of authorized orders, March 1.

Producers start shipments and reports to Controlled Materials Unit, March 15.

CMP materials flow starts April 1 on allotments issued. Other prime, secondary consumers use PRP during April-May-June transition period.

July 1 is deadline, after which no controlled material will be issued except under CMP.

Kanzler Says WPB Must Deal With Industry as One Unit

War Production Board has found it necessary to deal with American industry as "one tremendous integrated production unit," Ernest Kanzler, WPB director general of operations, said at the New York regional conference held to acquaint manufacturers with the Controlled Materials Plan. (See foregoing article.)

"All our efforts are directed toward smashing the Axis," he said "Speed is the great factor and it is necessary that materials be at the proper place at the proper time. To back up the fighting fronts we must back up the home industrial front with a controlled materials plan."

Mr. Kanzler emphasized that the only programs that would be authorized are those that actually are "do-able."

"Otherwise," he explained, "we would mislead the military chiefs of staff. If we promise them 6000 tanks for January, just to use an arbitrary figure, and fail to deliver them because of lack of materials, that is serious. The alternative would be to take away materials from other vital products, thus creating an unbalance."

Mr. Kanzler remarked that the plan probably would undergo many changes as result of suggestions received in the various regional educational conferences.

Steelworkers' Research Director Now Steel Division Assistant

Harold J. Ruttenberg, research director for the United Steelworkers of America-CIO since 1936, has been appointed assistant to the director of the Steel Division. The appointment is in line with the recently-adopted WPB policy of giving organized labor a greater voice in war production planning.

T. Spencer Shore, director of Industry Advisory Committees in the WPB has resigned, and will be succeeded Dec. 15 by Barry T. Leithead, Scarsdale, N. Y., who has been principal industrial advisor in the division.

George L. Gillette, Minneapolis, has been appointed director of the WPB Farm Machinery and Equipment Division. Mr. Gillette has been vice president and general sales manager of the Minneapolis-Moline Power Implement Co. He succeeds William R. Trace, who has accepted a position in the Motor Transport Division.

Bureau of Mines To Continue Most Construction Projects

Bureau of Mines last week announced the majority of its wartime construction, suspended by WPB, has been given the "green light" following a hearing before WPB's Facility Review Committee.

Ferdinand Eberstadt, program vice chairman, in a letter to Secretary Ickes said construction may continue on bureau's helium, explosives research, synthetic oil and aluminum pilot plant projects.

WINDOWS of WASHINGTON

Employes' suggestions are one of America's "secret weapons". War Production Drive encourages idea from the man in the shop. Many receive merit awards for time-saving proposals

WAR Production Drive Headquarters is plowing its crop of suggestions back into industry.

American workmen's suggestions and ideas for greater production have been termed "America's secret weapon." The drive has been stimulating these suggestions by a series of awards. In addition to large numbers of Awards of Individual Production Merit conferred by labor-management committees within plants, War Production Drive Headquarters has granted 39 Certificates of Individual Production Merit and 45 letters of honorable mention.

The ideas to win prizes have been given wide distribution through labor-management committees. As a consequence, ideas proven successful in single plants are now spreading through entire industries.

A new synopsis of prize-winning ideas has been compiled by War Production Drive Headquarters. Each suggestion has been assigned a number. American war plants interested in examining any of these ideas in greater detail may have a full report by writing to the headquarters, Hotel Raleigh, Washington, citing the number. The synopsis of items pertaining to the metalworking industries follows:

Machining Methods

251—A method for changing from a milling operation to a hand grinding operation on a shoulder rest piece on the Oerlikon Shoulder Rest Assembly.

Result: Saved 425 man hours per month—released a milling machine and a grinder.

248—Different method of machining the outside circumference of the top plate of the cylinder by designing a fixture for an engine lathe which eliminated the old method of machining on a vertical mill.

Result: Output increased by 60 per cent from 40 to 65 pieces per shift and a simple turning tool is used without undue breakage. Finish has been greatly improved, manual labor and costs substantially reduced.

244—A new method to combine two polishing operations on outside of cylinder barrel into one by using two wheels simultaneously with spacer in between. Suggester later developed a double wheel.

Result: Output was increased by 50 per cent from 64 to 96 pieces per shift by new method. Formerly used 12 single wheels per shift, now use three double wheels, due to greater rigidity of double wheel and subsequent less wear. Also obtained better finish.

245—Elimination of two operations on fork and blade rods. Connecting rod is held in special fixture. Operation is milling of bosses on pin end. A hollow mill cutter, descending on piece, mills the outside surface and radius at the bottom of boss. Rod is then turned over and same operation performed on other side. Cutter blades are held in head.

Result: Two machines and four men are eliminated, thus effecting an annual saving of $14,000 plus the cost of two machines. There is also some saving of time by eliminating second set-up.

Spot Facing Eliminated

246—Elimination of one operation on cylinder head by having core plug set at same level as cam bracket, thus eliminating the spot facing operation. Both faces must be machined to extreme accuracy and in perfect parallel with bottom face of head.

Result: Spot facing was eliminated, thus saving one radial drill and the time of this operation. More accurate surface on core plug face was obtained through milling than by spot facing.

170—New method of lapping diamond pointed tools used for dressing wheels of thread grinders.

Result: On each lapping, the cutting life of the tool is increased 300 per cent at and added cost of only 25 cents. In total 18 cutting edges are secured from a single diamond as against its original two.

220—Multiple torch arrangement for brazing tool tips to tool shanks. Device uses three torches which play equally on tool tips to give even brazing of carbide tips to tool shank. From the source of supply, the fuel passes through regulators to snap-off valve, then to manifold pipes, escapes through needle valves and then to blowpipes, where it is mixed. It feeds all three torches.

Result: This method replaces that of doing tool tip brazing by hand torch and electric furnace, which caused scale. Production of shells suffered because of tool tips breaking due to poor brazing. New method adopted and proven most successful.

232—A special arbor for loading brake cross levers into milling machine.

Result: Now forty brake shaft levers are milled where only two were milled before. Actual time saved is one-third of the former operation. Instead of a time of .012 hours to mill one piece, it is now done in .008, increasing production 33 1/3 per cent.

226—A power knife to replace a hand operation in handling any size plaster form which needs to be changed.

Result: Reduce the time required for cutting an average 1¼ hours per airplane fuel tank. Original idea that will enable women to do work formerly done by men.

224—A new method of construction on large airplane fuel tanks which involved cutting the tie gum for the corners as one piece.

Result: Method now used on all large tanks, effecting savings in repairs and increasing production.

210—Improved method of machining radius on torpedo tube rollers.

Result: Saves approximately 260 man hours per year and enables the plant to use a small engine lathe.

209—Adjustable pilot for countersink. It is threaded, allowing adjustment for wear.

Result: Adjustable pilot countersink can be used considerably longer than solid countersink.

207—Previously spoon extensions were cut with square corners by torch and corners rounded by grinding. Suggestion was to cut corners round instead of square with torch.

Result: Probable saving of 150 to 200 man hours per year plus saving in grinding wheels.

203—Simple portable grinding device to smoothly grind and blend steel barrel with riveted brass and flange.

Result: Saves 2500 man hours per year plus advantage of using unskilled labor rather than relatively skilled labor.

Less Machining of Diesel Cams

204—New method which reduces machining and fit-up time on Diesel engine split air starting cams.

Result: Saving of eight hours per cam is realized by this new method which, over a period of one year, will amount to better than 3100 man hours.

196—New method to remove plate or punched parts from mechanical press in stamping plate material for air cleaner parts.

Result: Press output increased 70 per cent from 585 to 1000 pieces per hour.

192—Work support ring for retainer and disc to prevent work from springing away from turret lathe as unsupported parts pass in a facing operation. Support is given at 9 equally spaced points.

Result: Device eliminates second and

third cuts and rework and is flexible enough to produce satisfactory work despite fact that parts are warped in heat treat and do not present a flat surface that will permit solid backing.

191—Redesign of adapter on shaft to eliminate necessity of loosening and tightening of 4 cap screws taking top half of adapter off and on for each piece, cleaning out chips, blowing out split collett indicating each piece.

Result: New device keeps all chips, oil does not get into collet or adapter and cleaning of adapter is eliminated. Increases production from 30 to 32 to 40 or 45 in eight hours. With this new designing, 5 new adapters will do the same amount of work 8 old ones did.

189—A fixture for an operation on a shaft. Instead of holding part between centers to be milled, it is held in a special V-Block fixture and has a locating finger with a 60-inch V which locates on trunion.

Result: Oil flat comes perfectly true; saves time on truing-up part; set-up time cut in half and set-up made easier.

157—Use of a portable type vacuum cleaner for cleaning carburizing retorts.

Result: Reduced the time for cleaning from 1½ hours to 10 or 15 minutes.

255—New method of drilling cotter key holes on connecting rods. This method provides for one man to operate two spindles on a four-spindle sensitive drill press by tying handles together with a bar.

Result: It is estimated that this will effect a savings of 4000 man hours in a year.

257—By building up a continuous supply of parts to be drilled, reamed and chamfered and changing the method of machining so that one hole could be drilled and another reamed at the same time, the loss of time caused by waiting for the tools to cut is eliminated. This operation is performed on a three-spindle, power-fed, multiple-head drill press.

Result: 3000 man hours saved per year.

New Tools and Fixtures

238—New design holding fixture for grinding form tools. By this holding fixture, the tool can very quickly be set at the proper angle for grinding with the assurance it will remain indefinitely in that position.

Result: The life of the tool is increased by accurate grinding and machine scrapping of parts is thereby greatly reduced. A saving of 66 per cent is realized in the setting-up operation alone.

240—Special socket wrench to facilitate the assembly of the cam and rocker bracket, which eliminates the need to turn bolts by hand until a tongue wrench can be applied.

Result: Increased production from eight pieces per hour for each man to 15 pieces per hour per man or a 90 per cent increase.

241—Tool to assist in checking the supercharger high and low speed clutch operating mechanism, after assembly with Servo-Cylinder.

Result: A 30 per cent saving in time besides being a better method of doing the job with no danger of injury to parts.

242—Tool to assist in taking "free period" and "contact" readings on supercharger clutches before Servo-Cylinder is attached. The use of this tool gives the mechanic full control over the movement of these levers without danger of injury to operating levers or to the shaft on which they operate.

Result: Because of greater efficiency, a saving of 25 per cent can be reasonably expected.

237—Welding rod holder, which can be made in various sizes to accommodate different thicknesses of welding rod. The hole in the holder should be tapered to keep the rod from slipping out.

Result: Saves on welding rods by using each rod in its entirety, with no resultant waste.

233—A special tool which combined two coupling rings on a splined arbor and then the whole assembly set up on an automatic lathe. Formerly a general drive coupling ring was turned out on a standard lathe and then chamfered in another operation on another machine.

Result: In addition to the two coupling rings being turned at the same time, the chamfering operation is also completed simultaneously. A saving of approximately 200 hours a month is made and production is increased 68 per cent.

Repairing Rivet Squeezers

229—Repair of broken squeezers for squeezing rivets.

Result: Can replace broken shafts without damage to head of tool.

223—Guiding or dowel pins to force tank fitting mold to close properly. Previously molds were being recut because of misplaced cavities.

Result: Method now used for tank parts has greatly reduced mold cost and cut down defective parts.

222—A rubber expanding plug to replace wire-tied fittings on hose for testing tanks with air pressure. Used in all tank fitting.

Result: Saves time on operation, eliminates injuries to tanks.

218—Drill square to square a reamer in spot-face surfaces especially in an inaccessible place where a regular square cannot be applied.

Result: Valuable for any type of drilling and reaming of various sizes.

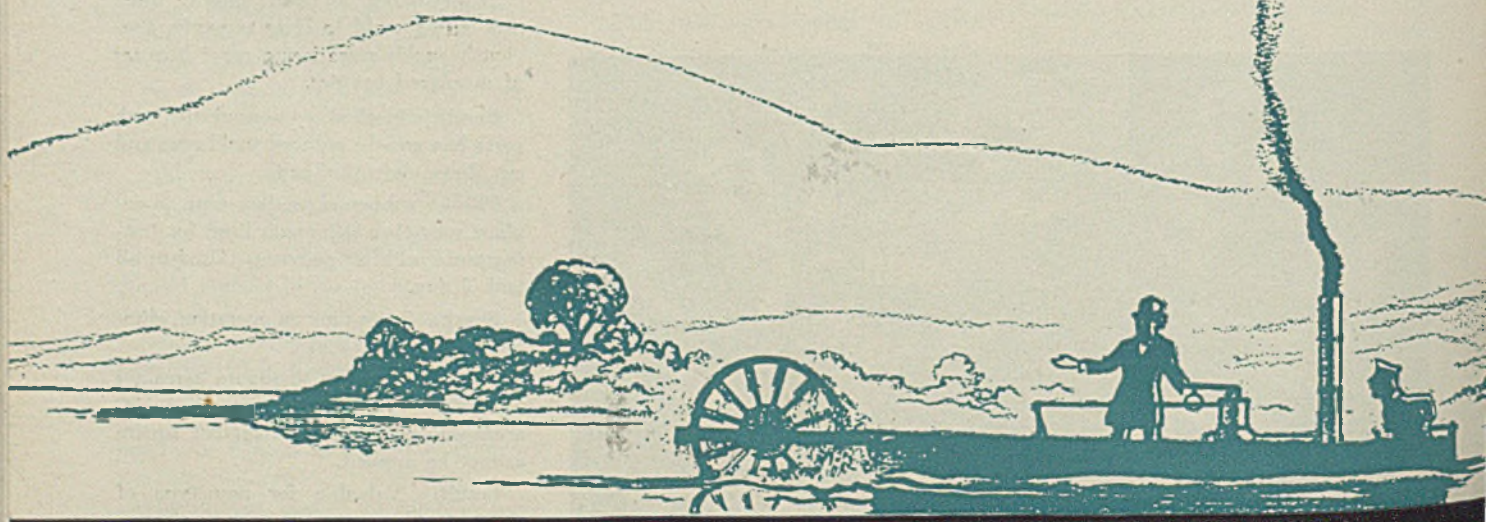
213—Tap wrench. Developed a jig which provides for manufacturing of tap wrenches out of scrap cold rolled and tool steel. Tool steel used at place where tap is inserted.

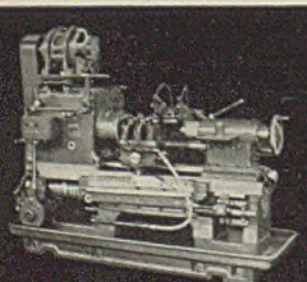
Result: Cut cost of production from $3—$7 each to approximately 60 cents on various sizes of tap wrenches.

Typical of the working of labor-management committees is this group, sitting around a table in a war production plant seeking ideas to save time, increase production and promote greater efficiency

While the Good People

One Sunday morning in the Spring of 1793 (the time when the people were at "meeting" being chosen to avoid the jeers of a crowd in case of failure) Captain Morey launched his steamboat at his ferry landing at Orford and with one assistant to steer, while he himself managed the engine, they steamed up the Connecticut for several miles above Orford and safely returned, making about four miles an hour against a quite rapid current. This was fourteen years before the first trip of Fulton's "Clermont" upon the Hudson.





FAY AUTOMATIC LATHES

AUTOMATIC THREAD GRINDERS

OPTICAL COMPARATORS

AUTOMATIC OPENING DIE HEADS

were at "Meeting"

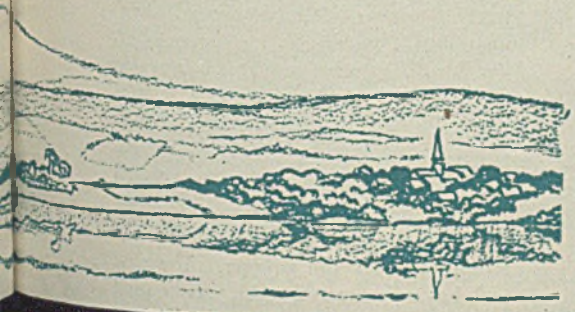
THE last steamboat that Captain Morey made with the original engine of 1793 now lies at the bottom of the Vermont lake that bears his name. Yet the same progressiveness shown in the life of early Vermont industrial pioneers still characterizes Jones & Lamson Machine Company today.

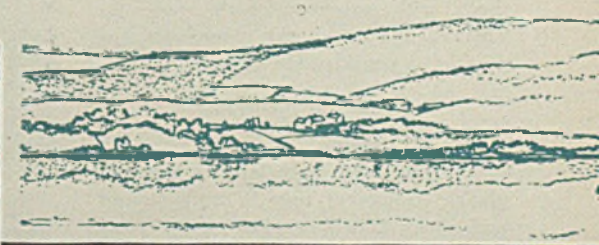
Today's problems, and those of the half-seen tomorrow, are infinitely more complex than those of Captain Morey and his contemporaries but the same spirit that vitalized them is serving industry and our country today. Whether your company is large or small your inquiry, addressed to Jones & Lamson, will receive the careful, detailed study of our engineers.

JONES & LAMSON
MACHINE COMPANY

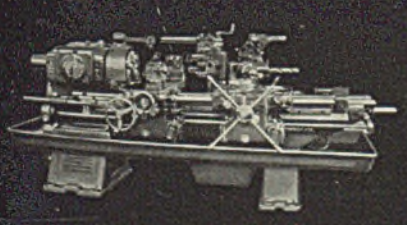
Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

Springfield, Vermont
U. S. A.

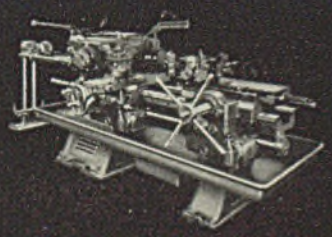




PROFIT-PRODUCING
MACHINE TOOLS



SADDLE TYPE
UNIVERSAL TURRET LATHE



RAM TYPE
UNIVERSAL TURRET LATHE

201—Tool with a 1½-inch offset handle, made of a small piece of ¾-inch plate with a ½-inch pipe handle, to replace stick or hammer handle used by various trippers.

Result: Prevents hand injuries.

198—Set of gages for hand-operated elbow-edging machine.

Result: Has tripled the production of elbows.

187—That standard snap gages be cut in half and mounted so that Go and No Go ends would be side by side. Previously Go and No Go ends were at opposite poles of gages.

Result: Adopted in plant and estimated saving is .02 minutes each time gage is used.

162 — Brake gage. An adjustable gage which may be set so that small parts may be engaged in a sheet metal brake rapidly and at the proper angle and depth, thus facilitating the bending of small parts.

Result: Saves time in set up of job, since the gages require only one set up for each type of bend and definitely insure that all parts will be bent alike.

158—New tool for milling breech block.

Result: Increased production 500 per cent.

156—Special fixture for machining 57mm recoil parts.

Result: Saves 260 hours per year, $300 in immediate labor costs and saves machine time.

247—Better method of checking camshaft gears for fit and backlash by a special horizontal fixture comprising four vertical posts fixed in a plate.

Result: Under the old method, if backlash was not within tolerance limits, it was necessary to remove the nuts and take the gears out of the assembly. As now measured, an unsatisfactory gear may be quickly replaced and once the set is perfectly matched, they can be assembled on the camshafts and rocker shafts with assurance of the same fit. This change in checking methods has resulted in considerable saving of time.

Work Simplification

250—An improved method for making steam coils used in metal cleaning and plating equipment, used in production of tank shoes, tank shoe pins, carbine parts and other war products.

Result: Reduces coil making time by 80 per cent; releases expert welder for other war work, as less experienced operator can do the job with the new method; down time for repairs greatly reduced as replacements are made in shorter time.

205—New method of milling torpedo tube tee guide used for main spoon.

Result: 48 Guides now machined in an eight-hour shift. At least 1500 man hours saved. Crane time eliminated not figured in man-hour saving.

188—Suggested changing height of rolling parts table used in assembly to match height of final benches by installing casters underneath bottom shelf.

Result: Saves a great deal of extra lifting and eliminates hazard of dropping parts.

186—To identify clearly racks on which finished painted parts and unpainted parts are placed, eliminating confusion and loss of time in mixing up painted and unpainted parts.

Result: Increase of 30 per cent in production per man-hour.

258—Method of repairing snap gages. By welding the snap gages with stellite first on one side and then weld on the other side.

Result: This gives stellite tips on both sides and greatly increases their length of service.

228—Tank support bracket parts were made originally by welding the inside and the outside of the joint and then grinding the outside weld flat so that bracket would fit against the mating part. Suggestion to omit the outside weld and grinding operation as inside weld would be sufficient.

Office and Shop Practices

185—When changes are to be made on large jigs and fixtures, a permanent record of the changes should be affixed to the piece to avoid confusion and mistakes.

Result: Provides accurate interpretation of status of any jig or fixture at any time.

184—Notations of L and R on cards used on Parts Location Control Board be combined on one card instead of issuing two separate ones.

Result: Saved $128 per week in cards and wages. Saving of 144 man-hours per week, releasing three clerks (one from each shift) for other duties.

183—A listing service be set up to provide employes with a means of advertising individually-owned tools, precision instruments, etc.

Result: An article in the plant paper announced the service which has been in effect for three months, with $500 worth of tools changing hands.

Aviation

221—Special head for speed screw driver to use in assembling metal shell on Boeing fuel tanks. Operators were not permitted to use speed screw drivers on bolts having screw type heads because if screw driver slipped from bolt, tank would be injured.

Result: Saves approximately ten minutes of assembly time on each fuel tank.

120—Cable stretcher to pre-stretch cables so that there will be no undue take-up required in service.

Result: In addition to pre-stretching the cables, this device allows the stretching of four cables at the same time, without overloading the remaining cables should one break.

161—A tool for the easy insertion and seating of bushings and strainers in fuel tanks. Consists of a combination wrench which will receive the bushing and strainer, providing means for locating the strainer threads in the bushing so that the bushing may be worked into the tank receptacle.

Result: Speeds up operation, reduces difficulties due to crossed threads.

Pitot Tube Installation

195—Pitot tube installation time can be reduced substantially by the use of 6/16-inch spacers of aluminum alloy or dural, placed under the four clips which are on the center spars. These spacers should be ⅜-inch in outside diameter, with a No. 18 hole through the center. The spacers would be installed in the same department where the clips are now installed.

Result: Has saved approximately 33 minutes installation time on each plane of model affected.

182—Bins installed on dollies which carry airplane wings along production line. Formerly workers, while installing hydraulic tubing, gas lines, vacuum lines, etc. on airplanes, had to keep their materials on the floor or in a bin some distance away.

Result: No loss of time on production line every time wings are moved, which happens often during an eight-hour day. Suggestion has been in effect for 2½ months, resulting in a saving of 360 man hours per week.

181—A thin, triangular-shaped metal tool to insert between a stringer and the thin metal skin which permits any dented area of a metal surface to be struck with a fibre mallet until smooth. A metal bar is used to back the stringer. The new tool, having a tapered width, can be used for dents up to approximately 1¾-inch and provide a flatening surface of the proper width.

Result: This removes the necessity of reworking or scrapping the part, thus saving time and costly material.

217—Clamp for Sheet Metal Insulation Molding which aids in Sheet metal work and is used for assembling insula-

tion moldings. It is equipped with handles which may be rotated, permitting clamp to be used where obstructions, such as piping, brackets, etc., are encountered.

Result: Use of clamp speeds up and makes more efficient work on ships.

216—An electrode molder for welding, devised by cutting off jaws of worn out tongs, drilling a hole in rear part which accommodated the electrode. A square fibre was inserted on handle to keep electrode holder from rolling as well as grounding on metal.

Result: Standard tongs usually returned to Repair Dept. every three days formerly. New holder prevents this and also adds a safety feature which stops rolling and grounding.

215—Combination torch guide for burning, which enables operator to burn a straight line, circle and bevel with ease. When it is necessary to burn an irregular line to fit the contour of another plate, this guide will facilitate this operation.

Result: Eliminates usual nerve strain which accompanies endeavor to follow straight line. Cuts are now very clean and no time is wasted by caulker or grinder removing and truing up plate.

214—In the installation of engines, fans, propellers, etc., on board ship, it is necessary to use chock blocks for leveling the beds. These blocks have to be planed of uneven dimensions; therefore, it is necessary to use various dimensions of shims placed under each corner of chock block. The fixtures devised have a micrometer adjustment and are mounted and bolted to a surface plate and set on a shaper at zero. The chock block can be raised at each corner anywhere from .001 of an inch to any desired dimension.

Result: This has speeded up chock block work 75 per cent over the old method, making the work more positive.

212—A new leverage stick for air drills, with a sliding swivel hook which can be adjusted for any leverage to replace former method of using long stick with bored holes and a hood with nut inserted at various points from fulcrum. Holes weakened stick and necessitated frequent replacements as well as being safety hazard.

Result: Cost is nominal, has speeded output, and eliminated the safety hazard.

252—Safety device on all electric hoists for prevention of accidents.

Result: The addition of the safety guard not only strengthens the rollers from spreading, but also stops the fall of the hoist if the pressure is still too great, resting on the rail holding up the hoist until repairs can be made.

ARMY CHIEFS, INDUSTRIAL SCIENTISTS CONFER

BRIG. GENERAL G. M. Barnes, chief of the Technical Division Ordnance Department, Washington shows a model to describe a heavy tank, at the second of a series of conferences by Army Officials and industrial scientists to study methods to improve effectiveness of war materiel.

In the group, left to right, are Dr. Edgar C. Bain, assistant to the vice president in charge of research, United States Steel Corp.; Dr. F. B. Jewett, vice president, American Telephone & Telegraph Co.; Dr. William D. Coolidge, vice president and director of research, General Electric Co.; General Barnes; R. Furrer, vice president, A. O. Smith Corp.; Dr. F. Sparre, director, E. I. duPont de Nemours & Co.; C. L. Bausch, vice president in charge of research and engineering, Bausch & Lomb Optical Co.; Fred M. Zeder, vice chairman of the board, Chrysler Corp. Official U. S. Army photo

Urges Immediate Reports On Steel Inventories

Steel Recovery Corp., 5835 Baum boulevard, Pittsburgh, calls attention to the fact that any firm which has inventories of steel products in excess of 1000 pounds must report the fact on Form 1663 at once.

Those who have not received a copy of this form are requested by Steel Recovery Corp. to write to the above address and request copies.

Further, it states: "All companies with more than one plant should return a form for each plant at which steel inventories are located. This should be done whether or not you have sent in a form covering inventories at all plants."

FBI Prepared To Act If Sabotage Threatens

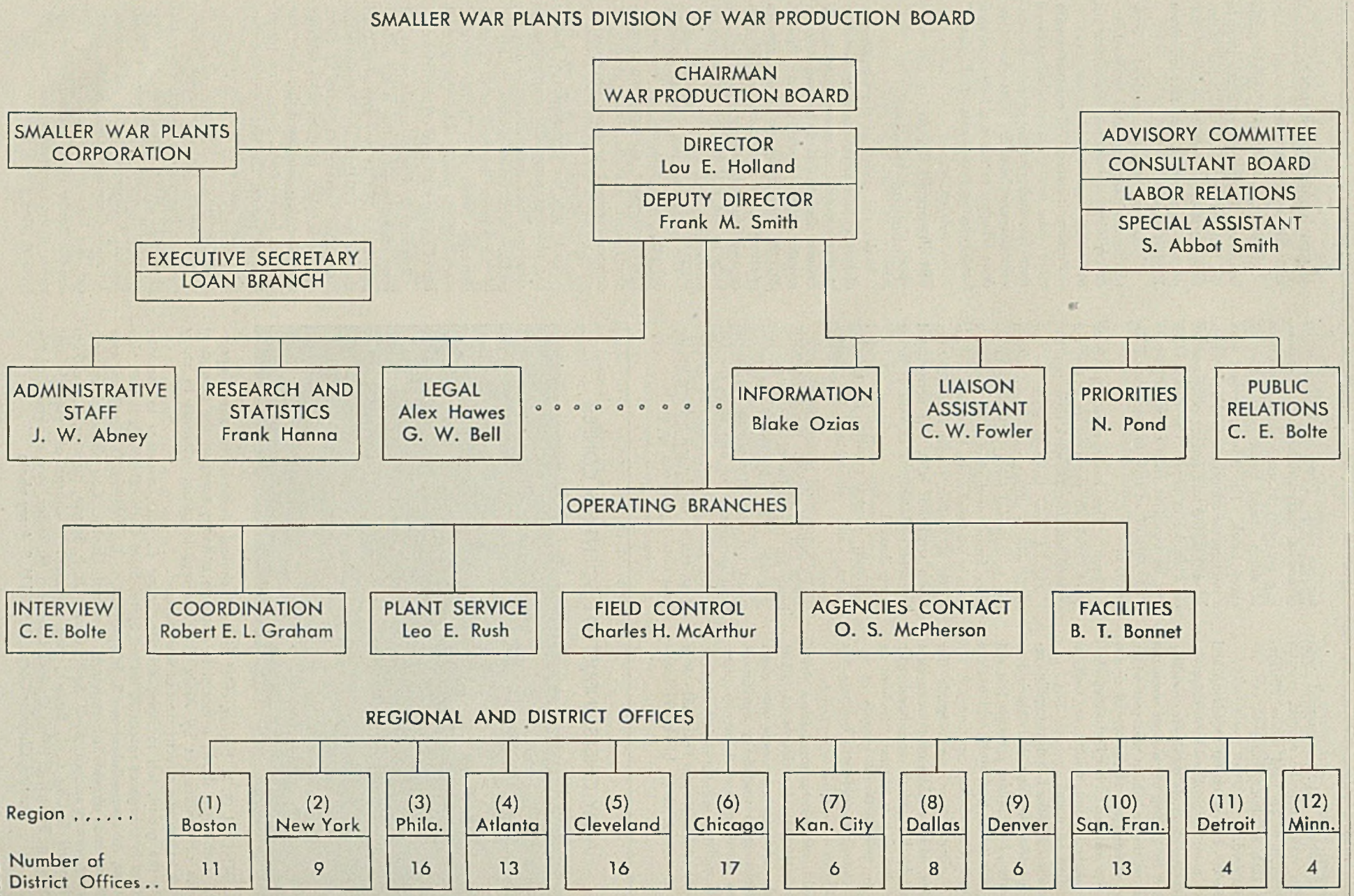
Under the policy of the Department of Justice, all counter espionage activities in this country are concentrated in the Federal Bureau of Investigation. No private citizen should concern himself directly with espionage. Any employer or employe who has doubts or suspicions, or who fears sabotage, should report the facts to the FBI but he should go no further than that.

The policy in this war is radically different from that of the last war—when numerous governmental departments and agencies, and almost all citizens—seemed to have responsibility for espionage.

Up to now the Department of Justice has obtained some 300 convictions in sabotage cases and believes it has the problem well under control. Nearly all of the current sabotage is of a petty character. Some of it is the work of crack-brained people who get a thrill out of seeing a train go off the tracks.

Sabotage by foreign agents so far has been negligible—and this is not a happenstance. Within two days after Pearl Harbor the FBI had apprehended some 3000 alien enemies suspected of being dangerous. None of them were released until investigation showed that there was no basis for suspicion. Some were placed on strict parole. The rest were placed in internment camps for the duration.

Incidentally, to take care of all its responsibilities under wartime conditions, the Department of Justice now employs some 30,000 individuals. This compares with about 20,000 prior to Pearl Harbor. A large portion of the increase, Attorney General Francis Biddle points out, has been in the ranks of the FBI and the Border Patrol and Inspection Division of the Immigration and Naturalization Service.



PATTERN of organization of the Smaller War Plants Division of the WPB, according to official War Production Board chart

Procedure Is Simplified for Companies Seeking Contracts

PROCEDURE by which the Smaller War Plants Division of the War Production Board will seek to give effect to the directives issued by the Army Services of Supply, the Navy and the Maritime Commission, and designed to spread war work to smaller plants, have been outlined by Frank Smith, deputy director of the Smaller War Plants Division.

"The first step," Mr. Smith said, "is for us to find out what the future requirements are as soon as they are determined by the planners of production as determined by grand strategy. These requirements are seen in specifications and blue prints in the various procurement offices.

"Our men, under O. S. McPherson, chief, Agencies Contact Branch, working with the officers assigned to select items suitable for us, carefully check over these specifications and together decide on the jobs we are to tackle.

"These requirement items are then brought back to our own offices for examination by a committee under the chairmanship of Robert Graham. The committee is composed of engineers from the Facilities and Plant Services Branches and one or more of our contact men. It meets every day and decides finally which items we shall work on and where we are most likely to find the best facilities.

"This group is pretty familiar with the situation in smaller plants throughout the country and also has before it a good deal of information as to plants that are desperately in need of work. Other things being equal we try to place work where the distress is greatest.

"After this preliminary examination, which sifts out the jobs we know we can handle, the Plant Service Branch goes to work to break down the jobs and designate specific plants to do them. This necessitates direct contact through our field engineers with the plants chosen.

May Invite Owner to Capital

"From what we know of a given plant's equipment and ability we conclude that the plant can handle the job, but we don't stop there. We have one of our field men discuss the job with the managers and production men in the plant. If this close examination shows that we have chosen the right plants, we are then ready to make our specific recommendation to the procurement officer who will place the order.

"When this stage is reached we may ask the owner or manager of the plant to come to Washington, if the contract is to be placed here. But in many instances contracts are let in the field and the whole business is arranged by our field representatives and the procurement officers.

"When the order is placed in accordance with our recommendations, our engineers in the field follow up closely with engineering advice and assistance to make sure that the job is properly done and delivered on time."

Mr. Smith said a semimonthly report will be issued from now on giving the amount in dollar value of contracts placed, the number of contracts and the number of plants participating in each contract.

Contracts Total $16,000,000

Thirty-nine prime contracts, totalling $16,000,000, had been awarded up to Nov. 13. The number of plants getting work on subcontracting from these 39 prime contractors is not yet known, except in the case of four contracts. Three of these are of the "mother hen" type (a prime contractor with numerous designated subcontractors), and one is a pool (an association of small firms holding a prime contract). In these four contracts, 30 small firms are participating.

To date 171 requirement items have been dealt with and facilities have been recommended, in respect to 121, to the procurement officers concerned. The discrepancy between 39 prime contracts *awarded* and 121 requirements *processed* is accounted for by the time lag between specific facilities recommendations to procurement officers and the actual placing of the orders with those facilities.

Mr. Smith urged owners and managers seeking war work not to come to Washington unless called there for conference. "Save your time and money," he counselled, "and let the railroads carry the soldiers. See the Smaller War Plants Division man in your nearest War Production Board field office."

Following is the list of Deputy Regional Directors for Smaller War Plants in the War Production Board regional offices:

Boston, 17 Court street, Clarence A. Woodruff; New York, 122 E. Forty-second street, Sydney E. Hogerton; Philadelphia, 1617 Pennsylvania boulevard, Audenreid Whittemore; Atlanta, Ga., 116 Chandler building, (To be designated); Cleveland, 13 Union Commerce building, Daniel P. Ford; Chicago, 20 North Wacker Drive, Linwood A. Miller; Kansas City, Mo., Mutual Interstate building, Roy W. Webb; Dallas, Tex., 4th Floor, Fidelity building, William G. Morrison; Denver, Colo., Kittredge building, Robert W. Gordon; San Francisco, 1355 Market street, Oscar L. Starr; Detroit, 7310 Woodward avenue, Hugo A. Weissbrodt; Minneapolis, 326 Midland Bank building, (To be designated).

CANADA . . .

Mineral Production Will Be Expanded

TORONTO, ONT.

C. D. Howe, minister of munitions and supply, states Canada now is producing about 40 per cent of all aluminum made in North America, as well as virtually all the nickel and a substantial percentage of copper, zinc and other important metals. Further expansions are planned for 1943.

Cessation of imports of strategic metals from China, India, the East Indies and other countries has increased demand on this country's mineral deposits and numerous new mining activities have developed. Most of these are privately financed, with government aid in some instances. Many metals not formerly considered sufficiently important now are being mined.

In the past two months production has been started in magnesium, fluorspar, tungsten and mica and recent explorations will result in manganese and other steel alloying elements being provided. About a year ago tin mining was started in a small way in British Columbia by Consolidated Mining & Smelting Co. Iron Mines are under intensive development in Ontario and Josephine mine in western Ontario soon will start shipping lump ore to Sydney works of Dominion Steel & Coal Corp. This consumer formerly imported lump ore from Brazil and Spain.

Economy drives to save materials, labor and money are bringing results. More than $4,100,000 has been saved on existing contracts for accessories for machine guns, rifles and other small arms. Most of these contracts expire at the end of next year. A. H. Zimmerman, director of the small arms division, states that consultations with military authorities of the United Nations have made possible the following steps: Simplification of design of some accessories; alteration of materials specifications; elimination of unnecessary accessories; standardization of accessories for use with two or more guns.

TOCCO Hardening SIMPLIFIES DESIGN

. . . increases life of seal rings 800%

In addition to increasing output 200% to 600%, TOCCO Induction Heat-Treating enables designers to improve machine parts for *longer life* and *lower cost*.

These TOCCO-hardened tractor seal rings for example: Formerly used castings plus packing type of seal. Required considerable grinding to finish.

Now use soft material (about 20 R.C.)—machine the seating surface to close tolerance—then TOCCO-harden only seating surface to 56-60 R. C. and give it a quick, final grind. Eliminates need for packing seal. Wearing surface is harder, resulting in 8 to 10 times former life. Simplified design cuts production time and cost.

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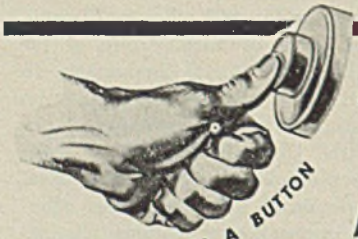
THE OHIO CRANKSHAFT COMPANY • **Cleveland, Ohio**



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World's Fastest, Most Accurate Heat-Treating Process

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ANNEALING
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By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Equipment outlook brightens. . . Armor plate heat treating facilities at Ford are spectacular. . . Nash contract for flying boats scrapped. . . Auto industry supplying 25 per cent of aircraft

DETROIT

DEFINITE signs point to a growing relaxation in the tightness of certain, if not most, lines of equipment on order for war production plants. Most recent development has been a sharp falling off in demand for gray iron castings to be used in machine elements. This is held to reflect a sharp drop in requirements for many types of machine tools, jigs, fixtures and the like, indicating the passage of the peak of war tooling.

Builders of heat treating furnaces also report the outlook much easier, with numerous instances of cancellations of equipment both on order and even some units which have been delivered and paid for. The case is cited of one purchaser of a special type of controlled-atmosphere heat-treating furnace, who, after taking delivery of the equipment, could find no one with sufficient training to operate it, so he was forced to cancel the order.

Revisions in specifications also are resulting in some furnace cancellations, as well as transfer of units bought for one department to another. An example is a group of carburizing furnaces ordered for use in carburizing airplane engine crankshafts. Late change in specifications for finishing these cranks threw out the carburizing treatment, so the furnaces were transferred to a plant processing gears for tank transmissions.

Equipment Is Massive

Speaking of furnace installations, one of the most spectacular hereabouts is that built for heat treating armor plate at Ford. Little has been released publicly on developments at this plant, although a week ago pictures and data were supplied by the Ford news bureau which gave some indication of operations at this new plant. Apart from this information, it is understood five complete lines of hardening furnaces, quenching presses and drawing furnaces have been installed for heat treating the homogeneous plate which is rolled in the Ford steel mill and used to armor the M-4 medium tanks Ford is building. Hardening furnaces are over 200 feet in length, nearly 6 feet wide and heated by multiple sets of gas-fired radiant tubes. Plate travels through on a roller hearth, each roller being 6 inches in diameter with ⅝-inch wall thickness.

After heating for several hours, the plate is rolled into the quenching press where it is gripped tightly under 2500 tons pressure while water sprays are played on it from supporting lugs on the press platen. The quenched plate then moves into 300-foot draw furnaces which temper it to the required toughness. There is nothing particularly secret about the method involved, inasmuch as it is standard heat treating procedure, but the speed of the process and the spectacular nature of the equipment make the installation notable.

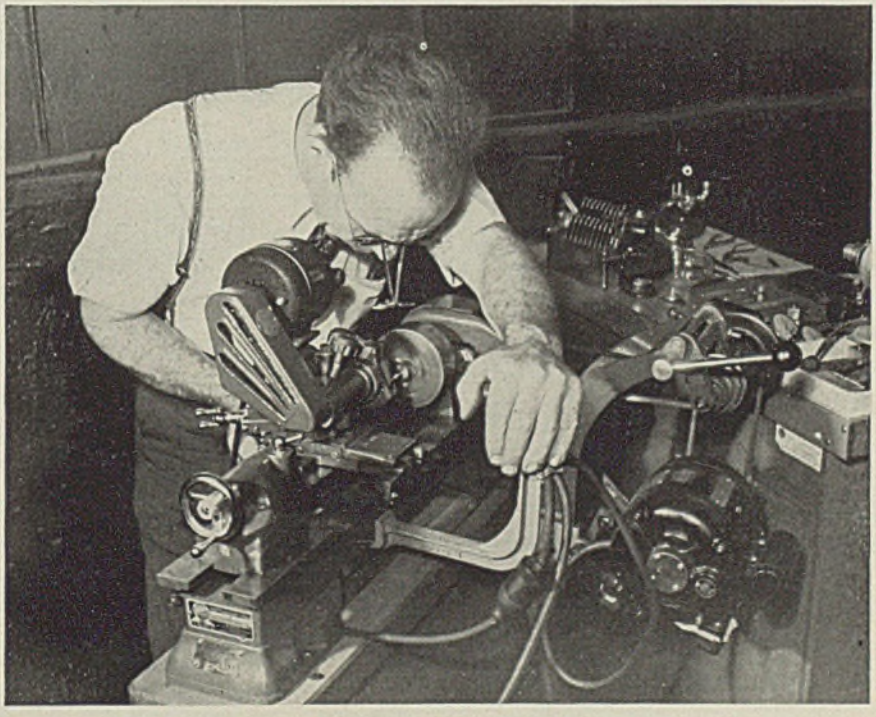
Unusual Quenching Method

Press quenching of the plate is somewhat unusual, most plants simply quenching armor by "dunking" the plate in a water tank and later straightening it on special machines built for the purpose. Early attempts made by Ford to quench the plate against flat water-cooled platens of the press, inside which water was circulated, resulted in breaking the platens because of the internal stresses.

Cancellation of the Nash-Kelvinator contract for building Vought-Sikorsky flying boats by the navy department is the first instance of a motor company having a major war contract abandoned after it was well along. The N-K plant in New Orleans was virtually completed and facilities at Milwaukee and Grand Rapids for supplying hulls and wings were getting close to the production stage.

Official navy explanation of the cancellation said that developments in the Pacific war zone made it imperative for the Navy to concentrate on combat planes and fast patrol bombers at the expense of the larger cargo planes. Admittedly the Vought-Sikorsky was a large craft, but at the same time it could be classified in the category of "fast patrol bombers" so the explanation of the change in policy is none too clear. Presumably the facilities now ready will be turned over to other aircraft builders, and it would be a good guess that the New Orleans plant will be occupied by Consolidated which is now supplying PBY patrol bombers to the Navy. What will happen to the Michigan operations remains open to question. Certainly they cannot be switched over readily to airplane engine

USE SMALL LATHE TO REPAIR DIAL INDICATORS



OUTSIDE service on more than 1300 dial indicators used in a Pontiac Motor Division gun plant was proving unsatisfactory, so the company purchased a 6-inch lathe of the basement hobby shop type. This, plus a jeweler's second-hand lathe, operated by a retired watchmaker, now handles repair of as many as 51 indicators weekly. Note magnifying lenses attached to operator's eye-glasses

production or propeller manufacture, other major phases of Nash war production.

Abandoning of production plans for the Vought-Sikorsky design, which represents an ideal cargo carrier, appears a little incongruous in the face of work now going ahead by the Higgins Industries in the South leading to production of a new type of super-super aircraft for cargo carrying. One of the Higgins designs is said to have a wingspread of 300 feet and to require the use of no critical materials. Col. John H. Jouett, recently resigned as head of the Aeronautical Chamber of Commerce, is now associated with Higgins in his aircraft operations.

With procurement of some types of gages regarded as a continuing critical problem, three branches of the armed services in this area have banded together with the automotive industry to ease the problem of providing more extensive information to gage buyers concerning shop capacity for gage-making. As a basic move, they are making wider use of the data supplied by the tooling information service of the Automotive Council for War Production. These data have been expanded considerably, and are shown in part in an accompanying illustration.

Joint consideration of all the possibilities involved in reclaiming and salvaging gages is being given by a group representing the armed services, the manufacturing industries and plants which make and rebuild gages. This study is expected to result in a more thorough understanding of the possibilities of putting gages back into use after they have been worn out, damaged or made obsolete by changes in design of the product.

Exchange of technical information between the automotive and aviation industries appears destined for emergence into a definite pattern, following the visit of George Romney, head of the Automotive Council, to the West Coast to consult with representatives of the Aircraft War Production Council there. Mr. Romney points out that the motor industry this year will supply about 25 per cent of total production of aircraft, engines and propellers, and this total will be equal to the highest annual dollar value of automotive production in the 40 years of that industry's existence; further that 50 per cent more employes are now being directly engaged in aircraft production than were normally engaged directly in automotive production. This is formal recognition of the fact that manufacture of aircraft is now the nation's No. 1 industry, and that it is on a level exceeding that of the former No. 1 industry in its best years.

Steps to acquaint manufacturers throughout Michigan with comprehensive details of the WPB's new Controlled Materials Plan have been undertaken by the regional WPB office here. First of a series of state meetings is scheduled to be held in Detroit, Dec. 1, at Masonic Temple, with several thousand manufacturers invited to attend. Morning will be occupied with an explanation of the CMP, amplified by slide films and charts. Afternoon will be devoted to questions and answers. Ernest Kanzler, director general of industry operations for WPB, and who, according to friends is currently working himself to a frazzle in Washington, may be on hand for the meeting.

The Three M's

Men, manpower and mechanics are the three chief problems facing General Motors divisions at the moment, according to recent observations made by C. E. Wilson, president. He said the corporation has now lost 30,000 men to the armed services, and expects to be hiring 150,000 new production workers in the next 12-18 months. He strongly opposes federal drafting of manpower however, declaring that you "cannot make a man go where he doesn't want to go or do what he doesn't want to do."

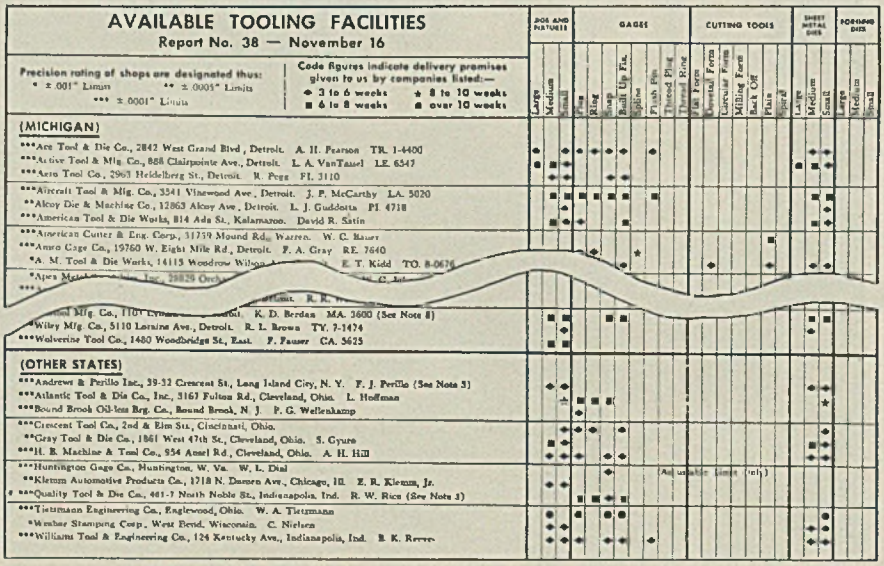
The third of the three M's mentioned by Mr. Wilson—mechanics—deals with one of the newer phases of war production, an understanding of weapons being produced by the industry so that its engineers can make improvements in them. Much has been accomplished in this direction from the standpoint of conservation of critical materials, but so far the effectiveness or potency of weapons has more or less been left to officers in the military services who serve as liaison agents between industry and field forces.

General Motors now has about 100 engineer-observers on various battlefronts

(*Please turn to Page* 113)

AUTOMOTIVE COUNCIL CHARTS OPEN TOOL CAPACITY

Expanding the scope of its weekly tooling information service to help overcome a continued critical shortage of gages, the Automotive Council for War Production has included additional information not previously published, in its thirty-eighth report shown in part herewith. Besides showing open capacities of tool makers, the report lists services available for repairing and salvaging all types and sizes of tools and gages; and three more types of gages have been added to the listing. An earlier change was the inclusion of precision ratings of tool and die makers, and delivery promises in weeks. At present, nearly 400 shops, including 175 gage shops, supply information on their open capacity each week, and 1500 users of gages receive weekly reports of such capacity. Chester A. Cahn, 424 Boulevard building, Detroit, is manager of this service.



AVAILABLE TOOLING FACILITIES
Report No. 38 — November 16

Precision rating of shops are designated thus:
* ± .001" Limits ** ± .0005" Limits *** ± .0001" Limits

Code figures indicate delivery promises given to us by companies listed:—
◆ 3 to 6 weeks ★ 8 to 10 weeks
■ 6 to 8 weeks ● over 10 weeks

JIGS AND FIXTURES: Large, Medium, Small
GAGES: Plug, Ring, Snap, Built Up Fix., Spline, Flush Pin, Thread Plug, Thread Ring
CUTTING TOOLS: Hob Form, Dovetail Form, Involute Form, Milling Form, Rack Cut, Plain, Spiral
SHEET METAL DIES: Large, Medium, Small
FORMING DIES: Large, Medium, Small

(MICHIGAN)

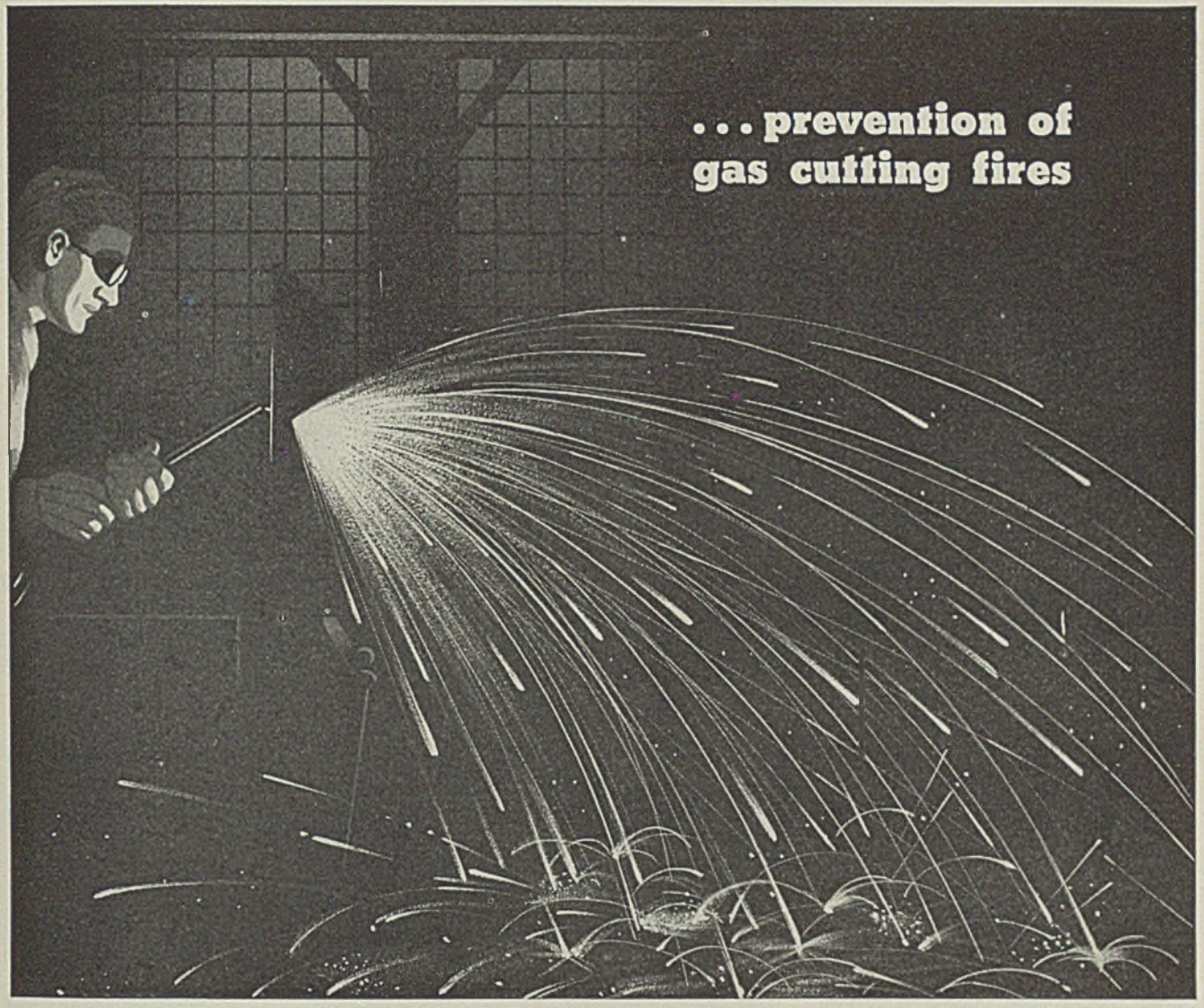
***Ace Tool & Die Co., 2842 West Grand Blvd., Detroit. A. H. Pearson TR. 1-4400
***Active Tool & Mfg. Co., 888 Clairpointe Ave., Detroit. L. A. VanTassel LE. 6547
***Aero Tool Co., 2963 Heidelberg St., Detroit. R. Pegg FI. 3110
***Aircraft Tool & Mfg. Co., 3541 Vinewood Ave., Detroit. J. P. McCarthy LA. 5020
**Alcoy Die & Machine Co., 12863 Alcoy Ave., Detroit. L. J. Guddeta PI. 4718
***American Tool & Die Works, 814 Ada St., Kalamazoo. David R. Satin
***American Cutter & Eng. Corp., 31759 Mound Rd., Warren. W. C. Bauer
***Amro Gage Co., 19760 W. Eight Mile Rd., Detroit. F. A. Gray RE. 7640
*A. M. Tool & Die Works, 14113 Woodrow Wilson [illegible] E. T. Kidd TO. 8-0676
*Apex Metal[illegible] Inc., 2882[illegible] Orch[illegible] [illegible] C. Jo[illegible]
***[illegible] R. R. [illegible]
[illegible] Mfg. Co., 1161 Dyna[illegible] [illegible]. K. D. Berdan MA. 3600 (See Note 8)
*Wiley Mfg. Co., 5110 Lorraine Ave., Detroit. R. L. Brown TY. 7-1474
***Wolverine Tool Co., 1480 Woodbridge St., East. F. Fauser CA. 5625

(OTHER STATES)

***Andrews & Perillo Inc., 39-32 Crescent St., Long Island City, N. Y. F. J. Perillo (See Note 3)
***Atlantic Tool & Die Co., Inc., 3161 Fulton Rd., Cleveland, Ohio. L. Hoffman
***Bound Brook Oil-less Brg. Co., Bound Brook, N. J. P. G. Wellenkamp
***Crescent Tool Co., 2nd & Elm Sts., Cincinnati, Ohio.
**Gray Tool & Die Co., 1861 West 47th St., Cleveland, Ohio. S. Gyure
***H. B. Machine & Tool Co., 934 Ansel Rd., Cleveland, Ohio. A. H. Hill
***Huntington Gage Co., Huntington, W. Va. W. L. Dial
**Klemm Automotive Products Co., 1718 N. Damen Ave., Chicago, Ill. E. R. Klemm, Jr.
***Quality Tool & Die Co., 461-7 North Noble St., Indianapolis, Ind. R. W. Rice (See Note 3)
***Tietzmann Engineering Co., Englewood, Ohio. W. A. Tietzmann
*Weather Stamping Corp., West Bend, Wisconsin. C. Nielsen
***Williams Tool & Engineering Co., 124 Kentucky Ave., Indianapolis, Ind. B. K. Reeves

(Adjustable Limits Only)

NOTE: 1. Also open capacity on die cast and plastic dies.
2. Open capacity includes spiral reamers and end mills up to 5 inches diameter.
3. Specializing in maximum profile chamber gages and all other necessary checking gages for shells.
4. Also open capacity on solid high-speed steel reamers ¼-inch up and all types of broaches excepting spiral.
5. Also open capacity on short run aircraft type low cost dies.
6. Also open capacity on limited number of thread hobs.
7. Open capacity includes straight reamers.
8. Open capacity includes boring bars, arbors, etc.
10. Open capacity includes tungsten carbide tipped reamers, C bores and solid boring tools, over 10 weeks delivery.



Information supplied by National Fire Protection Association

The surest way of preventing cutting and welding fires is to keep flames, sparks, molten slag and hot metal away from flammable materials. This elementary precaution is the most often ignored.

There are other precautions which, if observed, will do much to prevent cutting fires.

1. Always check fire hazards in new locations before starting work.
2. Have precautions in individual cases specified by responsible authority.
3. Move combustible material at least 30 to 40 feet away from cutting operation.
4. Sweep floors clean before lighting the torch.
5. If combustible material cannot be moved, or if sparks or slag may lodge in wooden structures, or drop through pipes or holes to floor below, use sheet metal guards, asbestos paper or curtains to localize flying sparks or slag.
6. Before cutting steel or iron be sure that it will not drop on combustible material.
7. When finished check surroundings thoroughly to make sure *all* smouldering sparks are put out.

West Coast Mills Near Completion

Two new units, under construction, will supply many of Far West's steel requirements

PACIFIC Coast steelmaking is "coming of age." After years of dependence on eastern mills for steel supply, carried by water through the Panama Canal, facilities are being developed to make the Coast largely self-sustaining.

More than a year ago, in September, 1941, W. A. Hauck, consultant for the Office of Production Management, prepared a report for the Supply Priorities and Allocations Board recommending a 10,000,000-ton steel expansion to meet war demands. In this report the area west of the Rockies was allocated 1,865,300 net tons of steel ingot capacity, part by expansion of existing plants and part by erection of new blast furnaces and mills. These were to be located at Los Angeles and Pittsburg, Calif., and Provo, Utah.

War interruption of coastwise water transportation placed the burden of steel transportation from the East on railroads, already crowded by essential traffic and resulted in higher costs and delay.

Two Plants Under Construction

Established steel plants have been enlarged and present interest centers in two plants now under construction. One is the new blast furnace and steelworks of Columbia Steel Co., subsidiary of the United States Steel Corp., at Geneva, Utah, near Provo, being financed by the Defense Plant Corp. This will consist of three blast furnaces, nine open hearths and slabbing and structural mills.

Plans are for pig iron production to start by May, 1943, ingots the following month and rolled products by the end of June. Coal for coking is to come from a new mine near Geneva and iron ore from a deposit in the vicinity of Provo.

The Kaiser plant is located at Fontana, Calif., and is well along. (See STEEL, Nov. 2, p. 41). Original plan was for a 1200-ton per day blast furnace, four open hearths and a plate mill to be rolling plates by March. Development of the Kaiser shipbuilding activities

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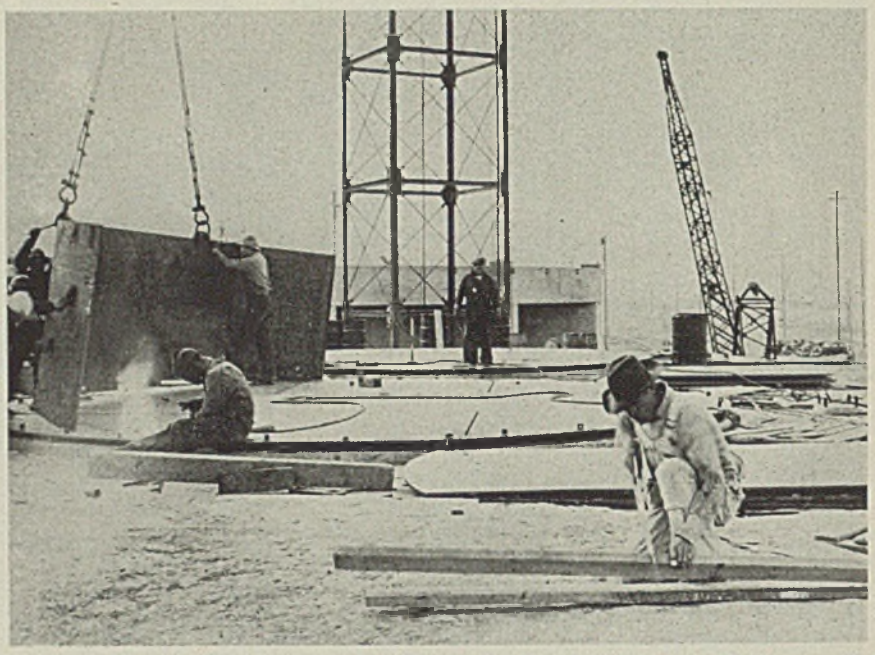
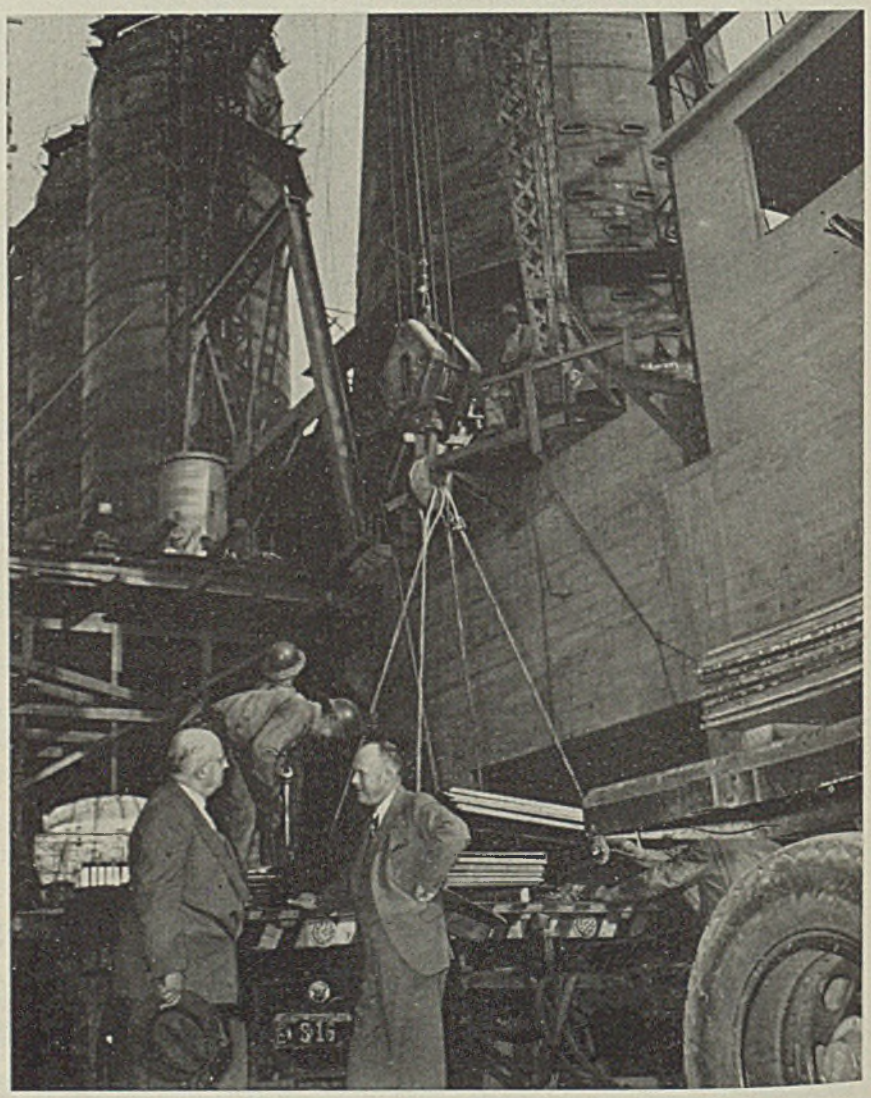
STEELMAKING expansion on the Pacific Coast includes as major factors new plants by Columbia Steel Co., United States Steel Corp. subsidiary, at Geneva, Utah, and the Kaiser Co., at Fontana, Calif. Above: Placing first steel for blast furnace at Geneva. Below: Henry J. Kaiser, left, and Tom Price, his construction manager at Fontana. In background is the 1200-ton blast furnace scheduled for production Jan. 1. Lower photo, Press Association





caused request to be made to WPB to provide $78,000,000 additional to more than double the first plan, adding another blast furnace, five more open hearths, electric furnace and a structural mill. WPB responded to this request with $26,000,000 for two open hearths, a structural mill, bar mill and other facilities. Coking coal will be obtained at Sunnyside, Utah, and iron ore from mines located in the Kelso, Calif., region.

Additions to the Pittsburg and Torrance, Calif., plants, started last spring, included open-hearth and electric furnace capacity and finishing mills, to cost about $8,500,000. The new Geneva plant will cost about $126,000,000. Its capacity is estimated as 1,450,000 tons of pig iron, 840,000 tons of ingots and 500,000 tons of plates annually.

First of 3 New Electric Furnaces Starts Operations at Duquesne

MOLTEN steel is now flowing from Defense Plant Corp.'s huge expansion of Carnegie-Illinois Steel Corp.'s Monongahela Valley facilities. Without formal ceremony which customarily would attend operation of the first unit in so large a project, employes brought into production a new electric furnace at Duquesne, Pa., Nov. 23.

Scheduled to yield more than 160,000 tons annually of the higher-grade alloy steels used in the manufacture of guns, shells, and airplane parts, a battery of three such furnaces is expected to be in full operation at the plant.

The first new operating unit has a capacity of 3380 tons a month. Two larger furnaces now under construction in the same building will add almost three times the capacity of the first unit.

Defense Plant Corp., subsidiary of the Reconstruction Finance Corp., also is financing the building of new steel-conditioning and heat-treating plants at the Duquesne site, to handle the tonnage from the new electric-producing units. These also are expected to be operating in the early spring.

In addition to the DPC-financed units, Carnegie-Illinois, at its own expense, plans to install soaking pits, pre-heating furnaces, and auxiliary facilities for handling the increased tonnage output.

The Duquesne works expansion extends from the Pennsylvania railroad tracks to the Monongahela river in an area between the main plant and the bar mills.

Aluminum Capacity Soon To Be Seven Times Peacetime Peak

ANNUAL aluminum production capacity will reach 2,100,000,000 pounds in less than a year from now, according to Thomas D. Jolly, vice president and director of purchases, Aluminum Co. of America. Speaking at the Carnegie Day dinner held by the Pittsburgh Men's Clan of the Carnegie Tech Alumni Federation at the University club, Pittsburgh, Mr. Jolly outlined the tremendous expansion job which has been done by his company since 1939.

The program began directly after the Munich agreement in 1938 with the appointment of a six-man committee representing various departments of the company. Based on their reports, the company started a program which called for a capital expenditure of $250,000,000 of company money. On March 8, 1940, construction began on a plant to produce 30,000,000 pounds of ingots per year. On April 16 this capacity was doubled and in September was increased to 160,000,000 pounds.

Existing metal producing plants were expanded to the limit of power available and two new hydroelectric power developments were started. By mid-1941 it became apparent the company would not be able to finance a plan of the magnitude which was indicated by the expanding aluminum demand. On Aug. 19, 1941, the company signed a contract with Defense Plant Corp. to design and construct, at cost, one ore refining plant and three metal producing plants. Later, additional contracts were made covering two more metal producing plants. All these plants were in operation in less than one year.

"Censorship does not permit me to describe the type or capacity of the new plants," said Mr. Jolly, "but I can say that we are building for the Defense Plant Corp. a total of 21 plants located in 14 states. With our own program, this gives us a total of 41 major projects now under way and brings our total acreage of floor space put under roof since Jan. 1, 1940, to more than 600 acres.

"So far we have placed more than 250 subcontracts for the Defense Plant Corp., only 48 of which were negotiated. We obtained nearly 900 bids for the competitively awarded contracts and of course there are still quite a few not closed. We have about 17,000 men engaged directly on construction and have placed more than 35,000 purchase orders. More men and more contracts will be added before the program is completed. The country is aiming at an eventual production of 2,100,000,000 pounds of aluminum annually, to be achieved in less than a year from now—a production that is seven times the size of the peak peace time years of 1937, 1938 and 1939. Each of several of the new plants will produce more aluminum than the entire nation made at its World War I peak, and still there won't be a pound left over for civilian goods."

A Substitute for Cryolite

Speaking of cryolite, a mineral necessary for the reduction of aluminum oxide and which is found in commercial quantities only in Greenland, Mr. Jolly stated: "We have facilities in this country for making a synthetic material which is the chemical equivalent of natural cryolite and we can use either in the production of aluminum. Therefore, our supply of cryolite is not dependent upon Greenland."

Electric power is a major item in any aluminum program. The power program in connection with this expansion has been a large factor and is derived primarily from hydroelectric plants owned by the company and by the government, and from steam and hydroelectric plants of privately owned public utilities. Because of the heavy power demand, it has been necessary to locate plants where facilities already exist. The largest metal producing plant in the country, for example, is under construction in one of the largest cities. The power costs there are higher but it is more readily available, which is the most important factor in the present program.

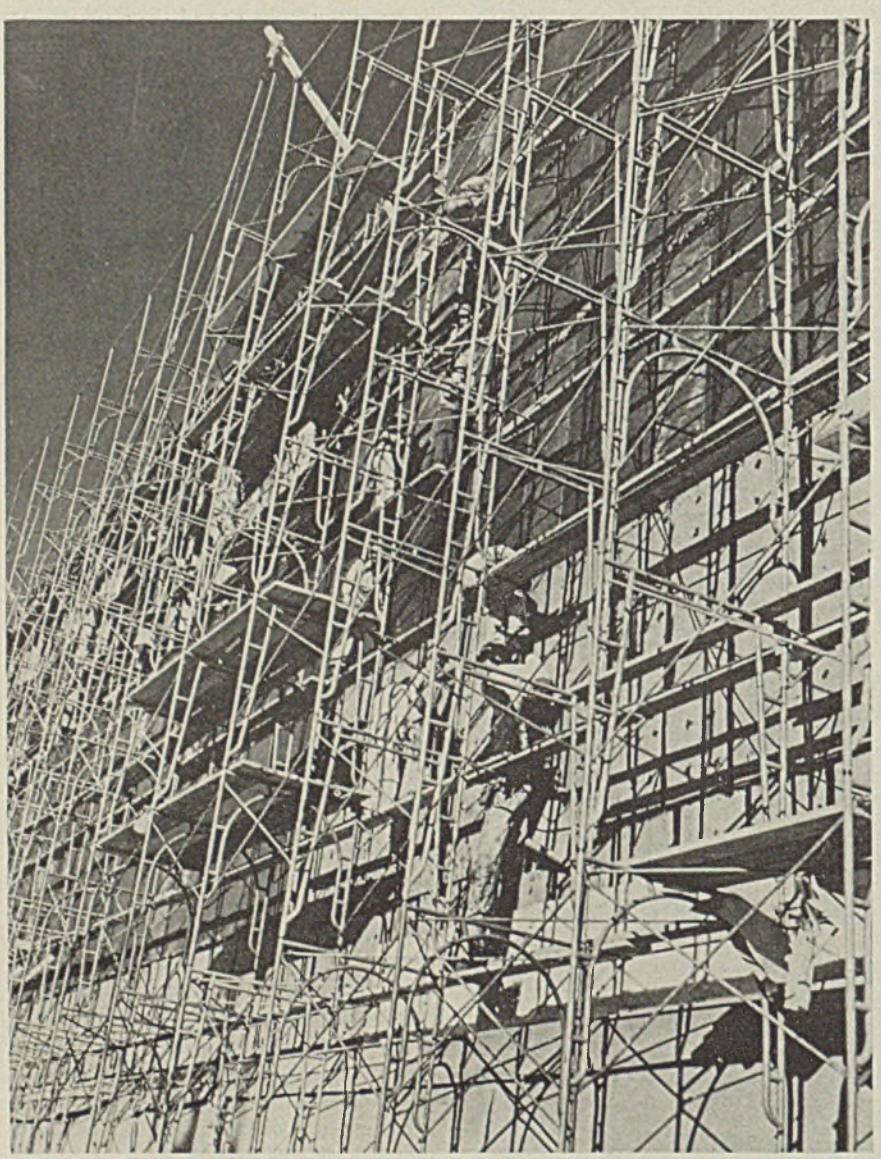
"In one instance," according to Mr. Jolly, "the company did a revolutionary thing. We are locating a metal producing plant in a district where we can be supplied with natural gas at a very low price. At this plant we are installing 50 gas engines, each driving a 750-kilowatt generator and 18 driving 2250-kilowatt generators. These are direct current generators and the power is trans-

mitted directly to the production line. The conventional procedure is to convert alternating current to direct current by means of mercury arc rectifiers but right now it is almost impossible to obtain large generator units, so we decided on gas engines and their comparatively small size direct current generators. With low priced gas, we believe it will be a very economical installation, in spite of the large number of units that are required.

"We found that it was cheaper and quicker to expand existing plants, and, where possible, to build new plants near old ones in order to utilize the supervision and experience of our existing personnel in developing a new operating organization . . .

"In one instance, we built 72 buildings from the same shop drawings, thus actually erecting plants by mass production. We made use of every short cut we could think of. One interesting feature in the new aluminum-producing plants is the new war type bus bar. Copper, the traditional material from which bus bar is made, is now so scarce that peacetime economics have been suspended. Silver is plentiful, however, and the United States Treasury arranged to lend-lease some of the silver now in its vaults. Altogether, we are using over 14,000 tons, which is a most unusual way to speak of silver. At the government's purchasing price, this costs, in ingot form, about $290,000,000. After the war, this bus will be returned to the treasury, to be replaced by copper. The silver bus bars, already fabricated, are now being installed. They will be under heavy guard."

STEEL SCAFFOLDING SPEEDS WORK ON BOMBER PLANT



TUBULAR steel scaffolding rises tier upon tier, full length of windowless sidewalls of new bomber assembly plant, location of which is not divulged for military reasons. The tubular type of scaffolding has been improved in many respects, for speed of assembly, safety, and special adaptability to war plant construction work. Wide World photo

Defense Plant Corp. Authorizes New War Plant Additions

New war plant facilities and equipment authorized by the Defense Plant Corp. were announced last week by Jesse Jones, secretary of commerce. In each case the facilities will be owned by the federal government and operated by the private companies. Awards include:

Increase in its contract with Crown Central Petroleum Corp., Baltimore, for additional machinery and equipment in Texas. The increase will be in excess of $900,000, making a total commitment of more than $7,000,000.

Increase in its contract with Wright Aeronautical Corp., Paterson, N. J., for additional plant facilities in New Jersey. The increase will be in excess of $8,500,000, making a total commitment of more than $63,000,000.

Increase in its contract with Pullman Standard Car Mfg. Co., Chicago, for additional plant facilities in Illinois. The increase will be in excess of $1,250,000, making a total commitment of more than $6,600,000.

Execution of a contract with Rohm & Haas Co., Philadelphia, to provide for the construction and equipment of a plant in Pennsylvania, at a cost in excess of $300,000.

Execution of a contract with Henry Weis & Co., Elkhart, Ind., to provide machinery and equipment in a plant in Indiana.

Increase in its contract with Nash-Kelvinator Corp., Detroit, for additional plant facilities in Wisconsin. The increase will be in excess of $900,000, making a total commitment in excess of $32,000,000.

Navy Offers To Participate In War Plant Rallies Dec. 7

The Navy Department will join all government agencies and private war plants engaged in naval procurement activities "to make Dec. 7 an inspiring occasion at factories and shipyards throughout the United States."

Upon request, the Navy will send officers and enlisted men, preferably those who have been in combat, into the factories for plant visits, rallies, and talks to the workers.

Early Relaxation of Curbs on Critical Products Denied by WPB

INDUSTRY may look forward to no early relaxation of any consequence in the severe restrictions curbing or altogether stopping production of many of the products it normally turns out, WPB officials said last week.

The reason is simple. Contracts placed for war goods in 1943 will exceed the 1942 total of 70 billions by 65 per cent. Thus war spending next year will top the entire national income for any peacetime year by a wide margin and materials will be required in even greater quantities.

It is reported all major programs will be brought into better balance with actual military requirements. At the outset of the rearmament program, this country had insufficient experience in the production of military equipment and contracts were placed for whatever it was thought might be needed. There now is actual overproduction in many lines since output of some large plants is running 40 to 50 per cent ahead of expectations. Production of some items—a certain large shell, for example—has been stopped. But, the overall program is much larger based on an estimated minimum of one year to defeat the Germans and another year to conquer the Japs. Shipping requirements alone are estimated at 24,000,000 tons.

WPB limitation orders—now numbering 1 through 230—are constantly undergoing re-examination and revision, but the tendency is to further restrict rather than extend the use of available materials, as in the most recent case of alloy steels in construction machinery.

Restrictions To Continue

Recently, less apprehension has been expressed in certain Washington quarters over materials but this does not mean that additional supplies will be available for civilian economy. In fact, the reverse may be expected. A leading WPB official is quoted as saying: "WPB will be extremely hesitant in relaxing present restrictions on products for civilian economy except at the subsistence level. Materials may be termed 'easier' only in the sense that the supply is more closely in balance with military requirements, as the result of restrictions on civilian outlets."

WPB might permit the use of structural steel in place of wood in the construction of a hospital or where the building must be fireproof, this official said. At the same time, makers of containers are not likely to get more tin plate, particularly in view of recent refinements in dehydrating foods.

Within the past fortnight, steel has been cited as an outstanding example of a more comfortable situation in materials. And, steel is distinctly "easier" from the standpoint of various products. Structural mills have whittled their backlogs down to somewhere around four weeks and no large replacement tonnage is in sight, shipwork excepted. Some of these structural mills cannot convert to shell steel. Pipe is in the same position, again excepting ship work. Tin plate plants, including the new electrolytic units, need business.

Reinforcing Bars Plentiful

Reinforcing bars, especially from rerolling mills, are plentiful. These mills are reputed to have 25,000 tons of rails on hand and are turning down new offerings. Trade reports indicate some rails have been broken up into charging box size for open hearth use. WPB is willing to relax slightly the uses for the products of the rerollers and also for bessemer steels but these are the only exceptions.

WPB now is understood to be operating on the theory that it is better to have stocks of materials pile up here and there rather than run the risk of a shortage. Officials have not forgotten the case of copper which, had it been shut off from civilian channels many months sooner, would have eliminated part of the present shortage.

Copper now is competing with alloy steel for the position of No. 1 critical material. The recent 3-month cancellation of Lend-Lease steel shipments occasioned by the North African campaign which caused the piling up of excess steel ingot and billet tonnage along the eastern seaboard, therefore, has not worried officials especially although the 18,000 tons of ingots coming monthly from a rehabilitated open-hearth plant in the East are regarded somewhat "troublesome."

Certain manufacturers privately have been questioning the extreme restrictions on use of zinc even for war products. A few weeks ago, a contract for powder boxes fabricated from rolled zinc was suddenly cancelled. The boxes now are made of wood with a chromium steel liner by another manufacturer. As another case, "igloos" for sheltering troops and storing ammunition were formerly assembled from galvanized corrugated steel sections. The sections now are painted and the job galvanizers have lost business.

However, it is explained that zinc is not easier and there are no immediate prospects that it will become easier as evidenced by the recent opposition of the WPB Zinc Branch to changing the proportion of zinc in ammunition brass slightly. For censorship reasons, production of high-grade zinc for last month cannot be reported but it may be stated that new distillation equipment now being installed will increase the supply 11,000 tons by the first of the year. As much as possible will be distilled from intermediate and brass special grades since these provide the highest yield. The balance will come out of the prime western zinc supply.

Further economies in the use of nickel are being explored, although production in Canada has been stepped up and a new property in Cuba will add 3,000,000 pounds monthly to the supply shortly after the first of the year.

Nation Needs All Steel That Can Be Made, Says Batcheller

All the steel this nation can produce is needed now and will continue to be needed until the war is won, Hiland G. Batcheller, director, WPB Steel Division, said last week.

"In recent weeks, a number of reports have given the impression that the steel situation is easier," Mr. Batcheller said. "Such expressions of opinion are likely to prove misleading without more complete explanation.

"It is true that the backlog of orders on the books of producers is lower than it was several months ago. However, this is a direct result of action taken by the War Production Board to restrict the tonnage of steel which can be purchased so that it may be related more closely to the available supply.

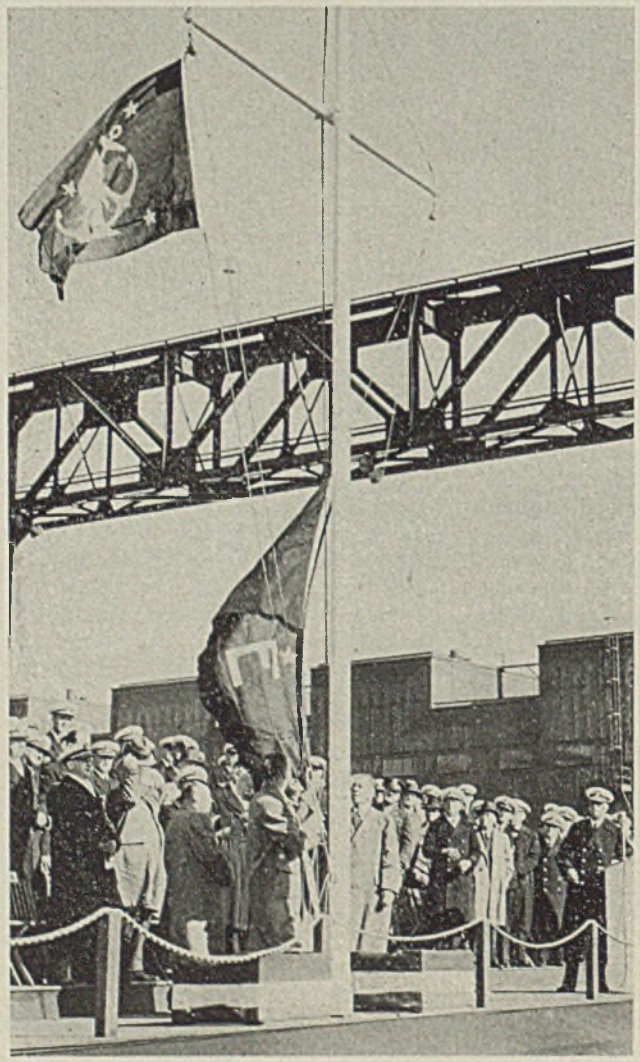
"Such action has been taken through the Production Requirements Plan and by numerous limitation and conservation orders eliminating the use of steel for nonessential purposes and curtailing its use for many other needs.

"Under such a program it is only natural that the demand for certain steel products will be much lighter than for others. Typical of this are the steels for construction purposes such as structural shapes and concrete reinforcement bars. The need for such types of steel is steadily diminishing as we near the completion of the war construction program.

"However, at the same time the demand for other types of steel—such as alloy steel, so important for aircraft and tanks—is steadily growing."

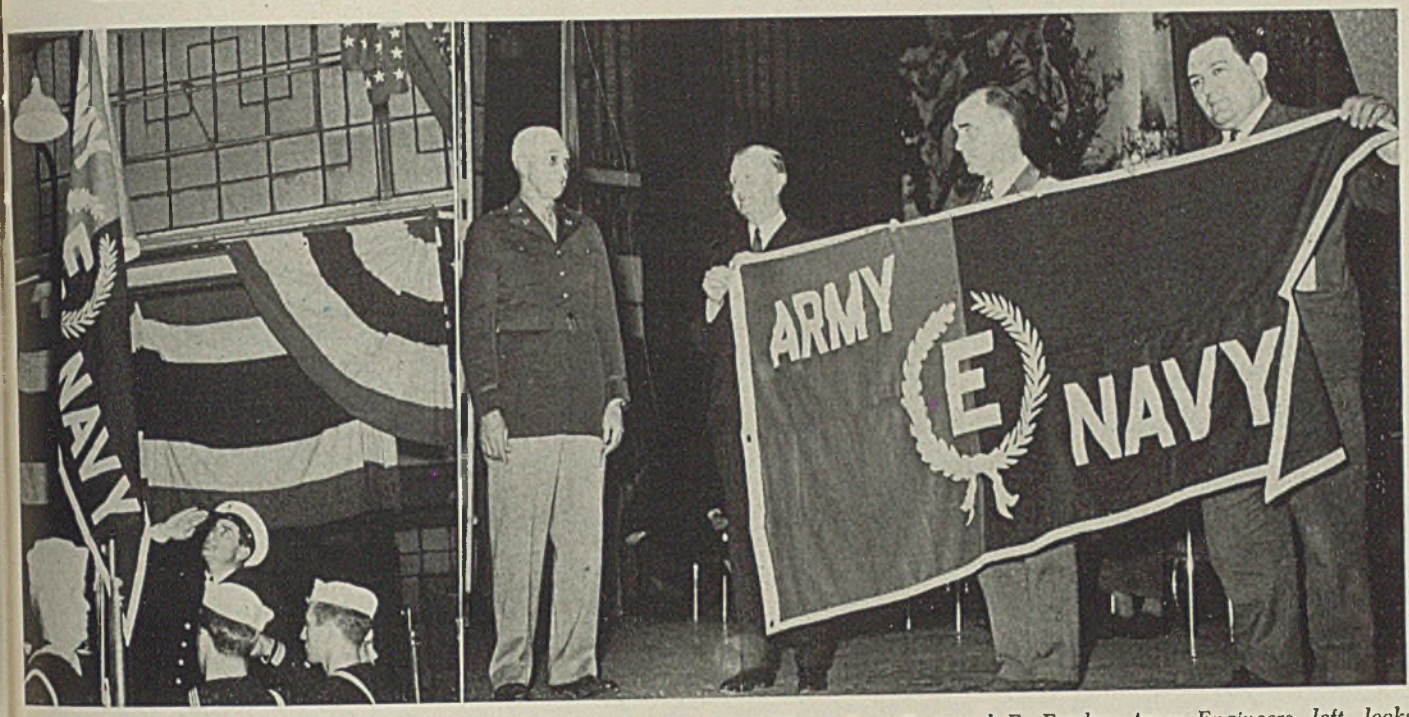
Allegheny Ludlum Steel Corp., Brackenridge, Pa., receives the "E" award. Shown at left above are Army, employe and management representatives

C. M. Kemp Mfg. Co., Baltimore, receives recognition for excellence of war effort. Shown above are employe representatives Miss Edna Hanson, J. Elmer DeHaven and William



Edward G. Budd, president, Budd Wheel Co., and the E. G. Budd Mfg. Co., presents the ten millionth Budd-built shell to Col. A. B. Quinton Jr., chief of the Detroit Ordnance District, as Budd received the production award

White star is added to the Army-Navy pennant awarded to the Philadelphia Navy yard, in recognition of continued excellent production, left. NEA photo



Hunt watching the raising of the "E" flag by the crew of Mr. Kemp's yacht, now loaned to the Coast Guard for the duration of the war

Brig. Gen. Raymond F. Fowler, Army Engineers, left, looks on while B. F. Goodrich Co. officials hold the "E" pennant aloft

Additional Companies Awarded Pennants for War Production

Continued outstanding war production achievement by Carnegie-Illinois Steel Corp. has been recognized by award of the joint Army-Navy pennant with two stars affixed. Earlier the company had received the Bureau of Ordnance flag and the Navy "E" pennant and the All-Navy "E" burgee.

Other companies receiving the award include:

American Brass Co., Buffalo.

The Athenia Steel Co., Division of National Standard Co., Clifton, N. J.

Cheney Brothers, Manchester, Conn.

Ferris Instrument Corp., Boonton, N. J.

Savanna Ordnance Depot No. 2, Proving Ground, Illinois.

Suncook Mills, Suncook, N. H.

United Wire & Supply Corp., Providence, R. I.

International Business Machines Corp., Plant Number 1, Endicott, N. Y.

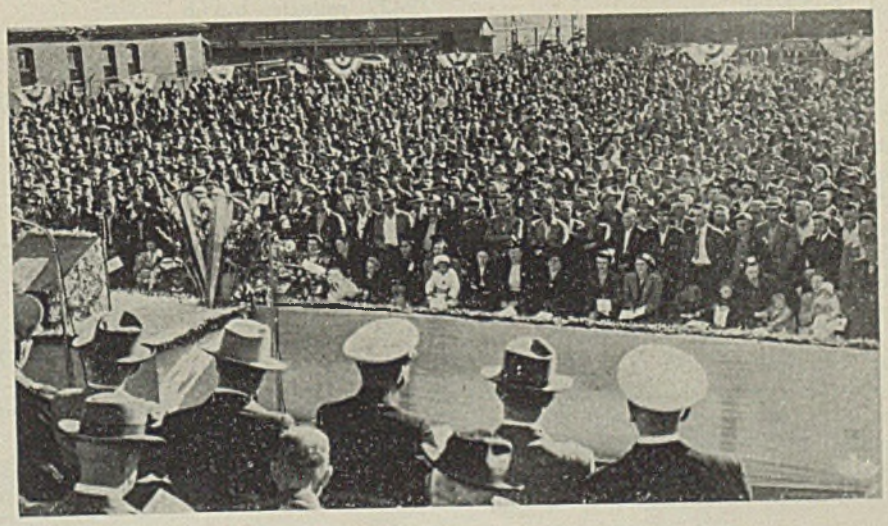
Macwhyte Co., Kenosha, Wis.

Nylon Research Laboratory and Pilot Plant, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.

Winthrop Chemical Co. Inc., New York.

Four employes of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., have been awarded the company's Order of Merit for outstanding ability. The award, established in 1935, includes certificates listing achievements, and bronze medals.

Admiral Henry A. Wiley congratulates factory manager W. R. Coley of Leeds & Northrup Co., Philadelphia



Three thousand Combustion Engineering Co. employes and their families witnessed the presentation at the Hedges-Walsh-Weidner Division, Chattanooga, Tenn.

Treasury Aims at Thirty Million Buyers Through Payroll Plans

STRONG support for the war savings program is coming from business and industry, according to the United States Treasury Department. Not only are the managements of a wide variety of firms co-operating with labor to introduce payroll plans for war bond buying, but many of these firms are qualifying as issuing agents for the Series E Bonds. The drive now under way to "Top That 10 Per Cent By New Year's," and raise the number of payroll savings participants to 30,000,000 workers, will create an even greater need for employer issuing agents.

Nearly 7000 business and industrial companies have already become issuing agents for Series E Bonds, many of them for the purpose of issuing bonds to their employes through payroll savings plans. Included also are some American branches of foreign companies, although this latter group can issue and sell bonds only to residents of the United States.

The total number of non-governmental issuing agents for Series E Bonds is now nearly 29,000. In addition to the list of nearly 7000 industrial and commercial companies mentioned above, this aggregate includes about 15,000 banks; more than 3000 building and loan associations; and nearly 3000 credit unions.

The shouldering of a part of the work by private firms has been an important factor in the spread of payroll savings plans. The issuing of large numbers of small denomination bonds entails an enormous amount of work which at times has threatened to swamp the facilities of banks and other agents, and to slow up bond deliveries to a corresponding degree. The increase in the number of employer issuing agents facilitates issues and speeds up deliveries.

Advantages of Payroll Plan

In the case of a bond purchased through a payroll savings plan, moreover, the fact that the employing organization issues the bond assures to the investor the earliest possible dating of the bond, with no lapse of time, after the price of the bond has been accumulated, before the funds begin to earn interest. There need be no waiting until the employe can get out to a bank or a post office to make his last payment or purchase his bond. Since bonds are dated as of the first day of the month in which they are bought, if the pay day which makes possible the last payment on a bond should fall on the last day of the month, the delay of one day in making that payment would cost the employe an entire month's interest.

Organizations operating payroll allotment plans for employe purchases of war bonds should apply to the Federal Reserve banks for designation as issuing agents for Series E Bonds. An organization which would, in all probability, issue E Bonds to its employes in a number sufficient to warrant its becoming an agent can obtain an application-agreement form from a Reserve bank.

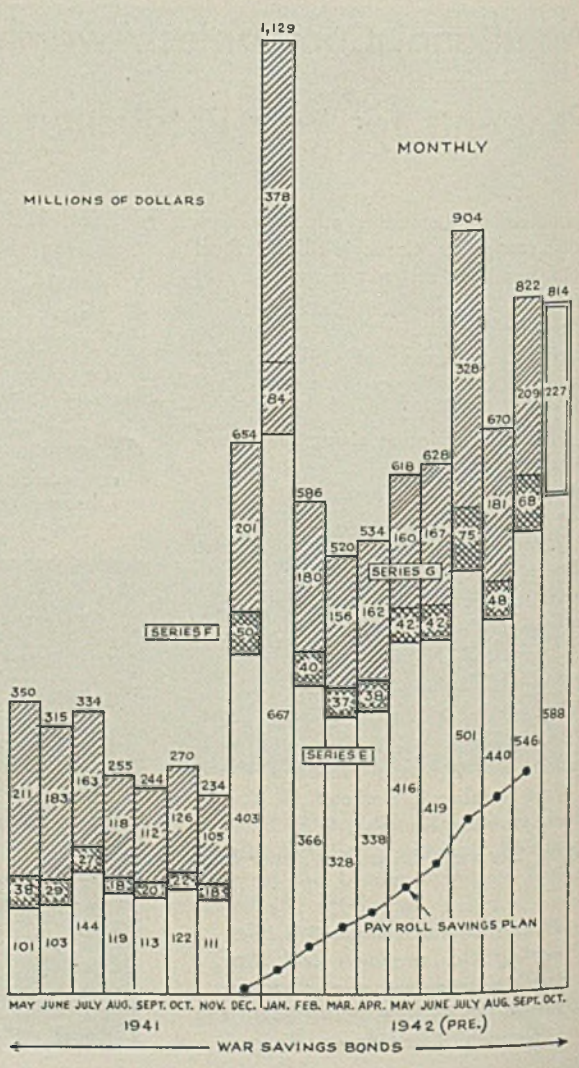
It is not required that business and industrial organizations deposit collateral to qualify as issuing agents for Series E Bonds. A simple arrangement has been established whereby employer firms operating payroll savings plans pay in advance for all bonds which they require for issuance to their employes. This procedure permits prompt receipt of funds by the treasury and works no hardship on the firm since the payments are not made from the working capital of the firm, but from amounts accumulated through payroll deductions and held in trust for employe bond purchases.

Wherever it is practicable, firms which are issuing agents deliver bonds directly into the hands of employes who have purchased them. In some cases, however, particularly in industrial plants and shops, working conditions make this manner of delivery impracticable, and bonds are sent to their owners by registered mail. Such mailing costs are refunded to agents through Federal Reserve banks, and as soon as arrangements can be made, it is planned to simplify the mailing procedure.

From 21,000,000 to 22,000,000 American workers are already participating in payroll savings plans to the extent of 7.6 per cent of total earnings. This percentage, of course, is based upon averages. Many workers have already pledged 10 per cent of their pay for war bonds; others have exceeded that figure. As of Oct. 21, there were 25,835 companies with 3,037,167 employes, all of whom had authorized deductions of at least 10 per cent of their pay for war bonds.

HOW BOND SALES MOUNT

SALES of War Bonds during the past two years are charted above, by months, from figures by the United States Treasury Department. The sharp increase in January, 1942, reflects both Christmas and year-end bonuses and the anger of the people over Pearl Harbor. Payroll savings plans have accounted largely for the steady increase in series E bond purchases throughout the past year. Chart by National Industrial Conference Board



Index of Activity Edges Upward

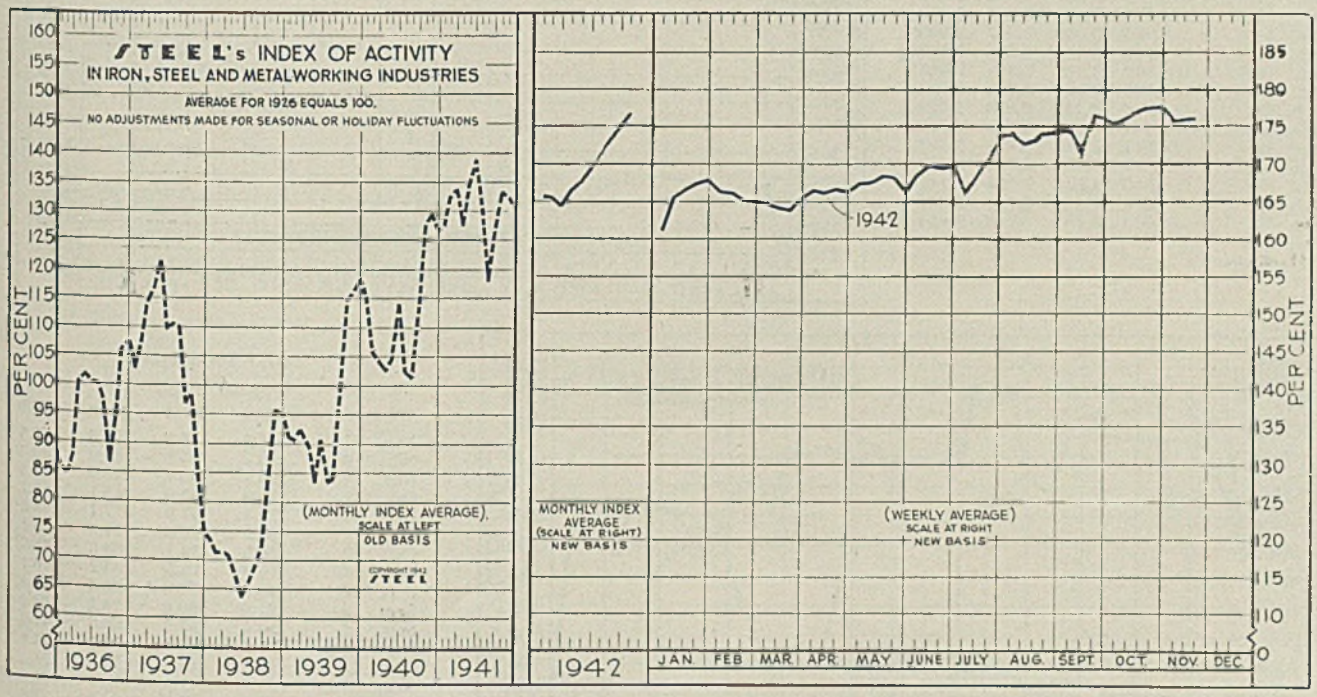
RECENT efforts of the Smaller War Plants Corp. indicate that help for small businesses—as yet unable to participate in the war effort—is definitely on the way. The armed services are now seeking to turn the production of less critical materials over to the smaller factories. The Smaller War Plants Corp. is expected to review the materials requirements of the several purchasing agencies of the government sufficiently in advance to see whether smaller manufacturers are capable of meeting them.

By the middle of 1943 the government debt will approximate $140 billion, according to a recent estimate of the Federal Reserve Board. This will equal more than $1000 per capita, or $4000 per average family.

Reflecting a slight upturn in revenue freight carloadings and steel ingot production during the week ended Nov. 21, STEEL's index of activity edged upward to 176.2. This represents a gain of 0.2 point over the preceding week's index figure, but remains slightly below the peak this year of 177.8 recorded in the period ended Oct. 31.

The national steel rate advanced one-half point to 99.5 per cent during the week ended Nov. 21. On a tonnage basis this represents the best level ever recorded. However, necessary furnace repairs forced a slight decline in steel ingot production during the latest period. Flow of iron and steel scrap to consumers' yards continues in sufficient volume to enable most users to build up inventories.

Early estimate of revenue freight carloadings for the latest period indicates a slight gain to about 835,000 cars. Electric power consumption is expected to record a moderate decline to around 3,750,000,000 kilowatts.

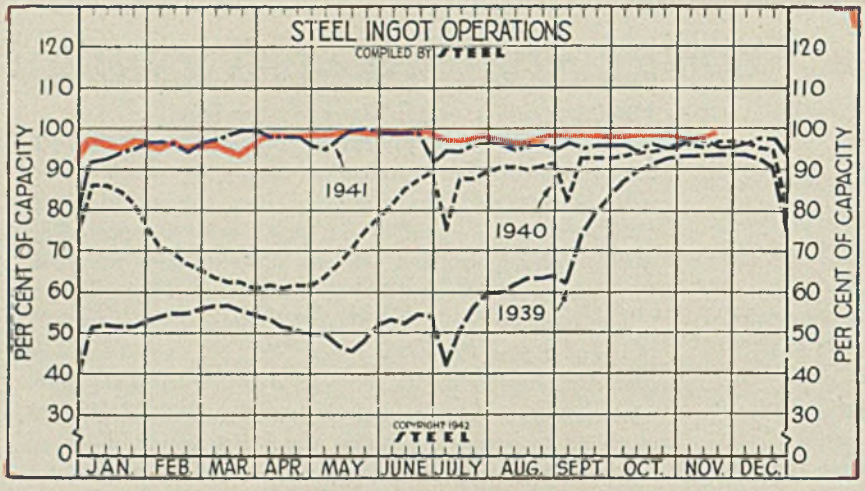


STEEL's index of activity gained 0.2 point to 176.4 in the week ending Nov. 21:

Week Ended	1942	1941	Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Sept. 19	176.8	130.6	Jan.	165.7	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Sept. 26	176.0	132.0	Feb.	165.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
Oct. 3	175.5	132.7	March	164.6	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
Oct. 10	176.5	132.3	April	166.7	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
Oct. 17	176.9	133.4	May	167.7	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
Oct. 24	177.7	133.5	June	169.4	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
Oct. 31	177.8	133.8	July	171.0	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Nov. 7	175.6	134.4	Aug.	173.5	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Nov. 14	176.2	133.8	Sept.	174.8	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Nov. 21	176.4†	128.4	Oct.	176.9	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
			Nov.		132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
			Dec.		130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

†Preliminary.

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



Steel Ingot Operations

(Per Cent)

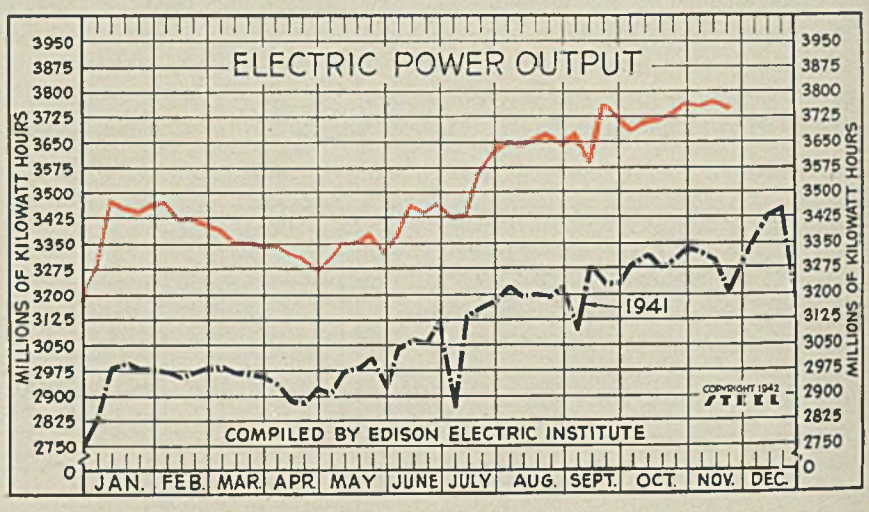
Week ended	1942	1941	1940	1939
Nov. 21	99.5	95.5	97.0	93.5
Nov. 14	99.0	97.0	96.0	93.5
Nov. 7	98.5	97.5	96.5	93.0
Oct. 31	99.0	95.5	96.5	93.0
Oct. 24	99.0	95.5	95.5	92.0
Oct. 17	99.0	96.5	95.0	91.0
Oct. 10	98.5	94.5	94.5	89.5
Oct. 3	98.0	96.0	93.5	87.5
Sept. 26	98.0	96.0	93.0	84.0
Sept. 19	98.0	96.0	93.0	79.5
Sept. 12	98.0	96.5	93.0	74.0
Sept. 5	98.0	95.5	82.0	62.0
Aug. 29	98.0	96.5	91.5	64.0
Aug. 22	97.5	96.0	90.5	63.5
Aug. 15	97.0	95.5	90.0	63.5
Aug. 8	97.5	96.5	90.5	62.0
Aug. 1	98.0	97.5	90.5	60.0

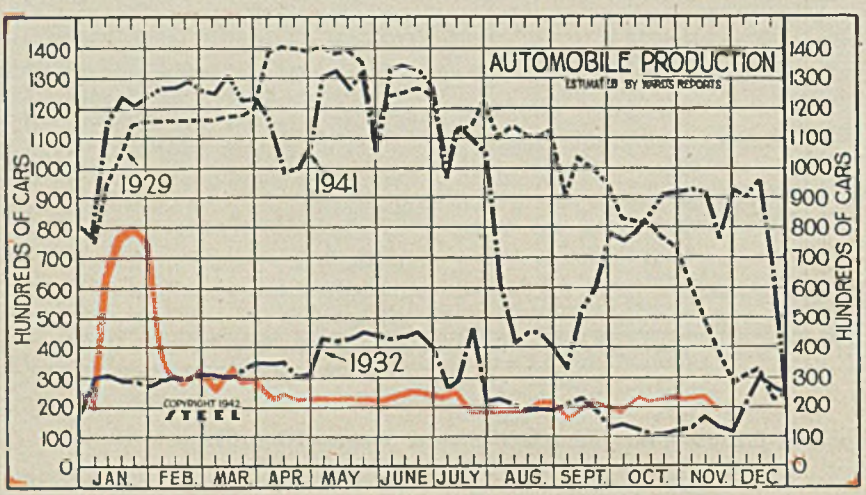
Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
Nov. 21	3,750†	3,205	2,839	2,561
Nov. 14	3,776	3,305	2,890	2,587
Nov. 7	3,762	3,326	2,858	2,589
Oct. 31	3,775	3,339	2,882	2,609
Oct. 24	3,753	3,299	2,867	2,622
Oct. 17	3,717	3,273	2,838	2,576
Oct. 10	3,702	3,315	2,817	2,583
Oct. 3	3,683	3,290	2,792	2,554
Sept. 26	3,720	3,233	2,816	2,559
Sept. 19	3,757	3,232	2,769	2,538
Sept. 12	3,571	3,281	2,773	2,532
Sept. 5	3,673	3,096	2,592	2,376
Aug. 29	3,640	3,224	2,736	2,442
Aug. 22	3,674	3,193	2,714	2,434
Aug. 15	3,655	3,201	2,746	2,454

†Preliminary.





Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
Nov. 21	18.3	76.8	102.3	72.5
Nov. 14	20.2	93.0	121.9	86.7
Nov. 7	20.2	93.6	120.9	86.2
Oct. 31	20.9	92.9	118.1	82.7
Oct. 24	20.8	91.9	117.1	78.2
Oct. 17	20.2	85.6	114.7	70.1
Oct. 10	20.3	79.1	108.0	75.9
Oct. 3	19.9	76.8	105.2	76.1
Sept. 26	20.9	78.5	96.0	62.8
Sept. 19	21.0	60.6	78.8	54.0
Sept. 12	19.6	53.2	66.6	41.2
Sept. 5	16.9	32.9	39.7	26.9
Aug. 29	21.1	40.0	27.6	25.2
Aug. 22	20.2	45.5	23.7	17.5
Aug. 15	19.2	45.8	20.5	13.0

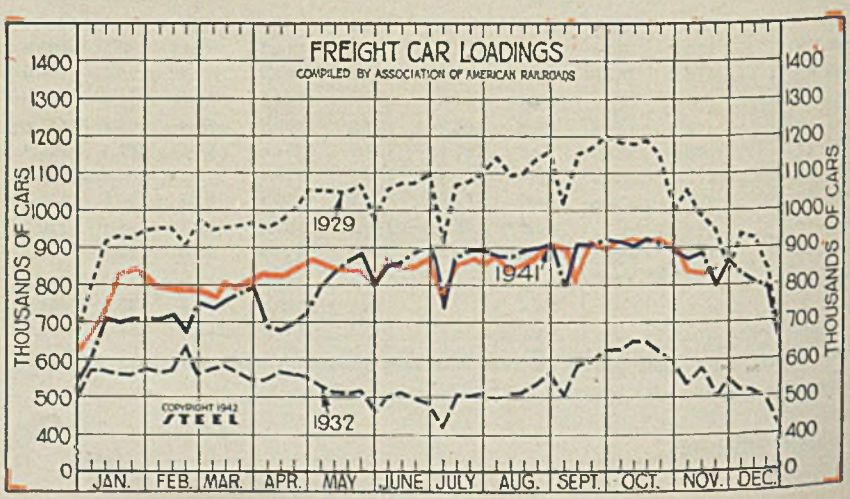
Figures since Feb. 21 last include Canadian trucks and automobiles and United States trucks.

Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
Nov. 21	835†	799	733	677
Nov. 14	827	884	745	771
Nov. 7	829	874	778	786
Oct. 31	891	895	795	806
Oct. 24	903	914	838	834
Oct. 17	901	923	814	861
Oct. 10	910	904	812	845
Oct. 3	908	918	806	835
Sept. 26	898	920	822	835
Sept. 19	903	908	813	815
Sept. 12	815	914	804	806
Sept. 5	888	798	695	667
Aug. 29	899	913	769	722
Aug. 22	869	900	761	689

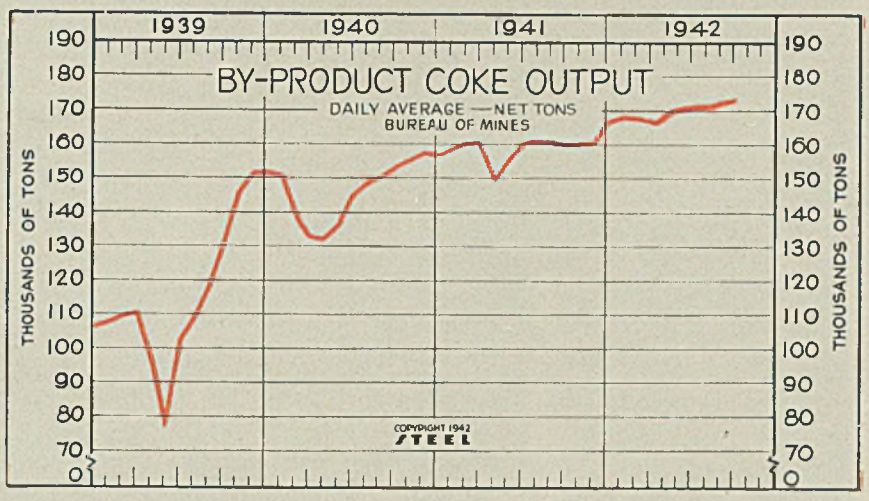
†Preliminary.

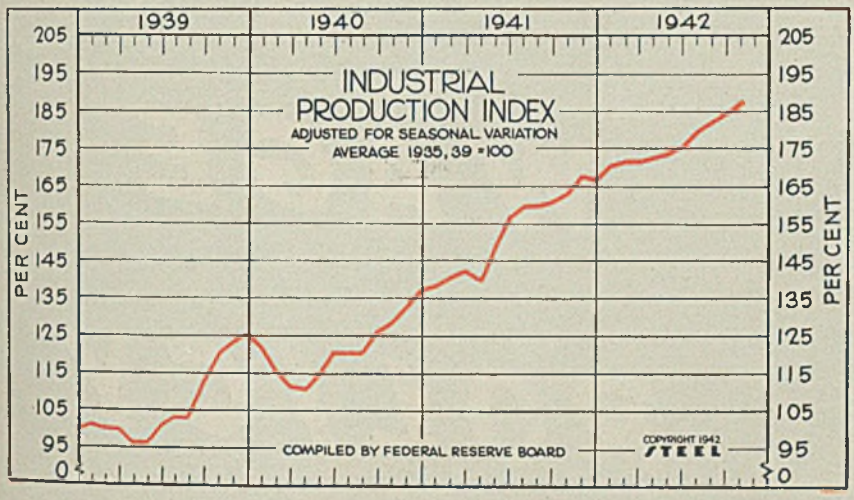


By-Product Coke Output

(Daily Average)

	1942	1941	1940	1939
Jan.	168,508	159,129	151,841	108,611
Feb.	168,414	160,789	138,508	109,923
March	167,733	161,268	133,056	110,921
April	168,960	149,144	132,812	97,155
May	170,187	156,318	136,897	77,304
June	170,593	161,201	145,821	102,991
July	170,244	161,731	149,005	108,542
Aug.	171,443	161,709	151,035	118,260
Sept.	172,110	160,193	154,247	130,144
Oct.		160,344	156,118	146,019
Nov.		161,116	158,331	152,219
Dec.		167,304	157,743	152,200
Total		160,037	147,157	117,892





Industrial Production

Federal Reserve Board's Index

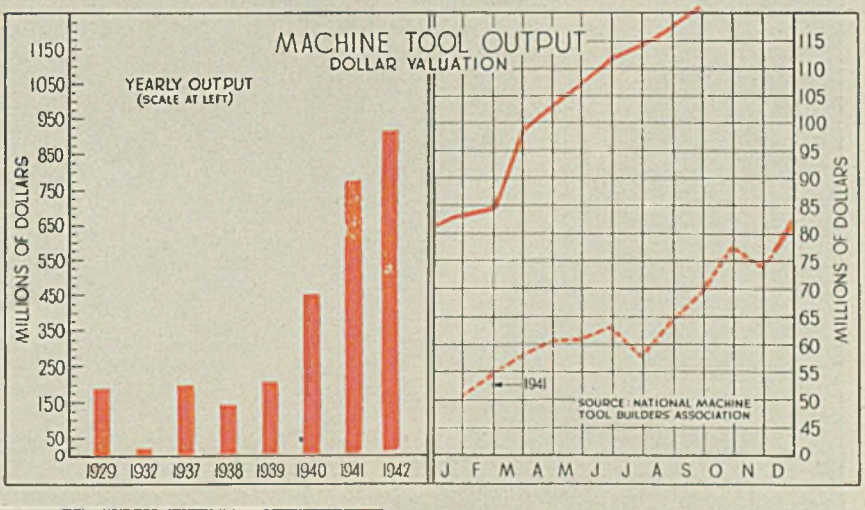
(1935-39 = 100)

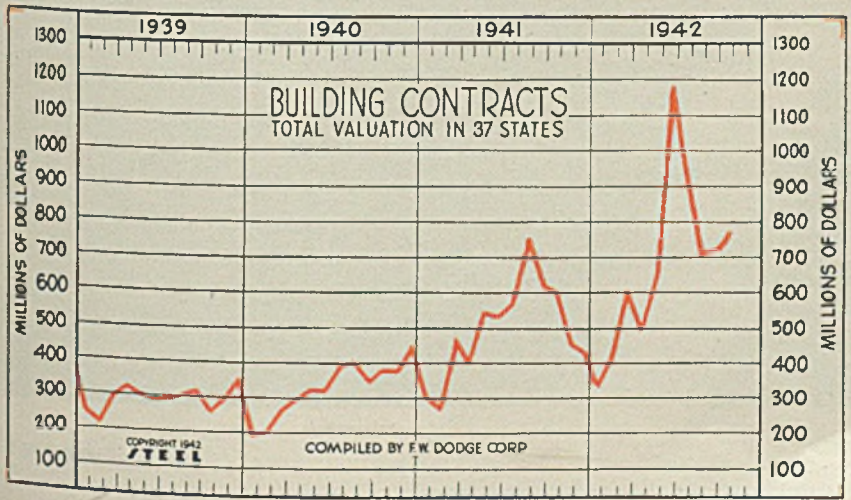
	1942	1941	1940	1939	1938
Jan.	171	139	122	102	86
Feb.	172	141	116	101	84
March	172	143	112	101	84
April	173	140	111	97	82
May	174	150	115	97	80
June	176	157	121	102	81
July	180	160	121	104	86
Aug.	183	160	121	104	90
Sept.	185	161	127	113	90
Oct.	188	163	129	121	95
Nov.		168	133	124	100
Dec.		167	138	126	101
Year Ave.		154	122	108	88

Machine Tool Output

(000 omitted)

	1942	1941
Jan.	$83,547	$50,700
Feb.	84,363	54,000
Mar.	98,358	57,400
April	103,364	60,300
May	107,297	60,800
June	111,147	63,000
July	113,600	57,900
Aug.	117,343	64,300
Sept.	120,118	68,400
Nine Months	939,151	536,800
Oct.		77,200
Nov.		74,600
Dec.		81,435
Year 1942 est.		1,500,000
1941		775,300
1940		450,000
1939		210,000

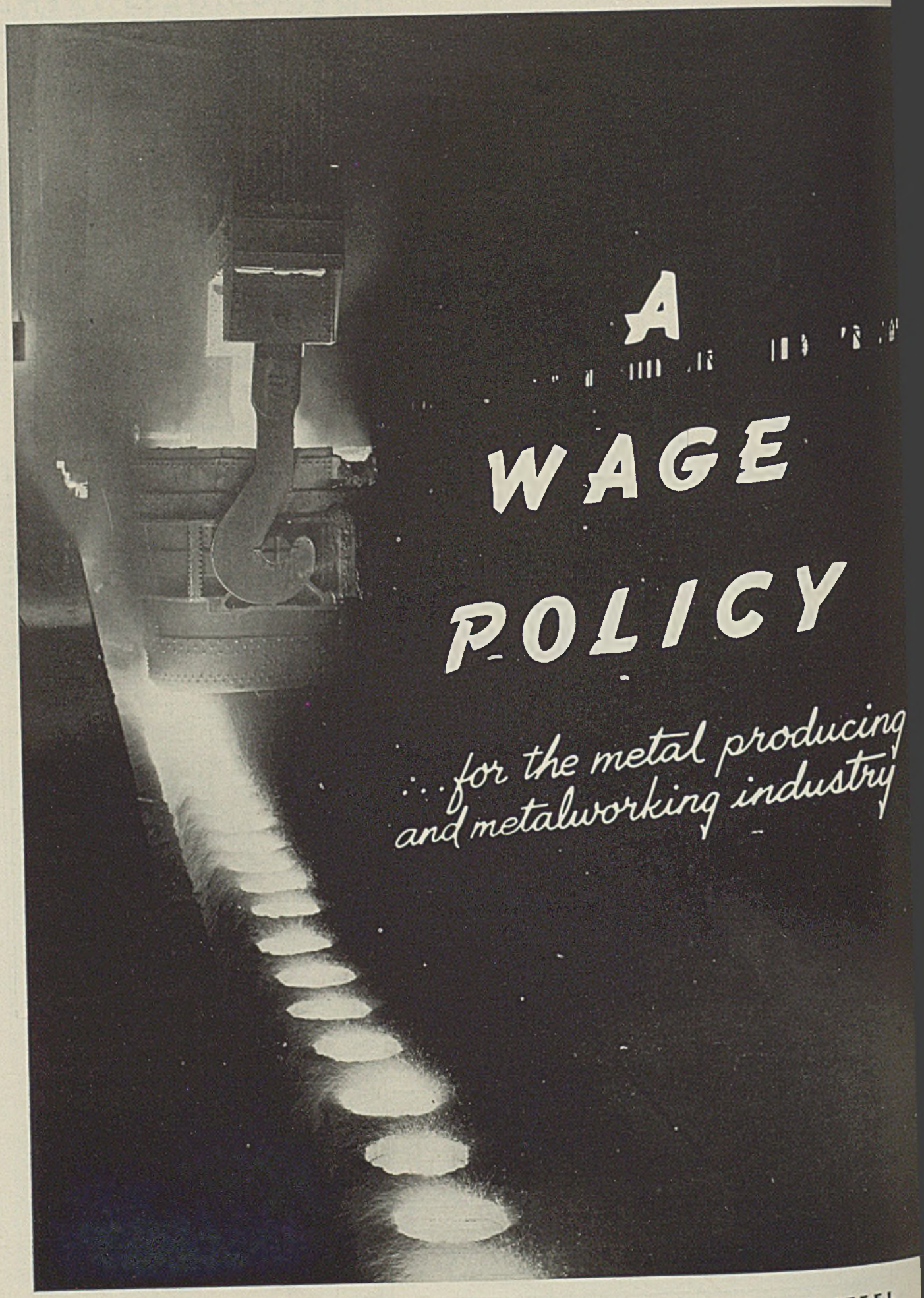




Construction Total Valuation In 37 States

(Unit: $1,000,000)

	1942	1941	1940	1939	1938
Jan.	$316.8	$305.2	$196.2	$251.7	$192.2
Feb.	433.6	270.4	200.6	220.2	118.9
Mar.	610.8	479.9	272.2	300.7	226.6
April	498.7	406.7	300.5	330.0	222.0
May	673.5	548.7	328.9	308.5	283.2
June	1190.3	539.1	324.7	288.3	251.0
July	943.8	577.4	398.7	299.9	239.8
Aug.	721.0	760.3	414.9	312.8	313.1
Sept.	723.2	623.3	347.7	323.2	300.9
Oct.	780.4	606.3	383.1	261.8	357.7
Nov.		458.6	380.3	299.8	301.7
Dec.		431.6	456.2	354.1	389.4
Ave.		$500.6	$333.7	$295.9	$266.4



Republic Steel Corp. photo

By JOHN W. ROBERTS
Vice President
Bedaux Co. Inc.
New York

IN THE FIRST seven months of 1942, America's steel industry produced 49,719,071 net tons of ingots and steel for castings, an output that fell short by just 2 per cent of equaling the production for the 12 months of 1917, which was steel's peak year in World War I.

Such figures speak for themselves. More vividly than could pages of text, they dramatize the outlines of the job—the tremendously expanded job — that the industry has undertaken in World War II.

Within those outlines runs a story of technoligical progress throughout all the metal producing and metalworking industries. Within them runs a story of constantly improving management of men, materials and equipment, and the development of an intelligent philosophy of human relations. And from within them are shadowed forth the potentialities for the industry's future.

World War II found the metal industries not unprepared to take on the larger assignment. For two decades management had been concerning itself aggressively with improved production technique, with methods by which equipment might be enabled to produce to its maximum. And, logically, this development had carried with it increasing consideration of the human element. For only the workers' understanding cooperation can equipment be so managed as to produce to capacity.

For years the industry's management, generally speaking, had recognized the wisdom of rewarding workers with extra pay for extra effort, usually in the form of "tonnage rates". These rates, although they offered the seeming advantage of simplicity, usually were established upon the basis, not of actual possibilities, but of past performance. And, naturally, the effect of such rule-of-thumb procedure was to induce the workers to turn out only "so much" work. Furthermore, under this unscientific policy, workers' rates often were cut—severely and without valid reason; and the over-all result often was controversy and poor labor relations.

It is with a more enlightened policy of compensation—*a policy that in instance after instance in the steel industry has increased production, lowered costs, and improved industrial relations*—that this article is mainly concerned.

In recent years, the production engineer has brought to industry such instruments of managerial precision as time study, motion analysis, job description and occupation evaluation. With these means of measurement and control, modern-day production engineering has learned new facts—facts that have made possible the spreading of equitable and scientific methods of compensation among increasing number of workers. And with more accurate knowledge has come a new concept of the workers' place—and of their true potentialities—in the industrial picture.

Not without reason—indeed, not without a number of reasons—has labor been dissatisfied with the old order, so far as "extra pay" plans are concerned.

Workers have feared that working standards or the work rates would be abused, and that, to "make out", a man would be required to exert severe physical effort.

Workers have feared for their security. Many of them have felt that high performance would induce unemployment. Indeed, many of them even have believed that, as more accurate measurement might disclose that too many employes had been assigned to complete certain jobs or tasks, men would be discharged.

Some Plans Lacked Balance

Workers have felt that the rates were not guaranteed. Many of them have feared that, as their earnings increased, management would cut rates arbitrarily and demand "more work for less pay".

Workers have believed that, as management began experimenting with extra-pay plans of various kinds, some of the so-called systems that were set up were too complicated for workers to understand. That which men cannot understand they are likely to mistrust.

Some of the plans unscientifically evolved have lacked balance and uniformity of policy and principle. In particular, this defect has developed in plants and mills that lacked central, wage-governing authority; and, to this day, in some enterprises, departmental compensation plans, differing from department to department, generate discontent because the men believe them to be—as they are—discriminatory and unfair.

These are merely some of the reasons for labor's discontent. Of course, there have been others.

In the 25 years that the Bedaux Co. has helped management improve production technique and in the 20 years that we have served the steel industry, we have heard these objections—and seen the reasons for them—close at hand. And experience has taught us that no wage compensation plan can hope to succeed that is not based solidly upon a policy of protecting the workers' interests.

In general use, there are four methods of compensation:

—A straight time wage, generally hourly

—Piece work, with a guaranteed hourly minimum, or tonnage rate

—Group bonus plans

—A combination of straight time wages plus extra pay based on performance or results.

Of the four, we have found the fourth is most satisfactory for the steel industry when—and I stress this proviso—the extra pay made available to the employe is based upon accurately measured effective work output and standards.

Such a plan's objectives are to reduce operating costs, increase production, and permit higher workers' earnings. Properly conceived and applied, such a plan improves employe relations, reduces labor turnover and creates a better spirit of co-operation. It is fair to both members of the production team.

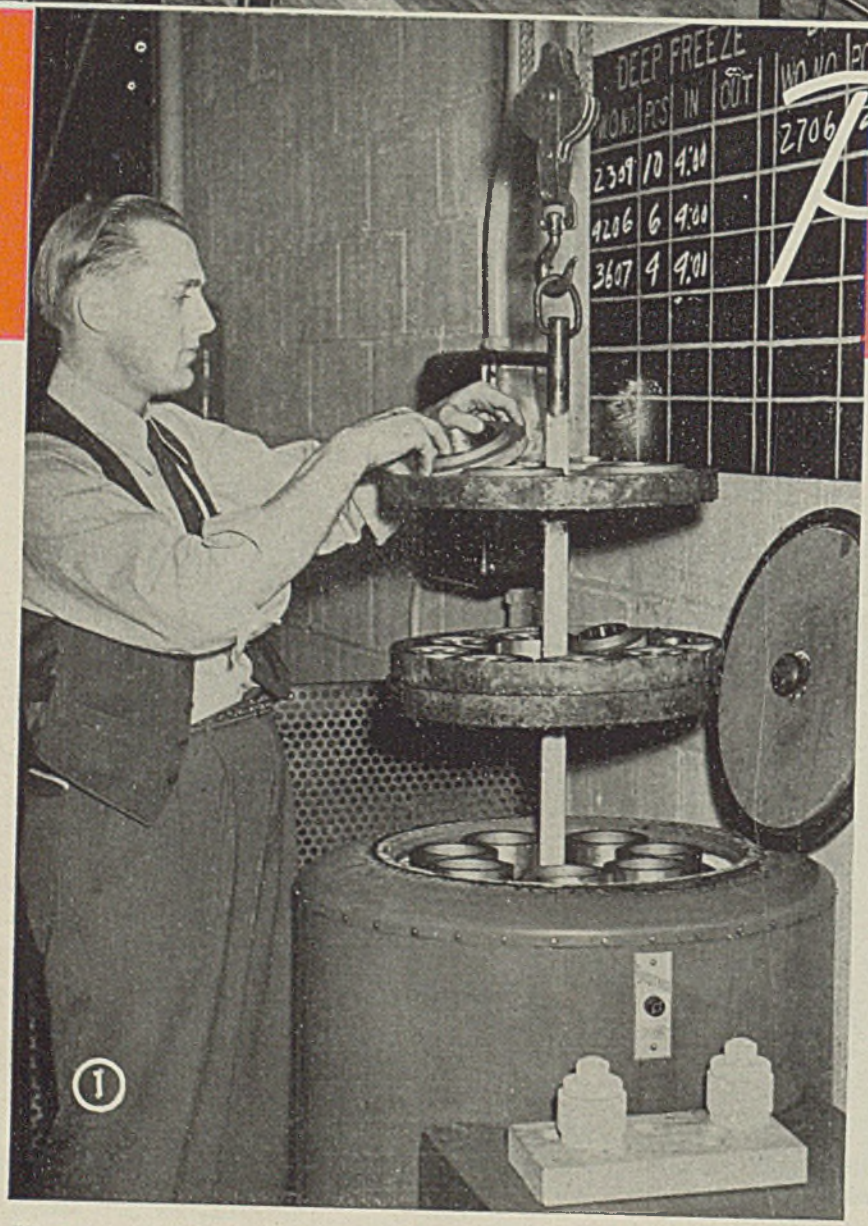
Management has the right to expect that, in return for a guaranteed full day's pay, the worker will deliver a full day's work. It is the worker's right to determine whether or not he wants to produce in excess of this level and for his extra effort receive his reward in terms of extra pay.

To establish equitably the first component of such a compensation plan—the basic, straight-time wage—we turn to two of the instruments of scientific management I have mentioned, job analysis and occupation evaluation. Proper relationship among the various job classifications is established by a job-evaluation plan that accords due consideration to such elements as experience, skill, responsibility, and the working conditions by which the jobs are surrounded.

The opportunity to earn extra pay should vary with the workers' respective opportunities to do extra work. If there is no possibility to do extra work above a fair day's quota, then there should be set up no opportunity to earn extra pay. The worker who has the greatest possibility to influence the performance and results should have the largest extra-pay opportunity. Between these two extremes range all the stages at which workers confront opportunity for extra work in varying degrees; and for each of these, a scientific extra-pay compensation plan will provide reward commensurate to the additional effort effectively applied.

Under such a plan, where the extra pay varies in production to the work load, the reward promotes a greater use of each man's working capacity by making extra effort attractive to the man

(*Please turn to Page* 92)



Producing

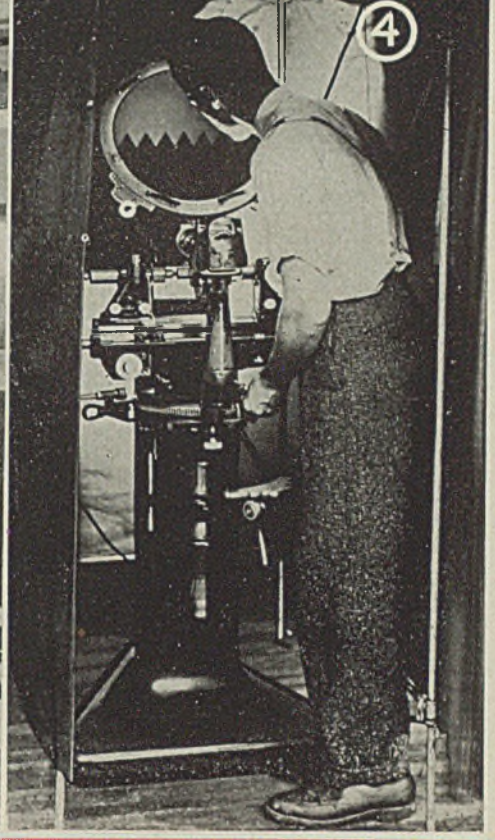
By GERALD E. STEDMAN

Fig. 1—This fixture handling multiple trays in a deep freezing unit makes it possible to load and unload gages on varying time schedules without disturbing other gages in the fixture

Fig. 2—Portion of air-conditioned room where finish lapping and final inspection are handled. Final inspection work is shown here

Fig. 3—Portion of air-conditioned room where finish lapping and final inspection are handled. Here gages are shown being finish lapped as close as 0.00002-inch tolerance. Both temperature and humidity are accurately controlled

Fig. 4—"Tent" provides darkroom in which operator checks accuracy of angle and shape of thread and root clearances. Unit is also insulated against vibration



a Precision Product

. . . . by modern mass-production techniques is a job being handled effectively in Michigan gage plant

"YES, THE TOOLS which would teach men their own use would be beyond price."

This reply of Glaucon to Socrates in Plato's *Republic* is intriguing, and it comes near being fulfilled in modern precision gages and measuring instruments, for with these instruments, new operators can quickly be taught the most delicate of inspections. If depending upon the cultivation of the "feel" of a micrometer, as was formerly required of each operator, they might require years to obtain the same accuracy.

When we consider the weapons of war, let us not forget that among the mightiest of all these are actually the thread, plug and ring gages the war worker so constantly uses at his machine or bench. Here, all weapon's ability to meet and destroy the enemy is in the balance. Actually, as many as 75 separate gages may be required merely to check accurately the components of a 75-millimeter shrapnel shell.

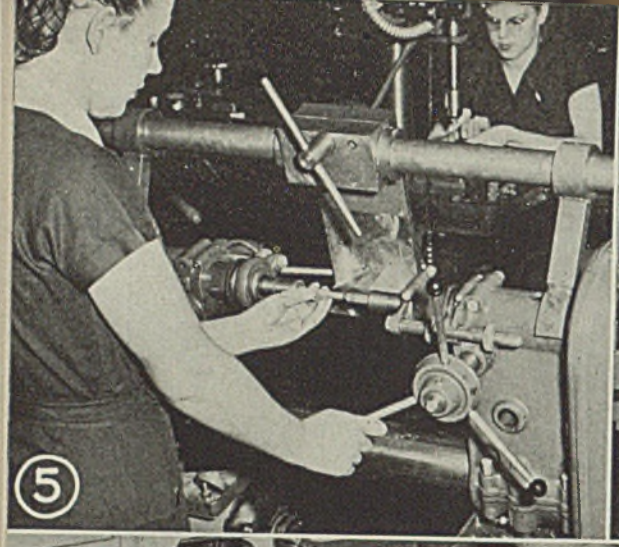
In practice, there is no such thing as an exact dimension. But when you see a Norton hydraulic machine, Fig. 6, grinding cylinder plug gages down to 0.00005-inch tolerance, about 1/40 the size of a human hair, you begin to realize that we are getting closer than just in the general vicinity of exactness. Thirty years ago as a kid in the shops, I saw the older toolmakers take pride in hitting 0.001-inch. They could "grind it down to the size of a hair," was their boast. But those were the days, too, when I stood bewildered as the Detroit-Chicago Comet whizzed by at 60 miles per hour.

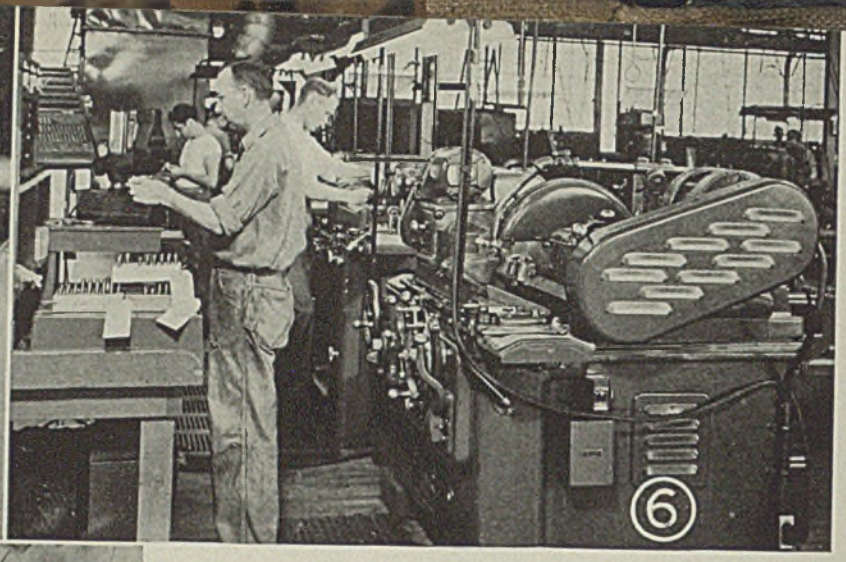
Last week I saw a plane approach 450 miles per hour in a test. Truly the day has gone when production was ruled by the "feel of a mike."

Today's battle of production is being fought within the tolerance of 0.0001-inch, and that is even a loose dimension in many operations. These are precision dimensions that pass the feel of man. For that matter, they almost pass his comprehension. *The war, in last analysis, is controlled by a precision gage.* To be able swiftly to jerk uninjured parts from the damaged material strewn all over the first echelon and reassemble a plane that will take off to a new killing . . . . that more than any other ability spells VICTORY. And this ability is the result of accurate gaging. The side that can thus make best use of its remnants is more than apt to be the side that wins.

And we are producing this ability because our war production is gaged to such precise dimensions as to make possible complete and perfect interchangeability of parts for all types of weapons and conveyances. All this is made possible by working gages, ground and lapped to a precision, in fact, which even reference gages did not have 10 years ago.

In the British system which constitutes





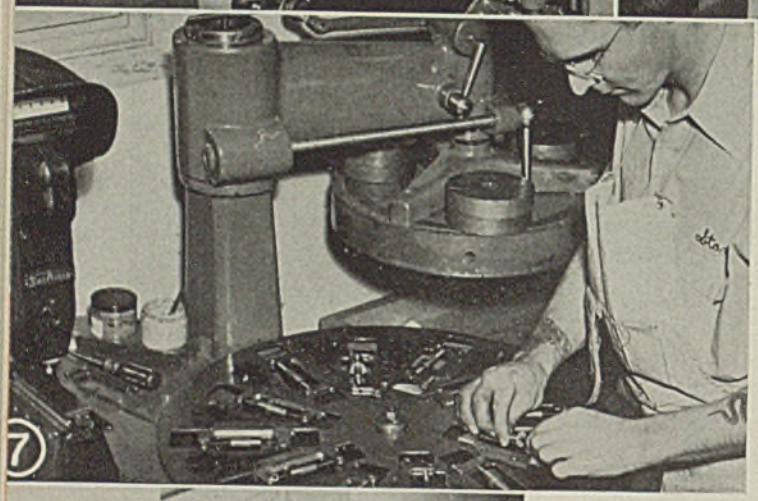


Fig. 5—Unusually high percentage of employes are women. Here a special fixture utilized for lapping a precision gage has doubled reduction, cut operator fatigue

Fig. 6—These grinders are capable of handling tolerances down to 0.00005-inch—1/40 the size of a human hair

Fig. 7—One of the many new machines of latest design. It is a Norton lapper which utilizes a special fixture that enables 12 cylindrical plug gages to be lapped simultaneously

Fig. 8—One of many precision instruments used for checking is this device to examine the leads of thread gages. It is a comparatively new type of instrument

our measurement control, the fundamental unit is the yard. The original standard consists of two gold plugs inserted in a bronze bar with a scribed line on each plug. When the room is 68 degrees Fahr., the distance between these lines is the standard for calibrating all copies of the bar, measuring instruments and gages.

As an example of how gages are being produced under the best of modern conditions, let us examine the procedure at Suprex Gage Co., Ferndale, Mich., for here the gages are not only given their inspection in a temperature controlled at 68 degrees Fahr. (a federal requirement), but this gage manufacturer also does final lapping of such gages under these same carefully controlled temperatures. While such precision production might be thought limited to small outputs, work at Suprex is of such volume as actually to be handled on a mass-production basis. Thus the production methods employed are of more than usual interest.

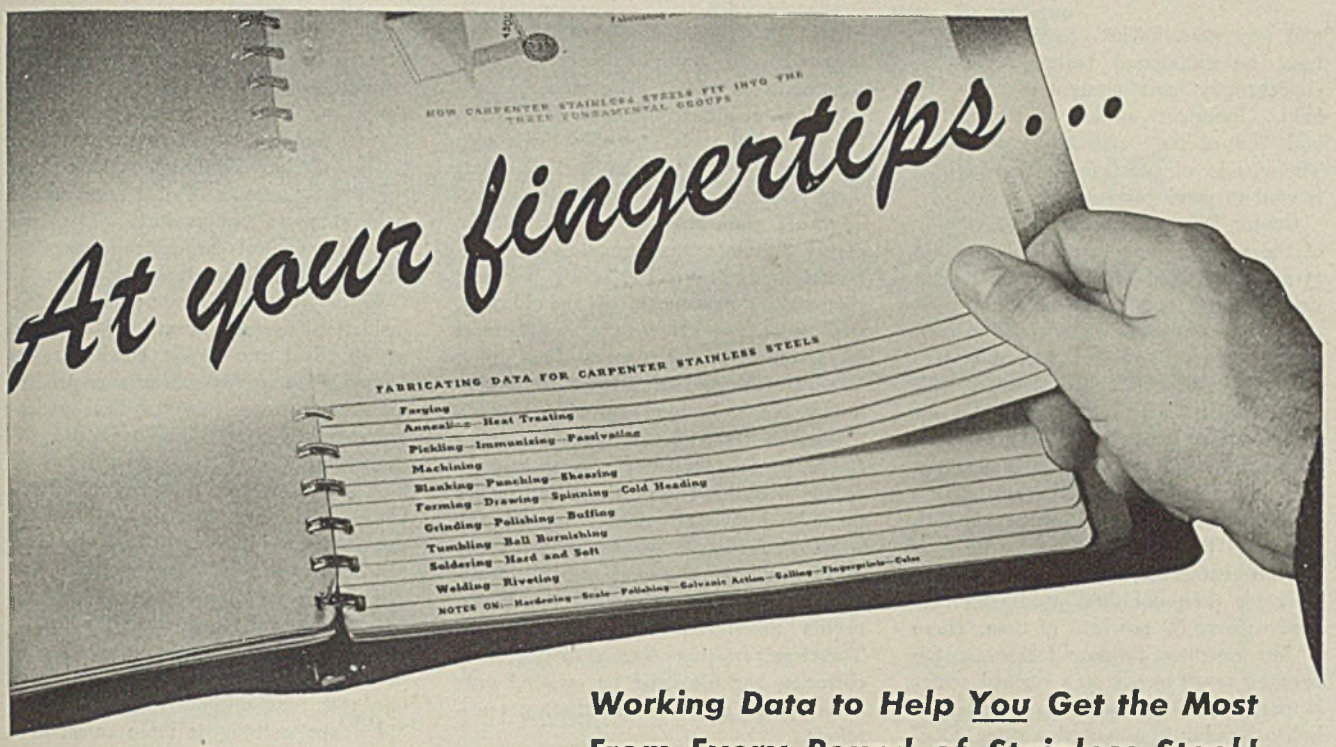
President of Suprex Gage Co. is N. A. Woodworth, who also is president of the N. A. Woodworth Co., which vaulted to prominence as a leading manufacturer of aircraft engine parts. Realizing the tremendous importance of precision gages in war production, he entered into a new plant expansion which was completed on Sept. 1, 1942, and immediately hit peak production with volume quadrupling its 1941 production record. Equipment and processing methods here make possible the most precise measurement control.

Suprex produces four types of gages—*cylinder plug, thread plug, thread ring, plain ring* of both standard and special types. The plug gages are of double-end, single-end and progressive types with taper lock parts. Certain types of gages are built for stock, permitting 48-hour emergency delivery service to war plants. Still other gages are carried in stock processed almost to the final operation, affording a fast 3 to 5-day service. This compares with the usual deliveries for such precision gages of several weeks. This plant obviously must be a good example of how modern techniques are being used to produce a precision product.

Suprex Gage has developed a method of production control in which custom lots of gage orders are reduced to a production basis. Gage blanks are taken from the raw and machined to a semi-finished state and then stocked. A control board is employed to accumulate like sizes of cylindrical, special and thread gages as they are received on each day's work orders. This permits knowing the machine load and carefully planning the work schedule.

These accumulations subsequently are routed for finishing in quantity lots with consequent economies in job-setting time and running schedules. There may be 25,000 such gages in process. But by means of progressive pan movement and a split-shift control book, the pan and part number can be used to indicate the progress of the gage through production. Thus a customer can be appraised within two minutes of just how his order stands and when delivery can be expected. This control has saved a lot of headaches, delays, useless trips and rubber. It is an extremely effective materials handling and production control system.

Cylindrical plug, thread ring and thread plug gages depend fundamentally upon the fine character of their center lapping for the precision of their measuring ability. Distortion by heat treating



Working Data to Help You Get the Most From Every Pound of Stainless Steel!

Here is the kind of practical production and engineering information you have been looking for—helpful hints on fabricating procedure, detailed data on Stainless Steels to meet government specifications and various conditions in service.

In the *Selection* and *Description Sections* of this Working Data Book you will find the basic information you need when considering Stainless Steel to meet specific design or engineering requirements.

The *Fabrication Section* (shown above) is a result of the diversified experience of Carpenter's service representatives. These men spend much of their time in production departments, where new fabricating problems must be solved *fast*. And in keeping with Carpenter's policy of sharing its "know how" with users of Stainless Steel, this information is now offered to you in printed form.

This 98-page book, "Working Data for Carpenter Stainless Steels," is offered to users of Stainless Steel in the United States. A note on your company letterhead is all that is needed to start a copy on its way to your desk. Drop us a line today.

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- Heat Resisting Steels for High Temperature Service
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Carpenter STAINLESS STEELS

BRANCHES AT Chicago, Cleveland, Detroit, Hartford, St. Louis, Indianapolis, New York, Philadelphia

and any inaccuracies of rough centers must be eliminated before roundness, concentricity and straightness can be held. Incorrect angle, "out-of-round" and "out-of-line" cannot be tolerated. The closest of precision center lapping is vital to good gage-making.

Center lapping machines are usually of the vertical type, lapping one center at a time, but at Suprex, an interesting dual-lapping machine of Woodworth design is employed. This machine consists of two drill presses, placed end to end. These are standard, sensitive drill presses that have been rebuilt. Their spindles are horizontal. The machine carries a truing fixture, which properly dresses the lap in place, permitting the dressing of the stone in about one-fifth the usual time.

Both centers are lapped simultaneously, more than doubling production, for it saves over 50 per cent of time. There is less operator fatigue, for while the operator tends to tire on a vertical center lapper, this horizontal dual center lapper holds the plug in a neutral position. Consequently no effort is required to center the plug properly.

Another interesting Suprex technique is the synthetic weathering or aging employed to stabilize the chromium steel gage stock. A continuity of shock heat treatments is used. The steel is submitted to a minus 50-degree Fahr. deep freeze and then is quenched in a plus 300-degree Fahr. oil bath. This treatment releases all stresses. A permanently stable grain structure results because of the complete transformation of all retained austenite. The draw tempers the resulting martensite. In the old days, steel was allowed to weather out of doors in factory fields for months. Such aging is now accomplished by this process in a few hours, limiting austenite growth.

A clever tri-fixture design of the deep-freeze loading basket increases the capacity of the unit three times and makes possible individual positioning of the work. See Fig. 1. Unloaded from the bottom by hoist, the work is automatically rotated in its treatment. Stabilizing occurs directly after rough grinding. Therefore, frosting doesn't matter since corrosion hazards need be avoided only when plugs reach finish-grinding operations.

Tolerances of 0.00002-inch, within which Suprex constantly works, are sensitive to every abnormal condition. Grinding and lapping operations create friction, which causes heat that must be dispersed by coolants under constant temperature control. A special setup prevents the coolants from reaching abnormal temperatures. Used coolant flows by gravity into a 500-gallon tank under the floor. Contents of this reservoir are held at room temperature. This temperature control prevents temperature shocks to the gage during grinding.

Throughout the Suprex plant, lighting, insulation against noise and vibration assure ideal production conditions. An unusual feature is a huge controlled-temperature room in which final production lapping is actually done under the same carefully controlled conditions as final inspection. See Figs. 2 and 3. Three Chrysler Airtemp units are used, one as the center and another at each end. One can be seen in the background in Fig. 3. These hold the temperature to a constant 68 degrees Fahr., which is the federal standard for precision checking. Double doors with vestibule delays help maintain this temperature.

Perhaps nothing is more essential to the final production and inspection of precision gages than such precise temperature control. Without it, no dimension can be considered as standardized when working at such close limits. When temperature is maintained constant, expansion and contraction of the gage was eliminated.

Humidity, likewise, is controlled, being held under 50 per cent. This acts to prevent corrosion. This, too, is important in gage production for maximum and minimum dimensions defining the boundaries of the specified tolerance zone are of such precise nature that half the limits can be thrown away by the corrosion that occurs in an uncontrolled atmosphere in a few hours. Thus, when Suprex performs the final operation of lapping under final inspection temperature conditions, it assures quick, sure, accurate production which practically eliminates all rejects.

If a gage is lapped in an uncontrolled atmosphere and subjected to overnight corrosion, it must be greased up and degreased between operations. Unless the gage is greased operators are in constant battle with corrosion. Thus an expenditure of more than twice the effort is required to gain the same effect.

On the other hand, under constant temperature and humidity control final production can proceed with no regard for corrosion, the only greasing required being that prior to final shipment. There is no probability of error between final lapping and final inspection in a controlled atmosphere. Worries and variables that cause limits to be lost are prevented. One source of scrap—production gone to waste because of vari-

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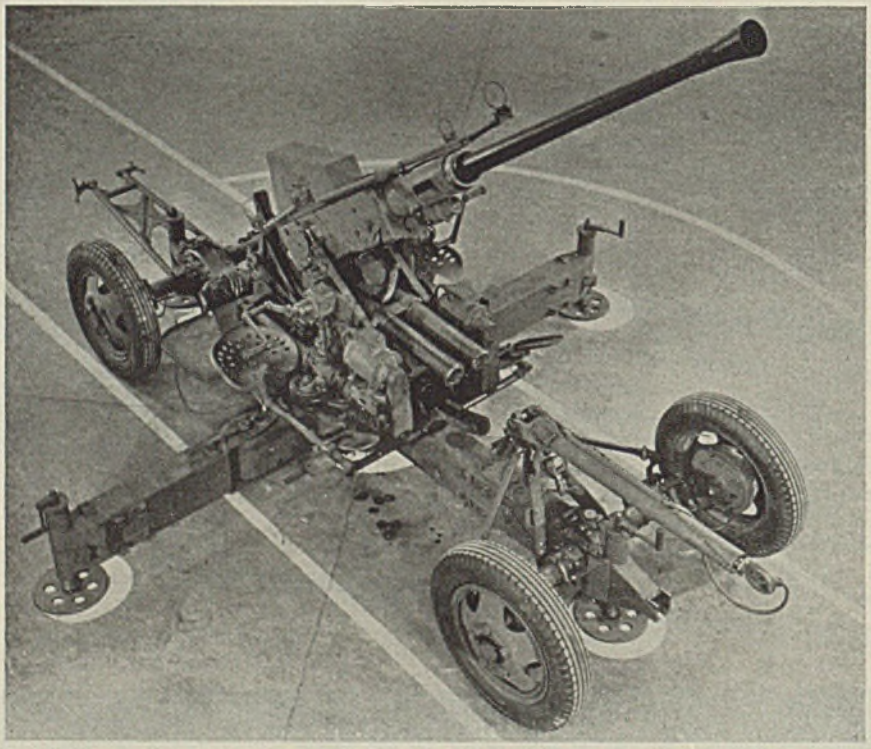
WELDED PLANE DESTROYER



WELDED construction of this 40 millimeter Bofors anti-aircraft gun carriage not only increased its strength by 50 per cent, but also was instrumental in quickening production and improving performance. Description of the construction recently netted Dr. J. L. Miller, chief metallurgist, Gun-Mount Division, Firestone Tire & Rubber Co., the second grand award of $11,200 in the 2½-year $200,000 welding study program sponsored by The James F. Lincoln Arc Welding Foundation, Cleveland

BORON ALLOYS

for greater hardenability in low-alloy and engineering steels

"SILVAZ" 3 ALLOY	"SILCAZ" 3 ALLOY	"ELECTROMET" FERROBORON
BORON 0.5%	BORON 0.5%	BORON . . 15-20%
SILICON 35-40%	SILICON 35-40%	SILICON . . 3.00% max.
ALUMINUM 6%	ALUMINUM 7%	ALUMINUM 1.00% max.
TITANIUM 10.0%	TITANIUM 10.0%	CARBON . . 0.50% approx.
ZIRCONIUM 6%	ZIRCONIUM 4%	
VANADIUM 10%	CALCIUM 10%	

SMALL AMOUNTS of Boron (0.001% to 0.003%) added to low-alloy and engineering steels produce an increase in hardenability comparable to that produced by much larger additions of the other common alloying elements. Like them, it lowers the rate of cooling necessary to harden a steel and widens the zone that cools rapidly enough to harden.

The procedure for making alloy steel must be followed to insure good results from the use of Boron. Boron is readily oxidized and must be added only to a completely deoxidized steel bath, or the Boron must be protected by strong deoxidizers until it is dissolved. Because of the extremely small amounts added (less than an ounce per ton), a diluted form is highly desirable to insure uniform results.

When Boron is added as "Silvaz" 3 alloy or "Silcaz" 3 alloy, the other elements protect the Boron from oxidation and also have their own effect on the steel. The Boron is sufficiently dilute to insure even distribution.

These Boron-bearing alloys are available in commercial quantities for immediate shipment; however, "Silvaz" 3 alloy is restricted to use in war production.

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Another Automotive User Reports on Experience with. . .

NE (National Emergency) ALLOY STEELS

By W. J. DIEDERICHS
Metallurgist
The Autocar Co.
Ardmore, Pa.

THE FOLLOWING contribution supplements the information on properties of the NE steels as presented in STEEL, Feb. 9, 1942, p. 70; March 16, p.72; June 8, p. 66; June 15, p. 66; July 20, p. 86; Aug. 3, p. 70; Aug. 17, p. 40; Aug. 31, p. 41, p. 76; Sept. 7, p. 78; Nov. 9, p. 96. It is the third article in a new series describing user's experiences with the NE steels. The first of these appeared in STEEL, Nov. 16, p. 106; the second, Nov. 23, p. 90.

At the Autocar Co., Ardmore, Pa., some work has been done with NE-8744, 8749 and 8620 to replace SAE steels formerly used for spring cross shafts, spring clips or bolts, main shafts and rear-drive axle shafts. Work on application of the carburizing grades of NE steels for gears is just getting under way. Details of present experience follow:

It should be pointed out that the results shown apply only to this company's particular applications and do not necessarily mean that these same steels will serve satisfactorily in the same applications for other users. However, the results detailed can serve as a valuable guide as to what can be expected from these steels, so are of particular interest at this time when every high alloy application is being studied critically to develop fairly satisfactory lower alloy substitutes.

Tests on NE-8744: A 4-inch square billet was forged down to 2¾-inch and 1-inch round stock. Ladle analysis showed 0.41 per cent carbon, 0.87 manganese, 0.019 phosphorous, 0.016 sulphur, 0.28 silicon, 0.49 chromium, 0.57 nickel, 0.25 molybdenum. After normalizing, the 2¾-inch material showed a hardness ranging from 223 to 269 brinell; the 1-inch stock, from 241 to 262 brinell. Hardening from 1525 to 1550 degrees Fahr. with an oil quench increased hardness of the 2¾-inch material to 341 brinell at the surface, 321 in the center. Values for 1-inch were 534 to 555 at the surface, 514 at the center. When the large specimens were quenched in brine, surface hardness was 514 brinell.

The response to drawing (repeated draws in this case) is detailed in Table I.

NE-8744 Applications: The material has been used *to replace SAE* 3140 *in* spring cross shafts. Items are heat treated as 1¾-inch diameter bar stock, then machined. By quenching in oil from a temperature of 1550 degrees Fahr., a hardness of a typical lot came within 477 and 514 brinell. A subsequent draw at 1175 degrees Fahr. brought the hardness in the range from 277 to 302 brinell.

In another batch, the hardness as quenched came within 555 to 601 brinell, and a draw at 1250 degrees Fahr. was required to bring them in the range from 269 to 293 brinell.

When used to replace SAE 3120 *and* 3125 *as material for spring clips and bolts,* the NE-87-44 bar stock of 1-inch diameter is first treated by quenching in oil from a temperature of 1525 to 1550 degrees Fahr. to produce a hardness ranging from 477 to 514 brinell. A draw at 1175 then places the work in the range of 269 to 293 brinell. Machining follows.

*When NE-*8744 *is used to replace SAE* 4340 *as a material for main shafts,* the work is heat treated in the form of 2¾-inch and 2⅝-inch rounds, followed by machining. They are quenched in brine from 1550 degrees Fahr. and show a hardness ranging from 514 to 534 brinell. A subsequent draw at 1100 degrees Fahr. brings that within 302 to 321 brinell.

NE-8749 Applications: A trial lot of rear drive axle shafts was produced from NE-8749, replacing SAE 4340. These were made from 2 3/16-inch diameter bar stock which was machined before heat treating instead of after as in the three applications mentioned above. The shafts were quenched in oil from a temperature of 1550 degrees Fahr., producing a hardness ranging from 550 to 601 brinell. A draw at 840 degrees Fahr. brought this within the range of 415 to 429 brinell.

NE-8620 Applications: When NE-8620 was adopted to replace in the manufacture of ball bolts, the manufacturing procedure was changed also. Ball bolts of SAE 2512 material are carburized all over and drawn at 525 degrees Fahr. to develop sufficient toughness and shock resistance, ball bolts of NE-8620 are being copper plated to stop carbon penetration at the neck section. They are carburized at 1700 degrees Fahr. and cooled in the carburizing boxes. Next they are reheated to 1550 degrees Fahr. and quenched in oil, followed by drawing at 300 degrees Fahr.

These ball bolts are about 1¾-inch diameter in the ball and 1 inch in the neck section. Case hardness of the ball ranges from 61 to 62 rockwell C. Core hardness at the neck section and in the taper section below the neck runs from 21 to 25 rockwell C.

TABLE I—Response of NE-8744 to Drawing, Brinell Hardness

Draw Temp. ° F.	2¾" Section Quenched in Oil	2¾" Section Quenched in Water	1" Section Quenched in Oil
None	341	514	534-555
900	302-311	363-388	375-388
1000	269-285	341-363	352-365
1100	255-262 (255 at center)	302-302 (269 at center)	302-302 (302 at center)

GE Device Calculates Horsepower Needs

A recently developed load calculator called the Motorule which simplifies computing motor horsepower required for metal cutting operations on various machine tools is being offered free by the General Electric Co., Schenectady, N. Y.

Designed along lines of an engineer's slide rule, and applicable to a wide range of materials, the calculator is said to be accurate for a wide variety of cutting operations on lathes, drills, planers, and milling machines. Its introduction is in line with WPB's campaign to conserve materials and make more motors available through closer motoring.

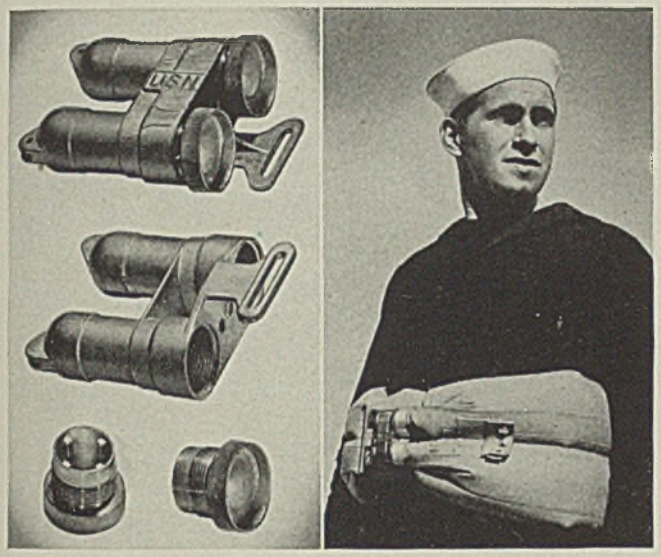
Recommendations by leading machine tool manufacturers and accumulated experience of metal-cutting authorities, were used in formulating the device.

Informative Catalog Lists Lower Tool Prices

Tools with longer tips, new tool styles and applications are announced by McKenna Metals Co., Latrobe, Pa., in its catalog 43 which lists substantially reduced prices effective since last month.

The publication illustrates standard, nonstandard and special tools. It also contains diagrams which show correct rake angles for tools made with standard blanks.

DIE CAST INFLATOR FOR LIFE BELTS



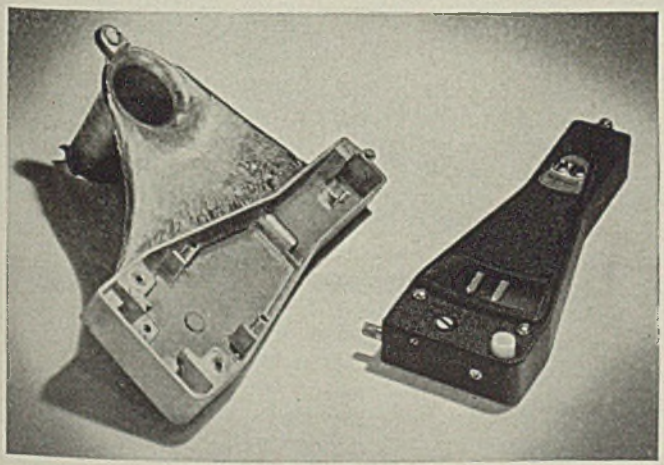
Note the complex design of these ZINC Alloy Die Castings.

The life belt shown at the right of the above illustration is issued to every man on Navy transports. To automatically inflate this belt to the proper pressure, it is only necessary to squeeze it with the left hand, which action punctures the two carbon dioxide gas cartridges in the ZINC Alloy Die Casting labeled "U.S.N." (left).

The die casting process provides an efficient means of production for the cartridge holder, as well as for the caps for the two compartments.

FOR RAPID TOLERANCE INSPECTION

Herewith another example of a high speed inspection method assisting high speed war production. The "Micro-Chek" device, illustrated below, speeds up the job of checking the tolerance range of duplicate parts against a standard. The two limit markers shown on the dial are set to permissible tolerance limits and the part under inspection is then "miked" by



This also can be used as a snap gage by adjusting the "hold-down screw" near the button.

THE New Jersey zinc Co. 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. 4

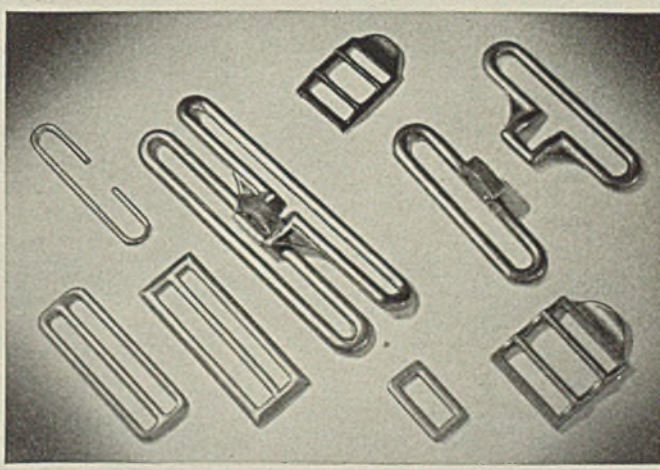
pressing a button (lower right) which moves the gaging plunger (at the left side of the "Micro-Chek") against the part, and causes an indicator finger to move across the dial. If the finger stops between the two limit markers the tolerances of the part are acceptable.

The housing base for this device is a one-piece ZINC Alloy Die Casting, shown attached to the sprue as it came from the die casting machine. All of the mounting elements are integrally cast, and the housing has a smooth as-cast surface which is easily finished in a durable olive-drab wrinkle lacquer.

ZINC ALLOY DIE CASTINGS AID ARMY Q. M. CORPS

The search for substitute materials often ends in the adoption of one which is so well suited to the application that one wonders why it was not used in the first place.

The U. S. Army Quartermaster Corps, for example, is now using ZINC Alloy Die Cast hardware for belts, haversacks, etc. This metal and method of production relieve other more critical materials and overburdened manufacturing facilities. And the parts produced (below) are clean cut, smooth-surfaced, strong—and are turned out at high speed. Thus a highly satisfactory and economical method of producing personal hardware has been developed.



ZINC Alloy Die Castings find a new niche—through substitution.

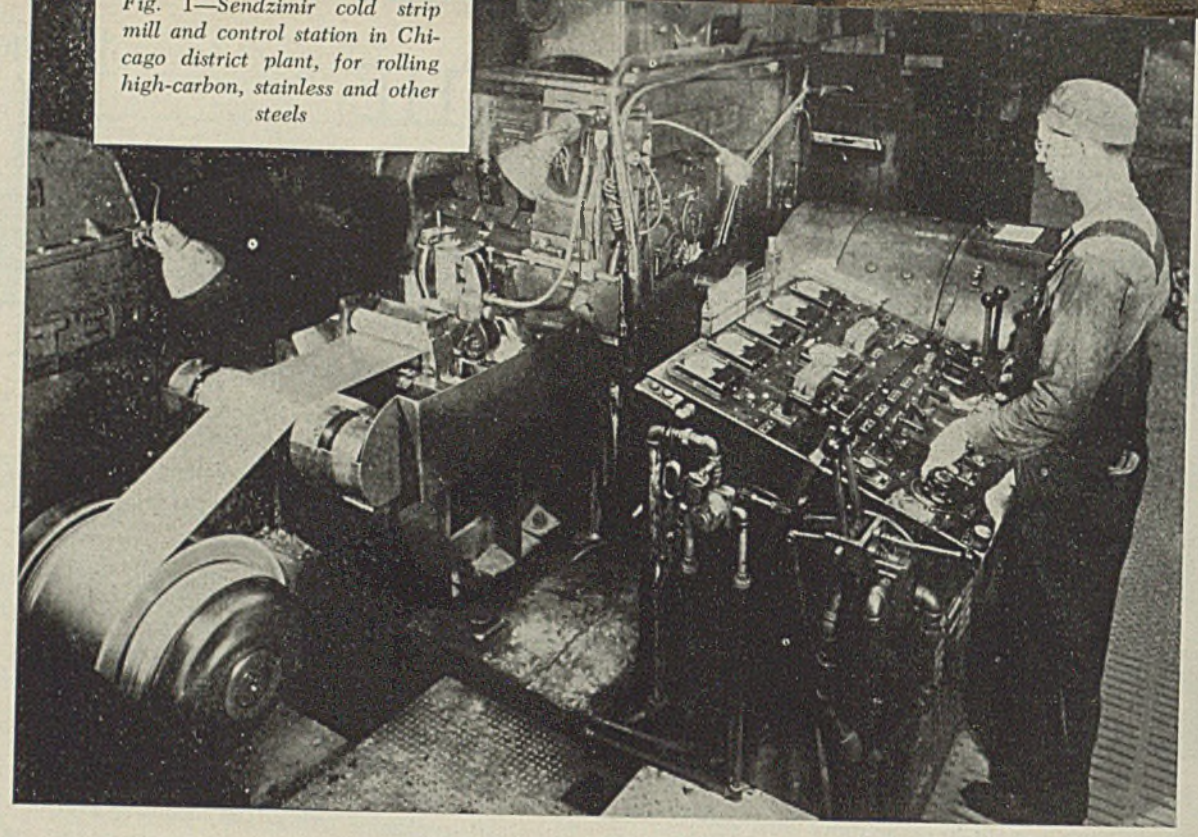


Fig. 1—Sendzimir cold strip mill and control station in Chicago district plant, for rolling high-carbon, stainless and other steels

SENDZIMIR MILL

ROLLS STRIP TO CLOSE TOLERANCE

By T. SENDZIMIR
Vice President
Armzen Co.
Middletown, O.

THIS COLD mill was developed in Europe, where several units for rolling strip 30 to 50 inches wide were in operation sometime before the outbreak of the present war. One unit is in operation at a plant in the Chicago district at present. Some of the results that are being obtained are as follows:

1. The strip is true to 0.0001-inch across its width and 0.0002 to 0.0003-inch lengthwise, has no crown, no camber and smooth edges.
2. The mill reduces strip down to the lightest gages, such as 0.005 to 0.003-inch and finer, without intermediate annealings even when working on stainless and other alloy steels.
3. Such steels, although cold-reduced 90 per cent or more on this mill are not brittle; they possess a good measure of ductility. Upon annealing, the elongation exceeds that of similar materials produced on conventional mills, where several intermediate annealings are necessary.
4. The strip is flat and as a rule does not need to be roller-leveled.
5. Output is high. Heavy reductions on work-hardened material are taken with remarkable ease. For instance, a last pass from 0.006 to 0.003-inch (50 per cent) is not unusual.
6. The mill is less expensive than conventional equipment. It weighs from 26 to 50 per cent of a corresponding 4-high mill. Its operating costs are lower.

This means a strip almost ten times more accurate than the current products which already are vastly superior to the hot-rolled sheets of a few years ago. The question frequently arises concerning the demand for such super-accurate and extremely flat strip as well as light-gage stainless and other alloy steels produced at reasonable cost and consequently subject to only light extras compared to heavy gages. This will be best answered only when such super-accurate strip becomes available on the market in sufficient quantities. For a good many uses, there may be a decided preference for such strip. For both the producer and the consumer, it will mean less scrap and rejections, when tolerances can be kept within close limits.

The characteristic of the Sendzimir mill lies in a new principle of backing elements for the small work rolls that establishes an entirely different standard of both accuracy and rigidity. This backing principle is simple. The backing elements take up the roll separating forces right where they are generated and carry them over the shortest distance right up to the housing.

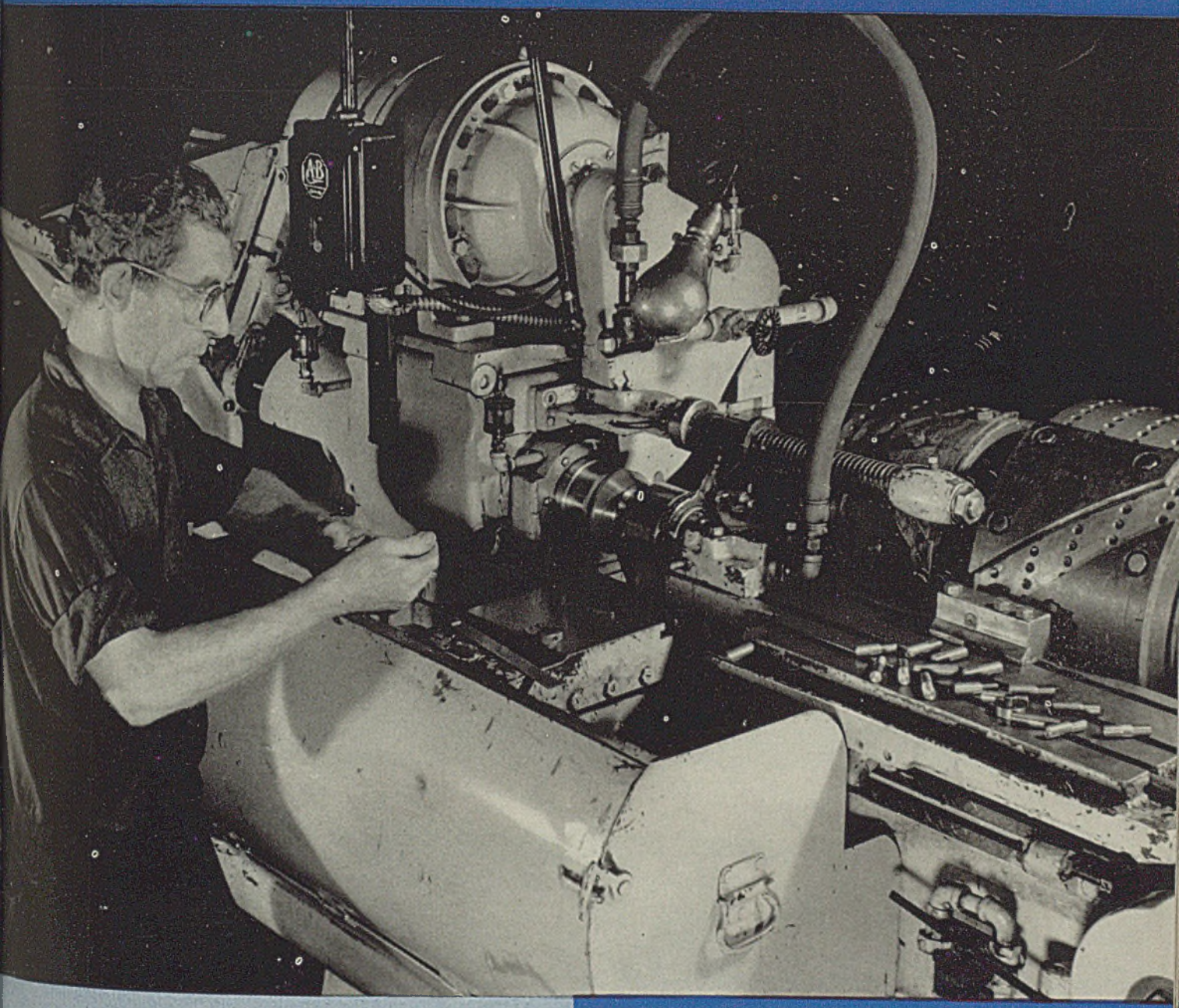
In contradistinction, conventional backing rolls pick up the roll separating forces along their line of contact with the work rolls and then carry them to their necks and bearings lying outside of the width of the strip.

For lighter operations, such as for nonferrous metals and skin-pass mills, a single-backing arrangement is used, similar to that shown in Fig. 2. Each work roll contacts two rows of bearing rings, each row mounted on one shaft. Between each two bearings (or each two pairs of self-aligning roller bearings, as shown in Fig. 2) there is a "saddle" so that the roll pressure, as exerted by the work roll on those bearing rings, is transmitted at frequent intervals to the rigid housing. (See also Fig. 5).

These illustrations show that the roll separating force is taken up right where it is generated and carried directly to the corresponding spot of the rigid, inflexible housing. Roll pressure at the center of the strip is borne by the central portion of the beam; roll pressure near the edge of the strip is borne by a more outlying portion of the beam, directly opposite such edge. Neither the work rolls nor the bearings carry any bending moments. There are no rolls or shafts with their bearings disposed outside of the width of the strip.

More bearing capacity is required for rolling steel and alloy steels. Fig. 3 shows a side view of the mill with such arrangement. Three shafts with backing bearings are provided for each work roll. Interposed between the bearings are saddles which transmit the forces to the housing. Between each work roll and

FOR MAKING STUDS—Caterpillar REG. U.S. PAT. OFF. TRACTOR CO. MEETS PRODUCTION DEMANDS TODAY . . . WITH A HOPPER-FEED *Model 'B'* CLEVELAND AUTOMATIC



• Lots of 6000 S.A.E. 1035 studs are produced from heat treated bar stock on this new Model B Cleveland Automatic of 1½-inch capacity, in a mid-western plant of the Caterpillar Tractor Co. • Operations on this stud are exceedingly simple for Model B. Bar stock, ½-inch diameter, is fed to gauge, and a coarse thread is cut ⅞-inch long, and stock is cut off. Pieces are then placed in hopper and gravity-fed to return through the spindle for the second operation, the cutting of a ⅞-inch long fine thread. • Maybe a Model B Cleveland can simplify and speed up your production. A Bulletin describing it fully will be sent on request.

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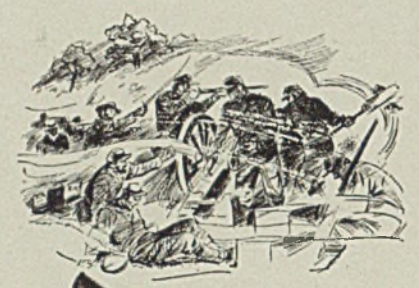

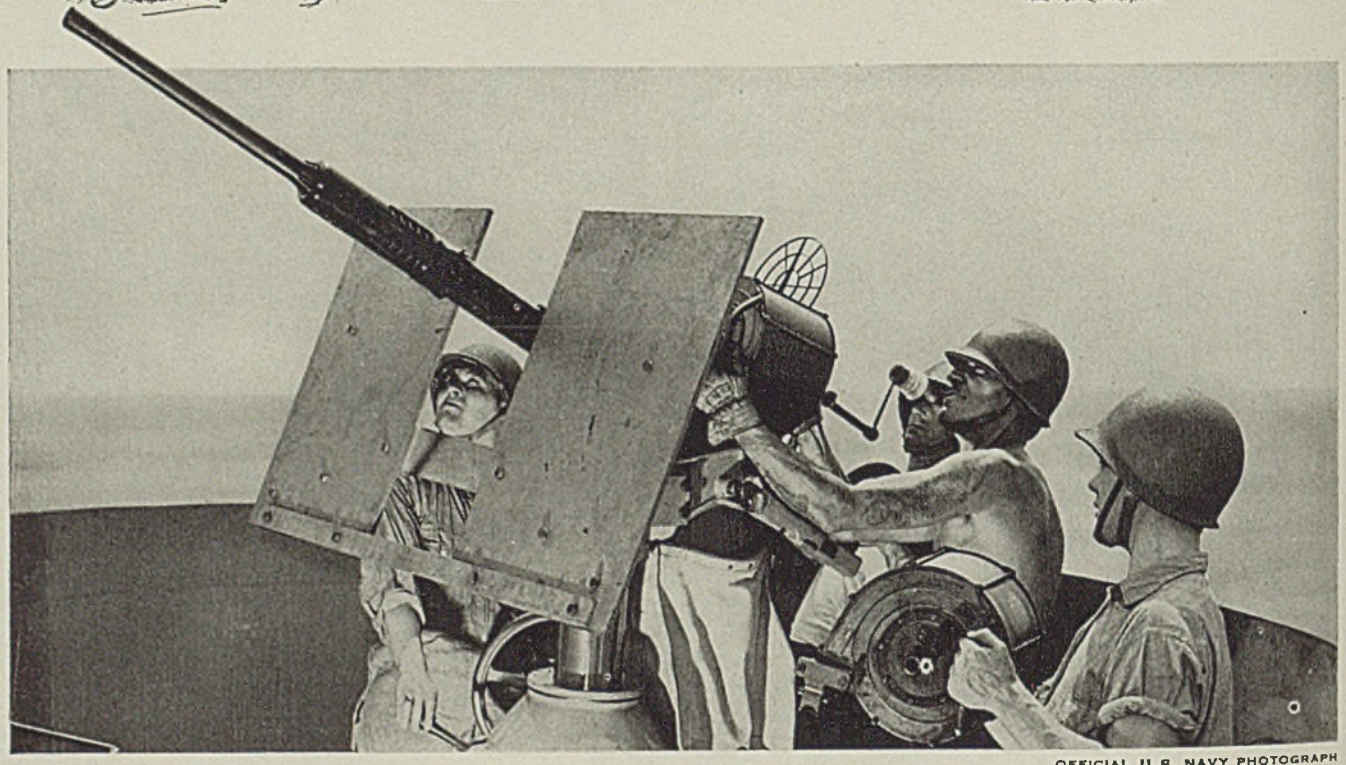

OFFICIAL U.S. NAVY PHOTOGRAPH

. . . goes to its 5th war

BRASS from Bristol has served American guns since the days of '61. And now it is serving the guns of the United Nations as well . . . rolling out faster and faster, in endless miles of sheet, rod and wire to help make the voice of freedom outshout all others on every battle-front.

Having seen history repeat itself four times, Bristol was ready when this war broke. No need to shed coats and roll up sleeves, for Bristol has always worked that way. . . . So this modern mill took war-production tempo in its stride . . . and that stride will never be broken, only lengthened.

Today, war-production plants find Bristol quality and uniformity to be the same as always. And when peace returns, Bristol Brass will also return from the fighting fronts to resume its many places in civilian life . . . doing again the jobs that only brass can do with fullest effectiveness and greatest satisfaction to its users.

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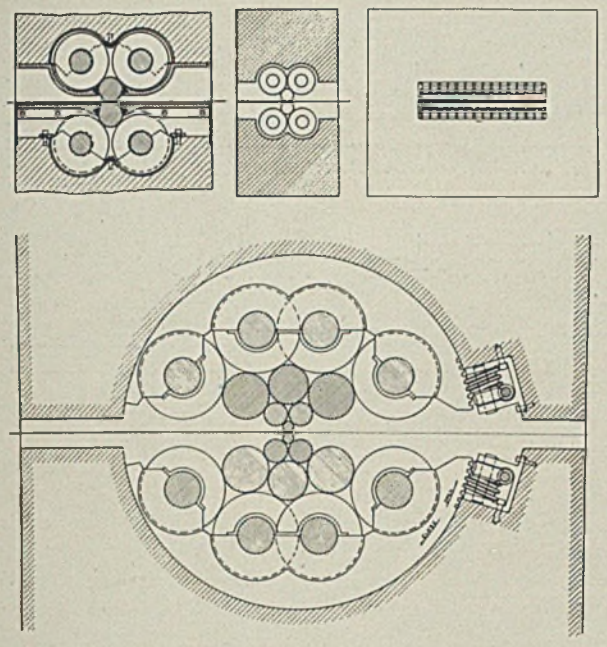
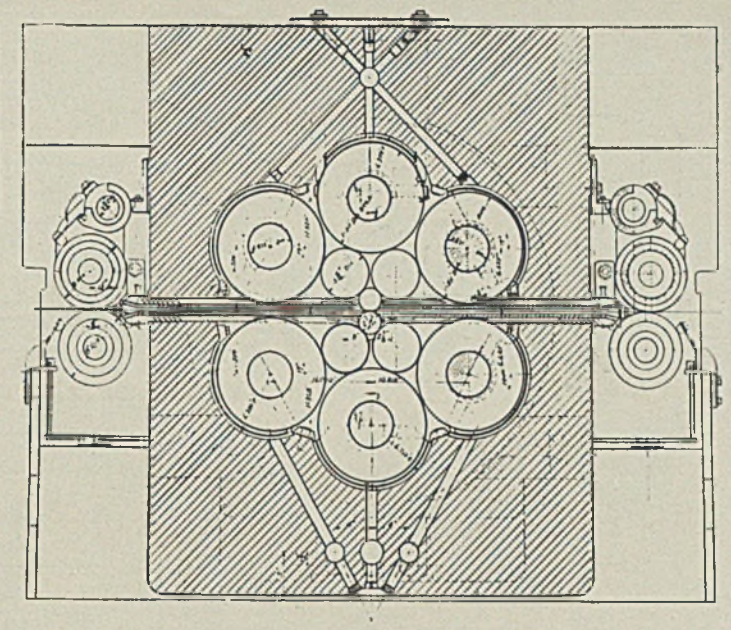




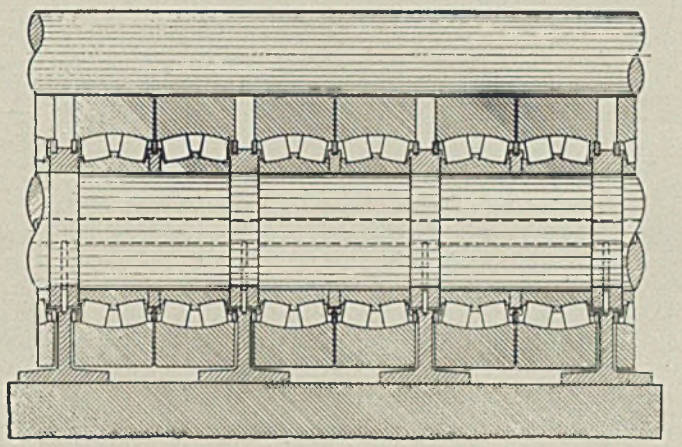


Fig. 2. (Top, left)—Six-roll mill for rolling nonferrous metal. Front view of the backing arrangement is shown at right

Fig. 3. (Top, right)—Mill equipped with intermediate rolls for rolling steel. Unit is provided with circulating system of lubrication and sealing rolls

Fig. 4. (Lower drawing, above)—Mill designed with first and second intermediate rolls and eccentric cradle screw-down for rolling tough alloy steel

Fig. 5. (Lower drawing, right)—View of backing bearings, saddle and eccentric shaft in longitudinal section. Oil circulating system is shown through the backing bearings

the three rows of backing rings, are two intermediate rolls, which simply transmit the roll pressure to the backing bearings, and are not subject to bending. In fact, they would perform just as well were they not solid rolls, but composed of a number of disks like a stack of poker chips.

Fig. 4 shows diagrammatically a still more powerful backing where each roll has two first intermediate and three second intermediate rolls, the latter in turn contacting four rows of backing rings, disposed on shafts with saddles interposed at spaced intervals.

This arrangement of backing elements is so powerful that heavy reductions can be taken even on already highly work-hardened alloy steels. No intermediate annealings are necessary and even the lightest gages required are produced right from the hot-rolled strip in several passes but in one operation. Contrary to conventional practice, the last passes can be rather heavy, such as 40 or 50 per cent, down to as low as 0.010 or 0.005-inch or lighter, even on stainless and other alloy steels, and yet, owing to its high precision, the mill produces a flat strip that does not even need to be roller-leveled.

All the working elements of this type mill operate in a circulating bath of lubricant that, at the same time, keeps them at an exactly uniform temperature and also flushes them as well as the strip itself and removes all impurities. For rolling alloy steels this feature offers another convenience in that the lubricant can be maintained at any desired temperature. Some alloy steels are sensitive in this respect and better results are obtained when rolling at predetermined

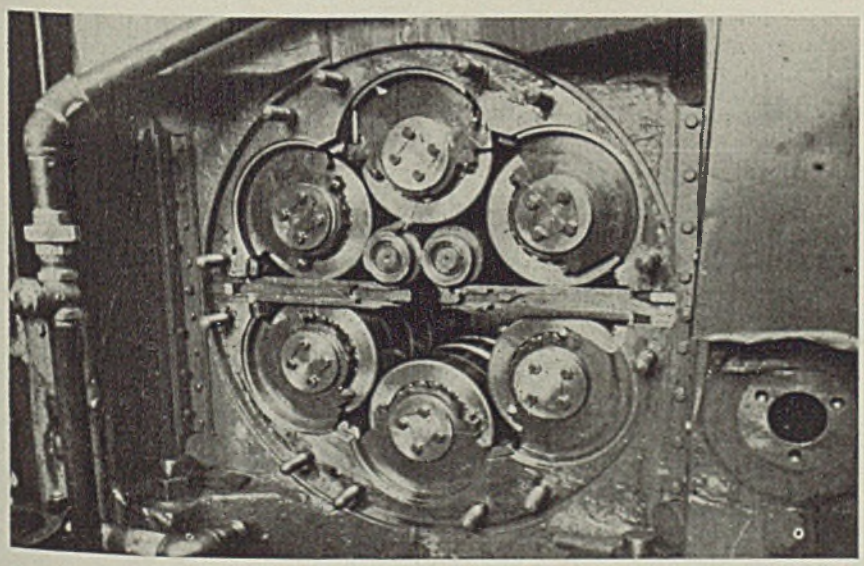
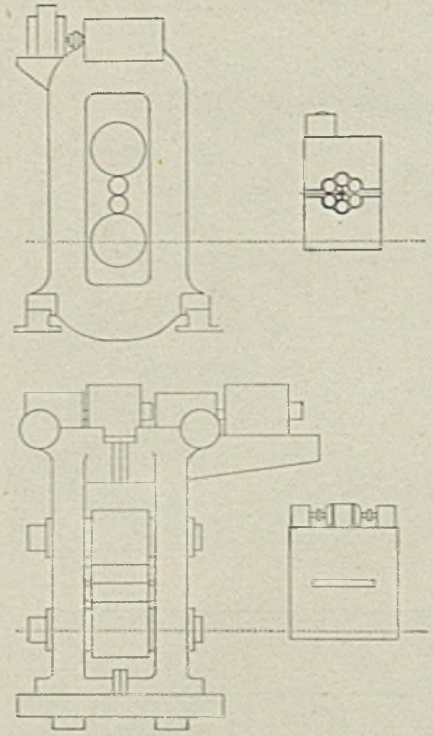


Fig. 6—Inside view of 20-inch mill shown in Fig. 1 taken from the roll-change side



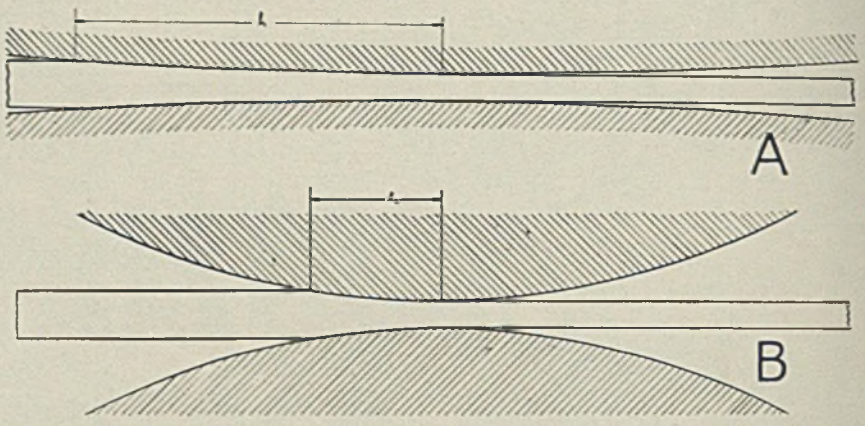


Fig. 7. (Left)—Comparative view regular 4-high and Sendzimir mill, both designed for production of strip 50 inches wide

Fig. 8—Cross section through roll bite magnified eight times to show a 40 per cent reduction from 0.050 to 0.030-inch. Work rolls, A, are 15 inches diameter; work rolls, B, are 1½ inches diameter

temperatures, such as 250 to 300 degrees Fahr. or even higher.

All four shafts are shown disposed in a cradle mounted in the bore of the beam of the housing. The cradle is slightly eccentric, and a mechanism is provided for rocking the two cradles symmetrically to each other, for screwdown purposes.

Fig. 5 shows a longitudinal section through an intermediate roll, its backing bearings with the shafts and the saddles. The intermediate roll is loaded by the roll-separating force transmitted from the work rolls, substantially throughout its length. But it is not subjected to bending, as it transmits the pressure to the backing bearings. From there, the roll separating force is delivered, at spaced intervals, to the saddles and then to the housing.

The high degree of precision of this mill can perhaps best be explained from this drawing. The housing, the saddles and the eccentric shafts carried by the spaced saddles do not rotate, and with the housing being practically inflexible, they also can be considered as fixed. The first rotating elements are the outer rings of the backing bearings, only about 1½ inches thick, the second, the intermediate rolls 4 to 6 inches diameter, and the third, the work rolls, usually 1 to 2½ inches diameter. They are all parts of relatively small diameter, made of alloy steel, forged, heat-treated and ground to close tolerances. Thermal dilation of such small parts is negligible and, since they work in a bath of circulated lubricant, they are maintained at a strictly uniform temperature, thus assuring an extremely high precision under all operating conditions.

The shaft which carries the backing bearings, as shown in Fig. 5, is an eccentric shaft and is used on mills such as those depicted in Figs. 2 and 3, for screwdown purposes. Two symmetrical shafts have worm gears mounted, one at each end, and by turning the eccentric shaft, the work rolls are approached toward one another. It is interesting to watch the operation of the screwdown. The mill is so rigid that the workman sets his screwdown to the gage he wants, like he would set a micrometer and he always hits it to a 0.001-inch accuracy.

A comparison of a Sendzimir mill for a 50-inch wide strip with a 4-high mill of the same width is shown in Fig. 7. On the former mill, the distance from the roll bite to the point where the roll separating force meets the housing is only about 18 inches, making a compact, rigid housing. On 4-high mills, the roll separating force is carried to the backup rolls, thence to the backup roll bearings, then to the screws, and finally to the housing. Total distance from the roll bite to the top of the housing on a 50-inch mill thus is about 6 feet. That means about four times as much length which is subject to stretching and bending.

A ring 12 inches diameter, 3 inches wide and 1½ inches thick can be ground to extremely close tolerances thus explaining why the Sendzimir mill can roll a strip within 10 per cent of the tolerances of a conventional 4-high mill. And a strip which is that accurate ordinarily stays flat.

Then, the Sendzimir mill uses work rolls only between 1 and 2½ inches diameter, and such work rolls take, for the same pass reduction, a roll-separating force less than 25 per cent of the corresponding roll-separating force on a 4-high mill. So that, in spite of its ultra-precision and rigidity, a Sendzimir mill for a 50-inch wide strip only weighs about 75 tons as against a 4-high mill weighing well over 250 tons, for the same size strip. On wider mills, the saving in weight is still more pronounced, so that wherever very wide strip, such as 80 to 100 inches or wider is wanted,

(Please turn to Page 74)

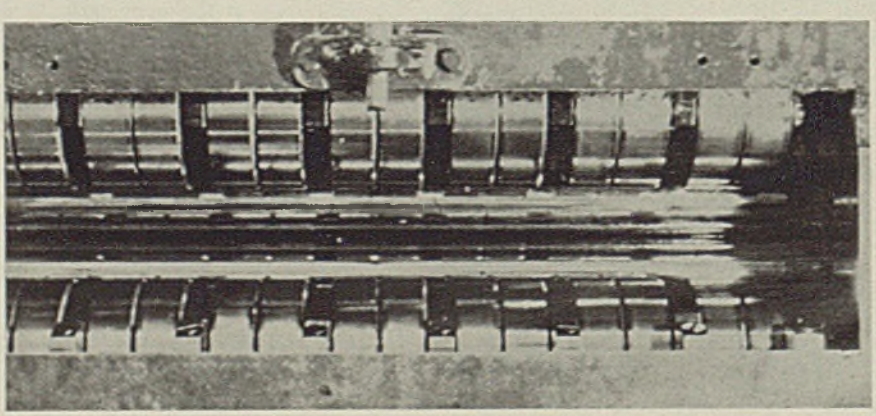
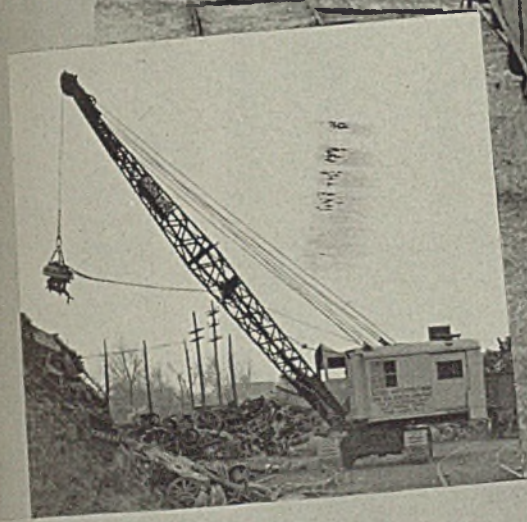
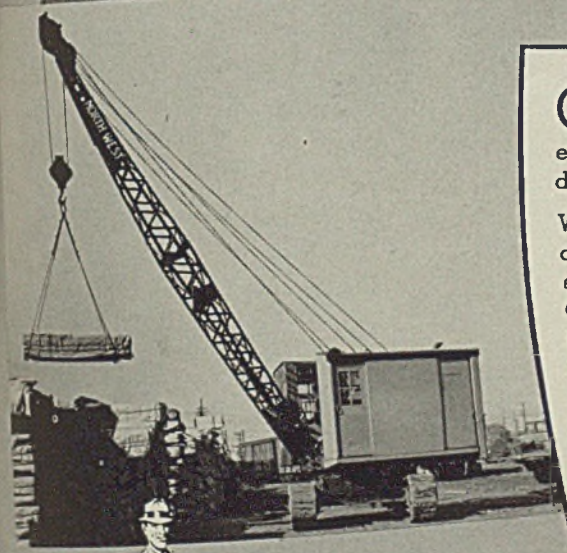


Fig. 9—Single backing used on a 40-inch wide mill

MATERIAL HANDLING Versatility FOR THE FUTURE





CAN your locomotive crane do these things? Can any other type of material handling equipment you have do them? Maybe you don't ever have to unload in this manner but there is seldom a plant that doesn't have some unusual type of problem even in normal times.

Watch your material handling problems today and plan a better solution of them for the future. It takes a combination of several other types of equipment to do the things a crawler crane can do. Northwest Crawler Cranes fit into any plant picture and handle any kind of material up to their rated capacity. They go anywhere, need no track, pile high or low, load any type of conveyance, are fast and economical to operate and because of their wide range of uses have a high rental and resale value. There is a time coming again when you can produce for profit. There will be Northwests available then to cut your handling costs.

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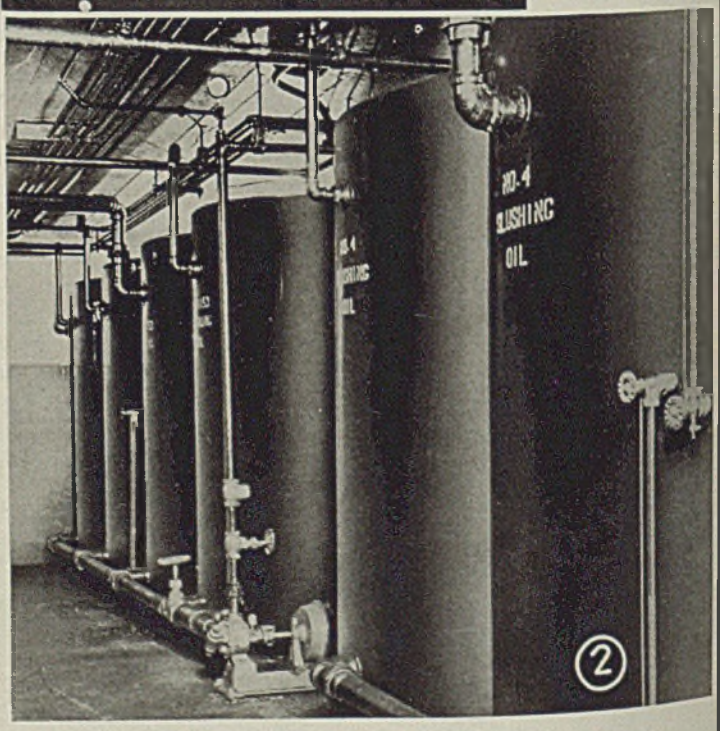
NORTHWEST

Fig. 1—The eight oil receiving lines are enclosed in this steel and concrete compartment for protection against fire, theft and other hazards

Fig. 2—A group of 280-gallon tanks in underground vault are used for the storage of eight different kinds of oil required in the plant processes

Fig. 3—One of the storage tanks is divided into three sections and mounted horizontally on a tank saddle of all-welded construction as shown here. It holds Polarine, kerosene and cylinder oil. All pumps are driven by individual explosion-proof electric motors

Fig. 4—Turbine oil, kerosene, cylinder oil and Polarine are dispensed in small quantities from these lines brought to the stock room from the underground vault. All photos from Republic Steel Corp.



HANDLING

. . . . accomplished efficiently by specially designed system

A NEW oil-distribution system recently completed at the Gary plant of the Union Drawn Steel Division of Republic Steel Corp. has improved machine maintenance and cut oil consumption and container handling cost to such an extent that plans are already underway for similar installations at four other plants of the company.

Altogether, eight different petroleum products are pumped in separate storage and piping systems, to individual machines and points of use throughout the plant which produces bars, wire, precision shafting and special shapes of cold finished steel. Turbine oil, kerosene, cylinder oil, Polarine oil, soluble oil, drawing oil, and two grades of slushing oil (light and heavy) are handled in this fashion. Fig. 6 shows schematically distribution of these systems.

The soluble oil is used as a coolant for metal saws, lathes, and grinders. The drawing oil is required for lubricating the dies used in cold drawing bars. The two grades of slushing oil are used for spraying a protective film on finished stock as it is loaded into railroad cars on the long depressed siding which runs into the plant shipping department.

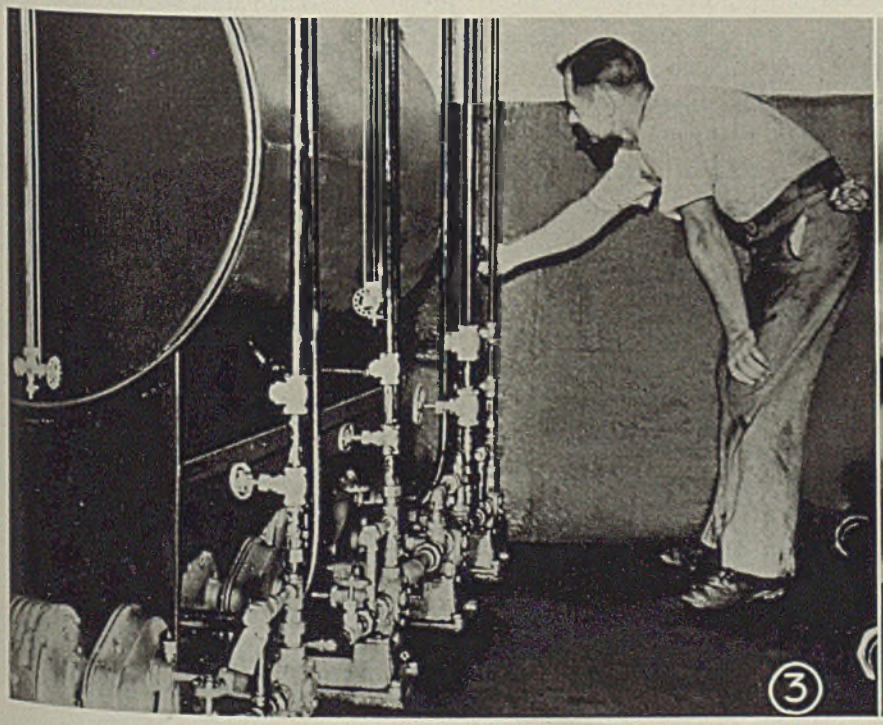
Delivered to the plant by truck, each grade of oil is allowed to flow by gravity into its individual storage tank in a ventilated underground vault through 2-inch filling pipes brought up inside an accessible concrete enclosure beside the plant building.

Weather-proof hinged covers on each oil line and locks on the sheet steel cover of the enclosure, Fig. 1, provide effective protection against fire, theft or other hazards.

The storage vault, Figs. 2 and 3, houses eleven 280-gallon tanks, installed vertically side by side, and a twelfth, also of 280-gallon total capacity, which has been divided into three sections of equal size and mounted horizontally on a tank saddle of all-welded steel construction.

Such large quantities of slushing oil are consumed that eight of the vertical tanks, connected together in batteries of four tanks each, have been provided to handle the hundreds of gallons of the two grades used per month.

Turbine oil, drawing oil and soluble oil are each provided with separate storage tanks. Consumption of Polarine, kerosene and cylinder oil is in each case



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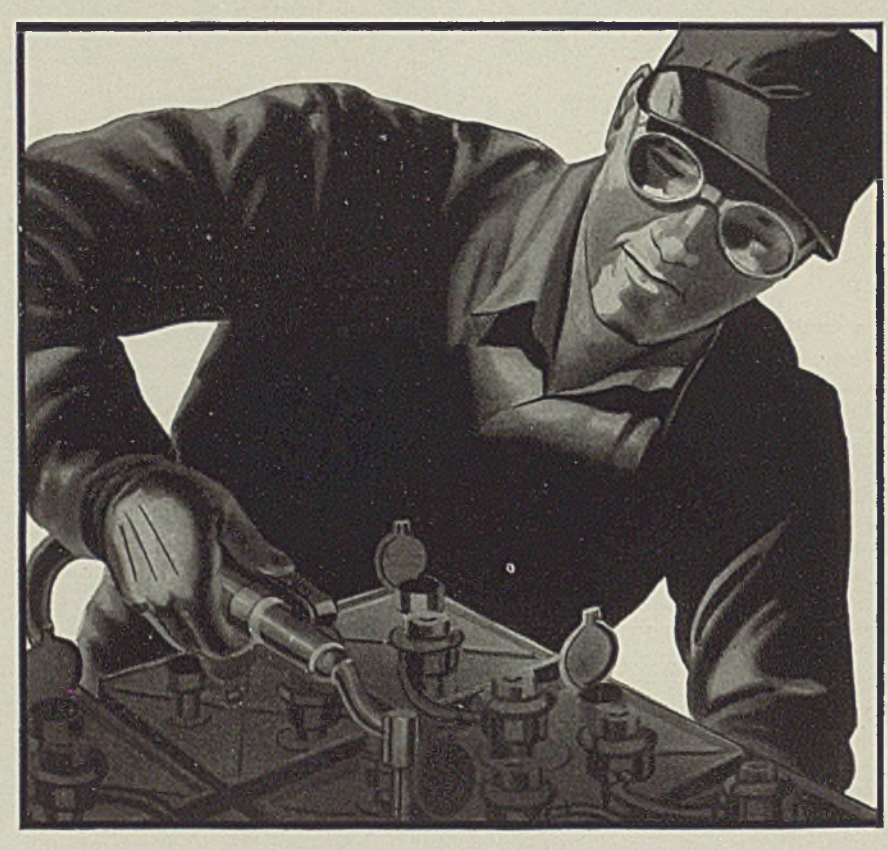
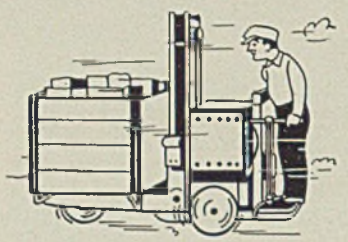
DURATION POWER



168 Hours per Week In war plants where battery industrial trucks are working 168 hours a week, the charging circuits are often in use almost whole time. The alkaline batteries are given a complete charge in 6 to 7 hours, and as one charge is completed another is started. This means highest utilization of charging equipment. It is one of the very useful contributions of the alkaline type of battery to the war effort.



Process Efficiency. Many war plants have been successful in laying out a part of their production for straight-line sequence of operations. But they often have other operations which, for purpose of process efficiency, are best performed in one place. In such cases they have found a good solution to the problem in the use of skid boxes, into which the work can be unitized and quickly taken anywhere on the floor by battery lift truck.

It's a Big Job. There is predicted a great shifting of man-power. It's a big job to make available new men for those lost to the draft and to other jobs. But this means new men, mostly untrained, throughout your plant. Fortunately, this presents no great problem in battery maintenance. Alkaline batteries are not easily damaged, even in unskilled hands; their charging and care are easily taught, readily understood and pretty nearly foolproof.

No one can predict how long the war will last—how long the necessity for peak production will go on. But one prediction will come true: trucks powered by alkaline batteries are those *most* likely to keep up their good work for the duration . . . are the *least* likely to require power unit replacement.

Long life and dependability are literally designed into Edison Batteries. Electrochemically and structurally they are built to last a long time, to do a lot of hard work and to require very little maintenance. The result has been that where they are handling the power job in material handling, that job is going well. The flow of production is directly allied to their efficiency.

INDUSTRY NEEDS THE DEPENDABILITY OF

Edison Alkaline BATTERIES

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

Fig. 5—Motor starter switches and pressure gages are grouped outside the storage vault

enough smaller that adequate reserves can be handled by allocating to each a section of the three section tank.

Gear pumps, equipped with relief valves on the pump heads, are used on all eight oil lines fanning out from the central storage vault. They are driven by individual explosion-proof 3-phase 220-volt 60-cycle motors. On the soluble oil installation and on the drawing oil installation where an interruption to supply would seriously inconvenience plant operations, two such pumps, one a standby, have been installed on each set of storage tanks.

Pipes Provide Ventilation

In addition to the ordinary control switches on the motor circuits, Mercoid switches have been installed on the slushing oil pump and on the main and standby pumps for the soluble oil to take care of the situation created by a tendency of these oils to leak past the diaphragms of ordinary pressure switches and render them inoperative. Motor starter switches and pressure gages have been grouped together on wall immediately outside the storage vault as shown in Fig. 5.

Ventilation of the storage vault is provided by the installation of 4-inch pipe sections at both ends of the room which exhaust to the outside atmosphere. One vent line extends down to within 4 inches of the floor; the other opens directly above the tanks at the ceiling level. Between the two it is possible to avoid a dangerous accumulation of fumes at any level.

From the centralized storage room, iron pipe lines run close to the basement ceiling. They are varying sizes depending on the viscosity of the oil handled and the length of travel involved. They carry the different oils to four principal points in the plant—the store room, the shipping department, and to settling tanks for separate drawing oil and soluble oil distribution systems.

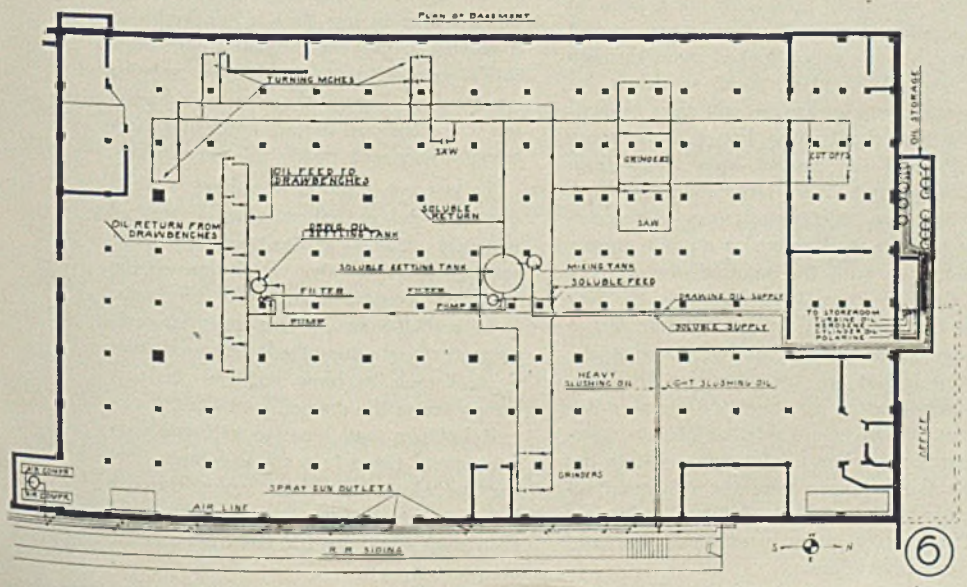
All oil lines pass from the underground storage vault through a short insulated tunnel provided with steam heating coils to insure the maintenance of at least 70 degrees temperature, even when outside temperatures fall as low as zero. This tunnel carries the pipe lines down into the main section of the plant basement.

Four lines carry turbine oil, kerosene, cylinder oil and Polarine oil to the store room where they are dispensed in small quantities as shown in Fig. 4 Kerosene and Polarine are pumped under 20 pounds pressure. This is increased to 40 pounds for the turbine oil and 60 pounds for the cylinder oil. For identification these pipes are painted as follows: Turbine oil — yellow; kerosene — red; cylinder oil—blue; polarine oil—aluminum.

The slushing oils are delivered to the shipping department through 400-foot supply lines from the storage room and carried along the depressed railroad loading bay in two separate lines. One-inch pipe, painted brown, is used to deliver the heavy slushing oil under 80 pounds pressure; ¾-inch pipe painted black handles the light slushing oil at from 20 to 40 pounds pressure. A 1½-inch line (gray) carries air under 20 pounds pressure from air compressors located at the other end of the shipping department and parallels the two oil lines for more than 200 feet along the track.

(*Concluded Next Week*)

Fig. 6—Diagram showing layout of oil handling system. Oil storage is at right



ASA Issues New List Of Industrial Standards

A new edition of the List of American Standards, which includes 558 American standards is announced by the American Standards Association, 29 West Thirty-ninth street, New York. It is broken down industrially and also alphabetically.

Special listings of commercial standards, of American war standards, and of safety standards make the new list more convenient for reference purposes than any previous edition. The publication is available upon request.

Sendzimir Mill

(*Continued from Page 68*)

a Sendzimir mill can be built at a moderate cost.

Other important economies, both in investment cost and in running expenses, also are apparent. The stock of rolls and bearings, owing to their small size, needn't be worth more than 10 per cent of the corresponding item on conventional mills. Then, there is no need to invest in a regular $50,000 roll grinder; a medium-sized tool-room grinder is sufficient. No overhead crane is necessary, as the rolls, bearings and other parts are small and light. Electric motors can be reduced 30 per cent in size, for the same output.

On the side of running expenses, there is considerably less wear on the rolls and, almost in proportion, the current consumption is lower.

The biggest saving is the yield. With a super-accurate product, there is little material that does not pass final inspection, as to gage, camber, flatness, surface or any other possible rolling defect. Edges are smooth to a point where trimming is unnecessary.

Fig. 8 depicts the action of small versus big diameter work rolls, in true proportions but greatly magnified. Work rolls (A) are about 15 inches diameter and (B) 1½ inches diameter. A 0.050-inch strip is shown reduced to 0.030-inch, in both cases. Designations l_1 and l_2 are the contact areas with the work rolls. With a delivery speed of 1000 feet per minute at 0.030-inch and a 40 per cent reduction, the feeding speed of the strip, at 0.050-inch, is 600 feet per minute, thus the difference, i.e., the speed of elongation, is 400 feet per minute and at this speed the strip has to slip back within the roll bite. With the small work rolls shown on the lower picture, the strip has to slip only over the short contact length l_2, as against the long contact length l_1 on the upper picture, but what is still more important, the roll bite with the small work rolls is more open, causing still less friction and not interfering appreciably with the beneficial effect of the back tension. It is clear that friction has a much more important effect in case of the large diameter work rolls, the surfaces of which are more parallel to each other, within the roll bite, so that there is actually a "crowding" effect. On one hand, friction prevents the back tension to exert its full influence within the roll bite, on the other, that crowding effect causes pressure to rise very high close to the exit point producing an effect similar to extrusion so that, with large diameter work rolls, the delivery speed of the strip is always a few per cent higher than the peripheral velocity of the work rolls.

This has a large influence on the power consumption and also on the wear of the rolls. The power consumption on the Sendzimir mill is about 30 per cent less than on conventional mills, for ordinary low-carbon steel stock. On stainless and alloy steels, the savings are much higher.

Wear of the work rolls is vastly reduced, and it is surprising how long these small rolls will stand and how little stock need to be removed when grinding.

Because of the small diameter, either high-grade alloy steels or tungsten-carbide can advantageously be used for the work rolls. Since it is preferable to drive the intermediate rolls, the work rolls have no torque to transmit. Tungsten carbide rolls will preserve a mirror-like finish for a long time. They also flatten appreciably less at the contact area, because their modulus of elasticity is roughly twice as high as steel.

Roll-flattening is not much of a problem with small diameter work rolls. Even in extreme cases, such as taking a heavy pass on a 0.005-inch stainless steel, the contact area is not increased more than about 20 per cent, due to roll-flattening. Under similar circumstances, a 15-inch diameter work roll flattens to such an extent that the contact area is increased from two to two and a half times that of a rigid work roll. When rolling light-gage steel, this roll flattening is chiefly responsible for the loss of efficiency in cold-reduction, and a point is soon reached, where in spite of the heaviest screwdown pressure, no further reduction can be obtained, a familiar picture to many engaged in this trade.

Fig. 8 does not show the effect of roll-flattening. It is drawn for the theoretical case of rolls with infinite rigidity. Had the actual roll-flattening conditions been shown, they would have appeared still more favorable for the small work rolls. The illustration, however, does show the extent to which friction within the roll bite interferes with rolling when using large diameter rolls as compared with small diameter. The surface of the work rolls, especially after they have been in operation for an hour or more, is not very smooth, when looked upon through a magnifying glass. Small scratches, indentations, etc. are present thus indicating that the friction between the work rolls and the contact area varies from spot to spot. With large diameter work rolls, those little irregularities on the surface of the work rolls play a much greater role than with the small diameter work rolls. They cause irregularities in the flow of the metal within the roll bite as, of course, the percentual reduction of the strip is not affected thereby. These irregularities in the flow of metal mean that actually more relative sliding movements and plastic deformation within the metal take place than the minimum required for a given percentual reduction. This means more work-hardening and more embrittlement.

In conclusion, the Sendzimir mill is a superprecision mill (reversing or tandem) capable of producing wide strip ten times more accuracy than conventional cold mills. This is due to ultra-rigid mounting of small work rolls in a solid one-piece housing, making the mill practically as rigid as a wire drawing die. At the same time, the mill produces heavy tonnages, as it works at high speed and takes heavy reductions.

The best fields of application for this mill would seem to be:

1. *Rolling light-gage stainless, carbon and alloy steels.* Not only is the product very flat and true to gage, but intermediate annealing is eliminated which means a striking economy. With aluminum as probable competitor of steel, after the war, low-cost production of light-gage high-tensile steel strip may prove to be important.

2. *Rolling wide strip, such as 60 to 100 inches or even more.* The Sendzimir mill is reasonable in cost weighing only 25 per cent of a corresponding 4-high unit. Rolls and backing elements cost only 10 per cent of 4-high rolls and last surprisingly long. A Sendzimir tandem mill for 50 inches wide costs less than a single-stand 4-high reversing mill.

3. *Where heavy-gage hot-rolled strip has to be reduced to light gages without intermediate annealing.* Some works in Europe have no hot strip mill and produce short-length strip on mechanized three-highs. Such strip is usually $\frac{3}{8}$-inch thick and is reduced to as light as 0.005-inch in several passes but without intermediate annealing.

Compressed Air Breakers Protect Power System

Power system guardians that use 600-mile-an-hour blasts of compressed air to blow out short-circuit arcs will soon be installed to protect electrical equipment at the Columbia Steel Co.'s new Geneva Works near Provo, Utah.

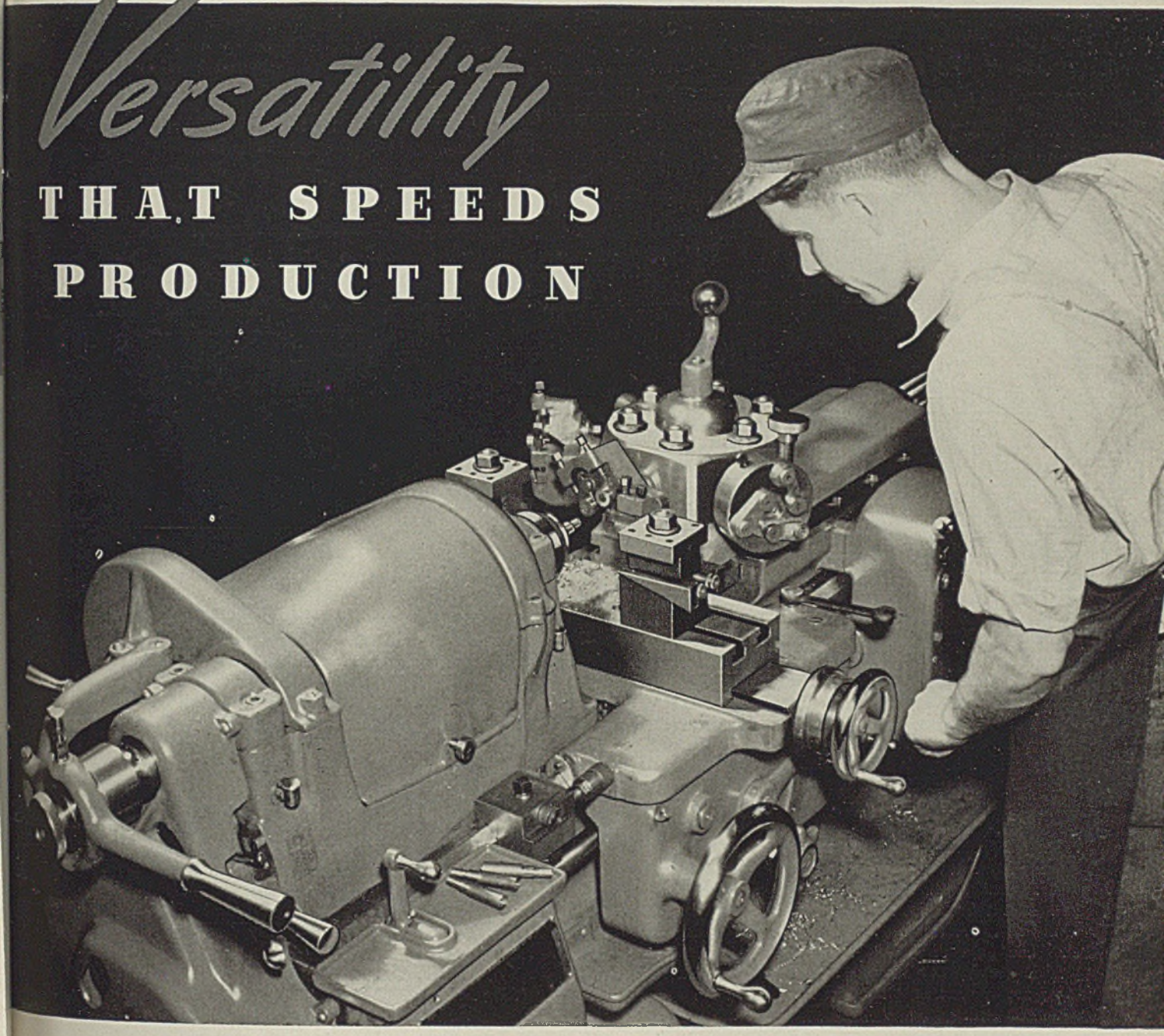
According to R. A. Neal, manager, Westinghouse Switchgear Division, Westinghouse is building 22 compressed-air circuit breakers, more than 200 motors, and other electrical apparatus for the steel mill, which is being rushed to completion to help meet the nation's war demands for more steel.

Each of the breakers will be capable of extinguishing 1,000,000-kilowatt short-circuits arcs in less than a hundredth of a second to prevent damage to the steel mill's power house and transmission equipment. Twenty-three smaller breakers will safeguard motors and other electrical equipment inside the steel plant.

To prevent a power shutdown a small electrical relay that acts as a sentinel instantly detects a short circuit. The sentinel opens a valve which spreads the breaker's contact apart. At the same time a 600-mile-an-hour gust of compressed air is automatically released from a steel tank to blow out the arc that jumps across the opened contacts. A circuit breaker may have to extinguish an arc several times in a single minute during an electrical storm when thunder bolts are bombarding a power line and then may stand by for months before it is operated.

Versatility

THAT SPEEDS PRODUCTION



In these days of top speed production, time is mighty precious. Any machine, any operation or process which saves time is of vital importance.

South Bend Lathes have the kind of versatility that reduces set-up time to a minimum and enables you to get into production quickly—permits change-over from one job to another with little loss of time—prevents delay when product specifications are changed. Such versatility speeds production—is a real time-saving factor. It is one of the advantages in selecting South Bend Lathes for urgent war contracts.

The new South Bend Turret Lathe is a dependable tool for production of duplicate parts. It has precision for close-tolerance operations, ample power, and rigidity for producing a fine finish. And its versatility makes it as readily adaptable to peacetime production as to your present work.

The three sizes of South Bend Turret Lathes, No. 2-H, Series 900, and Series 1000, offer a range of capacities for a wide variety of work. South Bend Engine Lathes and Toolroom Lathes are made with 9″, 10″, 13″ and 16″ swings. Write for Catalog 100B which describes the entire line.

ARMY E NAVY

SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA

LATHE BUILDERS FOR 36 YEARS

Preferred Sizes

- offer means for making important savings
- permit more effective use of mill facilities
- should be adopted by every plant, large and small

AN AMERICAN *Standard for Preferred Thicknesses of Uncoated Thin Flat Metals,* B32.1—1941 American Standards Association, 33 W. 39 street, New York, was recently adopted under procedure of American Standards Association. Additional current activity concerns standards for round wire. A principal purpose of these standards is to eliminate unfortunate conditions resulting from use of various wire and sheet-metal gage numbers.

These standards substitute an identification system that is directly in terms of decimal fractions of an inch. They recommend the same sizes regardless of the kind and form of materials, and they provide a badly needed system wherein every need of American industry can be accommodated.

Being based on American Standard Preferred Numbers, Z17.1—1936 American Standards Association, the recommendations guide the selection of the same sizes to the maximum extent permissible, and hence they can minimize the number of sizes in most common use. As a basic system, the standards include every size now in use or required in the future. They provide the means to rationalize past practices. The purpose of this article is to recommend serious consideration and adoption of ASA preferred sizes by industrial users and to offer helpful information.

Discoveries of an Investigation: An extensive investigation was initiated by a large industrial company a few years ago in connection with a revision of its material standards to determine the activity of various grades of copper, brass and bronze. On the basis of such data, recommendations were to be made on the grades of material that should be considered as standards for various general-purpose applications.

Small Orders: Past orders for this group of materials, excluding bull ring wire that is redrawn into copper conductors, were posted on cards (Fig. 1) to indicate a year's usage of material. The work had not progressed very far before frequent small-quantity orders were noticed, amounts of 5, 10, 20, 50 and 100 pounds. The procedure was then changed to include calculations of the extra costs paid to the supplier because of the small quantities of material. That such costs may be appreciable is evident by reference to the following typical quantity-extra tables for this class of materials.

Quantity (Lb.)	Extra Cost (Lb.)
0- 9	20
10-19	15
20-49	10
50-99	8
100-299	5
300-499	3
500-999	1.5
1000-1999	0.5

On some grades of material the extra for the smaller quantities amounts to 30 cents per pound with a minimum setup charge of $2.00 per order.

Most Frequent Quantities: *The records covered the purchase of many millions of pounds of material. The most frequent size of order, however, was for* 100 *pounds.* The next most frequent size of order was for 500 pounds; and the third most frequent size of order was for less than 50 pounds.

The original purpose of the investigation, of course, was the activity of the various grades. The investigation showed that 54 per cent of the grades were used in quantities of less than 5000 pounds per year. But the 54 per cent of the grades accounted for less than 1 per cent of the material purchased and only 4½ per cent of the extra charges incurred for ordering small quantities of material. The original intention of the investigation was fulfilled by indicating what grades were most active. The need for these various special materials was found to be justified in the majority of instances to satisfy the many special conditions encountered in a diversified field of application.

Extra Charges: In addition, the investigation revealed that very appreciable extra costs were incurred annually on this limited number of materials. Despite the fact that millions of pounds of material were involved, 61 per cent of the orders were for quantities less than 500 pounds per order. These orders covered approximately 10,000 items, taking into account size as well as grade of material. The fault was not traceable to ordering routine, except in two instances where quantities frequently were ordered in sets for parts as they were produced. The over-all record showed that 70 per cent of the orders were placed not oftener than once a quarter.

Number of Material Sizes: The analysis, therefore, narrowed itself down to the fact that the large number of units, the small size of the majority of orders, and the extra charges resulted from the number of sizes of material specified by designers. Also, instead

By H. W. ROBB
Standards Department
General Electric Co.
Schenectady, N. Y.

¼" ROUND — SPECIFICATION 41144

REQ.	DATE	VENDOR	DEPT.	QTY.	LGT.	BASE TOTAL	EXTRAS SIZE	EXTRAS QTY.	$ CHG.
316331	7/3	AB	045	500#	10'			1	5.00
87052	3/26	"	270	2 pc	10-12'			8	3.35
323852	1/22	Rev.	C	50#	6-8			5	2.50
142529	9/24	AB	143	100#	8-10'			3½	3.50
11-17106	9/24	"	11	15#	10'			15	2.25
66723	9/22	"	401	100#	10-12'			3½	3.50
318029	9/24	"	045	300#	10'			2	6.00
69969	10/14	"	401	100#	10-12'			3½	3.50

Fig. 1. (Top)—This is manner in which past orders were tabulated in making the study of sizes used

Approx. change in price from standard

Date	¢

STANDARD MATERIAL
COST AND STOCK
PHOSPHOR BRONZE

B11H14
SH & ST
PAGE 1

WORKS
ISSUED BY
DATE September 2, 1941

B11H14 is 8% Sn phosphor bronze sheet and strip used generally for spring application. For special conditions use B11H16 where better spring qualities justify higher cost; B11H51, where ease of fabrication, higher proportional limit, and electrical conductivity warrant still higher cost. B11H4C, half hard, commercial edge; B11H14E, hard, commercial edge; B11H14E, spring hard, commercial edge; B11H14G, extra spring hard, commercial edge; B11H14H, extra hard, commercial edge; B11H14H3, round corner edge, extra hard.

(Wt. 0.319 lb/cu in.)

COST PER 100 LBS: (base quantity delivered) 12% Copper

Add or deduct for each cent change in copper base = $.92

Thk \ Width	Incl 1/8 Excl 3/16	Incl 3/16 Excl 1/4	Incl 1/4 Excl 1/2	Incl 1/2 Excl 2	Incl 2 Incl 9	Over 8 Incl 12	Over 12 Incl 14	Over 14 Incl 16	Over 16 Incl 18
	B11H14C, E, F, H - with commercial edge♦								
.0508 & up	57.11	48.11	42.49	40.61	39.11	40.61	42.11	43.24	45.49
.0285-.0507	48.11	44.36	42.86	41.73	40.61	41.36	43.24	45.11	47.36
.0226-.0284	48.86	45.49	44.36	43.24	40.99	41.73	43.99	45.86	48.11
.0179-.0225	49.61	46.61	45.86	44.36	41.36	42.49	44.74	46.61	48.86
.0142-.0178	50.36	48.86	47.36	46.86	42.11	43.24	45.86	47.36	50.36
.0126-.0141	51.11	50.36	49.61	48.11	42.49	43.99	46.61	48.11	51.11
.0113-.0125	60.11	51.84	50.36	49.61	42.86	44.36	47.36	49.61	
.0100-.0112	60.86	52.61	51.84	50.36	43.24	44.74	48.11	51.11	
.0089-.0099	62.36	54.11	52.61	51.86	43.61	45.86			
.0080-.0088	63.11	54.86	54.11	52.61	46.11				
.0071-.0079	72.86	57.86	56.36	54.86	46.61				
.0063-.0070	75.11	60.11	58.61	57.11	49.61		Special		
.0056-.0062	76.61	63.11	60.86	59.36	51.86				
.0050-.0055	78.86	65.36	63.11	61.61	54.11				

Thk \ Wth	Over 18 Incl 20	Over 20 Incl 22	Over 22 Incl 24	Over 24 Incl 26	Over 26 Incl 28	Over 28 Incl 30	Over 30 Incl 32	Over 32 Incl 34	Over 34 Incl 36	Over 36 Incl 38
.0508 & up	47.36	49.61	51.84	55.61	58.61	62.36	66.86	71.36	76.61	80.36
.0285-.0507	49.61	51.84	54.11	57.11	60.96	63.86	68.36	72.86	78.86	82.61
.0226-.0284	51.11	52.61	54.86	58.61	62.36	66.11				
.0179-.0225	51.84	54.11	56.36				Special			
.0142-.0178	53.36									

For B11H14G add $1.50 per 100 lbs to the above costs.

♦Edges: Add the following extras for metal purchased with round corner edges - B11H14C3, E3, F3, G3, H3:

Thk \ Width	Over 3/8♦ Incl 3/4	Over 3/4 Incl 2	Over 2 Excl 4	Incl 4 & over
.0907-.2043♦	See Rods, B11H12		1.89	1.50
.0720-.0906	3.00	2.25	1.69	1.50
.0320-.0719	3.39	2.62	2.25	1.88
.0179-.0319	4.13	3.39	3.00	2.62
.0126-.0178	5.25	4.50	3.75	
.0100-.0125	6.75	6.00	5.25	

♦Metal with finished edges in widths 3/8 inch and under if flat wire, B11H54

Metal with finished edges in thicknesses over .2043 inch is rod, B11H12.

ORDER DATA - NOT FOR USE IN BILLING

Lengths Extras: Metal in rolls or coils - no extra charge.

Metal in straight lengths - extras will be charged as shown on Sheet, B11H13.

Quantity extras: Calculated on single item basis:

Quantity (lb)	0-24	25-49	50-99	100-299	300-499	500-999	1000-1999	2000 & up
Extra (¢ / lb)	♥+30	+15	+7.5	+3	+2	+1	0	See 0 & S

♥Plus $2.00 per item

STANDARD TOLERANCES: SEE METALLIC MATERIALS BOOK (Same as those shown on sheet B11H13)

Fig. 2. (Center)—A standard cost and stock sheet is reproduced here to show manner in which this data is prepared as regards size, finish, tolerance specifications

B11H14 — STANDARD MATERIAL — COST AND STOCK — PHOSPHOR BRONZE SHEET & STRIP

PAGE 2

WORKS
ISSUED BY
DATE

PREFERRED SIZES (★ or ♦) — STOCK SIZES ( )

Size♥	Code	Size♥	Code	Size♥	Code

★ or ♦ Preferred sizes, give preference to sizes marked ★. (★ or ♦ may be substituted)
♥ List thick x width x length of stock, and thickness only on nonstock sizes; mark as follows:
★ .004, .006, .010, .016, .025, .040, .063, .100
♦ .005, .008, .012, .020, .032, .050, .080, .125
Code:

SPECIAL WORKS STOCK
Do not use on designs repetitively ordered.

Fig. 3. (Bottom)—Back side or page 2 of same cost and stock sheet in Fig. 2. Note reference to preferred sizes

of being by a large *number of grades* of materials, the results were traced to the *number of sizes* of most commonly used materials. This is illustrated by Table I—Small Quantity Extras:

Exploring one material further, the sizes shown in Table II were specified. This example is taken at random. Instance after instance was found of variations of one thousandth of an inch in the range from 0.030 to 0.130-inch.

That such conditions are unsound is seen by reference to manufacturers' tables of tolerances. For example, the sizes 0.125, 0.127 and 0.128-inch come within the permissible tolerances of a single size. The quantities that were obtained in this instance were 5300, 7000 and 45 pounds respectively.

While they could be supplied from a single mill size, they were nominally different sizes; extra charges were incurred amounting to 20 cents per pound for some of the material. These and other sizes indicated that the decimals that were specified were derived from fractions in some instances and from gage numbers in others.

Defense of Operating Units: It must be recognized that these sizes represent the operations of a large number of divisions. The results, therefore, are an indication *of the lack of a satisfactory national system for the many* different products involved, rather than a condemnation of the inefficiency of a single division.

Evidence indicated that improvements were possible only by discarding gage-number and other past systems and by adopting new methods on a vast scale.

Reasons for Number of Sizes: Many reasons account for the number of sizes in use by a manufacturer and for the resultant expense and confusion. Some of these may be summarized briefly as:

—National practices on fits and tolerances, etc.

—Existing gage-number systems

—Over-emphasis on direct labor costs

—Design practices

TABLE I—Small Quantity Extras

Material	No. of Sizes*	Consumption: Number of Sizes Less Than 100 lbs.	Consumption: Number of Sizes Less Than 500 lbs.	Extra Charges Incurred for Small Quantities
Strip No. 1, one temper	299	75	192	$2,630.87
2nd temper	186	54	119	1,574.49
3rd temper	198	37	97	2,123.05
Sheet No. 1, one temper	247	45	124	2,050.06
2nd temper	331	69	173	3,232.80
Bar No. 1	189	31	93	2,452.20
Bar No. 2	252	64	122	1,855.37
Tube No. 1	207	97	171	1,566.88

*The number of sizes applies strictly to differences in principal dimensions and does not include variations in edge, tolerances, etc.

TABLE II—Typical Sizes Specified

0.063	0.125	0.190
0.065	0.127	0.194
0.066	0.128	0.197
0.082	0.134	0.203
0.089	0.136	0.204
0.090	0.139	0.205
0.092	0.143	0.215
0.093	0.144	0.218
0.094	0.156	0.221
0.095	0.157	0.228
0.096	0.163	0.240
0.104	0.164	0.243
0.109	0.166	0.245
0.110	0.168	0.250
0.111	0.172	0.253
0.114	0.173	0.260
0.115	0.187	0.265
0.120	0.189	0.281

—False economies in control of waste and spoilage

—Accounting methods

No attempt is made herein to indicate the relative importance of these causes. The first two require joint consideration on a national scale; the others can be corrected by the individual manufacturer, provided he recognizes their importance and gives them proper attention.

Fits and tolerances now include unilateral and bilateral tolerances, basic hole and basic shaft systems, and a confusing variety of fits. If a hole is basic, the shaft must vary with different fits. Where shafts are not machined by a manufacturer, more sizes are purchased. Where practices vary for different products, the number of sizes of drawn or centerless ground bar multiply; usually the availability is decreased.

Some conclusions have been drawn prematurely about the relationship of drill and material sizes. More consideration of methods and costs of processing shafts and pins is desirable in relation to cost and the practicability of making holes the variable item.

Gage-Number Systems: The problem of gage-number systems has been under consideration and is in the process of solution, provided industry recognizes the importance of the American Standards that are mentioned herein, and applied them promptly and understandingly.

An inspection of the gage-number sizes in Table III makes it apparent why many sizes are now in use. It should be noticed that not only do the sizes for copper, brass and bronze differ from those for steel; but manufacturers' sizes of steel strip differ from those for steel sheet. *In an age of interchangeable manufacture and the frequent need of substituting one material for another, it is difficult to understand why such conditions are tolerated. It must be assumed that they are not recognized.*

This table of gage numbers is incomplete. There are others, and there is a long story for each system. The sheet steel gage is a weight gage, originally established by statute for internal revenue purposes. A few years ago, steel manufacturers changed the decimal thicknesses corresponding to the various gage numbers, since improvements in steel manufacture produced denser steel. By this action they multiplied the number of thicknesses in use. In addition to the steel weight gage, there are weight gages for copper and zinc. There are a number of so-called music wire gages for steel wire that are not listed.

Where some gage-number systems are based on weights, other systems have various origins. One gage system was developed to facilitate the calculation of drawing operations in the manufacture of wire.

Of all the systems, only the Brown & Sharpe or the American wire gage, is a rational system from a user's point of view. This system, like American standard preferred sizes, is a geometric progression wherein each size is proportionally larger than the preceding one. This helps to account for its popularity. Although strongly entrenched, particularly in the electrical industry, and in spite of its adherents, it has certain disadvan-

(*Please turn to Page* 95)

TABLE III—Gage Sizes in Decimals of an Inch

Gage No.	(1) Birmingham or Stubs'	(2) American or Brown & Sharpe	(3) U. S. Standard Old	(3) U. S. Standard New	(4) Washburn & Moen	(5) Music Wire (Standard)	(6) Zinc Gage
6–0	. .	0.5800	0.4687	.	0.4615	0.004	. . .
5–0	.	0.5165	0.4375	. . . .	0.4305	0.005	. . .
4–0	0.454	0.4600	0.4062	. .	0.3938	0.006	. . .
3–0	0.425	0.4096	0.3750	.	0.3625	0.007	. . .
2–0	0.380	0.3648	0.3437	. .	0.331	0.008	. . . .
1–0	0.340	0.3249	0.3125	.	0.3065	0.009	. . .
1	0.300	0.2893	0.2812	.	0.283	0.010	. . .
2	0.284	0.2576	0.2656	.	0.2625	0.011	.
3	0.259	0.2294	0.25	0.2391	0.2437	0.012	0.006
4	0.238	0.2043	0.2343	0.2242	0.2253	0.013	0.008
5	0.220	0.1819	0.2187	0.2092	0.207	0.014	0.010
6	0.203	0.1620	0.2031	0.19443	0.192	0.016	0.012
7	0.180	0.1443	0.1875	0.1793	0.177	0.018	0.014
8	0.165	0.1285	0.1718	0.1644	0.162	0.020	0.016
9	0.148	0.1144	0.1562	0.1495	0.1483	0.022	0.018
10	0.134	0.1019	0.1406	0.1345	0.135	0.024	0.020
11	0.120	0.09074	0.125	0.1196	0.1205	0.026	0.024
12	0.109	0.08081	0.1093	0.1046	0.1055	0.029	0.028
13	0.095	0.07196	0.0937	0.0897	0.0915	0.031	0.032
14	0.083	0.06408	0.0781	0.0747	0.080	0.033	0.036
15	0.072	0.05707	0.0703	0.0673	0.072	0.035	0.040
16	0.065	0.05082	0.0625	0.0598	0.0625	0.037	0.045
17	0.058	0.04526	0.0562	0.0538	0.054	0.039	0.050
18	0.049	0.04030	0.05	0.0478	0.0475	0.041	0.055
19	0.042	0.03589	0.0437	0.0418	0.041	0.043	0.060
20	0.035	0.03196	0.0375	0.0359	0.0348	0.045	0.070
21	0.032	0.02846	0.0343	0.0329	0.0317	0.047	0.080
22	0.028	0.02535	0.0312	0.0299	0.0286	0.049	0.090
23	0.025	0.02257	0.0281	0.0269	0.0258	0.051	0.100
24	0.022	0.0201	0.025	0.0239	0.023	0.055	0.125
25	0.020	0.0179	0.0218	0.0209	0.0204	0.059	. . .
26	0.018	0.01594	0.0187	0.0179	0.0181	0.063	. .
27	0.016	0.01420	0.0171	0.0164	0.0173	0.067	. . .
28	0.014	0.01264	0.0156	0.0149	0.0162	0.071	. . .
29	0.013	0.01126	0.0140	0.0135	0.015	0.075	. . .
30	0.012	0.01003	0.0125	0.0120	0.014	0.080	. . .
31	0.010	0.00893	0.0109	0.0105	0.0132	0.085	. . .
32	0.009	0.00795	0.0101	0.0097	0.0128	0.090	. . .
33	0.008	0.00708	0.0093	0.0090	0.0118	0.095	. . .
34	0.007	0.006304	0.0085	0.0082	0.0104	0.100	. . .
35	0.005	0.005614	0.0078	0.0075	0.0095	0.106	. . .
36	0.004	0.005	0.0070	0.0067	0.009	0.112	. . . .
37	. .	0.004453	0.0066	0.0064	0.0085	0.118	. . .
38	. . . .	0.003965	0.0062	0.006	0.008	0.124	. . .

(1)—Tubing and steel bands, flat wire, strip, hoops, spring steel.
(2)—Small brass tubing, nonferrous sheet, strip, and wire.
(3)—Steel sheet also monel, nickel, inconel sheet.
(4)—Iron and steel wire except armature binding, music, and flat.
(5)—Music wire.
(6)—Zinc.

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A JAMMED machine gun is a matter of life or death to the sky fighter. In the breathless seconds of mortal combat this belt of 30-calibre bullets must roar through his gun without a falter. On the unfailing uniformity of the links that hold the bullets together, his safety and the safety of his plane depend.

That unfailing uniformity starts with the strip steel from which those links are made.

Every pound of American Quality Cold Rolled Strip furnished for machine gun belt links, and similar high-precision parts, is bright annealed in furnaces which were especially improved by American Steel & Wire engineers.

Precise and positive automatic control of annealing time, temperature and atmosphere results in highly uniform annealing and freedom from decarburization, insuring perfect workability of the material. That's why millions of machine gun belt links are being manufactured of American Quality Cold Rolled Strip. It enables the belt link fabricator to set his dies for top-speed manufacture with full assurance of getting the precise contour required.

Our engineers will be glad to help you in solving any problems you may have in fabricating cold rolled strip steel for war products.

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United States Steel Export Company, New York

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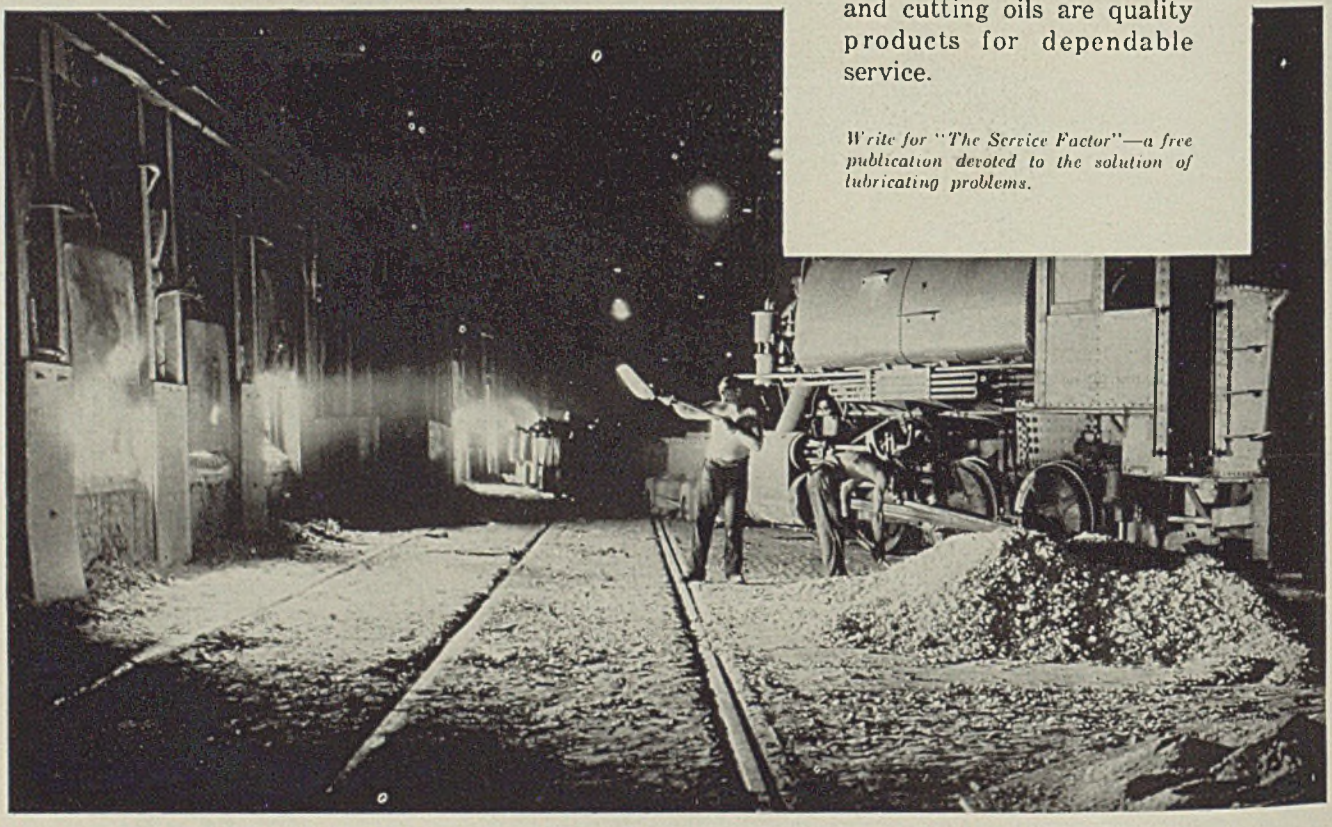

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By I. H. REMIKER
Chief Engineer
Lindberg Engineering Co.
Chicago

Forced Convection Heating

. . . . to 1750 degrees Fahr. is practical in new furnace design

Fig. 1—Fixture carrying 12 large forgings has just come from a 4½-hour normalizing heat at 1650 degrees Fahr. in Super Cyclone furnace

A NEW TYPE of forced convection furnace with heating capacity to 1750 degrees Fahr. makes possible a definite increase in production speeds in hardening, annealing, normalizing, tempering, nitriding and other heating operations. A saving in floor space is also obtained.

The new unit, the Super Cyclone, developed by the Lindberg Engineering Co., 2450 West Hubbard street, Chicago, has increased production in many instances from 3 to 12 times over old equipment occupying the same floor space. This is due to the fact that forced convection heating permits the handling of work on fixtures or in work baskets rather than spreading it out on the hearth as with conventional type box furnaces.

This is believed to be the first furnace developed that heats totally by forced convection to 1750 degrees Fahr. The heat is forced under pressure by a high velocity fan through every part of the charge. This completely eliminates radiation to the work from a source hotter than the desired work temperature and does away with one-sided heat which may strain, distort or pull work out of shape.

Forgings: A typical example of the increased production capacity of this new unit is shown in Fig. 1 where a fixture carrying a charge of 12 forgings has just come from a 4½-hour normalizing heat at 1650 degrees Fahr. Made of SAE 3450, these forgings weigh 126 pounds each for a total of 1512 pounds.

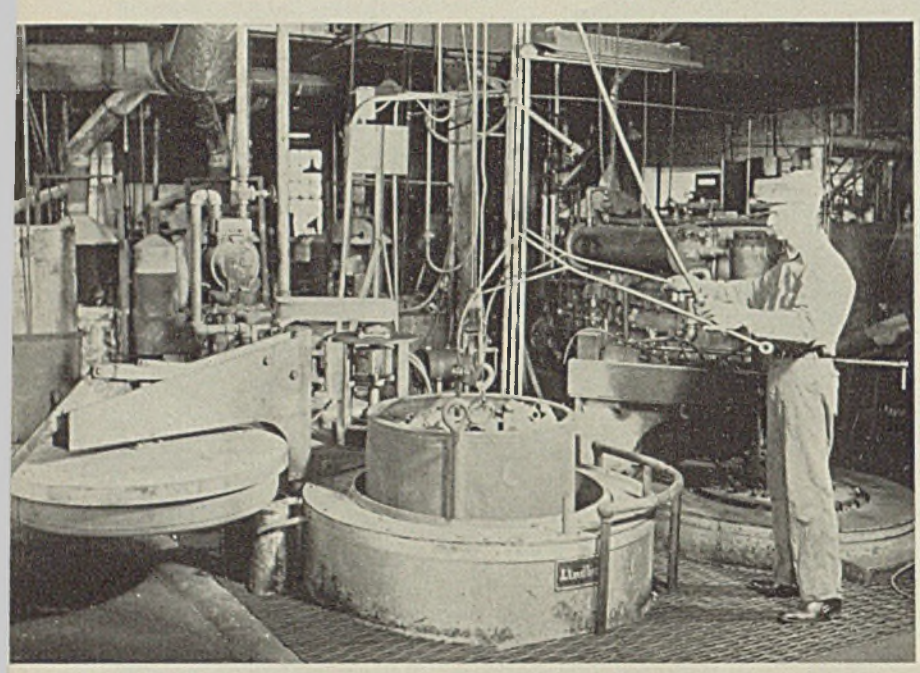
After being allowed to air cool, they are charged—still on the same fixture—back into the same Super Cyclone, heated to 1500 degrees, held for one hour, and then oil quenched. On the same fixture, the work goes back to the furnace once more, this time for a 4-hour draw at 1075 degrees Fahr.

The previous method of normalizing these forgings was by means of a radiation type box furnace which could handle only five pieces per heat. The capacity was limited to this extent due to the difficulty of loading and unloading, and also because piling the parts one on top of another would result in an exceptionally dense charge that would be difficult to heat in the box type furnace. Time to heat the work to 1650 degrees Fahr. was five hours, which included one hour for soaking.

Thus only five forgings are normalized in 5 hours with the older type of equipment, as compared with 12 forgings being turned out in only 4½ hours in the Super-Cyclone. This production increase is almost three times the old output.

The forgings handled in the box furnace required straightening, whereas the work handled in the Super-Cyclone required no straightening whatsoever. With the box furnace, two men were required to handle the forgings individually in loading and unloading the furnace for each operation. With the Super Cyclone the operator loads the fixture away from the furnace, and then lowers it into the furnace by means of a hoist or crane. As pointed out above, the work remains in the same fixture during normalizing, hardening and drawing operations. Thus it can be quickly and easily handled by one-man with a hoist.

Annealing Gray Iron Castings: Shown



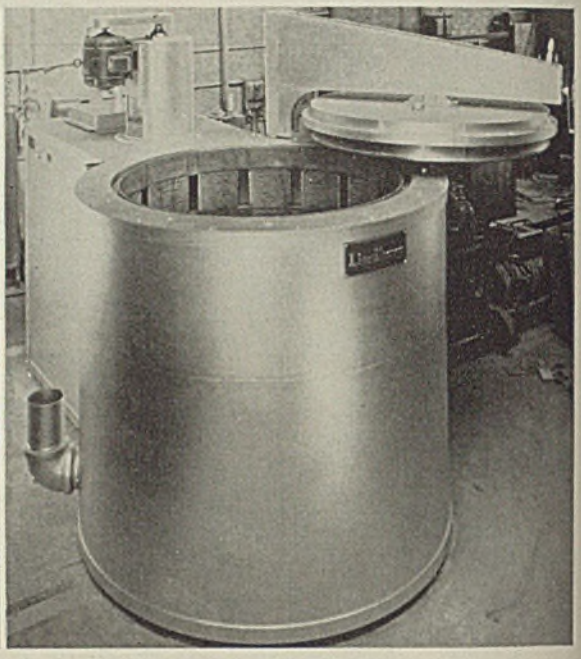


Fig. 2. (Left)—This Super Cyclone furnace requiring a floor area of only 54 square feet replaced eight radiation type box furnaces occupying 324 square feet and at the same time doubled the volume of work handled in annealing gray iron castings

Fig. 3. (Right)—A foundry utilizes this Super Cyclone to normalize or harden steel castings. With as much as 5000 pounds of work per load, daily output is 35,000 pounds. Photos from Lindberg Engineering Co., 2450 West Hubbard street, Chicago

in Fig. 2 is a Super Cyclone requiring a floor area of 6 x 9 feet or 54 square feet. This unit replaced eight radiation type box furnaces occupying a space 36 x 9 feet or 324 square feet. Besides the saving in floor space, the production actually was doubled.

The box furnaces were used to anneal gray iron castings in a large mid-western appliance plant. The castings had to be handled individually in the box furnaces, spread carefully over the hearth to be certain of heating uniformity, and were then raked from the furnace piece by piece.

In the Super Cyclone, these castings are loaded into a basket, charged into the furnace and dumped when thoroughly heated. In 8 hours, the new unit annealed as much work as the eight box furnaces formerly handled in 16 hours. Thus, the one Super Cyclone, occupying but one-sixth the floor space, doubled the output of the eight older furnaces. This amounts to a production increase 12 times per square foot of floor space.

Steel Castings: For normalizing or hardening steel castings a large Wisconsin foundry is using Super Cyclones 60 inches in diameter by 48 inches deep, such as shown in Fig. 3.

The normalizing load is approximately 5000 pounds per furnace. Time required for the charge to reach the 1520 degrees Fahr. normalizing heat is 2 hours and 15 minutes. The castings are held at this heat for one hour and then air cooled. This 3¼-hour cycle permits seven heats to be handled each 24 hours for an average daily production of 35,000 pounds.

On work to be hardened, the loads are limited to 2400 pounds. This is due to temporarily limited quenching equipment. The parts which have a maximum cross section of 1¼-inch are heated to 1600 degrees Fahr., the cycle being 1 hour and 45 minutes. Hardness following the water quench is 207 to 241 brinell. Twelve loads are being hardened per 24-hour period for an average daily production of 28,800 pounds.

Construction of Furnace: Heating is by gas, oil or electricity. The circulating fan is in a separate chamber away from the work chamber where it is safe from damage that might result from careless handling in loading or unloading operations.

The fuel fired unit consists essentially of work chamber, fan chamber, and combustion chamber. The electric unit has separate work chamber, fan chamber and the element chamber which contains the nickel-chromium Tabulaire heating elements.

All parts subjected to high temperatures—the fan, fan shaft and air ducts—are of nickel-chromium heat-resisting alloy. Work chamber sizes range from 16 inches diameter by 20 inches deep to 72 inches diameter by 84 inches deep.

Goodyear Pliofilm Now Speeds Making of Templets

An emulsified Pliofilm, called Transphoto film, recently developed by Goodyear Tire & Rubber Co., Akron, O., is now being used to hurry the fabrication of templets for war-expanding factories. The product is said to be highly accurate.

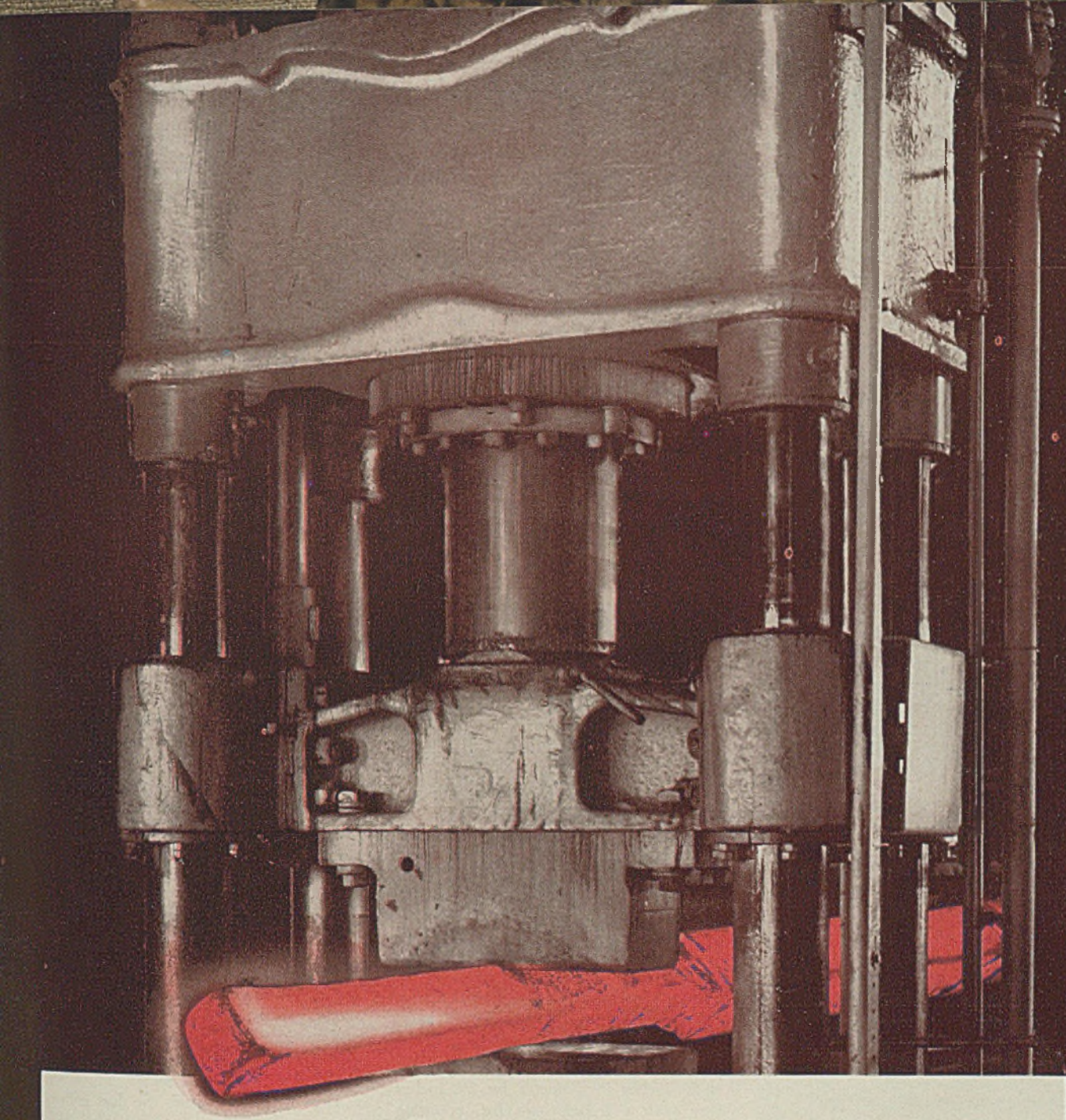
In using the development, a pattern for a templet or master layout, is outlined on a smooth, thin sheet of metal after being previously coated with a priming paint.

Then the emulsified sheet of Pliofilm is wet in a special solution, after which it is spread over the master layout. A brush or rubber squeegee is used next to bring the two into as close contact as possible.

After about five minutes in this position, the emulsified film is lifted off and processed through hypo solution, then rinse water, then a bleach and finally through a transfer solution. Next the "developed" sheet of film is pressed against a sheet of virgin metal allowed to remain in this position several minutes.

When film is removed, a bright positive image of the original layout remains on the copy sheet of metal in the form of black lines which have been formed by a deposit of metallic silver.

Goodyear officials point out that the Transphoto templet process can be adapted also to producing similar layouts on masonite, plywood and similar nonmetallic surfaces if the material is coated first with a special zinc-base paint.



FROM BILLETS TO BARS—QUICKLY!

This recently installed 1000 ton forge press is another Jorgensen service to steel users. It speeds up the replenishment of Jorgensen warehouse stocks of regular sizes of forged steel bars in order that these sizes will always be available for immediate delivery. It also enables Jorgensen to supply special sizes quickly—both are vital needs now.

EARLE M. JORGENSEN CO.

STEEL

SAN FRANCISCO OAKLAND LOS ANGELES HOUSTON

Lapping Plate

American Gauge Co., 128 Bayard street, Dayton, O., is offering an improved lapping plate for all types of gages and surfaces requiring close tolerances. It measures 8 inches wide by 12½ inches long and 2½ inches high.

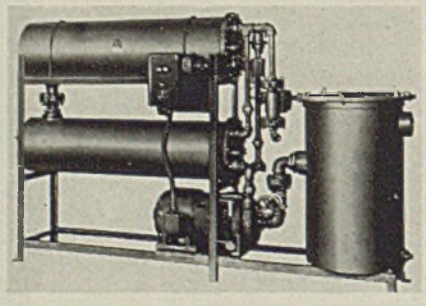
The cast iron block is of especially

fine grain, about 1⅛ inches thick, and mounted on four legs. Surface is cut with 1/16-inch grooves in a diamond pattern, the grooves being spaced ¼-inch and at right angles to each other, but 45 degrees to the length and breadth of the plate. This is said to give superior cutting action.

Oil Strainer

Bell & Gossett Co., Morton Grove, Ill., is offering a new type of oil strainer for quench-oil cooling. It employs two basic features which permit thorough cleaning of the oil without restricting free flow.

First, it is amply sized to accumulate large amounts of scale before cleaning becomes necessary. Second, its screens are meshed to meet various operating conditions without clogging and yet affording full protection to the pump. The strainer



is not rated by pipe size, but rated to permit the maximum flow of oil which the pump can deliver if there is a minimum of resistance in the suction line.

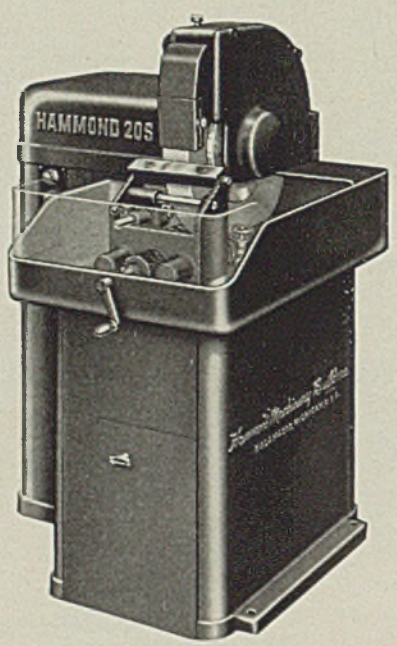
Wet Tool Grinder

Hammond Machinery Builders Inc., 1611 Douglas avenue, Kalamazoo, Mich., is offering a new 20-inch wet tool grinder which incorporates all latest improvements for grinding hard metals, alloys and tungsten carbide. It features the recently designed tool rest and wheel dresser manufactured by the company.

The former is adjustable to any angle and has a replaceable steel wearing plate. The wheel dresser, an integral part of the assembly, affords a quick method of dressing grinding wheel face. Entire unit adjusts in and out from the wheel by a detachable hand crank.

The circulating coolant system with regulating valve in the sludge pan to the right of the tool rest provides regulation of the coolant flow. Grinder motor is a 3-horsepower fan-cooled unit and is located in the base.

Starter is of the magnetic type with overload, low voltage and phase failure protection. Grinding wheel furnished

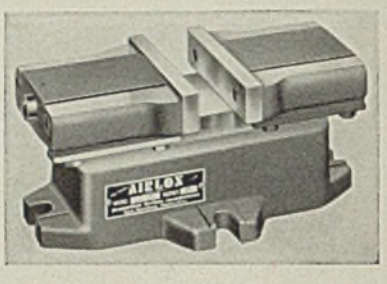


is 20 inches in diameter by 2½ inches face with a 9-inch hole for mounting on a large hole wheel flange. Table of the grinder tilts by flipping the locking levers on the sides. It moves in and out from the grinding wheel face by means of a detachable hand crank.

Pneumatic Vise

Production Devices Inc., Poultney, Vt., announces an improved quick-acting Airlox Junior pneumatic vise for use in conjunction with precision production. Powered by a special Schrader air cylinder, which is enclosed inside the vise body, the unit insures even distribution of weight on the milling machine table whether it is fastened across or lengthwise on the table.

A screw adjustment of the stationary jaw, located in the middle of the end of the vise enables the operator to set the jaw opening to grip the work during the last 1/16-inch jaw travel. Units are offered with No. 2 Brown & Sharpe jaw hole spacing, and soft jaw faces. They also are supplied with undrilled



jaw castings. The vise has an overall length of 10 inches. Its jaw width and depth is 4¾ and 1⅛ inches respectively.

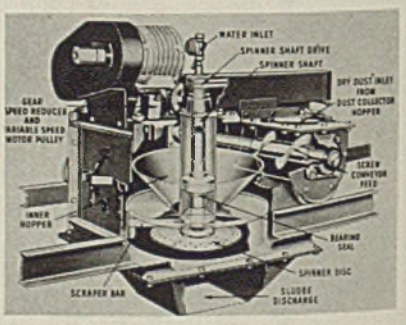
Fluorescent Fixtures

Sylvania Electric Products Inc., Fluorescent Fixture division, Ipswich, Mass., announces eight new industrial fluorescent fixtures with composition reflectors. The fixtures range in size from 100 to 300 watts and are available for either individual or continuous-row mounting. They are finished in Miracoat baked white enamel, the outside being finished in French gray.

Screw Conveyor Feed for Wet Disposal Unit

American Foundry Equipment Co., 555 South Byrkit street, Mishawaka, Ind., has added a screw conveyor feed to its wet disposal unit to provide a constant and uniform rate of feed of discharged dust from dry type dust collectors into the sludge forming device.

Dust which falls from the dust collec-



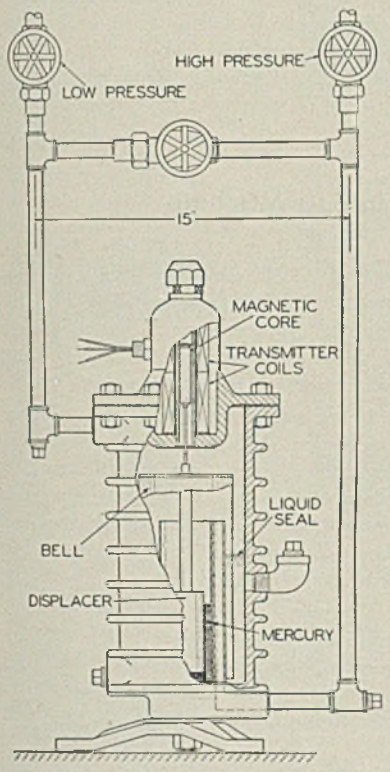
tor hopper through a flexible coupling is deposited directly into the screw conveyor of the wet disposal unit. Rate at which this dust is fed into the mixing chamber can be controlled through gear speed reducer and variable speed motor pulley.

When dust enters the unit, water or

other liquid is discharged at the center of a high-speed mixing disk causing instantaneous mixture of the two. The sludge is then discharged at the bottom of the unit. The consistency of the sludge can be controlled by the amount of dust and water fed into the unit.

Transmitter

Cochrane Corp., Seventeenth and Allegheny avenues, Philadelphia, is offering a new style H transmitter for use in conjunction with standard electric meter receiving units. It is designed specifically for measuring low static pressure gases where low differential and result-



ant low permanent pressure loss is of prime importance.

The transmitter is designed for differentials of 2, 4, 6, 8 and 10 inches of water. Standardization of design permits altering the differential head by changing the displacer and amount of mercury in the central reservoir. The bell casing is designed for a maximum working pressure of 75 pounds per square inch.

Differential pressure in excess of the design differential will move the bell to its upper limit, and the gas will bubble out from under the bell with relatively little disturbance because of the large volume of bell in comparison to the size of high pressure inlet pipe. Normal operation of the meter is resumed upon the differential falling to normal values. Ease of accessibility to the transmitter interior permits quick and thorough cleaning of all parts. Sealing oil level can be quickly checked through the filling plug without removal of the top cover.

Fluorescent Lamp

Acme Electric & Mfg. Co., Cuba, N. Y., has introduced a new model F 100-25 lamp ballast for four 100-watt fluorescent lamps. It is designed to pro-

vide equalized and balanced secondary voltage to each lamp assuring all four lamps of the unit lighting at same time. Core and coil elements of this ballast are impregnated and compounded to minimize normal resonant vibration reducing the sound level to a negligible point.

Crater Filler

General Electric Co., Schenectady, N. Y., announces a new crater filler or foot accelerator for use with Strikeasy arc welders. It is designed to provide close auxiliary control of heat required in welding thin material, such as aircraft tubing, and to permit tapering off welding current at the end of a bead in order to fill the crater.

The crater filler essentially consists of a combination of a foot-operated rheostat for reducing current and a field forcing switch for providing a hot start when required.

Self-Locking Nut

Tinnerman Products Inc., 2039 Fulton road, Cleveland, has developed a new self-locking Speed nut for plywood assemblies which can instantly be driven into anchored position. It is designed with two pairs of integrally formed attaching legs.

When driven into thick plywood the

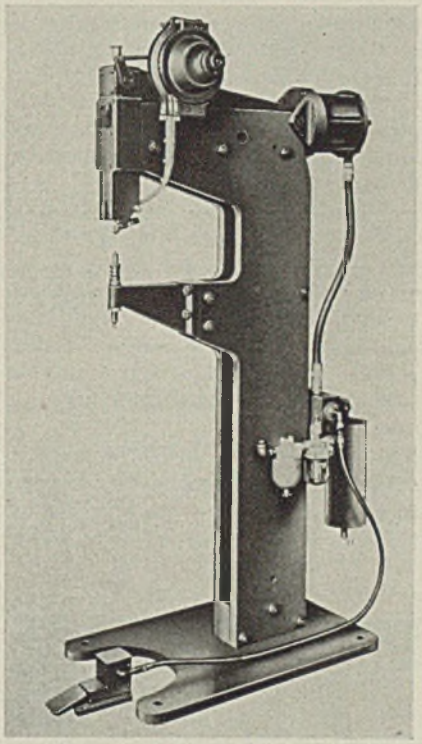
cam-like structure of the attaching legs forces them outward as they are driven, providing a firm spring-tension grip in the wood. When driven into thin plywood sections the attaching legs "peen" over when driven against a backing plate.

Other advantages claimed for this self-locking nut is light weight, 3½ pounds per thousand, and larger bearing surface which spreads the load over a greater area. The nuts may be used on both Air Corps 530-8 and 530-screws.

Riveting Machine

Tomkins-Johnson Co., Jackson, Mich., has developed a new Rivitor designed to step up speed of flush riveting in aircraft production. It is air powered with automatic feed and setting mechanism.

Pressure for riveting is furnished by an air cylinder. The air pressure from the cylinder is applied, and stepped up, through a toggle mechanism. Construction of unit is such as to meet aircraft requirements for aluminum alloy rivet-



ing, with capacity for rivets ¼-inch diameter by ¾-inch long.

By using a different type of rivet set and rivet jaw construction, this machine also can be adapted to handle counter sunk head, round head, full and semibrazier head rivets. It is available in throat depths from 9 to 36 inches.

Other features of the riveting unit include precision setting, adjustable setting tools and interchangeable horn type construction.

New Type Pallet

Union Metal Mfg. Co., Canton, O., announces a new pallet, utilizing wood for the top and bottom slats, reinforced with steel at the ends and in the center.

Metal is thus conserved without sacrificing strength.

Bolted construction permits easy replacement of the wood slats, while the

steel ends protect the pallet from damage by power fork trucks. According to the manufacturer, these new pallets are available in sizes to meet any ordinary materials handling requirement.

Arc Etching Machine

George Gorton Machine Co., Racine, Wis., reports a new Spit Fire arc etching machine for use in making permanent identification of parts, tools, etc. It is an all-purpose production etching machine, which deeply etches hardened parts without burr in minimum time and handles either light or deep etching by the turn of a dial.

Designed for either high production etching or individual marking of soft to hard metals, it is said to be exceptionally efficient on highly polished and ground surfaces. Due to an extension-arm design, the unit readily handles etching in inaccessible places such as inside a cylinder, cavity, or along both sides of a V-block.

Etching depth is variable by one dial control from 0.0001 to 0.003-inch deep. Etching width is variable by diameter of electrode used from 0.0075 to 0.015-inch. Characters can be varied in height

from 1/32-inch to much larger sizes.

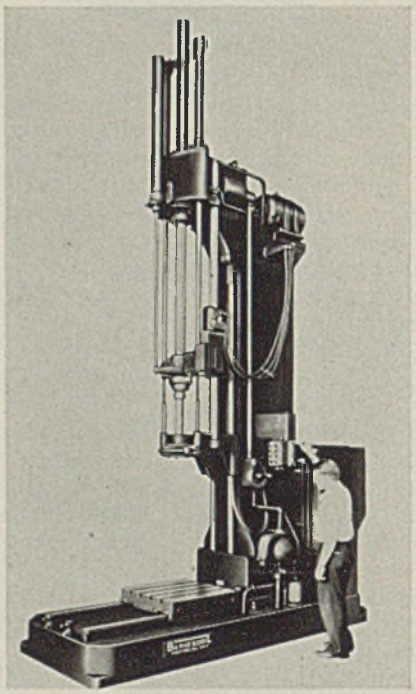
Operating on 110-120 volts, 60 cycles alternating current only, etching voltage is stepped down, and is variable from 3 to 9 volts. The etching machine is furnished with a choice of either 3:1 or 6:1 fixed ratio pantograph.

Areas covered by the etcher electrode point are, for 3:1 ratio; up to 5-inch diameter circle, a 4½ x 5 inch rectangle, or 4 x 8-inch strip; or, for 6:1 ratio; up to a 3-inch diameter circle, a 2¼ x 4-inch rectangle, or 2 x 5-inch strip.

Honing Machine

Barnes Drill Co., 814 Chestnut street, Rockford, Ill., announces a new No. 4014 medium duty vertical honing machine for handling cylinders to 14 inches diameter. It has a 40-inch swing and three standard spindle travels of either 35, 50 or 65 inches.

Parallel hydraulic cylinders on oppo-



site sides of unit's spindle housing, minimize height and allow various lengths for greater or less spindle stroke. A yoke connection to the spindle permits attaching multiple heads when so desired. These may have 2, 3, or 4 spindles.

Control is by push button for starting, inching, withdrawing and stopping the reciprocating cycle of the spindle. The machine will operate either hydraulic or mechanical hones. Two motors power the unit—one for the hydraulic system, and the other for spindle drive both being direct connected.

Redesigned Respirator

Mine Safety Appliances Co., Braddock, Thomas and Meade streets, Pittsburgh, announces a redesigned Comfo dust respirator which features filter cases of plastic having high impact strength and no electrical conductivity. Filter units are thinner, with rounded edges permitting better sidewise and downward vision. Also they are not affected by perspiration. The respirator is of the twin side-placed filter type. It is easy to clean and is available in types to meet various dust and mist conditions.

Clamping Pliers

Knu-Vise Inc., Detroit, announces a new parallel clamping pliers recently adopted by aircraft industries. Its ex-

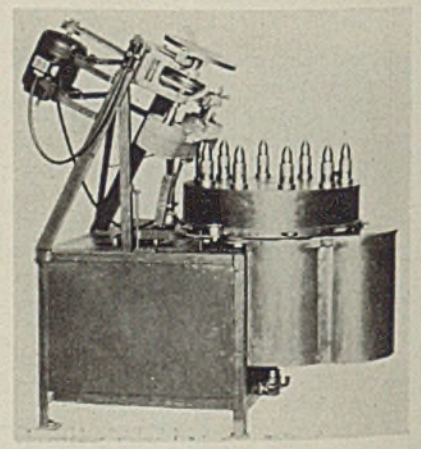
tended parallel jaws, affording two spindles, cause the pressure to be distributed more uniformly over a greater area. This feature recommends the use of these pliers, particularly in gluing plywood.

Tinning Machine

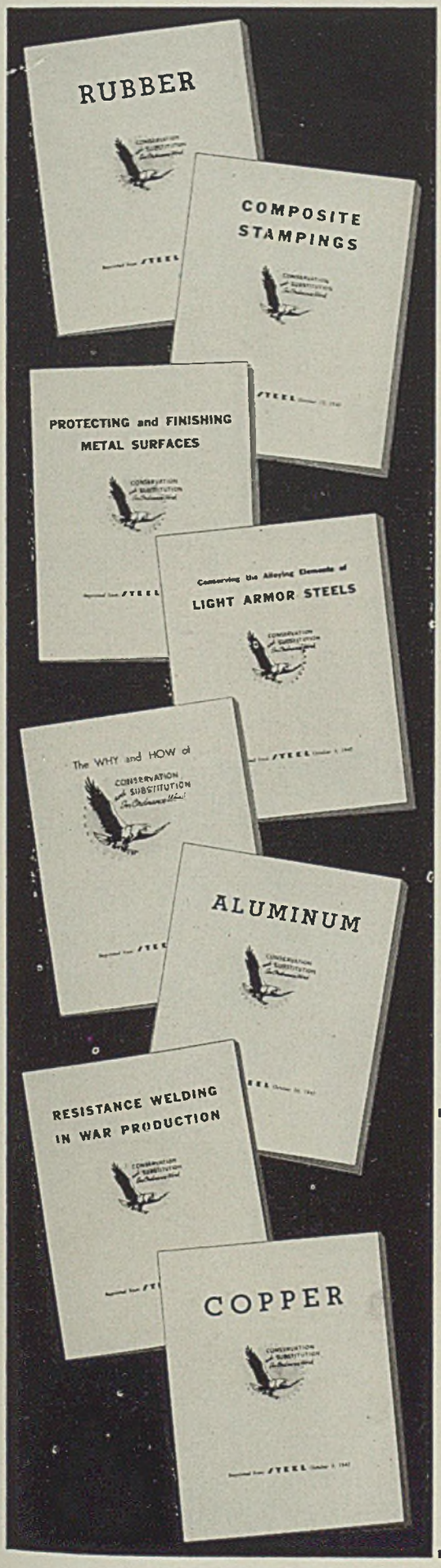
Leiman Bros., OA-145 Christie street, Newark, N. J., announces a machine for preparing 37 millimeter shot tips for tinning. It is arranged so a number of rotating chucks mounted on a rotating wheel, present the parts to be polished.

In operation, chucks of the machine are loaded at a point where they automatically stop rotating. As the rotating wheel indexes intermittently, the work is brought against a running abrasive belt where is dwells for a short period while it becomes polished.

The abrasive belt is driven by a separate motor and has a range of three speeds. Two small motors individually drive the chucks and the wheel, driving mechanism being enclosed in a dust tight



base. The machine occupies a floor space of about 38 x 48 inches and is about 52 inches high. It is offered complete as shown in the accompanying illustration.



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Reclaiming High-Speed Steel Tools

. . . . by an improved welding process

By THOMAS SUTTON
Welding Engineer
Welding Equipment & Supply Co.
Detroit

ONE OF THE most critical problems that confronts American industry is that of obtaining sufficient cutting tools and maintaining them in working condition. Contributing to this shortage of vital tools is the scarcity of tungsten and cobalt normally used to make high-speed steel and the fact that there is not enough of the substitute type materials to satisfy the extreme demand of the war production program. A shortage of skilled labor required to make high-speed steel tools is also a factor.

A specialized welding and mechanical process developed specifically for reclaiming high-speed steel tools is known as "Suttonizing." It is effective in repairing teeth, flutes, tangs, shanks and fractures on milling cutters, broaches, drills, large size Ingersoll-type ball and end mills, line reamers, cutting tools for lathes, planers, shapers and special shape-forming tools. Further, taps and hobs of all descriptions come within the scope of this reclamation process.

Brazing is not used, either to repair fractures or affix inserts. In fact, the principle does away with inserts entirely, as the weld metal becomes an actual part of the tool. For this reason, a minimum of mechanical preparation precedes the welding.

Possibly of greatest importance is the fact that subsequent heat treatment of the units is not necessary in most cases. This is important for it shortens the time required for the reclamation operation, thus allowing the tool to be placed back in service sooner. Neither is it necessary to anneal before making the repair for the process includes both a controlled preheat and post-heat.

This elimination of the necessity for separate heat treatment usually precludes the possibility of dimensional distortion that sometimes results from heat treatment. Certain tools such as large broaches are almost impossible to hold in line during heat treatment.

In the research work incidental to development of Suttonizing, considerable effort was expended in obtaining the proper welding rod as well as the proper technique. The aim was to secure a deposit that would be hard "as welded" and would require no subsequent heat

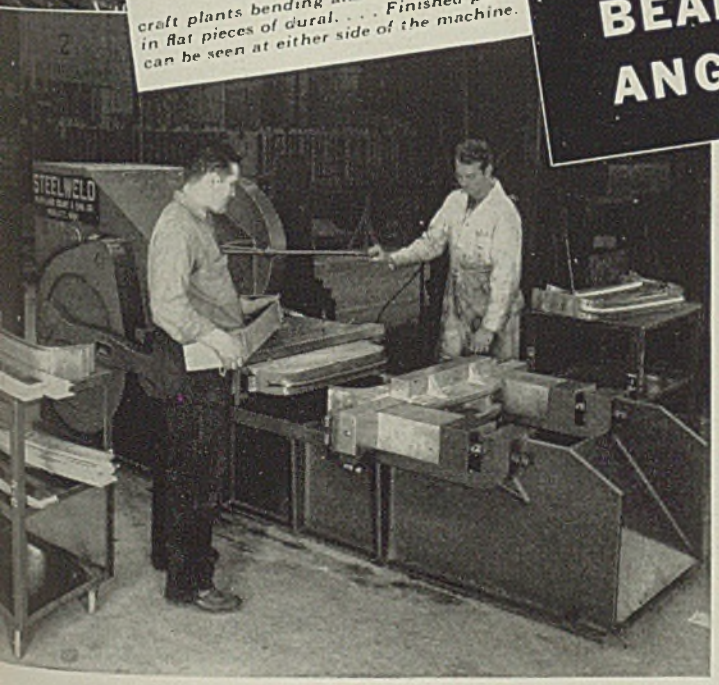
Fig. 1. (Left)—This gun broach cost $980 but became just so much scrap when all teeth were worn down 0.005-inch. It would have taken months to replace it, but Suttonizing enabled the unit to be put back into production in a few hours. New metal was welded on the teeth as shown

Fig. 2. (Below)—This shows a group of typical tools repaired by Suttonizing. It includes end mills, side mills, ball mills, gun drill retaining shoulders, special form cutters, etc.

ABOVE: In a North American Aviation plant in Texas, a Steelweld Bending Press is shown producing channels from long, flat pieces of dural.

BELOW: A Steelweld Bulldozer in one of the Douglas aircraft plants bending and forming a bead in flat pieces of dural. . . . Finished parts can be seen at either side of the machine.

CURVES, BENDS BEADS, CHANNELS ANGLES, SHAPES



STEELWELD Forms Them All for Fighting Planes!

In aircraft plants throughout the nation Steelwelds are speeding the fabrication of parts for every type of plane. Complex bends and curves, channels, beads, angles and shapes are quickly produced in dural and other metals measuring up to 20 feet in width. When small quantities of parts are needed, Steelweld design permits quick change of dies.

Steelweld precision-built presses — powerful, rugged and accurate—are serving the needs of war production on jobs that range from delicate aircraft operation to the straightening of heavy heat-treated armor plate, performing unfailingly under the severest conditions of constant operation.

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treatment. Conventional high-speed steel rod could not be used to make the necessary air hardening deposit in the weld zone because its use would necessitate the conventional high-speed steel heat treatment involving an oil quench. Typical hard-facing rods as well as the conventional cobalt-base rods also were examined. While these produce deposits of sufficient hardness "as welded," their abrasive resistance complicated grinding procedure.

Eventually material was obtained which provided a means of combining the cutting qualities of conventional high-speed steel with abrasive resistant qualities about equal to those of typical tungsten carbides. However, no difficulty is encountered in grinding these deposits. The combination of fine cutting qualities and wear resistance in the structure of the weld results in an excellent solution to many problems encountered in the repair of cutting tools. The material gives a deposit which matches or excels the original hardness of the tool being welded.

To eliminate the necessity for subsequent heat treatment after welding, a system of ingenious preheating before welding is employed since it must be borne in mind that in this process no preliminary annealing of the tool is necessary. Maintenance of proper and constant preheat during the welding operation and skill in proper post-heating are vital parts of the process. A minimum amount of decarburization is produced in the deposit by air hardening.

To secure the highest cutting efficiency, a maximum of ¼-inch depth of deposit is made. No appreciable reduction in hardness adjacent to the weld deposit is encountered in the process. Any small depreciation that may result is far offset by the superior cutting qualities of the deposit, which shoulders any load thrown on adjacent areas.

As an example, a 3-inch shell mill which was broken in two pieces and on which four of the twelve flutes were chipped out was welded to determine the hardness reduction adjacent to the weld area. There was no subsequent heat treatment. Maximum decrease in hardness was found to be within 1½ points rockwell.

A similar determination on a 2 x 1½ x 1-inch shell mill with six of its eight teeth broken showed a hardness depreciation of a maximum of two points rockwell after repair. These reductions appear negligible, especially in view of the scope of the reclamation.

Contours on most tools can be maintained easily in the process, making a minimum of grinding necessary after welding.

Extensive application of the process has indicated that in many cases high-speed steel tools faced by this method have a service life three times as long on one regrind as that experienced with a new tool. The importance of this can be readily understood.

The process also can be used for the composite construction of tools for the lathe, planer, shaper as well as cut-off, boring and special shape-forming tools. For such work readily procurable SAE steels, preferably of the 1335 variety, are employed, facing the cutting surfaces with the special alloy employed in the Suttonizing process. Approximately 90 per cent of tools thus constructed can be put into operation after grinding with no subsequent heat treatment.

It should be emphasized that our first and biggest job is to eliminate tool breakage so far as possible. This means that tools must be handled with the utmost care for the smallest tool may have an inestimable value. All master mechanics, tool supervisors, superintendents and foremen can well emphasize the following points to their mechanics and workmen:

—Don't be timid about consulting your foreman or the old timer.

—Learn to know the type of steel upon which you are working.

—Watch your tools and machines closely for evidence of strain.

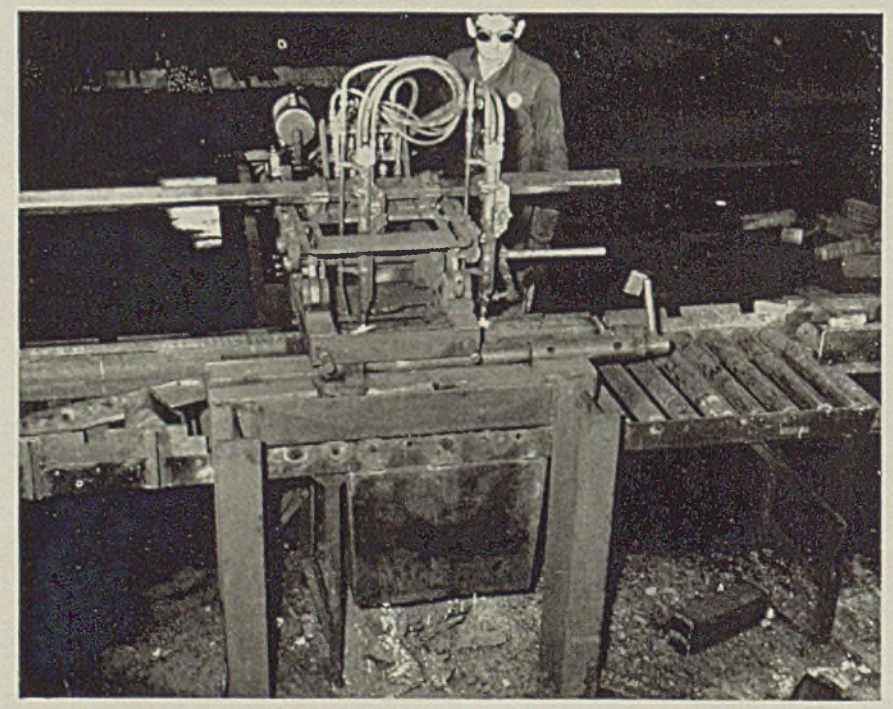
—Keep your tools clean and free of chips.

—Don't use dull tools.

—Exercise care in setting up your machine.

—Prove yourself to be a good mechanic. Don't be negligent with tools simply because you feel that they can be resharpened or reclaimed.

LINKS THAT DOOM THE AXIS



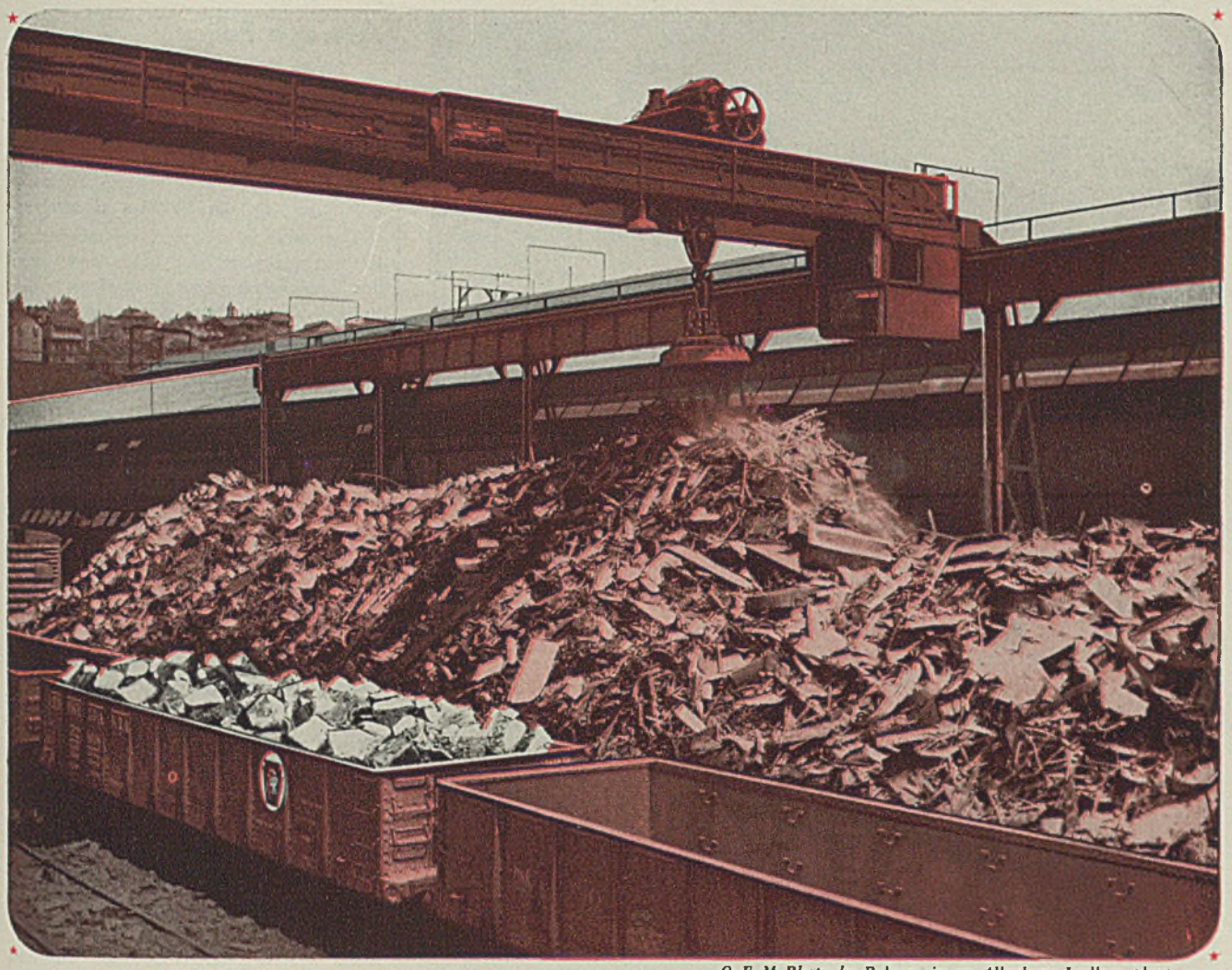
TRACTOR driving links for Army tanks will be forged from these alloy steel bars shown here being cut into 14-inch lengths by this Linde Air oxy-acetylene cutting machine. Bars are fed into machine on rollers and quickly positioned for cutting by guiding stops. Cutting two blanks simultaneously, machine is controlled by one operator at a control table located behind cutting mechanism

Movie Shows How To Handle, Repair Plexiglas

Methods of storing, handling, fabricating, repairing and maintenance of transparent Plexiglas aircraft sections are shown in a 20-minute sound movie just released by Rohm & Haas Co., Philadelphia.

The movie, which was photographed at Rohm & Haas factories and at aircraft manufacturing plants, covers most of the points that aircraft workers, ground crews and flying personnel should know about this transparent plastic now being used for noses, observation domes, gun turrets and cockpit enclosures in a majority of United States war planes.

Available in 16 millimeter sound film only, it may be borrowed by educational institutions and aircraft manufacturers at no cost upon written request.



O E M Photo by Palmer, in an Allegheny Ludlum plant

Save . . TO PRODUCE MORE

★ *The nation needs scrap iron and steel—millions of extra tons of it this year. Make your clean-up complete, both in the plant and at home. Subject every pound of idle metal to the searching question: "Is it absolutely essential that we keep this?"*

But don't stop there! Rounding up the scrap and instituting more thorough salvage methods are only part of the job of conserving the nation's resources. Start at the beginning and make better use of *new* steel . . . aim to get more finished products out of it, with less waste.

That is particularly necessary with electric-furnace steels, and the critical alloys they contain. There are many ways to save. Both stainless and tool steels can be more efficiently selected and better used, to step up production and cut down the amount of rejects and spoilage. The substitution of lower alloys, and of standard analyses, sizes or finishes instead of special ones, all offer good opportunities to save.

Right now, do your share to increase the nation's scrap stockpile. And for the duration, avoid waste in all its forms—*make every pound of steel and alloys go as far as possible.* There will be problems involved, but not insoluble ones. Call on our Technical Staff to help you

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

A Wage Policy

(*Continued from Page* 55)

himself. As compared with a plan that would provide all workers with the same opportunity for extra pay, it is sounder, and when understood, more acceptable to the workers themselves.

The question arises: How much shall the extra reward be? Our experience has demonstrated that, according to the individual employe's opportunity and capacity to produce extra work, *the work reward should range between* 10 *and* 35 *per cent above the hourly base rate.* Set too low, the extra reward loses importance; set too high, it leads to temptation to abuse equipment or to overwork.

To be effective, such a plan demands that in its conception and application, management and workers collaborate. Because it demands the workers' intelligent co-operation, it demands their understanding. And to gain their understanding, it must enlist their participation right from the start, with provision made for adequate training of shop workers for such participation.

Workers Should Understand Plan

It demands that standards be equitably and scientifically established upon the basis of accurate measurement and that the standards be thoroughly explained to the workers. Until the plan is explained and the workers understand it, the management will be wise not to proceed with its application at all.

For proper administration of such a plan, our experience suggests that:

—The plan should be administered by a standards or engineering department whose members have had experience as workers in the plant or mill.

—An equitable, truly protective hourly base wage should be paid as long as the worker is available for work.

—The base wage should correspond to a logical occupation evaluation and a mechanism should be set up whereby, as the physical conditions of the job are materially changed, rates will be adjusted up or down.

—A formula should be established by management and workers for general movement of base wages as living conditions change and for division of the benefits that accrue from technical development and cost-reduction programs, taking into account the ability to pay.

—Workers should be assured that standards will not be changed arbitrarily, or without a corresponding change in conditions.

—Any increase or decrease in work requirements should be met by an immediate and corresponding adjustment of the production standard.

—Extra pay should be computed on

a daily basis and should include all jobs worked on that day. Thus, each day is figured by itself and extra earnings are not penalized by conditions existing on another day.

—Wherever possible, each workers' work should be figured separately, so that the individual is given an opportunity to control his own extra pay.

—Lost time beyond the control of the worker should be paid for at the base rate, and should not operate to penalize any extra pay that has been previously earned or would be earned by the worker later on in the day.

—All time on jobs for which no standards have been established should be considered day work, pay for which is at the base rate for the job.

—When methods are changed, standards should be changed, and at once. If necessary, standards may be set up temporarily and later stabilized. Management should make every effort to obviate unmeasured work, for that kind of work diminishes the worker's earnings.

—It should be made clear to the worker that it is his right to request that any standard be checked.

—All standards should be published and made available for anyone to see and check.

—Wherever production operations are varied or involved, arrangements should be made to acquaint the employe with his daily pay calculations.

—The standards or engineering department and the management should constantly strive to simplify and clarify pay calculations.

—Foremen and other staff men should be ready at all times to teach workers the fundamentals of the plan and to explain its workings.

—Under no circumstances should a worker be asked or required to work at an excessive pace.

—As far as possible, all hourly workers in the plant or mill should be given the opportunity to earn extra pay on a uniform type of plan.

—The amount of extra pay should be related directly to the extra effort produced.

In the main, this discussion has been concerned with workers' pay as viewed in the light of modern-day production engineering philosophy. Important as this phase of managerial method has become, there are, of course, other engineering instrumentalities whose application to production will substantially increase plant output. To make possible maximum output, modern management must also concern itself with such functions as:

—Checking the arrangement of equipment and, if necessary, re-arranging the layout to facilitate the handling of the

product and to streamline its flow through the plant.

—Improving materials control.

—Improving planning and scheduling.

—Installing new equipment and improving old equipment and tools to permit greater production without greater effort; eliminating "back-breaking" jobs.

—Conducting motion studies and time-simplification studies to permit greater output without greater effort.

—Improving working conditions; providing adequate floor space, lighting, wash-room and medical facilities.

—Providing extra pay for supervisors whose work affects the workers' output.

—Training workers in acceptable methods.

—Improving the assistance provided by such staff departments as engineering, personnel, and standards.

In short, *the aim should be to make it both attractive and easy for the worker to produce more.* Management strives for greater production and lower costs. Workers strive for higher earnings. The two objectives are compatible only when a reasonable labor effort results in a maximum of output with a minimum of waste. Every dollar lost on waste increases costs or reduces wages—or does both.

Workers expect management to provide efficient and capable supervision. Good supervision—good management—is neither a choice nor a luxury; today it is a downright necessity.

Precision Work

(*Continued from Page 60*)

ables in temperature—is eliminated.

Assume, for example, that 2000 gagings are possible for a certain plug within its tolerance limits. All the effort that has previously been expended becomes valuable in relation to the conservation of the ability to use the gage 2000 times. If final lapping is not done in a controlled atmosphere identical to that of final inspection at 68 degrees Fahr., half of that tolerance zone may be destroyed—or, let us say, 1000 gagings. Such gages will come back prematurely, half of their life value having been destroyed by humidity variations. Therefore these most certainly must be controlled in the interests of accuracy and economy.

When a gage surface is finish ground, parallel furrows of about 0.0001-inch remain. If these are not finally removed, the gage will wear away speedily. Obviously friction caused by sliding against these furrows as the gage is used will tend to wear down the peaks of these ridges that haven't the support which a

smoothly lapped surface possesses.

Final lapping is, therefore, the ultimate gage-making art. The Suprex aim is precision lapping on a production basis. To accomplish this, a specially designed Woodworth fixture is used on a Norton lapper. See Fig. 7. This fixture carries up to 12 gages. Each gage is seated to slip slightly at an angle, providing a honing perfection in lapping that makes possible a better, straighter lap in one-third the time. The angle can be varried to obtain the best results.

An ingenious coolant control in the final lapping operation employs a constant-temperature coolant tank, which pulls the hot water away from the gages without the use of a pump, restoring it to room temperature for recirculation quickly so there is never a variant of more than one degree in the lapping coolant. Gages thus lapped reach a tolerance as close as 0.00002-inch—or 2 hundred-thousanths of an inch.

The final inspection department has some excellent equipment, including a Jones & Lamson comparator with a maximum magnification of 100, used to check the accuracy of angle and root clearance of thread gages. It is enveloped in a dark-room and insulated against vibration as shown in Fig. 4. It can judge an angle within 1 minute, a radius within 5/10000. It also provides lateral and vertical readings within 1/10000-inch. Another precision instrument used in final inspection is the lead checker shown in Fig. 8. Final references at Suprex are Johannesen blocks.

All of this care and control is required to achieve precision on a production basis, this in turn assuring maximum number of gaging tests within the specified tolerance range.

Preferred Sizes

(*Continued from Page 78*)

tages. However, its similarity to American standard preferred numbers in the smaller sizes facilitates substitution of American standard preferred sizes for many applications.

American Standard Preferred Numbers: Frequent reference is made herein to American Standard preferred numbers since they are the logical solution to the problem. It is for that reason that they are the basis of the American standard for thicknesses of sheet and strip metals, as well as the proposed standard for wire.

Preferred numbers are neither mysterious nor complicated. They are just plain common sense. An adequate solution to the problem of material sizes must also take into account dimensions of parts and products. Preferred numbers are an admirable tool for this purpose, also. References to the American standard and

other literature, therefore, are included to assist their utilization.

Shapes of Material: Besides the frequent necessity for substituting different kinds of material, a review of the shapes of material shows that they are produced by different methods of manufacture. This fact, as well as usual practice in the use of decimals and fractions, emphasizes the need not only for unifying present gage-number systems, but for introducing features of American standard preferred sizes that are not found in any present gage system.

The development of continuous strip mills provides a material to replace or to be used interchangeably with sheet. This indicates a need to consolidate the Birmingham and United States Steel gage for steel. Present substitution of steel sheet for aluminum and brass further involves the AWG or B&S gage.

In addition, it must be borne in mind that in some instances, rod is produced as straightened, cut lengths of wire. Strip sometimes is flattened wire or sheared sheet. Bar may be rolled or drawn as such, or produced in some sizes as flats by cutting plate. Tube or pipe may be used interchangeably with bar as structural members to provide rigidity with reduction in weight. Strip or sheet may be used to make tubing.

In other words, all of these forms of material are interrelated: substitutions are not restricted to different materials.

Dimensioning: It is common practice to dimension wire, strip and sheet in decimals, whereas plate, bar and rod are usually dimensioned in fractions. Wire extends up to an inch in diameter. Bar and rod may be identified as such down to 0.090-inch. Pipe and tubing utilize Stubbs gage, decimals and fractions for various dimensions.

All of these factors indicate a need for correlation, not only between preferred sizes of different kinds and forms of material, but between methods of dimensioning in decimals and fractions. American standard preferred numbers provide a means for this correlation. *Both decimal and fractional preferred numbers have been standardized. Their combination makes it practicable to have decimals and fractions in a co-ordinated system.* This reason is presented for changing AWG gage sizes to ASA preferred sizes.

The similarity in the small sizes is accounted for, since the multiplying factors of preferred numbers are the fifth, tenth, twentieth, or fortieth roots of 100 with 10 as a base, whereas the AWG multiplying factor is $39\sqrt{92}$ with 0.005-inch as the base. The AWG system, therefore, corresponds very closely with the forty series of preferred numbers in the small sizes.

Avoiding Another Gage System: The

adoption of the American standards on preferred thicknesses of sheet and strip and the proposed preferred sizes of wire could result merely in adding another "gage" system, unless users modernize their material selection and control procedures. This is essential to remove other causes for the present number of sizes in use and to make the adoption of the preferred size idea practicable.

The adoption of preferred sizes should be accompanied by:

—Improved methods of establishing capacities of products, of selecting dimensions of products and parts, etc.

—An analysis of labor and material costs.

—The establishment of a system to control material costs.

—An organized method of presenting information on material costs and sizes that are recommended to meet the requirements of an individual company.

A review of the American Standard Association publication Z17.1—1936 and some of the appended references should indicate the potentialities of ASA preferred numbers in respect to the first item. They would suggest the advantage of designing to preferability instead of availability.

They might raise questions why an existing stock size is selected for a new product when that stock size may have been obtained for a temporary large-production item. Changes in models of such items frequently involve changes in materials sizes. Instances may be found where the original justification for a size vanished, leaving merely another uneconomical size to reduce margins of profit.

Controlling Material Costs: The next two recommendations are related. Modern machine tools and manufacturing methods usually result in material being the largest element of manufacturing cost. Too often material costs are assumed to be fixed and capable of reduction only by redesign. *Material costs are not fixed.* The current market base price is merely a component.

In case of doubt, a glance at extra charges for quantities, sizes, tolerances, cutting to length, tempers, edges, finish, crating, etc., is enlightening. Appreciation of size and quantity extra might result in more consideration of stripper widths of piercing and blanking dies and the practice of buying special width to avoid a small amount of waste in production.

Investigation along such lines would soon indicate that a substantial part of material costs is controllable. A check test at one factory of all materials purchased indicated that *quantity extras alone added approximately 5 per cent to materials costs. Other unnecessary costs of the same dollar volume would have*

received attention and energetic action long before.

Pooling Material Costs: Frequently the practice of pooling material costs effectively hides the extra costs mentioned above. Permissible deductions in procurement in lots of 5000 or 10,000 or more pounds may offset the extra charges on the small quantities. Hence, the average price per pound may approximate the base market price of the material. In addition to disguising the conditions referred to herein, this practice hinders the introduction of more economical size selection methods.

Investigations may show instances where extra charges of 5 to 8 cents per pound are incurred for the purchase of a special size in small quantities to avoid a labor cost of 0.25 cent per pound to machine down a slightly larger size in more common use. Where material costs are pooled and billed out to using departments at a stated number of cents per pound regardless of the quantity used or the actual costs involved, there not only is no incentive for the selection of the more economical size but there may be criticism for requiring an apparent extra labor cost.

Selection of Sizes: After this ground work, there would still remain the question of the recommended sizes to meet an individual manufacturer's requirements. A published list of American standard preferred sizes should not be used by a designer to pick any size at random. One manufacturer's requirements might be such that five sizes between 0.010 and 0.100 inch would satisfy his usual requirements *whereas another might require* 10 *or* 20 *sizes over part or all of this same range.* The activity of steel likewise might differ from that for brass.

In a larger manufacturing organization, particularly, it might pay to analyze requirements for an *individual material* and recommend selected sizes for that material that should be stocked and used for general-purpose applications wherever possible. This would require a working knowledge of the preferred number idea.

One sample of such published information is shown in Figs. 2 and 3. These particular cost and stock sheets serve as common record for cost man, storekeeper, production supervisor, ordering clerk, and designer. The use for the types of information are obvious.

Transition to Preferred Sizes: After these various investigations are made, and steps are taken to correct faults, the practical difficulty of changing to preferred sizes remains. Where quantities are large enough to order from mills, the problem usually is simple. Smaller quantities from warehouses impose difficulties. While a purchase order should list the preferred size that is desired, the order should also indicate an existing warehouse size that would be accepted temporarily. *Sufficient orders of this kind would indicate the prospective volume of preferred sizes and would soon result in revised warehouse sizes.* Similarly, certain substitutions would have to be authorized by designers to permit the use of new preferred sizes in existing designs and minimize the number of sizes in use during the transition.

Commercial Tolerances and Prices: Commercial tolerances should not be confused with selection of size. Tolerances are a function of manufacturing practice in the processing of material. They change from time to time with changes or improvements in manufacturing methods. Hence, *dimensional tolerances of currently available material do not constitute a part of standardization of sizes.*

Questions also arise in respect to possible increases in material prices through the use of preferred sizes. A previous analysis of the American standard preferred thickness of sheet metal indicated that two or three preferred thicknesses would fall in higher price brackets if the present gage-extra pricing structure were maintained. The analysis also

showed that about the same number would fall in lower price brackets. For a user of a considerable range of thickness, there would be little if any difference in the overall effect. In any case, existing price structures vary for different materials and are subject to change. Universal adoption of preferred sizes would encourage simplification in this respect.

Benefits: The benefits to be derived from standard preferred sizes of material and from more sensible methods of material selection, costs and control will accrue to both user and supplier.

The user, however, must initiate the activity and give the supplier an opportunity to assist him. Naturally some of the problems will take time and effort. But results from the consideration and adoption of American standard preferred sizes are worthwhile objectives.

National Need: Impetus should be given to this work because of the present need for reducing the strain on material fabricating facilities. Longer runs of fewer sizes increase production of material shapes by reducing time lost in setups. Restrictions already have been imposed on aluminum sizes that may be procured. Similar restrictions are possible for other materials.

It seems preferable, therefore, to have a uniform national plan to follow to minimize the number of sizes, rather than to trust to luck. The American standard preferred sizes and preferred numbers provide such a plan.

References:

"How Preferred Numbers Can Be Applied in a Standardization Program" by H. W. Tenney. Size problems in design of manufactured products are simplified and expense is saved.

"American Standard Preferred Numbers" *American Standard* Z17.1-1936. Purpose—Tables of Preferred Numbers—Theoretical Basis—Basic Rules—Time of Application—Application to Complete Machines—Application to Parts—Application to Materials—Application to Interrelated Values—Rounding of Preferred Numbers—Conversion of Inches to Centimeters—Choice of Series and Steps—Supplementary Series—Calculations Based on Preferred Numbers—Logarithms of Preferred Numbers.

"American Standard Preferred Numbers" *American Machinist*, July, 1936, Vol. 80, page 665. Table of the ASA Preferred Numbers.

"Preferred Numbers—An aid in Selecting Standard Sizes" by John Gaillard, *Industrial Standardization*, July, 1936, page 161. Attention called to origin of preferred numbers and advantages of their use.

"Preferred Numbers and the Civil Engineer" by Robins Fleming—*Engineering News-Record*, June, 1936, Vol. 116, page 846. Reference to basis of American Wire Gage as series with multiplying factor of $\sqrt[39]{92}$ or 1.229 and basic size of 0.005. Table of preferred numbers—Desirability of use in Civil Engineering.

"Preferred Number Would Simplify Wire, Sheet-Metal Gage Systems" by J. I. Hommel, *Industrial Standardization*, March, 1936, page 64. Tables show how system of logical progression of numbers could be applied to coordinate existing gage practice.

"Establishing Standards for Materials", *Prod. Engineering*, March, 1936, by R. E. Hellmund and D. F. Miner, Vol. 17, page 82. Basic principles for determining the most

economical number of sizes and grades and showing how the preferred number system can be used to establish a definite plan whereby the sizes are chosen on a rational basis. Makes reference to number of sizes used and quantity extras.

"Preferred Numbers" by Arthur Van Dyck—*Inst. of Radio Engineering Practice,* February, 1936, Vol. 24, page 159. The history of preferred numbers in this country is given briefly and the present status of recommendations of the American Standards Association is described. The subject is explained, and advantages to design and manufacture which the system affords is outlined. Tables are given of preferred numbers recommended by the American Standards Association, in both decimal and fractional systems, and rules and suggestions for use of the tables in design work. Some possibilities for immediate use in radio design are suggested.

"Preferred Numbers", *Industrial Standardization,* October, 1934, page 220. Information on Proposed American Standard Series.

"Standardization and Profits Aided by Preferred Numbers" by R. E. Hellmund—*Electrical World,* August, 1934, Vol. 104, page 208. 'Topsyness' and frantic competition are to blame for the senseless steps in sizes of electrical products. This article takes the mystery out of preferred numbers and shows how orderliness and economy will result from their early adoption by producers. Reference is made to application of preferred numbers to furniture, refrigerators and air conditioning apparatus.

"Fundamentals of Standardizing Sizes and Ratings as Related to Preferred Numbers"—*Product Engineering,* September, 1932, Vol. 3, page 353 by R. E. Hellmund. Discusses the economic balance between a number of factors entering into the cost and utility of a product.

"Standardizing Sizes and Ratings by Means of Preferred Numbers" by R. E. Hellmund—*Comm. Standards Monthly,* May, 1932, Vol. 8, page 322.

"Standardizing Sizes and Ratings" by R. E. Hellmund, *Electrical Engineering,* January, 1932, Vol. 51, page 14.

"A Method for the Standardization of Centrifugal Pumps" by Jos. S. Stepanov, ASME Annual Meeting, Dec. 1930. In the author's opinion, the combined application of the preferred number idea and the law of similitude provides an effective means of eliminating unnecessary variety of sizes and of simplifying tool and machinery equipment in any field of industrial production.

In the application of this method to the standardization of centrifugal pumps, the author develops a set of geometric series conforming to the preferred numbers table. The formation of the series and their standardization problem are illustrated by numerical tables, charts and diagrams.

Standardization of hydraulic and mechanical parts of centrifugal pumps are tied together by the use of the law of similitude, resulting in the formation of a set of interconnecting geometric series applicable to both cases.

"Standardization by Preferred Numbers" by R. E. Hellmund and J. I. Hommel—*American Mach.,* Nov., 1931, Vol. 75, page 697. The use of certain geometrical progressions in engineering specifications results in a line of equipment consistent in size and capacity range. In addition, this practice correlates automatically similar products made by different manufacturers. Thus the foundation of a national standard is built into the original design, avoiding subsequent expensive changes.

"Experiences and Suggestions Relating to the Preferred Number System" by R. E. Hellmund, *Mech. Engineer,* April, 1931, Vol. 53, page 284. Desirability of adopting a supplementary fractional system of preferred numbers—Possible technical difficulties in applying a preferred number system—Cases for standardization presenting no particular technical difficulties.

"Experiences and Suggestions Relating to the Preferred Numbers System" by R. E. Hellmund, ASA Bulletin—January, 1931, page 3.

"Preferred Numbers as a Tool of Management Research" by L. P. Alford, Institute of Man-

Better Balance Attained In Steel for War Use

Some semifinished accumulation from lend-lease interruption. . . . Railroad program outlined for 1943. . . . Iron ore shipments pass ninety million tons. . . . Scrap search intensified

DEMAND
Top priorities crowded.

PRODUCTION
Down ½-point to 99 per cent.

PRICES
Steady at ceilings.

SIGNS of the better balancing of war production continue to accumulate and less talk is heard about shortages of critical material.

Ingots and billets actually are piling up here and there, due to cancellation of certain lend-lease shipments and to reduction of tonnage being converted into structural shapes, tin plate, pipe and reinforcing bars. Also production of certain military items has been eliminated or reduced as a result of lessons learned at the fighting fronts. Of all metals zinc is most critical and new ways continue to be devised to reduce consumption, as by painting instead of galvanizing sheets.

A notable trend is the rising demand for alloy steels for aircraft construction. To assure that the supply of alloying elements will go round further efforts are being made to conserve them, as, for example, eliminating certain applications of stainless steel.

Civilian goods manufacturers who have regarded the news about the easier steel supply as paving the way for early resumption of their normal activities do not yet have justification for this belief other than that the War Production Board is considering revisions in some of its limitation orders. The board feels that these orders, unless liberalized, will result in stripping the civilian economy to an unwarranted degree after present inventories are exhausted. While some easing is expected no definite decisions yet have been reached. Meanwhile, steel producers are sharply restricted as to customers to whom they may sell.

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Steelworks operations last week declined ½-point to 99 per cent of capacity, necessity for open-hearth repairs being the only cause. Pittsburgh gained ½-point to 98⅝ per cent, the only district to advance. Chicago fell back 1½ points to 100½ per cent, New England 5 points to 95, Wheeling 5½ points to 81, Cleveland 2½ points to 92½ and Detroit 3 points to 91. Rates were unchanged at Youngstown, 97; Buffalo, 90½; Birmingham, 95; Cincinnati 91; St. Louis, 94; eastern Pennsylvania, 96 per cent.

War Production Board has formulated a program for steel, steel rails, cars and locomotives to be allowed railroads for various portions of 1943, to allow orders to be placed promptly to obtain delivery. Allowances are considerably below quantities desired by the carriers and are determined in accordance with needs of other steel consumers. Rail tonnage for first quarter is 480,000 tons, with 288,000 tons of accessories and 330,000 tons of steel for equipment repairs. For first six months 20,000 freight cars will be allowed.

Delivery situation is steady in nearly all products. Sheets, aside from directives and allocations, are available in six to eight weeks, with some producers reaching into February. Galvanized sheet promises range from December to 10 or 12 weeks. Small bars are available in December but large rounds and flats can not be promised before first quarter and some makers can do no better than second quarter.

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Efforts to obtain dormant scrap from every possible source are being intensified and the fact is kept in mind that a repetition of the household drive can not be expected. Other sources are being explored and government agencies are pushing salvage of structures, equipment and other material, largely those where cost of reclaiming is greater than scrap value. Additional pig iron production from new furnaces may serve to close the gap of late winter shortage.

Blast furnaces in the United States in October consumed 7,370,595 gross tons of Lake Superior iron ore, compared with 6,421,959 tons in the same month last year. In ten months this year consumption was 68,946,113 tons, against 61,393,488 tons in the like period last year. Furnaces Nov. 1 had on hand 45,883,243 tons, compared with 38,852,223 tons a year earlier. In the United States 174 blast furnace stacks were in service Nov. 1 compared with 172 a month earlier and 169 on Nov. 1, 1941. Early on Nov. 23 loading of 90,000,000 tons of ore at the head of the lakes was completed, topping by nearly 10,000,000 tons the full season shipments of 1941.

Steel and iron composite prices remain unchanged at levels prevailing for some time, frozen by Office of Price Administration. Finished steel composite is $56.73, semifinished steel $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Nov. 28	Nov. 21	Nov. 14	One Month Ago Oct., 1942	Three Months Ago Aug., 1942	One Year Ago Nov., 1941	Five Years Ago Nov., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$62.18
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	40.00
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.84
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	19.17	13.50

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

COMPARISON OF PRICES

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

Finished Material

	Nov. 28, 1942	Oct. 1942	Aug. 1942	Nov. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.49	2.49	2.49	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.22	2.22	2.22	2.22
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.15
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pittsburgh	2.60	2.60	2.60	2.60
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pittsburgh	2.00	2.00	2.00	2.00

Pig Iron

	Nov. 28, 1942	Oct. 1942	Aug. 1942	Nov. 1941
Bessemer, del. Pittsburgh	$25.19	$25.19	$25.19	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.39	25.39	25.39	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2 Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.30	24.30	24.30	24.06
No. 2X, del. Phila. (differ. av.)	26.265	26.265	26.265	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.54	31.54	31.54	31.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.19
Ferromanganese, del. Pittsburgh	140.65	140.65	140.65	125.33

Scrap

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

Coke

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

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.25; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.25; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.27. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.27c; New York del. 2.51c; Phila, del. 2.49c; Gulf Ports, dock 2.52c, all-rail 2.59c; Pac. ports, dock 2.50c; all rail 3.25c, (Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.) Joslyn Mfg. Co. may quote 2.35c, Chicago base. Calumet Steel Division, Borg Warner Corp., may quote 2.35c, Chicago base, on bars produced on its 8-inch mill.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethhlehem, 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
1320	0.35	(.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, Phoenixville, for export.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic, bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
⅛	56	33	⅛	24	3½
¼ & ⅜	59	40½	¼	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-2	68½	57½	2	37½	18

Lap Weld

In.	Steel Blk.	Steel Galv.	In.	Iron Blk.	Iron Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
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%, wastewasters 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 ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex.	U.S.S.	S.A.E.
⅛-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
½-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	†12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

*Operators of hand-drawn ovens using trucked coal may charge $6.50, effective Aug. 12, 1942.
† $12.75 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha	
Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.62	26.12	27.62	27.12
Brooklyn, N. Y., del.	27.63	.....	.....	28.15
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.67	.....	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	‡24.47	.....	.....	.....
Cincinnati, del.	24.30	22.92	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.24	.....	.....	.....
Philadelphia, del.	25.51	25.01	.....	.....
St. Louis, del.	‡24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.17	24.67	25.67	25.17
Muskegon, Mich., del.	27.38	.....	.....	27.38
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.47	24.97	25.97	25.47
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.45	25.95	26.95	26.45
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.76	.....	27.26	26.76
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.68	24.68	.....	25.35
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	26.05	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.89	25.39	.....	26.39
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	26.06	25.56	26.56	26.06
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorus 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base).....$29.50
6.51-7.00..$30.50 9.01- 9.50.$35.50
7.01-7.50.. 31.50 9.51-10.00. 36.50
7.51-8.00.. 32.50 10.01-10.50. 37.50
8.01-8.50.. 33.50 10.51-11.00. 38.50
8.51-9.00.. 34.50 11.01-11.50. 39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn. $28.00
Chicago, del. 31.54

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn..$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn.. 33.00

Gray Forge

Neville Island, Pa. $23.50
Valley, base 23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.81, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton, effective April 20, 1942. Chester, Pa., furnace of Pittsburgh Coke & Iron Co. may exceed basing point prices by $2.25 per ton, effective July 27, 1942.

Refractories

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 ....

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

	Soft Bars	Hot-Rolled Strip Bands	Hot-Rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3 82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Washington, D. C.	3.95	4.10	4.45	3.80	3.80	5.35	3.60	....	....	....	4.03	....	....
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Chattanooga*	3.80	4.00	4.00	3.85	3.85	5.80	3.75	....	4.50	....	4.39	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.20	4.25	5.45	4.75	4.45	6.50	4.65	7.60	5.70	....	5.75	....	....
Los Angeles	4.35	4.90	6.70	4.90	4.60	7.15	4.65	6.50	5.95	....	6.60	10.55	9.55
San Francisco	3.95	4.50	6.25	4.65	4.35	6.35	4.55	6.40	6.10	....	6.80	10.80	9.80

*Not named in OPA price order.

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	..
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.45	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham, Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-10,000 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco; 1 to 99, Los Angeles; 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

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)

Extras for Alloy Content

Designation	Chemical Composition Limits, Per Cent: 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
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 8339	.35-.42	1.30-1.60	.20-.35	.....	.....	.20-.30	.75	15.00	1.25	25.00
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-.60	.15-.25	.75	15.00	1.25	25.00
NE 8715	.13-.18	.70- .90	.20-.35	.40-.60	.40-.60	.20-.30	.80	16.00	1.30	26.00
NE 8949	.45-.50	1.00-1.30	.20-.35	.40-.60	.40-.60	.30-.40	1.20	24.00	1.70	34.00
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-.40	.08-.15	.80	16.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.40-.60	.20-.40	.20-.40	.08-.15	.85	17.00	1.35	27.00
NE 9537	.35-.40	1.20-1.50	.40-.60	.40-.60	.40-.60	.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

				Low Phos. Grades		ELECTRIC FURNACE AND FOUNDRY GRADES								
					Bar									
		Machine	BLAST	Billet,	Crops and	Heavy Structural, Plate			Cut Auto Scrap			Alloy-Free	First Cut	
	OPEN	Shop	FUR-	Bloom	smaller;	3 ft.	2 ft.	1 ft.	3 ft.	2 ft.	1 ft.	Low	Heavy	
	HEARTH	Turn-	NACE	Forge	Punchings,	and	and	and	and	and	and	Phos. &	Axle &	Electric
	GRADES*	ings	GRADES*	Crops	Plate	less	less	less	less	less	less	Sulphur	Forge	Furnace
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	...	13.85	13.85	...	...	...	...	...	...	...	...	...	...	...
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50

RAILROAD SCRAP

				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	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. No. 1 chem. borings, 1 per cent oil, $1 under, No. 2, 1.5 per cent oil, $2 under heavy melting steel. No. 3 bundles, $2 under No. 1 heavy melting; cast steel, $2.50 over, No. 2 busheling, $2.50 under No. 1 heavy melting steel, auto springs, crankshafts, $1 over No. 1 heavy melting. **Blast Furnace Grades** prices refer to mixed borings and turnings, shoveling turnings, and cast iron borings.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. Commissions must be shown as separate item on invoice.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.65 per ton.

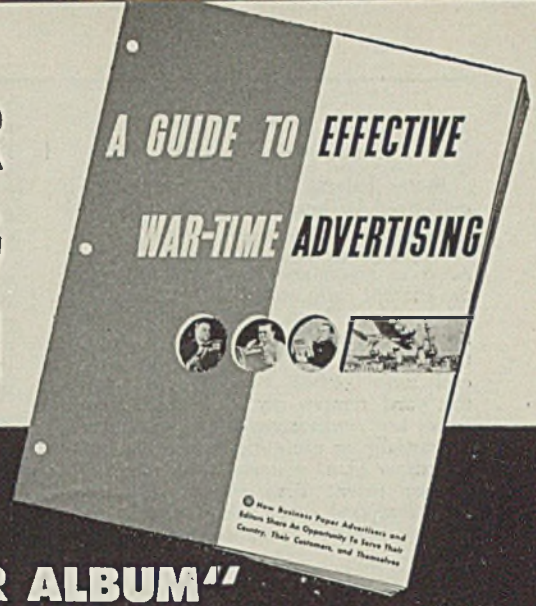
Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 (plus freight rate increase March 18, 1942) the prices listed in the table for the nearest basing point. Certain exceptions specified in Revised Price Schedule No. 4 (Amendment 1) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan; to shipments of turnings to ferroalloy producers and of borings to chemical users. Delivered prices of scrap shipped under WPB allocations may exceed prices at nearest basing point by more than $1, if most economical transportation is used.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less (railroad grades $3.50 less; material from which Nos. 1, 2 and 3 bundles made is $4 less) than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon, Washington, Louisiana, Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price. Colorado scrap is remote scrap for Colorado consumers only.

WANTED: BETTER *EXECUTIVE* UNDERSTANDING OF WARTIME ADVERTISING!



Do your company heads know how advertising can help fight the war?

A.B.P.'s "Guide" helps advertising men and sales managers demonstrate the many important uses to which advertising is being put today.

"The 'Guide' helped our company understand how we could do exactly what the business paper editors do . . . use our space to transmit useful information from where it is to where it is needed."

An Advertising Manager, New York City

FREE "WAR ALBUM"

141 PAGES OF PRACTICAL HELP

Demonstrates, by example, how priority-stricken, war-burdened Management can use advertising to help solve wartime problems; help speed war production; help clear up wartime customer-relation problems; help build a sound foundation for future business.

WOULDN'T YOU LIKE TO HEAR YOUR COMPANY HEADS SAY THIS?

"Business paper advertising is much more vital to our present and future welfare than it was in the days when our chief problem was simply selling! Today it is helping us solve four problems." *(The President of a prominent manufacturing concern discusses the wartime uses of advertising, as a tool of management, in the first Supplement to the "Guide.")*

"If our advertising failed to deal helpfully with the readers' problems . . . if it confined itself to extravagant bragging about our line and our company . . . they not only wouldn't read it, they would criticize us for trying to impose upon their time and their intelligence. We keep our business publication advertising useful to the readers!" *(The President of a large consumer goods manufacturing company says this, and elaborates upon the point on Page 40 of the "Guide.")*

WHAT TO DO WHEN WAR NEWS MAKES YOU FIGHTIN' MAD

Many an advertising man has asked himself at some time since Pearl Harbor, "Am I kidding myself? Couldn't I find something more helpful to do in the armed forces, even if I had to take a desk job?"

There's a simple way to find out the answer to that one. Richard Hayes, Advertising Manager of The Okonite Company did. He didn't start out with that problem in mind, but that was one good by-product of a simple presentation which he made up in order to show his company heads, specifically and by example, exactly why they should keep on advertising today.

Says Mr. Hayes, "I know I've worried a great deal about just how much our advertising was contributing to the war effort. After I had done this job for our executives, I found that we were doing much more of a helpful nature in our advertising than I had dreamed of. I realized, too, that there were still many things we could do to help."

Ask the Representative of Any A.B.P. Paper to Show You Mr. Hayes' Presentation. Every publication which is a member of this Association has been supplied with a plain, homely, but *accurate* replica of Mr. Hayes' presentation. If you feel that any of your company heads do not understand the full significance of wartime advertising, or if you, yourself, question the value of your own contribution to the war effort *as an advertising man*, this presentation will very likely help you. Ask any publication man whose paper is a member of A.B.P.

IS THE "GUIDE" USEFUL? Ask the Man Who Has Used One

"It distinctly helps us think through the many problems facing us now in advertising and selling."—*Advertising Manager, Wilmington, Del.*

"Full of useful information. It is easy to read due to the manner in which the comments are presented. The direct and effective use of two and three syllable words to strike the theme is to be recommended as worthy of special notice." — *Advertising and Export Manager, Les Nietos, Cal.*

"The most outstanding study we have read on the subject. Brief and concise, it gets over its points with the simplicity of a primer, and the wallop of a torpedo." — *Head of an advertising agency in Philadelphia, Pa.*

An added benefit that accrues from the proper use of this "Guide," according to those who have used it, is the way it dispels executive doubt concerning the *ethics* of advertising at this time; demonstrates that *useful advertising needs no defenders!*

The "Guide" is a sound foundation upon which any advertising man or sales manager can base his own presentation to the men who pay the bills. Send for it now and you'll receive additional up-to-the-minute case studies, free, as fast as they're produced.

SEND FOR YOUR FREE COPY OF THIS WARTIME ADVERTISING PRESENTATION

THE ASSOCIATED BUSINESS PAPERS
Room 776, 369 Lexington Avenue, New York City

Please send me, without obligation, my free copy of A.B.P.'s War Album, "A Guide to Effective Wartime Advertising," including the first two supplements.

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THE ASSOCIATED BUSINESS PAPERS

A national association of business publications devoted to increasing their usefulness to their subscribers and helping advertisers get a bigger return on their investment.

Plates . . .

Plate Prices, Page 105

Better balance in plate inventories is evidenced by heavier reserves with some fabricating shops, most under subcontract to shipyards. Tonnage down to AA-3 to warehouses has been approved in current allocations in some cases; most jobbers have more rounded stocks, both as to tonnage and sizes. Allocations for one shipyard are lowered, several mills getting cancellations against the yard temporarily. Shipyard inventories are confusing. Those with banks of partially or prefabricated sections may withdraw plain material from stock to a greater extent than yards with fewer semifabricated parts; one yard may have a large bank of prefabricated parts and an apparent low reserve of plain material, while another a relatively high inventory of unfabricated material and a light bank of semifinished sections. Allocations are generally based on unfabricated tonnage.

Sustained high production on strip and universal mills accounts for the easier situation in plates, sheared material remaining tight. Structural shops with ship and war equipment contracts are working more plates than shapes in most instances.

Sheets, Strip . . .

Sheet & Strip Prices, Page 104

Demand for sheets is somewhat easier, but hinging on semi-finished supplies, deliveries are little improved, few producers promising definite shipment below AA-2; cold-rolled averages about two weeks better than hot-rolled. Several producers are soliciting cold-rolled tonnage, demand having slackened, while fabricators in scattered cases are offering back to the mill lots of 50 tons or more recently received, due to revised production schedules. At least AA-2 is required for resale of this stock. A few cancellations are also reported.

Except for heavily loaded spots growing out of concentrated demand for fluctuating war production, hot and cold-finished narrow steel strip is somewhat easier. Equipment employed on copper-clad cartridge cup steel is engaged at capacity, with heat-treating a choke point. Accelerated step-up in demand is notable, with tonnage specified for early delivery increasing. Under directives, processing of this material is given the right of way over all others at the moment, deliveries going direct to loading plants. Small emergency varied lots for lend-lease frequently appear. Some producers of rerolled high carbon material are booked up to quotas through first quarter, but new buying is more spotty and supply has eased in some directions.

Bars . . .

Bar Prices, Page 104

Conditions in the steel bar market show little change, deliveries on small rounds being easy, some sellers still able to make shipments before the end of the year on most priorities in the AA class. On large rounds and flats deliveries extend well into first quarter and in some cases beyond. An eastern producer has nothing available before second quarter in larger diameters, except on directives or allocations.

Spread between melting schedules for alloys and finished steel is at least 75 days, nearer three months, and the November schedule of a leading eastern producer was not approved until the tenth of this month. Further complicating alloys are frequent changes in specifications, substitutions and revised production schedules, although the latter influence is minor. In this connection fewer changes are made in aircraft steels than others.

Improved deliveries against allocations for cold-finished carbon bars, presage improved shipments to consumers before the end of the year, a development expected to lag in alloys. Some optional orders for bessemer or open-hearth carbon bars are appearing from jobbers, but demand for bessemer stock has been slower than expected despite better deliveries on this grade with some mills.

Pipe . . .

Pipe Prices, Page 105

Standard pipe stocks in the hands of distributors are at low level but it does not appear likely any immediate relief will be afforded. Jobbers will continue to receive 6¼ per cent per quarter, plus tonnage obtainable on extended priority ratings high enough to insure delivery. Considerable pipe is moving in this category, much of it carrying ratings as high as AA-1.

A better picture of available stocks of oil country tubular goods will be available as a result of a survey by the petroleum co-ordinator. Form OPC-MA-2 has been sent to all oil country

operators, providing for listing of all inventories. The purpose is to adjust stocks of drill pipe, standard pipe, casing and other items and thus eliminate some demand. Because of low preference ratings operators with small stocks have found difficulty obtaining needed sizes. It seems apparent that inventory is sufficient to take care of much of this demand if location of excess stocks is known.

Large tonnages of light walled, 14 gage, 4-inch steel pipe, are being supplied to a service depot in New England, hundreds of miles being bought for portable fuel lines. This is electric welded, flexible, and is used in field supply service. Demand for electric welded tubing is temporarily off slightly, users with war contracts having covered substantially. Two months delivery was the best a railroad could get on two cars of boilers tubes, most producers being unable to ship under three. A heavy demand for boiler tubes has backed up, although jobbers are getting meager deliveries at a slightly better rate from some suppliers.

Rails, Cars . . .

Track Material Prices, Page 105

Transportation equipment division of WPB has outlined a program as determined by the requirements committee, covering deliveries for railroads over various periods in 1943. The program is as follows: Steam locomotives 250, for delivery in the first eight months; road diesels 36, in first eight months; switching diesels, 100 for first six months; freight cars 20,000, for first six months; passenger cars, none.

For first quarter the plan provides 330,000 tons of steel for repairs to equipment, 480,000 tons of rails and 288,000 tons of track accessories.

The announcement is made to allow railroad executives to outline their programs and place orders for rails and equipment at once to assure delivery early in 1943.

New York Central has placed orders, subject to approval by War Production Board, for 120,000 tons of steel rails for its 1943 program. The order was divided among three producers. Tennessee Valley Authority has issued an inquiry for 44 seventy-ton container gondolas.

Missouri Pacific has been authorized by federal court to buy 15 roller-bearing 4-8-4 steam locomotives and seven 1000-horsepower diesel switchers, to replace engines leased from other lines to meet heavy traffic needs.

Pig Iron . . .

Pig Iron Prices, Page 106

Pig iron consumers will continue to file monthly requirements on form PD-69, no change being made because of the approaching shift from PRP to the Controlled Materials Plan. The reviser form will provide a different breakdown of ratings. The present form groups ratings from AA through A-1-k and for A-2 through A-8, with separate spaces for A-9 and A-10. The revised form will contain mode detailed breakdown of the AA ratings, which now apply to most tonnage. Ultimate use information will be required for all ratings, now asked only for A-4 or lower.

Some sellers believe there will be moderate easing in pig iron supply for first quarter, a result of better balance in ratio of supply and demand expected to be apparent soon. Little likelihood is seen of iron being made available for other than purposes essential to winning the war. Some indirect war work and essential civilian industries may be allowed somewhat larger share than in recent months but purely civilian foundry work not related to the war effort is out for the duration. Additional blast furnace units coming into production probably will not add to output of merchant iron as their tonnage will be needed for steelmaking, especially to supplement scrap supply.

Steel and malleable iron foundries are crowded with war work and some gray iron shops are well occupied, especially those making machinery castings. Jobbing foundries, with more flexible equipment and schedules, are faring better than those equipped for single production work. Foundries engaged in manufacture of light heaters, stoves and soil pipe have especial difficulty in maintaining production in face of inability to obtain war contracts.

Structural Shapes . . .

Structural Shape Prices, Page 105

Shapes can be delivered in three to four weeks on most AA ratings but de-

liveries are more extended on special sections, principally in demand by shipyards. In absence of important construction work fabricators' backlogs are dwindling rapidly. Some shops have been able to maintain operations by special assemblies carrying high priority, such as an increasing quantity of landing craft work. Some observers believe structural mills may not operate higher than 65 per cent in 1943.

Scrap . . .

Scrap Prices, Page 108

Assurance is increasing that sufficient scrap will be available to carry open hearths through the winter if the salvage program continues to be pressed at the present rate. Blowing in of additional blast furnaces will be a factor, enlarged pig iron supply easing demand for scrap to some degree. Several new stacks will be completed within the next few months. Another contributor to scrap volume will be additional material from manufacturing plants not yet at maximum production. The fact that much salvage at present is non-recurrent is a spur to efforts of governmental and other agencies, which are searching for other sources of dormant material.

Alloy steel producers have a special problem as they must be more selective in their scrap charges and it seems probable they will have difficulty for some time. Electric furnace operators are handicapped in obtaining supplies of desired analysis and unusually long hauls have been resorted to in some cases to fill requirements.

In the Cleveland area supplies are ample for current high production rates of steel plants and some reserves are being laid down. Most of the tonnage from the recent household drive has been worked over, though this has been difficult because of labor shortage and the class of material, much of which was outside the usual grades. Much overtime has been worked to move tonnage promptly.

Iron Ore . . .

Iron Ore Prices, Page 107

Loading of iron ore from the Lake Superior region passed the 90,000,000-ton mark at 7 a.m. Nov. 23, thus meeting the quota set early in the season. This is a new record by a wide margin, total movement for the 1941 season being 80,116,360 tons.

Rough weather on Lake Michigan early last week delayed ore deliveries, five ships arriving Sunday and six on Monday being unable to dock at the Gary plant of Carnegie-Illinois Steel Corp. until conditions moderated.

Blast furnaces in the United States consumed 7,370,595 gross tons of Lake Superior iron ore in October, compared with 6,933,602 tons in September and 6,421,959 tons in October, 1941, according to the Lake Superior Iron Ore Association. Cumulative consumption to Nov. 1 this year has been 68,946,113 tons, compared with 61,393,488 tons in the corresponding period last year.

Iron ore on hand at blast furnaces in the United States Nov. 1 totaled 44,415,052 tons, against 41,173,849 tons a month earlier and 37,474,314 tons a year ago. Ore on Lake Erie docks Nov. 1 totaled 6,784,039 tons, compared with 5,873,741 tons Oct. 1 and 5,093,528 tons Nov. 1, 1941.

Canadian consumption in October was 228,069 tons, in September 206,286 and in October, 1941, it was 190,227 tons. To Nov. 1 Canadian furnaces had smelted 2,064,203 tons, compared with 1,379,186 tons in the same period in 1941. As of Nov. 1 Canadian furnaces had on hand 1,468,191 tons, compared with 1,374,015 tons a month earlier and 1,377,909 tons a year earlier.

Pacific Coast . . .

Seattle—Wholesale jobbers report improvement following the last directive, which is bringing more steel. This applies particularly to sheets, bars, plates and shapes but it has not helped with alloys, tool or cold-finished steel. Demand continues as urgent as ever and dealers are unable to supply many items, with inventories at record low. Stocks cannot be accumulated, being shipped out as fast as they arrive from the mills. The situation is expected to improve under the new regulations.

Washington state has awarded a contract to M. P. Butler, Seattle, low at $52,614, for construction of a steel girder bridge in Clallam county, planned to provide ingress to a stand of timber required for the war effort. The project

involves about 250 tons of shapes, of which the state will furnish about half from stock on hand. The Navy department announces a contract to Star Iron & Steel Co., Tacoma, low at $119,000, for fabrication of a 15-ton drydock crane. Tonnage is unstated.

Steel in Europe . . .

London (*By Radio*)—Plate mills in Great Britain are booked ahead many weeks to meet demand for ships and war material. Shipbuilding and tank construction are at full capacity. Heavy engineering foundries are busy. Demand for structural steel is increasing.

M. A. Hanna Co. Broadens Coal and Dock Interests

M. A. Hanna Co., Cleveland, important producer of coal from Ohio mines, has bought control of the United States Coal Co., with properties in Jefferson county, Ohio, annual production about 620,000 tons. The company has been owned by Alva Bradley and Hudson E. Willard, Cleveland, and other members of these families. The company has been reorganized by election of R. L. Ireland Jr. as president, R. V. Clay and P. C. Sprague vice presidents, J. C. Robb secretary and W. C. Geist treasurer. Mr. Ireland is vice president of the M. A. Hanna Co. and president of the Hanna Coal Co., a subsidiary. The latter will product 3,000,000 tons of coal this year and Jefferson Coal Co. which it operates will mine about 1,100,000 tons.

M. A. Hanna Co. Oct. 17 announced organization of the Western-Hanna Fuel Co. to acquire docks, machinery and equipment of the North Western Fuel Co. and Hanna Coal & Dock Co. The new company will operate eight large docks with 3,500,000 tons annual capacity at Duluth, Superior, Milwaukee, Waukegan and Menominee.

Mirrors of Motordom

(*Concluded from Page 42*)

studying war equipment in action and relaying reports back to headquarters in Detroit. The story is told of how one of these observers was given a message from C. L. McCuen, head of GM engineering activity, instructing him to get hold of a new type of German shell and send it back to Detroit for inspection; and in 10 days a sample of the shell rested on Mr. McCuen's desk.

Further moves in a constructive program of labor relations were made recently by George T. Christopher, Packard president, when he called together 500 company superintendents, foremen and union shop stewards for a joint dinner. Mr. Christopher told the assemblage, "Without good labor relations, all the mechanical skill in the world can't get our production job done. Toward that end, we propose to give company supervisors and union representatives the same information. Men cannot be expected to co-operate their best if all do not know and understand company policies and courses of action. By hearing the same story, at the same time, in the same way, these joint meetings of management and labor leaders are expected to clear the air and cut out the double-talk that can slow up production progress.

Experiment in upgrading of production employes to tool repair men in the Pontiac Oerlikon gun plant has proved so successful that other tool repair shops in Pontiac plants are being supplied from the same source. Last February, several hundred production workmen who had applied for upgrading to the toolroom were interviewed by the toolroom foreman and 75 picked for immediate training. At present, upgraders make up the entire afternoon and night shifts of the gun plant's tool grinding department, exclusive of supervision, and about 80 per cent of the day shift.

Some of the upgraded employes have already progressed from machines to bench work, and all were producing toolmaking details on machine within 3-5 weeks. Only four failed to grasp the job.

Nonferrous Metal Prices

Nov.	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
1-26	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.50	35.00

F.o.b. mill base, cents per lb. except as specified. Copper and brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, l.c.l.	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

Yellow brass (high)	19.73

OLD METALS

Dealers' Buying Prices
(In cents per pound, carlots)

Copper

No. 1 heavy	9.25-10.00
Light	7.25- 8.00

Brass

No. 1 composition	8.50- 9.00
Yellow brass castings	5.50- 6.00
Auto radiators	6.12½-6.62½
Red brass, borings & turnings	8.00- 8.50

Zinc

Old	4.75- 5.00
New clippings	6.00- 6.50

Aluminum

Clippings	9.75-10.25
Cast	8.75- 9.25
Pistons	8.50- 8.75
Sheet	8.75- 9.25

Lead

Heavy	4.75- 5.25
Mixed babbitt	5.35- 5.50
Electrotype shells	5.00- 5.50
Stereotype, Linotype	6.00- 6.75

Tin and Alloys

Block tin pipe	44.00-46.00
No. 1 pewter	32.00-36.00
Solder joints	7.75- 8.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l.	12.50
Standard No. 12 aluminum	14.50

MAGNESIUM
(12 pound rod, 4 in. diam.)

99.8% ingot, carlots	22.50
100 lb. to carlots	24.50
Extruded sticks, ¼ to 2 lb.	
Carlots	32.00
100 lb. to carlots	34.00

Nonferrous Metals . . .

New York—Clarification of operation of the Controlled Materials Plan was made last week by government officials. It was re-emphasized that when CMP becomes effective no copper, steel or aluminum may be purchased without authority of an allotment number. Priority ratings will be of no use in buying these three materials but they will continue to aid the manufacturer to schedule production, and will be the means for buying all other materials.

With all aluminum produced still required for war work, the production capacity continues to expand rapidly. T. D. Jolly, vice president and director of purchases, Aluminum Co. of America, revealed last week that less than a year from now annual aluminum production capacity will reach 2,100,000,000 pounds, equal to seven times the size of peak production in peace time years of 1937, 1938 and 1939.

"Each of several of the new plants will produce more aluminum than the entire nation made at its World War I peak, and still there won't be a pound left over for civilian goods," Mr. Jolly said.

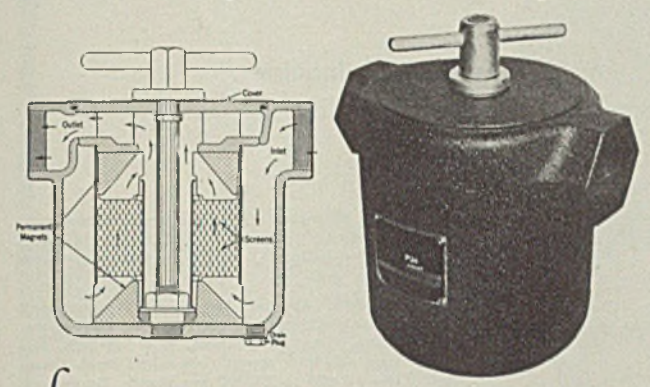
Wire . . .

Wire Prices, Page 105

Current melt with producers of semifinished for wiremaking is as high as 95 per cent on AA-1 volume or better. Mills without rod producing equipment are getting semifinished under directives to finish high-rated tonnage, but most inventories are low, with output confined almost exclusively to important war volume. It now appears some non-integrated mills supplied finished wire from inventories of semifinished at priorities too low to warrant replacements by extension of rating. Higher ratings or directives will be needed to secure more replacements, this depending on finished wire priorities or directives to assure semifinished.

Production schedules, somewhat steadier under quotas, place expanding aircraft requirements at top with heat treating and primary melting for alloys the bottleneck in some finishing departments.

Good-by ~~Mr.~~ Chips!



LONG distance phone from mid-west manufacturer to our plant in New York City:

"Hello—we are drawing steel cartridge cases and having trouble with fine chips in the lubricant. Will Frantz FerroFilter help us?"

"We believe so."

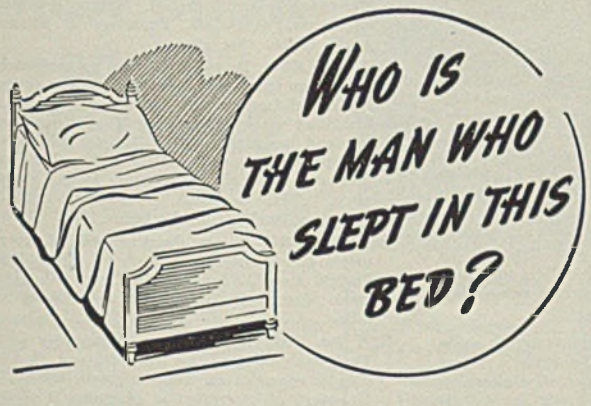
"Well—send us two for trial."

One week later . . . *"Send us sixty-five FerroFilters as soon as you possibly can—high priority."*

FerroFilters by magnetically removing fine chips provide clean coolant for all machining operations on steel. Essential in deep drilling, broaching, and tapping. They prolong tool life, protect machines and improve finish.

Illustrated bulletin lists types, sizes and prices.
May we mail you a copy?

S. G. FRANTZ CO., INC.
161 GRAND STREET, NEW YORK, N. Y.



Here are a few clues. *He dreamed the night away in one of the 891 most comfortable beds in Baltimore. Now—he's off to keep his business dates in Baltimore and Washington. He is one of the many who have found that the Lord Baltimore offers everything that's expected of a famous hotel in an equally-famous city. So—the Lord Baltimore Hotel is his GHQ in this territory.*

Come to think of it—he could be you!

Nearly 50 trains every day run between Baltimore and Washington. It's only a short 45 minute trip. . . . An advance reservation assures better accommodations. Let us know when you are coming.

The LORD BALTIMORE HOTEL
BALTIMORE • MARYLAND
700 rooms—each with radio, tub and shower

"General GEAR" IS A FIGHTER TOO...

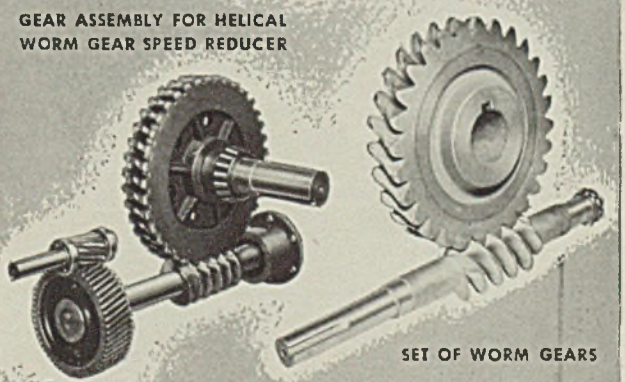
He's the guy that makes the Jeeps Jump... He's also the BIG-WORKS in the tank, battleship or airplane... in fact he's the BIG-WORKS in any Power-saving or Power-driving machinery. HE'S GOTTA BE GOOD. Our organization of many years of Gear Making Experience is going to keep him fighting and to help keep all of us on top.

A SET OF PLANETARY GEARS

CONTINUOUS-TOOTH HERRINGBONE GEAR AND PINION

A SET OF SPIRAL BEVEL GEARS WITH PINION BEARING MOUNTING

GEAR ASSEMBLY FOR HELICAL WORM GEAR SPEED REDUCER



SET OF WORM GEARS

D.O.James
MANUFACTURING COMPANY
1120 W. MONROE ST. (Established 1888) CHICAGO, ILL.

MAKERS OF EVERY TYPE OF GEAR AND GEAR REDUCER

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.

Detroit office, Contract Distribution Branch, Production Division, WPB, Boulevard building, is seeking contractors for the following:

Jobs No. 3354 to 3364: Prime contractor has listed requirements on these eleven jobs and seeks subcontracting facilities. Material is furnished on AA-1 priority. Automatic screw machines required. Materials, duralumin, copper silicon, steel. Orders are for 50,000 to 100,000 of each part.

Job No. 3365: Machining operations on gear. SAE No. 3245 forgings are furnished. Equipment required: Lathe, 9 7/8-inch O.D., three operations; sensitive drill; bevel gear cutter; universal or vertical mill; gear lapper; band or doall saw; heat treating; magnaflux. Order is for 1500 to 2000 on AA-1 priority.

Job No. 3366: Machining operations on pinion. SAE No. 3245 forgings are furnished. Equipment required: Lathe 8 1/8-inch O.D.; sensitive drill; bevel gear cutter; gear lapper; universal or vertical mill; horizontal mill; heat treating, magnaflux. Order is for 1500 to 2000 on AA-1 priority.

Job No. 3367: Machining operations on pinion. SAE No. 3245 forgings are furnished. Same equipment as for job 3366 and same quantity required.

Job No. 3368: Machining operations on gear. SAE No. 3245 forgings are furnished. Equipment: Lathe 9¼-inch O.D.; universal or vertical mill; sensitive drill; bevel gear cutter; gear lapper; band or doall saw; heat treating; magnaflux. Order is for 1500 to 2000 on AA-1 priority.

Job No. 3405: Machining operations on piston pump mount. Castings are furnished, malleable iron or cast steel annealed. Priority is AA-1. Equipment: Turret lathe; lathe, three operations; key seater; sensitive drill. Order is for 3500.

Job No. 3436: Connector link. Stainless steel is furnished. Equipment: Horizontal mill, three operations sensitive drill. Order is for 3250.

Job No. 3437: Gun mount shaft sleeve. SAE No. 4140 steel is furnished, 1⅝-inch O.D. Equipment: Hand screw machine, heat treating cadmium plating; internal and external grinder. Order is for 6500.

Job No. 3438: Plunger for mechanic's rear seat. SAE No. 4140 steel is furnished, ⅝ diameter x 2½-inch. Equipment: Hand screw machine, ⅝-inch O.D.; mill; centerless grinder; cadmium plate. Order is for 3250.

Job No. 3439: Retainer for plunger spring on turret seat. SAE No. 4140 steel is furnished. Equipment: Hand screw machine, ¾-inch hex; sensitive drill; cadmium plate. Order is for 3250.

Job No. 3440: Gun eccentric bushing. SAE No. 4140 steel is furnished. Equipment: hand screw machine, 1 7/8-inch collet; hand drill; mill. Order is for 6500.

Job No. 3442: Turret sight actuating shaft. Equipment: Hand screw machine, 1⅛-inch O.D.; hobber, two operations; heat treating; cadmium plating; centerless grinder. Order is for 3250.

Job No. 3443: Housing. No. 4140 steel is furnished. Equipment: Hand screw machine, 1⅛-inch O.D.; mill, two operations. Order is for 3250.

Job No. 3510: Machining and broaching operations on body casings. Hot-rolled seamless tubing 4 11/16-inch O.D. is furnished. Equipment: Turret lathe. Order is for 100,000 on AA-1 priority.

Job No. 3511: Machining and broaching operations on bases. Forged steel is furnished. Equipment: Broach or machining complete; chucking machine, two operations 4⅜-inch O.D.; broach. Order is for 100,000 on AA-1 priority.

Boston office, Contract Distribution Branch of WPB, 17 Court street, is seeking contractors for the following:

SC-24: Hand turret lathe with 3½-inch diameter bar capacity for first operation and 3½-inch diameter chucking capacity for second operation; also light drilling and bench drilling. Material, stainless steel tubing, supplied by prime contractor. Continuous production, first order 50,000 at rate of 3000 per week. Reference 1-A-329.

SC-25: Multiple or single-spindle automatic screw machine work for machines having ⅜-inch diameter bar capacity; also hand turrets for second operation. Four items ranging in length from 2½ to 3 7/8-inch. Material, free-cutting hex stainless steel supplied by prime contractor. Quantity, 100,000 each at rate of 7500 each per week. Reference 1-A-300.

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

S-73-5288: Long Island manufacturer seeks open time on 00 B & S automatic screw machine. Material, monel metal. Tolerance, close. Quantity, 4000 per week for indefinite period.

S-73-5295: New York City manufacturer requires facilities on six-spindle automatic screw machines, 2⅝-inch capacity. Material, No. 1314 cold-rolled steel. Quantity, 58,000 monthly. To be tapped and threaded in one operation.

S-73-5340: Northern New York prime contractor seeks subcontracting facilities on primer bodies, requiring four or six-spindle automatic screw machines, also diamond knurling and threading facilities. Threading materials to be furnished by prime contractor. Material, WDX 1314 steel. Dimensions, 1.29-inch diameter x 1.81-inch length. Quantity, 50,000 at 3000 per day delivery. Tolerance, close. Prints at New York office.

S-73-5342: New York City manufacturer seeks facilities on four-spindle automatic screw machines, to make valve stems. Dimensions, .514 diameter x 2.94-inch long. Quantity, 25,000. Material, 4130 steel.

S-73-5374: New York City manufacturer requires subcontracting facilities to make screw machine parts. Dimension, 1 3/8 x 2¼-inch long. Material, steel. Tolerance, commercial. Quantity, 1,000,000. Equipment required, multi-spindle 1½-inch automatic screw machine.

S-73-5535: Central New Jersey procurement office requires facilities to make screw machine parts. Dimensions, ½ x 1 1/16-inch. Material, ½-inch round cold-rolled steel. Quantity 10,000 to 25,000 per month. Equipment, ½-inch capacity automatic screw machines. Left-hand thread to be cut.

Minneapolis office, Contract Distribution Branch of WPB, 334 Midland Bank building, is seeking contractors for the following:

S.O. No. 295: Connector, heater fuel line. Facilities required, automatic screw machine ⅞ hex x 3-inch. Operations, drilling, reaming, turning, threading, two setups required. Tolerance, .002. Class 3 thread. Material, ⅞-inch hex stainless steel, type 416. Drawings at Minneapolis office.

S.O. No. 295: Fuel mixture outlet fitting. Facilities required, automatic screw machine ⅞-inch hex x 3 inches. Operations, drilling, reaming, turning, threading, two setups required. Tolerance, .002. Class 3 thread. Material, ¾-inch hex stainless steel, type 416. Drawings at Minneapolis office.

S.O. No. 296: Brass stud, 5/16 x 3 1/16-inch, thread one end, knurl opposite end. Facilities, automatic screw machine, 5/16-inch rd. Operations, turnings, threading, knurling. Quantity, 800,000 at 80,000 per week, starting Jan. 1. Tolerance, class 2 thread. Material, 5/16-inch rd. brass, 4302-L-8. Drawings at Minneapolis office.

S.O. No. 294: Recoil cylinder, approximately 38 inches long, 5 inches diameter. Facilities, horizontal boring mill 3-inch or larger, No. 3 milling machine, welding. Operations, boring and honing of wide diameter I.D., machining of various brackets and welding of brackets to O.D. Quantities, large. Tolerance, .001. Material, forging, furnished. Drawings at Minneapolis office.

S.O. No. 293: Taper shank. Facilities, automatic screw machine 1-inch rd. Quantities, 20,000 monthly for duration. Material, 4140 steel, furnished. Drawings at Minneapolis office.

S.O. No. 292: Manufacture of stamping dies. Facilities required for manufacture of five dies as required for making small stampings. Drawings of stampings at Minneapolis office.

S.O. No. 209: Secondary annulus, sprocket hub and outer member. Quantities, 500 to 1500 each. Forgings furnished. Requires 18 to 24-inch turret lathes, internal gear cutting and splining.

Philadelphia Office, Contract Distribution Branch, Production Division, WPB, Broad Street Station building, reports the following subcontract opportunities:

Roystuart-61-1: Ohio corporation requires 25,000 discharge valve seats. Material, stainless steel. Equipment required, automatic screw machine, 1-inch spindle; hand screw machine; drill press; flat lapping machine, ½-inch diameter x 5/32-inch seat. Dimensions, 1 inch O.D. x .328 width. Tolerance, .002. Threads, NEF No. 3. Material to be furnished by contractor. Drawings and specifications at Philadelphia office.

Keefer-57-1: A government agency is interested in securing subcontracting facilities for manufacture of precision dies for radio tube parts.

Roystuart-57-7: A government agency requires

up to 1600 recoil spring housing assemblies per month for the duration. Equipment required, Engone lathe with 14-inch swing, butt welder for tubing O.D. 3.666-inch and ½-inch wall, swedging machine to reduce 2⅛-inch end of tube from 3.666 to 2.612-inch O.D., heat treating. Pull test 10 tons. Tolerance, .005. Material, seamless steel tubing, SAE 4640, and drop forgings, SAE 4640. Forgings will be furnished. Overall dimensions, 6½ x 14⅝ inches.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

Display No. 89: Combustion starter parts, material furnished by subcontractor. Priority A-1-a. Three items, 10,000 each. Sizes, 3 x 6, 3 x 3½ and 4 x 3½ inches. Material, cold-rolled steel. Equipment required, single and multi-spindle automatic screw machines, ⅝, 4½ and 5½-inch bar capacity; turret lathes, engine lathes, gear shapers, thread mills, cylinder grinders, heat treating, sand blasting, bevel spiral gear cutter, horizontal milling machine, hand mill, thread mill disc cutter, external thread grinder, three-spindle sensitive drill, carburizing. Tolerances, .001 and .002.

Display No. 299: Various sizes shackle bolts, material furnished by subcontractor. Quantity, 5000. Size, 1¼ x 5⅛ inches. Material, cold-rolled steel. Tolerance, .001. Equipment required, turret lathes, 1 and 1½-inch bar capacity; single-spindle bench drill ⅞-inch drill capacity, hand milling machine, cylinder grinding machine 6 x 18 inches, heat treating.

STRUCTURAL SHAPES . . .

SHAPE CONTRACTS PLACED

250 tons or more, Washington state steel girder bridge, Clallam county, to M. P. Butler, Seattle, low at $52,614; half of materials to be furnished by state.

Unstated, drydock crane for U. S. Navy, to Star Iron & Steel Co., Tacoma, Wash., low at $119,000.

REINFORCING BARS . . .

REINFORCING STEEL AWARDS

100 tons, water tank, Waukegan, Ill., to serve Great Lakes Naval Training Station, Great Lakes, Ill., to Olney J. Dean Steel Co., Cicero, Ill.; W. E. O'Neil Construction Co., Chicago, contractor; bids Oct. 29.

REINFORCING STEEL PENDING

1250 tons, S-6656-2-TT, Panama Canal, Purchasing Officer; bids Nov. 27.

PIPE . . .

CAST PIPE PENDING

500 tons, 16-inch water supply line, 9380 feet; Hugh G. Purcell, Seattle, sole bidder, for U. S. Pipe & Foundry Co., Burlington, N. J.

STEEL PIPE PENDING

Unstated, 34,118 feet 4 to 8-inch lap welded steel water pipe, King county district No. 63, Washington; bids to James W. Carey, engineer, Seattle, Nov. 30.

RAILS, CARS . . .

CAR ORDERS PENDING

Atlantic Coast Line, 300 fifty-ton composite hoppers, 300 fifty-ton composite gondolas and 300 fifty-ton flats.

Delaware, Lackawanna & Western, 100 covered hoppers.

Missouri Pacific, 1600 seventy-ton hoppers and 100 fifty-ton flats.

CONSTRUCTION AND ENTERPRISE

OHIO

CANTON, O.—Hercules Motors Corp., Market avenue South, has let contract for two 2-story factory buildings, including machine shop, warehouse, etc., to Melbourne Bros. Construction Co., Mellett building. Estimated cost $150,000. (Noted Nov. 16).

CLEVELAND—Barco Machine Products Co., 1969 East Sixty-fifth street, A. W. Kenerson and Edward E. Slabe, plans to expand its instrument manufacturing department.

CLEVELAND—Cleveland Steel Barrel Co., J. M. Finney, president, 9612 Meech avenue, has let contract for factory addition to Bolton-Pratt Co., 1276 West Third street. Estimated cost $40,000.

CLEVELAND—Corundum Co. Inc. is being incorporated through Walter S. Piotrowicz, attorney, 1004 Standard building, to take over some of the affairs of the Corundum Co., 14800 Miles avenue. The new firm will make industrial diamonds, diamond tools, tungsten tools, etc.

CLEVELAND—Polacky Engine Mfg. Co., M. J. Polacky, 7806 Guthrie avenue, plans to convert existing building at that address into a light machine shop. Maturity depends on decision of Board of Zoning Appeals.

LIMA, O.—Ohio Steel Foundry Co., John E.

Galvin, president, and Lyman T. Strong, construction superintendent, is taking bids for acetylene generator building and equipment. Giffels & Vallet Inc., 1000 Marquette building, Detroit, architect-engineer.

LORAIN, O.—Brush Beryllium Co. has let contract for chemical and smelter plant to H. K. Ferguson Co., Hanna building, Cleveland. Estimated cost $750,000.

PARRAL, O.—Robinson Clay Products, Second National building, Akron, O., will build a kiln here costing over $40,000.

RAVENNA, O.—War Department, Maj. L. Kafer, commanding officer at Portage Ordnance Depot near here, is in charge of addition to sewage treatment plant for which plans are being completed.

TIFFIN, O.—Tiffin Art Metal Co. has let contract for rebuilding plant to Thomas L. Hickey Inc., 121 North Hill street, South Bend, Ind. Cost over $100,000.

MASSACHUSETTS

BOSTON—Tredennick Billings Co., 10 High street, Boston, has contract for plant for an industrial company.

WARE, MASS.—H. P. Cummings Construction Co., 14 Prospect street, has contract for plant unit for industrial company in Maine.

WRENTHAM, MASS.—Winter Bros. Co., Kendrick street, has let contract for two-story addition to Walter H. Barker Inc., 23 Main street, Taunton, Mass. Estimated cost $125,000.

NEW JERSEY

JERSEY CITY, N. J.—Colgate-Palmolive-Peet Co., 105 Hudson street, is having plans prepared for five-story soap manufacturing plant. Estimated cost $60,000.

LYNDHURST, N. J.—Leslie Co., Grant avenue, has given contract for boiler plant to Child & Scott-Donohue Inc., 153 East Thirty-eighth street, New York. Estimated cost $40,000.

PENNSYLVANIA

EAST BUTLER, PA.—Pittsburgh Steel Drum Co., S. Reed, manager, is rebuilding factory at cost of $150,000. (Noted Nov. 23).

ERIE, PA.—National Erie Corp., W. J. Johnson, president and general manager, is awaiting government approval of proposed $750,000 plant expansion program at 1520 Raspberry street.

ERIE, PA.—Erie Resistor Corp., 644 West Twelfth street, has been authorized by government to take over the former Friehofer bakery building at Eighth and Perry streets. Cost of remodeling the building is estimated at $275,000.

MICHIGAN

DETROIT—Giffels & Vallet Inc. and L. Rosetti have completed plans for additions and alterations to factory at 21400 Mound street for Rotary Electric Steel Co.

DETROIT—Wilbur F. Lockwood has been awarded contract for addition to factory at 14231 Birwood avenue for Ajax Engineering & Mfg. Co.

DETROIT—Burton Bros. have been awarded contract for addition to factory at 729 Meldrum avenue for Pennsylvania Grinding Wheel Co. Estimated cost $10,000.

DETROIT—Southfield Screw Products Co., 1064 Penobscot building, has been incorporated with $10,000 capital to manufacture machines and machine products. Agent, Milton A. Bresler, 1064 Penobscot building.

JACKSON, MICH.—Frost Gear & Forge Co. has started work on erection of buildings.

MARYLAND

BALTIMORE—Defense Plant Corp. has au-

thorized plant facilities in Maryland by Maryland Sanitary Corp., 4500 East Lombard street, Baltimore. Cost estimated at $1,250,000.

BALTIMORE—Defense Plant Corp. has authorized an increase in its contract with Crown Central Petroleum Corp., American building, Baltimore, for additional machinery and equipment for plant in Texas.

GEORGIA

COBB COUNTY, GA.—United States engineer, Marietta, has let contract to A. Farnell Blair, Decatur, for pumping station. Robert & Co., Bona Allen building, Atlanta, engineer.

MISSISSIPPI

BILOXI, MISS.—FWA, Atlanta, Ga., will erect waterworks system here at cost of $870,000.

CENTREVILLE, MISS.—City, Omer Carroll, mayor, will soon call bids for sewers and waterworks for FWA., Atlanta, Ga. Estimated cost $120,000. J. Weseley Brown, city engineer.

PASCAGOULA, MISS.—FWA, Atlanta, Ga., will erect waterworks system here at cost of $508,000.

TENNESSEE

KINGSPORT, TENN.—City has plans by Wiedeman & Singleton, engineers, C. & S. Bank building, Atlanta, Ga., for waterworks improvements.

LOUISIANA

MONROE, LA.—M. K. Leiber, Monroe, has let contract for factory warehouse to J. R. White, Monroe. Cost $40,000.

MONROE, LA.—G. S. Lawhead, Monroe, has awarded contract to Concrete Material Co., Monroe, for warehouse costing $50,000.

ARKANSAS

YELLVILLE, ARK.—Silver Hollow Mining Co. plans development of zinc mine in north Arkansas field, for which it has federal loan of $20,000. John Dirst, manager, and W. C. Cushing, mining engineer, have headquarters at Yellville.

WISCONSIN

MARINETTE, WIS.—Marinette Maritime Corp. has plans by Max Hanisch, Stephenson building, for one-story boiler house.

MILWAUKEE — Harnischfeger Corp., 4400 West National avenue, has let contract for one-story chemical storage building to R. L. Resinger & Co., 733 Van Buren street.

TEXAS

HOUSTON, TEX.—Nyotex Chemical Co., C. F. Dunasky, Mellie Esperson building, has let contract to William A. Brunet, Shell building, for main building of lime and chemical plant to cost between $50,000 and $100,000.

KILGORE, TEX.—R. Lacy Refining Co., Longview, Tex., will reconstruct certain units of cracking plant. Estimated cost $150,000.

CALIFORNIA

BERKELEY, CALIF.—American Forge Co., 701 Ashby avenue, has let contract for repairing building to Fire Protection Products Co., 1106 Sixteenth street, San Francisco. Estimated cost $48,000.

LOS ANGELES—Contract has been awarded for machine shop at 2940 East Olympic boulevard, for Universal Metal Products Co., 641 East Sixty-first street. Estimated cost $15,000.

LOS ANGELES—Abasco Welded Products Co. is the firm name under which Louis B. Adams, Leland B. Adams, George M. Sims and Dale M. Benest have obtained a certificate to conduct business at 5244 West Adams boulevard.

LOS ANGELES—Fluor Corp., 2500 South Atlantic boulevard, Los Angeles, and M. W. Kellogg Co., 1025 Broadway, New York, have been awarded contracts to erect a 100-octane gasoline refinery plant at Parko, Wyo., for Sinclair Refining Co., to cost over $1,000,000.

LOS ANGELES—Dallas Tin Corp., subsidiary of Los Angeles Byproducts Co., Los Angeles, will operate plant to be erected in Texas. H. K. Ferguson Co., Hanna building, Cleveland, general contractor. Cost estimated at $1,000,000.

LOS ANGELES—Weston-Aero-Hydraulics Inc. has been organized with capital of $200,000, by Ira E. Weston, Sten A. Anderson, and H. C. Borgeson, all of Van Nuys, Calif. The new corporation is represented by Kaplan & Livingston, 6253 Hollywood boulevard, Los Angeles.

LOS ANGELES—Six Wheels Inc. is erecting additions to its factory at 1564 East Twentieth street.

LOS ANGELES—RFC has approved appropriation of $12,500,000 for construction of first unit of an airplane modification plant in Alabama to be built under a Defense Plant Corp. contract and to be operated under contract with United States Army Air Forces and Bechtel-McCone-Parsons Corp., Los Angeles. Meriman and John C. Byrne are engineers for the company.

SAN PEDRO, CALIF.—Contract has been awarded for three-story mold loft and warehouse building at berth 77, San Pedro Harbor, for the Standard Shipbuilding Corp. Estimated cost $30,000.

SOUTH SAN FRANCISCO, CALIF.—Western Pipe & Steel Co., South San Francisco, has awarded contract for plant to Carrico & Gautier, 365 Ocean avenue, San Francisco.

WILMINGTON, CALIF.—Building permit has been issued to Shell Oil Co. for refinery building at 20945 Wilmington avenue here, to cost $176,000.

CANADA

HAMILTON, ONT.—Dominion Foundries & Steel Ltd., Depew street, has given general contract to Frid Construction Co. Ltd., 126 King street East, for addition to chipping and annealing aisle and annex. Plans have been prepared by Prack & Prack, Piggott building. Estimated cost $1,100,000 with equipment.

SAULT STE. MARIE, ONT.—Algoma Steel Corp. Ltd., Wilde avenue, will start work immediately on repairs to Nos. 4, 5 and 22 open-hearth furnaces, to cost about $45,000.

ST. THOMAS, ONT.—St. Thomas Bronze Co., Wellington and First streets, D. M. Loucks, manager, has given general contract to Sidney Jones, 244 Ridout street, London, for plant addition to cost about $12,000, equipment extra. John T. Findlay, 17 Hincks street, architect.

TORONTO, ONT.—Dominion Wheel & Foundries Ltd., 171 Eastern avenue, is receiving bids through James, Proctor & Redfern Ltd., 36 Toronto street, for plant addition to cost with equipment about $25,000.

TORONTO, ONT.—Willard Storage Battery Co. of Canada Ltd., 269 Campbell avenue, has given general contract to Bradford-Hoshal, 1170 Yonge street, for plant addition. Plans have been prepared by Chapman & Oxley, 2200 Sterling Towers.

TORONTO, ONT.—Metals & Alloys Ltd., 7 Wiltshire avenue, has given general contract to Dickie Construction Co. Ltd., 17 Yorkville street, and preliminary work has been started on plant additions, to cost about $160,000 with equipment. Plans call for an aluminum and bronze foundry, magnesium foundry building, receiving, shipping and laboratory building, and unit for oil and water pumps.

BEAUHARNOIS, QUE.—St. Lawrence Alloys & Metals Ltd. is completing erection of $75,000 office building here and has had plans completed and will start work immediately on plant addition under supervision of R. A. Turnbull, chief engineer. Cost with equipment about $90,000. New equipment will include electric smelting furnace.

LONGUEUIL, QUE.—Canadian Pratt & Whitney Aircraft Co. Ltd., Lorne avenue, will award contracts soon in connection with plant addition to cost about $60,000, equipment extra. Plans are by Edward J. Turcotte, architect, 1010 St. Catharine street West, Montreal.

MONTREAL, QUE.—Canadian Machine Works Co., 752 Rachel street East, has begun preliminary work on addition to machine shop to cost about $60,000 with equipment. D. Bordeau, 2570 Iberville street, has general contract.

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2-1½-1¼	Louis Allis	1200/ 900/600/450
2-1 1/3-1 2/3	Fair Morse	1800/1200/900/600

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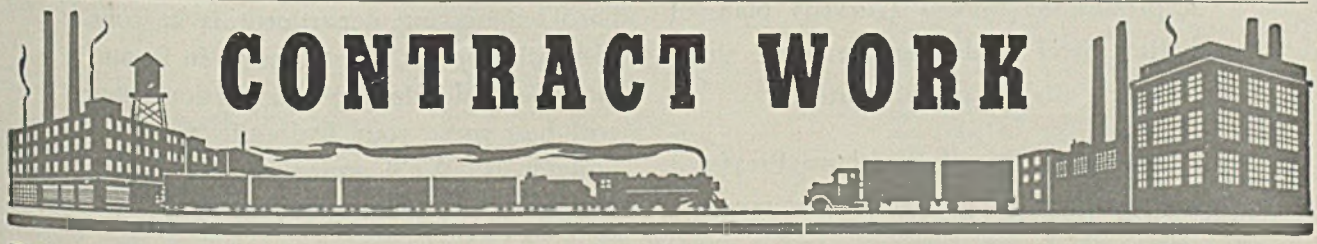

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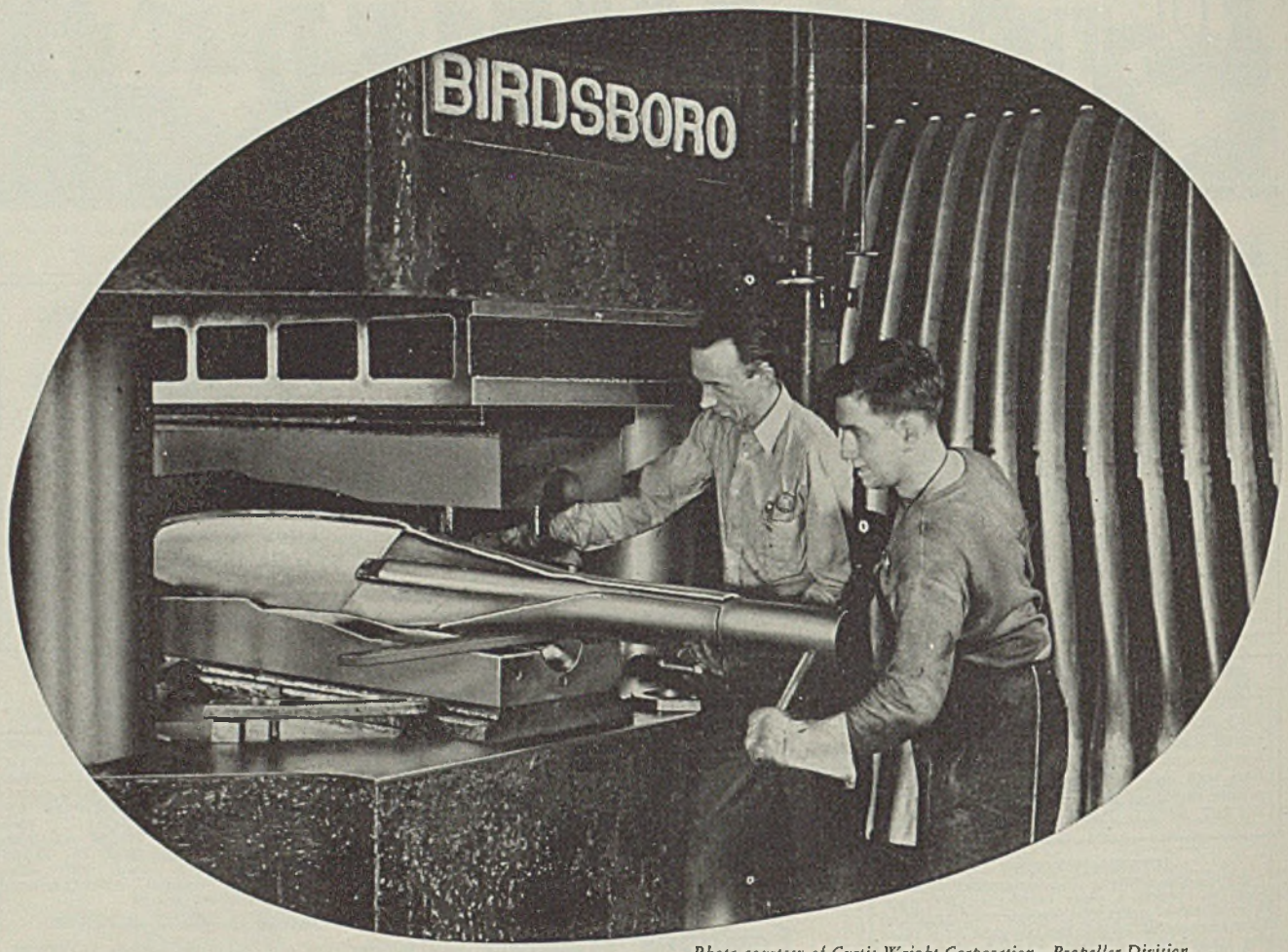

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