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STEEL
July 24, 1944

Heads I Win; Tails You Lose!

On or before July 31 officers of every corporation in the United States will have performed a painful duty which should remind them of the urgent need for drastic tax reform. On or before that date they will have declared the values of the capital stocks of their respective corporations and will have paid their so-called capital stock taxes.

Their duty is painful, not because of the amount of tax paid but because of the absurd manner in which it is determined. This curious tax, which in its present form dates back to 1933, requires corporation officials to commit a technical lie and to gamble in a game so crooked that it is impossible for any player to win.

The law provides that officers of a corporation declare a value on its capital stock which has no relation to its true value. This year it is not uncommon for a corporation whose stock is worth say $1,000,000 to declare a value of $5,000,000 or more. This greatly inflated value is declared not because the corporation's officers wish to deceive but because the law challenges them to guess at a valuation that will exceed by as narrow a margin as possible ten times the corporation's 1944 earnings before taxes.

In this game the player is almost certain to lose. If he guesses too high, he is penalized by paying $1.25 per $1000 for the amount by which his declaration in July exceeds ten times the corporation's earnings as determined when the books for 1944 are closed early in 1945. If he guesses too low, his corporation is compelled to pay stiff declared value excess profits taxes on the amount by which ten times the corporation's earnings exceed the declared value.

One would think that if the tax authorities are concerned with revenue only, they could accomplish their purpose by the simple expedient of levying a tax of 1.25 per cent on earnings before taxes. This is equivalent to the $1.25 per $1000 on a correctly guessed declared value. Why the guessing? A national lottery, which the public has frowned upon consistently because of its gambling aspects, is infinitely fairer than the capital stock tax. In a lottery somebody wins; in the capital stock tax guessing game, everybody gets gypped.

Isn't it time that we revise our tax system so that corporation officials are not required by law to be deceivers and gamblers?

GET READY FOR THIS: Fall of the Tojo cabinet forecasts a situation which should concern every leading American industrialist. The two Japs commissioned by the emperor to succeed Tojo were friendly to the United States. In time their cabinets will be replaced by civilians, some of whom will be Japanese business men who before Pearl Harbor had good connections with industrialists in the United States.

In Germany events will take a different course, but in the end the German authority with which we deal in arranging peace terms will include industrialists, some of whom are well known by and prior to the war enjoyed the respect of American industrialists. The enemy nations will exploit to the limit the one-time good relations of their captains of industry with their contemporaries in the Allied Nations.

Perhaps some Americans are visualizing their first postwar talks with their prewar business friends in

(OVER)

Germany and Japan. They can anticipate almost word for word the laborious explanation by the German and Japanese business man of how he was compelled by reasons beyond his control to play ball with Hitler or Tojo.

American business men will be well advised to consider the attitudes they will take toward these ingratiating advances. Industrialists will be in positions to encourage or discourage the sowing of seeds for future wars. Now is the time to decide what to do when this situation arises.

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REHIRING SERVICEMEN: Carnegie-Illinois Steel Corp., which now has more than 40,000 employes in the armed forces, has adopted a carefully prepared program for re-employing returning servicemen and for facilitating their adjustment from wartime to peacetime job routine.

In setting up a program of this kind, employers find that their problem is complicated by a number of factors largely beyond their control. One of these factors consists of commitments under collective bargaining agreements which involve numerous delicate questions of seniority. Another factor embraces government regulations, some of which are not clearly defined and all of which are subject to change.

Regardless of the difficulties and uncertainties involved, every employer should be well along on plans for taking back war veterans in an orderly and satisfactory manner. The policies adopted by Carnegie-Illinois, Bethlehem, International Harvester and other large employers who have announced plans recently should serve as useful guides for other companies. —p. 47

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BATTLEFIELD SCRAP: Although only small tonnages of battlefield scrap thus far have been purchased by dealers for delivery to scrap consumers through normal channels, there is evidence that accumulations of scrap from the battle zones may mount rather rapidly in the near future.

Army Salvage has established three segregation centers on the Pacific Coast—South Gate, Berkeley and Seattle. In June 2500 tons of scrap—mostly ferrous—were received at South Gate from South Pacific points and 10,000 additional tons were expected in two weeks of July.

The present trickle of scrap to receiving stations on the Atlantic and Pacific seaboards will increase to a steady flow. For some time this will be a welcome accumulation, after which we may encounter a problem of disposal. —p. 73

MASTER TOOLING DOCK: Consolidated Vultee has installed a tooling dock at San Diego which will attract the attention of every manufacturer who is confronted with the problem of fabricating fixtures of large dimension.

The San Diego unit is a steel framed structure 60 feet long, 15 feet high and 10 feet wide resting upon a massive foundation and equipped with four longitudinal straight edges 60 feet long and with 15-foot vertical straight edges and 10-foot transverse straight edges which are movable and can be positioned at any points on the longitudinal members. By means of this equipment it is possible to locate reference points anywhere in space in a minimum of time and to tolerances of 0.005-inch.

Manufacturers without such elaborate facilities have performed miracles with transits, piano wire, surface plates, height gages, scales, verniers and other devices, but to get results with such improvised equipment requires painstaking care, exceptional ingenuity and a great amount of time. Where the volume of large-dimension fixture work justifies it, the tooling dock of Consolidated Vultee or a modification of it offers promising possibilities.

—p. 97

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TACTFUL COMPROMISE: In considering the outcomes of the feud on gradual reconversion and of the recent conference on resuming automobile production it is well to understand that major government policy is involved.

On one side are the military authorities who fear a letdown in the war effort resulting from continued favorable war front news will be intensified by even a small-scale reconversion program. In this camp also are those who feel that partial reconversion now will favor some manufacturers at the expense of others who must remain on war work.

On the other side are those who, like Nelson, feel that a modest shift to civilian work now will make a wholesale shift easier later on and will reassure employes that they need not fear serious unemployment. Also they hold that the injustice to war contractors is less than that which would result if reconversion were held back until all were ready to shift simultaneously.

The four-order program is a compromise between these conflicting viewpoints. —pp. 50, 63

E. L. Shaner

EDITOR-IN-CHIEF

Ryerson flame-cut steel pl being loaded aboard Zep for Denver shell-loading pl

Ryerson

Rushes Emergency War Steel . . .

Prepared and delivered 1200 miles in 23 hours!

Disaster—damaging as enemy bullets—struck a Denver shell-loading plant. An all-important casting had cracked. Weeks were needed to replace the broken part. Production of desperately needed anti-tank shells was threatened.

At 10:30 the morning of the breakdown, a Ryerson service man suggested flame cutting steel plates to the required shape. The order was immediately phoned to a Ryerson plant 1200 miles away.

Plates of a thickness needed for the job were in Ryerson stocks ready for such an emergency. Just four hours after the order reached us, the steel was cut to shape and on its way. At 5:30 that afternoon, the Denver Zephyr pulled out with the plates—still warm from the burning operation. The shell plant got its steel at 9:30 next morning. This record-breaking Ryerson delivery not only saved weeks of production time—but the flame-cut plates were stronger than the casting they replaced—and cost less!

When you have a problem of steel supply, application or fabrication that needs an extra measure of "know how", extra speed and cooperation—get in touch with your nearest Ryerson plant. Stocks in the eleven-plant network are the nation's largest, including: bars, plates, structurals, sheets, tubing, stainless, alloys and many other steel products. Service is always quick, accurate, personal. It will pay you to call Ryerson for steel.

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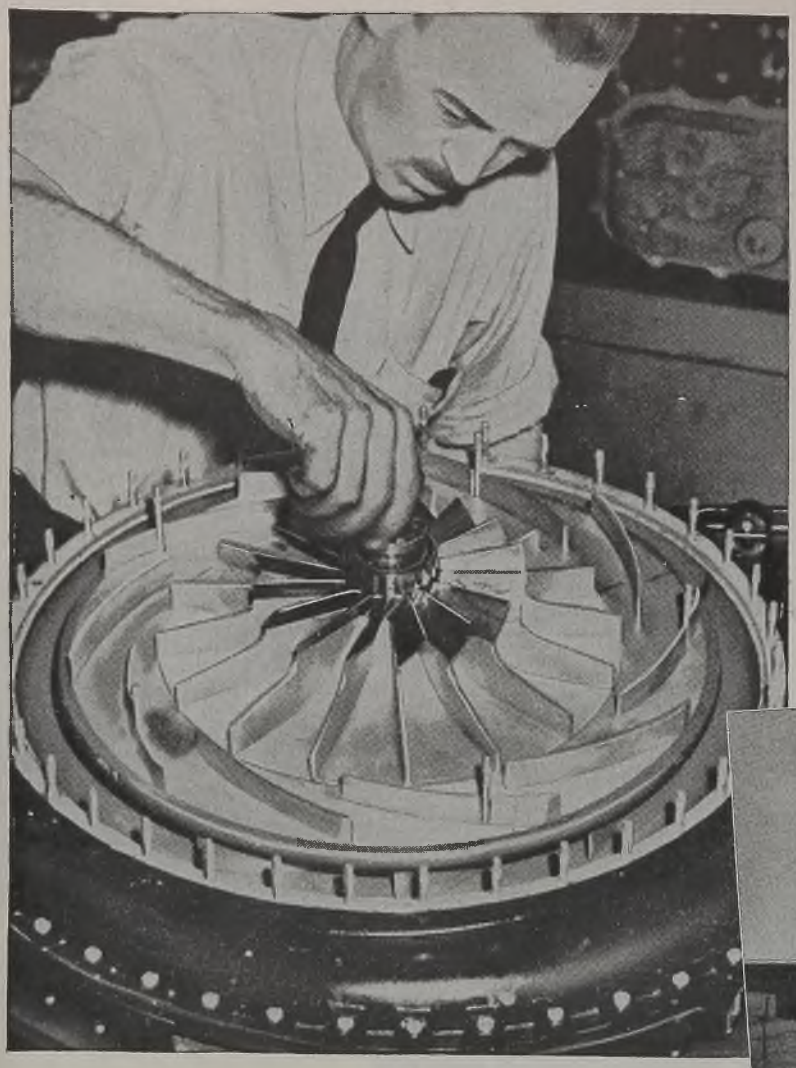
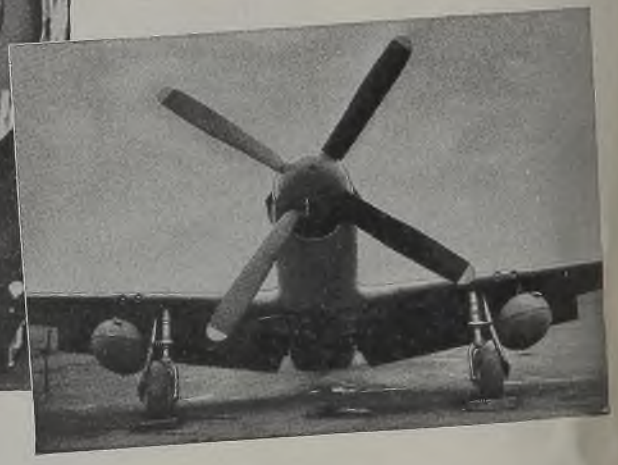


LIFTING THE *Ceiling*



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Steelmaker Adopts Policy For Absorbing Servicemen

Carnegie-Illinois Steel Corp., with more than 40,000 employes now serving in the armed forces, sets up basic plan designed to facilitate rehiring of discharged veterans. Policy is tailored to meet any future governmental regulation

Back from the fighting front, Steve Dzamko is backing up his former buddies "over there" by working in the heat treating and forge machine shop at Carnegie-Illinois Steel Corp.'s Homestead Works

By R. L. HARTFORD
Pittsburgh Editor, STEEL

PITTSBURGH

PROBLEM of re-employing returning servicemen has already made its appearance in industry with the discharge of thousands of men through physical disability, for passing above military age and for various other reasons. Available records indicate approximately a million veterans have already been released from military service and during 1944 the release rate will run between 60,000 and 70,000 men per month. This, of course, is merely preliminary to the larger problem which will come with cessation of hostilities.

Many forward looking companies in the metalproducing and metalworking industries have established policies to guide them in reabsorbing returned veterans. This is particularly true of the larger companies. Among these larger companies which have taken steps to handle the problem is Carnegie-Illinois Steel Corp. which already has more than 40,000 former employes now in the armed forces. Company estimates indicate that as many as 50,000 of its employes may be inducted before the end of the war. Thus far 1718 discharged former employes have been rehired, together with 663 other returned veterans. To handle the problem the company has developed a general policy which may be of interest to all employers.

The problem of reinstatement divides itself into two principal categories: (1) Adoption of a general policy to cover re-employment which will be consistent with collective bargaining agreements and governmental regulations, and (2) establishment of a definite procedure to put such a policy into effect. One of the principal difficulties now involved in this problem is the fact that the governmental angle has not yet been completely settled. However, a basic plan can be set up which can be subsequently tailored to meet any future government regulation.

The legal requirement for re-employing former employes covers certain specific groups but not by far the total number of employes who have left to enter the armed forces. In general, the obligation covers employes inducted under the Selective Service act and the National Guard Training act, employes who volunteered for the armed forces, Merchant Marine, Women's Auxiliary Corps or Red Cross Field Service after May 1, 1940, and employes released by the company for special government service at government request after July 1, 1940. Such persons were given special war service leaves and during the period of that leave these employes receive full credit for continuous service for purposes of seniority. Participation in various pension funds and plans also has been preserved.

It is obvious that some of this work devolves upon government, while certain specific functions are within the company's sphere of activity. For example, a governmental agency will centralize the job of mustering out veterans and replacing them in gainful employment. Much of this work will be handled through the local draft board working in reverse. Government will provide prospective employers with information regarding previous work experience, military experiences, training while in the armed service, and physical disabilities, if any. In case veterans wish to accept positions with companies other than their previous employer, the government will notify the previous employer so that particular job will not be held open. The government will also tell the veterans what their privileges and advantages may be under the legislation passed affecting them. Disabled veterans will be assisted insofar as possible in regaining skills or acquiring new skills so they will be fit

Kelly Jones, 38-year-old Goodyear Tire & Rubber Co. worker, recently released from military service to return to his old job of building critically needed military truck tires, greets Lieut. Gen. W. S. Knudsen, Army production expert, on a recent visit to Goodyear plants.

for employment. Educational or vocational training will be provided for those returning veterans who so desire.

When the veteran returns and asks for his previous position, he must apply for such re-employment within 40 days after date of his discharge. This does not mean necessarily that he will be denied re-employment if he fails to meet this requirement, but special consideration must be given if it is not met. He must be honorably discharged from military service and he must be qualified to perform the duties of the position in question.

There are certain groups which do not fall into the limitations outlined above, even though they may be former employes of the company. These include employes who voluntarily terminated their service with the company before entering the armed forces, particularly those who left before the effective date of May 1, 1940. Also in this category are employes hired to fill vacancies left by other employes who were inducted or who enlisted. Employes who were hired to fill strictly war jobs which do not exist after the emergency are not eligible for a military leave of absence. This is also true of employes who had not completed a probationary period (usually 6 months) before entering war services. Employes in these four groups do not have credit for continuous service and therefore will be considered in the same light as new employes when returning and asking for employment. This is not a hard and fast rule, however, and the company expects to consider each such case on its merits with a view to re-employing such veterans in jobs which may be available.

If the returning veteran has the proper military leave of absence but on returning refuses to accept the job he left before the war, he forfeits his legal rights under the act, but the company policy states definitely that such men shall be given consideration for placement in higher rated positions if they can demonstrate ability to perform, or if the refusal is based on a physical disability, transfer to another job should be approved by the medical department and in accordance with the other provisions of the general policy.

Job May Have Been Eliminated

In case the veteran returns to find his job has been eliminated, he will be given special consideration in order to provide him with employment equal to his former status in pay, even though under the Selective Service act the company does not necessarily have to rehire such people. It is the sincere view, however, of the company management that such employes are entitled to special treatment and every effort should be made to restore them to a job suited to their capabilities.

If the veteran who applies for a job was not formerly employed by the company but holds a military leave of absence from another employer, he will be given preferential consideration over non-veteran applicants for those positions in which new employes are usually placed. Such applicants, however, will not be given positions at the expense of present employes nor will that preference hold beyond the 40-day period after discharge.

One of the most difficult problems involved will be that of employing returned veterans who have never previously had employment. Most of these, of course, will be younger workers who were inducted or enlisted direct from school and had never had any job experience. They will be placed on the same footing as the veterans on a military leave of absence from other concerns and will be given preferential consideration for vacancies in positions where new employes are usually placed. The company policy here states that such applicants who live in the residential area of the plant involved will be given preference over those whose homes are elsewhere.

The general policy in regard to disabled veterans is to seek productive employment for those men in occupations which they are capable of filling. This will involve careful study by the plants of job requirements in order to determine what existing occupations offer suitable opportunities for persons suffering from various types and degrees of disabilities. Studies also will be made to discover what additional legitimate and productive occupations can be created through reshuffling of job requirements to make them suitable for disabled workers. Not only does the company desire to provide opportunities for its employable disabled veterans, but it will survey possible positions to which such employes might be promoted to determine whether the duties can be performed efficiently and with safety to the man and his fellow workers, and to enable such employes to hold their jobs and be promoted in accordance with their proved abilities.

Proper preparation in establishing such occupations and in designating classes and degrees of disabilities which can be accommodated and yet permit successful performance in these jobs will assure the worker that his job is justified on the basis of production and economy and is no case of "made work." Any other course of action would jeopardize the economic position of the company and affront the independence and morale of disabled workers.

This program will of course involve special training for the disabled veterans. The government may assist in the program and the company will see to it that the veteran secures the essential training, taking advantage of whatever government facilities may be available and supplementing these facilities through regular training channels. In this connection the company also will extend the special military leave of any returned veteran who wishes to take advantage of government educational programs. The company will encourage veterans to attend schools or colleges if available insofar as the collective bargaining agreements do not restrict the extension of the leave of absence. Such individuals will be subject to recall to the job at any time, however, and if they refuse to do so, their military leave rights may be forfeited.

The question of how long preference should be extended to veterans is a diffi-

cult one for any company to tackle. Carnegie-Illinois takes the stand that once a returned veteran has been reabsorbed by industry and has been put into a productive job, he attains the same level as other workers and should not thereafter be given particular preference. One exception to this rule, however, must be made in the case of disabled veterans whose handicaps may remain with them for life. Special attention will be paid these individuals until it is no longer necessary.

For present employes who are filling positions of men in the service, the company has decided that they will be subject to demotion, regrading or layoff if such action becomes necessary to reemploy properly qualified veterans in their old jobs. Such employes have been in the main given only temporary rating and have no permanent standing with the company. Classification of these workers is done by the Industrial Relations Department and each job request from any departmental head must be marked clearly, "For reason of military separation to fill vacancies caused by quits or to fill positions created by war expansion." Only in the case of a permanent non-war job shall the employe be given a permanent rating.

Promotions on Temporary Basis

Promotions made on the same basis shall also be considered temporary and the employe must be notified that the temporary condition exists. No temporary employe will be granted a military leave of absence, even though he is inducted while employed by the company. This eliminates the possibility that more than one person could return to a given permanent job after the war.

Some degree of employment preference will be given to employes of other war industries who are subject to unemployment because of dissolution or deflation of the industry in which they worked during the war period.

In the case of women employes, if a returning serviceman displaces a temporary woman employe, she will be laid off unless work is available for her elsewhere in the company. Exceptions will be made to this rule, however, particularly in those cases where the woman is married to a man still in the service or is supporting an incapacitated veteran, or who because of family losses caused by the war must support herself or her family.

It is obvious from the description of the general policy involved here, re-employment of returning servicemen is found to be extremely complicated. It is therefore essential that a record be kept of each employe involved showing his status as a permanent or temporary employe, his war record if any, and his previous job record. It is also necessary to keep a complete record of each job showing who has filled it and who has the claim to permanent employment in that job. This is obviously necessary in order to identify the proper claimant in case more than one man asks to return to that job on the cessation of hostilities.

The actual mechanics of reinstatement of men returning from the armed forces begin with the director of personnel at the plant involved, and he will personally welcome the returning veteran and will see to it that the veteran is placed in the proper job and will follow up to determine how the employe is functioning and how he reacts to his environment. The personnel and job records mentioned above will be used to determine the position to which he is eligible, as well as the status of other employes who might have some claim to the job in which the man is placed. When there is no doubt as to the proper placement of the man, the supervisor involved will be notified and it will be the supervisor's job to explain the reason for layoff or demotion to any temporary employe because of the return of the serviceman.

The returning veteran will be given a complete medical examination upon his return, the results of which will be checked with his war record. Indoctrination films will be provided to be used in reinstating ex-service employes. Such films will also include material planned to acquaint new employes with the company inasmuch as there undoubtedly will be a large number of veterans returning who have no previous work experience. In addition to the films, pamphlets and other literature will be utilized in the general program of reorienting servicemen to the job.

All veterans, as with all other employes, will be eligible for enrollment in training programs calculated to prepare them for advancement in the job. In the case of veterans particularly, the training program will involve quick brush-ups if necessary to assist them in filling their previous job, as well as preparing them for promotions whenever a vacancy may occur. The foreman under whom the veteran is to work will determine the extent and nature of training or retraining which the employe needs and will furnish this either through personal attention or the use of job instructors. The personnel director will also co-operate with the foreman in following up the progress of the veterans, both new and those who have returned to their old jobs.

Present, Past and Pending

KNUDSEN HEADS NEW MATERIEL ORGANIZATION

WASHINGTON—War Department reports that Lieut. Gen. William S. Knudsen, who has been serving as director of production in the office of the Secretary of War, will head a new organization combining the materiel and service commands of the Army Air Forces. With headquarters at Patterson Field, O., the organization will be known as Army Air Forces Materiel and Services.

BETHLEHEM STEEL ARRANGING SALE OF $60,000,000 NOTES

NEW YORK—Bethlehem Steel Corp. is arranging the sale of a new issue of $60,000,000 notes with a group of institutional investors. Company will utilize proceeds to retire its convertible 3½ per cent debentures and serial debentures.

POTENTIALLY WORLD'S LARGEST COAL PRODUCER

PITTSBURGH—The new Robena mine of U. S. Steel Corp.'s H. C. Frick Coke Co., which is now delivering coal at the rate of 4000 tons daily, is expected to have a daily output of 20,000 tons of washed coal when completed. This will make it the largest bituminous coal producer in the world.

STERLING DEVELOPS EFFICIENT DIESEL ENGINE

BUFFALO—Sterling Engine Co. reports that after 15 years research experimentation, it has developed a new, refined diesel engine that can be installed in boats to replace its gasoline engines of the same horsepower.

MEXICAN COMMISSION SEEKS AMERICAN MACHINERY

WASHINGTON—A Mexican purchasing commission, which does not have an official status but has the support of the Mexican government, has been organized here with $20,000,000 in initial available credits to be used for the purchase of many types of industrial machinery not needed for war production.

PLAN TO PRODUCE TIN CANS IN VENEZUELA

NEW YORK—Export licenses for necessary machinery and equipment to manufacture tin cans in Venezuela for processed foods of that country have been obtained by the Grey International Corp. Expected to be in production by November, the plant will have an annual capacity of from 60 to 75 million standard cans.

REPORT FORD PLANS BUILDING REVAMPED MODEL "A"

WASHINGTON—Ford Motor Co., Detroit, plans to produce a revamped version of its famous old model "A" immediately after the war as part of the company's bid for supremacy in the automobile field, according to newspaper reports. The automobile will be in the extra-low price field, reportedly selling for about $500.

WPB Releases Aluminum for Broader Use

First of four orders signalling start of reconversion issued. Others to follow over period of a month. Only limited expansion in civilian goods production likely for present

REMAINS AT POST: Charles E. Wilson, executive vice chairman, War Production Board, is shown here as he left the White House recently after conferring with President Roosevelt. He said that he again had acceded to the President's request to remain at his government post instead of returning to his job in private industry as head of the General Electric Co., Schenectady, N. Y. NEA photo

FIRST of four War Production Board orders signalling start of reconversion of industry from war to civilian goods production went into effect July 15, when aluminum and magnesium, which are in surplus supply, were released for civilian goods manufacture under certain restrictions.

Under terms of the aluminum order, any use of the metal in expanded civilian goods production must not involve use of manpower, facilities or materials which are needed in the war program. Currently it is estimated there is a 3,000,000 pound surplus of aluminum.

Releasing of aluminum to industry is in step with a compromise decision reached a week ago between the WPB, the War Manpower Commission and the Army and Navy. This compromise resulted in staggering over a period of a month the effective dates of Donald M. Nelson's proposed plans to start reconversion.

The second of the series of orders, that permitting manufacturers to make working models of the postwar products they plan to produce is scheduled to go into effect July 22. The third in the series, permitting a producer to acquire machine tools and other production machinery necessary to peacetime manufacture, becomes effective Aug. 1, while the fourth order, that permitting a manufacturer to produce civilian goods in any area where his operations will not take manpower, production facilities or materials from war production, goes into effect on Aug. 15.

In announcing the new aluminum order WPB officials emphasized that although it still keeps some restrictions considered essential to protect war production, anyone who wants to use aluminum for any purpose not covered by the order, or who wants to increase his use over the allowed limits, may apply for permission under regular authorization and appeals procedures.

Controls which are retained over aluminum are chiefly to assure that manpower requirements of war production are fully met and not diverted to production of peacetime goods. This, according to WPB officials, will assure that war production programs are not hindered by labor shortages. At the same time these officials emphasized that no immediate large-scale resumption of civilian production is expected. War demands still come first—and will continue to come first until Germany and Japan are defeated.

New Rules Established

The new rules relating to use of aluminum, contained in supplementary WPB order M-1-I, provides that the metal may be used in the manufacture of cans, subject to packing quotas applicable to all cans under order M-81, and for making pots and pans to the extent allowed by the L-30 series of WPB orders. The use of aluminum was formerly forbidden for these products. In addition, rules relating to the use of aluminum in the manufacture of closures have been liberalized.

All other products which previously could be made from aluminum continue to be permitted under the revised order.

Furthermore, aluminum may be substituted for any other metal in the manufacture of any item. The order contains restrictions preventing this substitution from creating an increase in total production—which might use too much aluminum or divert manpower from more essential operations.

All restrictions on use of aluminum in WPB orders other than M-1-I, whether it is referred to specifically as aluminum or merely as a metal, no longer apply. However, rules relating to aluminum scrap (order M-1-D) and to aluminum pigment (M-1-G) are not affected by the changes.

Persons who desire to use aluminum for other purposes than (1) manufacture of articles permitted under order M-1-I, or (2) substitutes for other metals may apply to the Aluminum and Magnesium Division, War Production Board, Washington for specific permission to do so. Such applications should be made by letter in duplicate, and should indicate substantially the following information:

1. Weight, form and alloy of aluminum, for which authorization to use is requested.

2. The number of months the quantity of aluminum requested will cover estimated requirements.

3. The part to be fabricated or other use to be made of the aluminum requested.

4. The production into which such part will be incorporated, and end-use of the product.

5. If previous requests for this use have been authorized or denied, give reference number of most recent authorization or denial.

6. Manpower information on form WPB 3820, or, if granting the authorization will not involve any increase in number of production employes in applicant's plant, a statement to that effect.

The amended order also contains an

appeals provision which may be used by persons who desire to use more aluminum for a specific purpose than they would be permitted to do under its provisions. Appeals should be filed with the Aluminum and Magnesium Division, in conformity with provisions of Priorities Regulation No. 16.

As a precautionary measure to assure that amounts of aluminum made available for production of civilian goods do not interfere with output of aluminum for military purposes, a deferred allotment procedure has been adopted. Aluminum may still be obtained under the usual allotment application procedures, but, especially for new uses, the WPB may issue "deferred allotments" of aluminum which will permit producers to delay filling orders for aluminum going into civilian goods if they would interfere with war orders. This procedure is described in the new Direction 54 to CMP Regulation No. 1.

Modifications of the magnesium order, M-2-B, lift restrictions on use of the metal in other than ingot or raw form and provide means for its distribution to civilian uses. It may be used as a substitute for other metals in the same way as aluminum. Since there are few large civilian uses for magnesium at present, it is expected that its civilian uses will be largely for experimental purposes. It will be made available for new civilian uses on preference ratings after previous allocations for war purposes have been met.

Approved Items Listed by WPB

The use of aluminum is specifically permitted for the following purposes, including manufacture of the items listed below and parts, components and subassemblies of such items.

1. Products and equipment prescribed for use by and produced for the Army and Navy of the United States, the Maritime Commission, or the War Shipping Administration of the Army or Navy of a foreign country.
2. Aircraft, in addition to those described in subparagraph (1) above.
3. Alloys.
4. Aluminizing or calorizing.
5. Aluminum to be exported in any of the forms and shapes described as a controlled material in CMP Regulation No. 1.
6. Anhydrous aluminum chloride.
7. Anodizing equipment.
8. Automotive busses, trucks and truck trailers.
9. Cans. The receipt and use of aluminum cans is subject to the quota provisions of Order M-81 except in the case of cans authorized under direction 4 to Order M-81.
10. Carbometer wire.
11. Cathodes for the electrolytic refining of zinc and cadmium.
12. Cauls for use in the manufacture of plywood.

Chemical Equipment Included

13. Chemical processing equipment for use in manufacturing plants.
14. Closures for parenteral solutions and blood.
15. Closures of aluminum sheet or strip for glass containers. The use of glass container closures made of aluminum is subject to the quota provisions of Order L-103-b.
16. Collapsible tubes. The use of aluminum collapsible tubes is subject to the quota provisions of Order M-115.
17. Cooking utensils to the extent allowed by orders in the L-30 series.
18. Commercial radio equipment and all wire communications equipment, but only where aluminum, copper or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941. The above restriction in part on the use of aluminum does not apply to electronic equipment, as defined in Order L-265, manufactured pursuant to subparagraph (25) below.
19. Data and instruction plates.
20. Electric bus bars, electrical conductors, and current-carrying accessories for conductors.
21. Electric condensers.
22. Electric conduit fittings and wiring devices, but only where aluminum was used in commercial production in the United States during 1939, 1940 or 1941.
23. Electric motors.
24. Electric switch gear equipment.
25. Electronic equipment, as defined in Order L-265.
26. Fire-fighting equipment, protective signal and alarm equipment, but only where aluminum, or copper or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941.
27. Food processing machinery for bakeries, canneries, dairies, dehydrating plants and packing plants.
28. Foundry equipment, the following items only: Bottom boards, core boxes, core dryers, flasks, match plates and patterns. Damaged and obsolete equipment listed in this paragraph may be remelted for the production of new items listed in this paragraph without a CMP application or authorization pursuant to Order M-1-d. (See Direction 1 to CMP Regulation No. 5).
29. Galvanizing, for addition to bath.
30 Hydraulic brake pistons.
31. Industrial-type fans and blowers and fans and blowers manufactured for incorporation into other machinery or devices, but only where aluminum or copper or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941.
32. Industrial machinery and attachments therefor, but only where aluminum or copper or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941. "Industrial machinery" as used in this subparagraph means machinery designed for use in manufacturing and chemical processing on a commercial basis; construction machinery, packaging machinery; conveyors for use in connection with manufacturing and chemical plants and in connection with construction; laundry, dry cleaners' and tailors' pressing machines, and shoe repair machinery. The above restriction in part on the use of aluminum does not apply to food-processing machinery if manufactured pursuant to subparagraph (27) above.

Provision for Spray Guns

33. Industrial spray guns and grease guns, but only where aluminum, or copper or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941.
34. Instruments, mechanical and electrical. Dials, scales and panels for all types of such instruments. Other parts of only the following mechanical or electrical instruments:
(I). Drafting machines.
(II). Engineering instruments.
(III). Geophysical instruments.
(IV). Industrial instruments for measuring, recording or controlling industrial processes.
(V). Laboratory instruments.
(VI). Safety controls and heating controls.
35. Internal combustion engines.
36. Jigs and fixtures for use in manufacturing processes.
37. Lighting equipment of the following types only:
(I) Aviation ground lighting equipment.
(II) Hospital operating room lighting equipment.
(III) Industrial type lighting equipment.
(IV) Miners' lamps.
(V) Reflectors for dry-cell lights.
38. Molds for the manufacture and repair of rubber products.
39. Orthopedic, medical, dental, ophthalmic and surgical instruments and equipment designed exclusively for orthopedic, medical, dental, ophthalmic and surgical use.
40. Portable electric and pneumatic tools.
41. Portable power-driven, tree-felling saws.
42 Pots and pans. See cooking utensils, subparagraph (17) above.
43. Repair and maintenance parts for mechanical or electrical equipment.
44. Refrigeration and heating coils and fins.
45. Research, developmental or experimental activities, including the making of experimental models to the extent permitted by applicable orders and regulations.
46. Safety equipment as defined in Limitation Order L-114, but only where aluminum, or copper, or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941.
47. Scales (weighing), but only where aluminum, or copper, or copper base alloy was used in commercial production in the United States during 1939, 1940 or 1941.
48. Steel deoxidizer.
49. Stove and range top burner heads.
50. Thermit reaction, for use in the manufacture of thermit powders and ferro-alloys only.
51. Welding rod and metallizing wire.
52. X-ray equipment, infra-red and ultra-violet lamps.

RECONVERSION CODE

Before granting authorization to any contractor wishing to commence civilian goods production the following conditions must be checked, WPB officials state.

(a) Whether plant is on schedule with military orders.

(b) Whether military prime or subcontracts can be placed in the plant.

(c) Whether workers can be released for other war programs in the area.

(d) Whether male workers can be released for inter-regional recruitment.

Additional production will be authorized if any of the following conditions apply:

(a) In plants where labor forces are needed in a standby condition for further war work.

(b) The female workers involved would be lost on the labor market.

(c) The plant will be able to train workers without interference with their war contracts so that they could expand production and employment rapidly when termination of war contracts occurs.

Truck Industry Expects To Meet 1944 Civilian Quota

Contrary to earlier reports, the truck industry expects to fill its 1944 quota of 101,000 trucks for essential civilian use, according to C. T. Ruhf, president, Mack Trucks Inc., New York.

The civilian truck total was raised to 101,000 from 88,000 following recent cutbacks in military truck production. The cutback, spread over the entire industry, was greater than the subsequent increase in the civilian truck quota.

During the first four months of this year, the industry produced 18,039 trucks for civilian use.

Pressure on Industry Rises with Key Military Programs Enlarged

Heavy materiel consumption on all war fronts imposing increasing burden on manufacturers in certain categories. Manpower shortage being keenly felt. Shell container program reported cut back 60 per cent to meet new conditions

WITH the Pacific war six months ahead of schedule and consumption of shells and other war materiel at an unexpectedly high level in both the European and Pacific theaters, a number of key war production programs have been materially stepped-up over the past few weeks.

To meet these augmented schedules is the major problem now facing the military and the War Production Board.

"Never before in this war has there been a time when the production situation in certain vitally important lines has been as critical as it is right now," John C. Virden, director, fifth regional War Production Board states. "We still have not started to meet the munitions requirements needed for these new schedules. We must speedily exceed the highest peaks of production that we have yet reached."

Reflecting the intensive efforts to increase output of key military programs, June expenditures for war hit a new monthly high of $7,957,000,000.

General opinion that current schedules for the war program will be met is faulty, Robert P. Patterson, Acting Secretary of War, states. "On the contrary actual production for the second quarter of 1944 was $400 million behind the estimates made on April 1, reflecting an 8 per cent lag in the goals set."

Items that failed to reach their quotas during the last quarter, he said, were the 155-millimeter guns, medium tanks and tank destroyers, bulldozers, heavy duty trucks and field wire for the Signal Corps.

WPB officials point out that this second quarter deficit not only has to be made up, but recently stepped-up tank, heavy cargo truck, large shell, ship construction, heavy bomber and tank programs have to be met.

The war program is feeling the pinch of the manpower shortage more keenly now than at any previous time. Wage-earner employment in all manufacturing industries declined 49,000 during June, which is considerably below the average monthly decline over the last six months. In the durable-goods group there was a decline of 63,000, against an average decline for the preceding six months of 94,000. The nondurable group reported an increase of 14,000 last month, in contrast with an average monthly decline of 69,000 over the preceding half year.

Problems being encountered in the heavy truck production program were explored last week at a conference in Washington of manufacturers with Lieut. General Brehon Somervell, chief of the Army Service Forces. The truck program is reported 32 per cent behind schedule, 75 per cent of the lag being attributed to a shortage of gray iron castings.

Extremely tight sheet delivery situation, curtailment in the small shell program and absence of any essential need to so thoroughly protect shells scheduled for the European war theater, have resulted in a reported 60 per cent cutback in the steel shell container program. Third quarter sheet schedules for this program formerly were 200,000 tons.

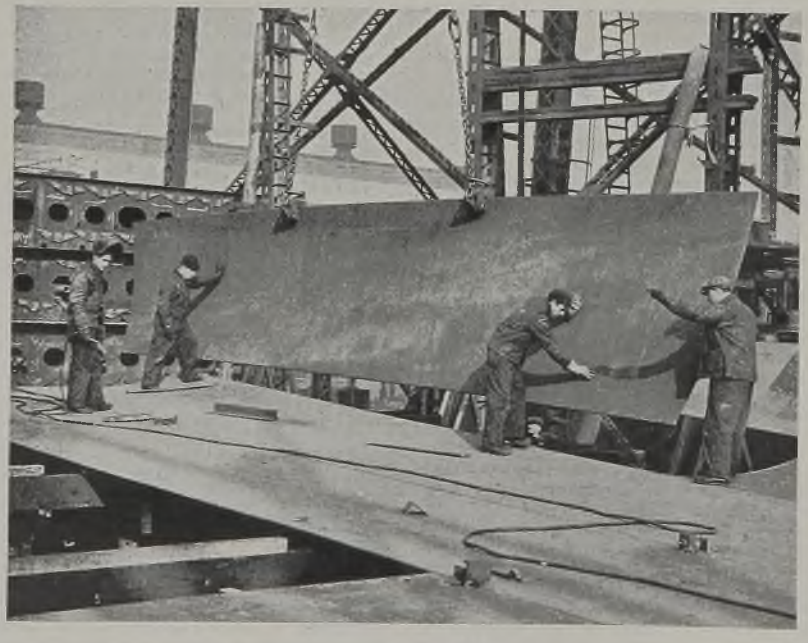
The biggest portion of the curtailment was centered in those containers for the 90-millimeter shells and under, containers for 57-millimeter shells being particularly affected.

At a recent WPB conference in Washington, Charles E. Wilson, WPB executive vice chairman, outlined to field representatives the present status of war production programs, and urged that efforts be made to bring and keep war production up to the required level.

"We can't fool ourselves about the steel situation, as one example," Mr. Wilson said. "Steel ingot and plate production has been dropping steadily in recent weeks. We have to step up steel output for all the important programs, as much as 500 per cent in some instances, for the fourth quarter as compared with the third period."

There is no hope of an increase in the availability of facilities for rolling steel plate for the next three to six months except to fill urgent military orders, WPB officials stated at the Steel Boiler Industry Advisory Committee meeting last week. No reduction in demand for quality plates or sheets is anticipated, and plate production has fallen behind from 70,000 to 75,000 tons per month in the past three months due to manpower problems. Rolling mills went into third quarter with carryover tonnage approximating 30 per cent of their orders, and this is not expected to be reduced by operations this quarter, the WPB representative said.

Industry members believe that the falling off in steel output is due basically to a manpower deficit of between 40,000 and 50,000 employes. In recognition of this situation, 26 plate mills have been placed on the urgency list for top priority in labor referrals and 500 key men under 26 years of age in the industry have been granted deferment. Application for deferment must be limited to only those men who are "absolutely irreplaceable" and whose loss "would affect the output of the plant." In addition the deferments will apply only to those engaged directly in the production of coke, pig iron, steel ingots, semifinished and finished steel products.



SHIP UNDERWAY: Workers at the Federal Shipbuilding & Dry Dock Co., Kearny, N. J., are shown as they placed the plates of an AKA—Attack Cargo Auxiliary—in place. A welder with a torch in hand stands by ready to "sew" the plates together. NEA photo

Steel Sheets in Tight Supply

WPB officials tell galvanized ware manufacturers that increase in military demands for steel sheets is making it difficult to supply them with materials for civilian products

HEAVY military demands for steel sheets have increased to such a degree that raw materials, as well as rolling space, has become a serious problem, thus increasing the difficulty of supplying enough steel to meet the needs of galvanized ware manufacturers, War Production officials said at the recent meeting of the Galvanized Ware Manufacturers Industry Advisory Committee.

WPB officials explained that in the event any military orders for sheet steel are canceled, they will be replaced by other military orders because many new programs are under way, such as the ammunition storage container program. It is therefore doubtful whether galvanized ware manufacturers will be able to take advantage of such cancellations to place orders for sheet for galvanized ware. Demand for steel plates also has increased.

Committee members reported that they had been able to place orders to the extent of their advance allotments. Though deliveries of sheets may be further delayed in the future, committee members said they expect to be able to produce galvanized ware to the full extent of their present iron and steel quota since they are permitted to place orders for material well in advance of the quarter in which it is to be used.

Questioned about the feasibility of making purchases from warehouses or from idle and excess inventories to supplement orders from steel mills, committee members said sheets in the needed sizes and types were not readily available from those sources.

According to manufacturers' reports, shipments of most types of galvanized ware were larger in the first quarter of 1944 than in the fourth quarter of 1943. Shipments of wash boilers were almost 200 per cent as high as in the fourth quarter of last year, wash tubs 140 per cent, and pails and buckets 117 per cent. Only garbage can shipments were lower, about 5 per cent below fourth quarter shipments of 1943.

WPB indicated that shipments of all types of galvanized ware, including garbage cans, have increased during the second quarter. Effects of the supplementary steel allotments made in the first quarter of 1944 are beginning to be reflected, since deliveries are now being made on orders placed with the mills at that time, committee members said. The increased steel usage permitted under L-30-a, as amended June 21, 1944, will be reflected later in the year.

A representative of WPL"s Office of Civilian Requirements emphasized the importance of maintaining quality standards for galvanized ware. He urged manufacturers: 1. To determine the optimum thickness of galvanized ware items for specific uses; 2. to apportion production of the different types, weights and sizes of galvanized ware in accordance with needs; 3. to distribute galvanized ware in such a way that each type of consumer will receive items of the proper type and quality for his purpose.

Steel and Iron Produced for Sale During May

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period MAY - 1944

Steel Products	Number of companies	Items	Maximum Annual Capacity Net Tons	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) Total	To Date This Year: Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	46	1	xxxx	xxxx	xxx	707,931	241,065	xxxx	xxx	3,541,383	1,109,556
Structural shapes (heavy)	10	2	8,977,450	329,997	44.3	317,753	xxxx	1,728,085	47.1	1,684,343	xxxx
Steel piling	4	3		6,651		9,497	xxxx	29,718		28,734	xxxx
Plates (sheared and universal)	23	4	15,990,020	1,153,043	85.1	1,097,578	55,667	5,861,428	88.2	5,685,199	235,719
Skelp	6	5	xxxx	xxxx	xxx	72,931	55,599	xxxx	xxx	361,169	281,319
Rails—Standard (over 60 lbs.)	4	6	3,625,000	205,916	67.0	204,379	xxxx	984,031	65.3	974,329	xxxx
—All other	6	7	518,600	17,130	39.0	15,783	xxxx	80,398	37.3	80,986	xxxx
Splice bars and tie plates	13	8	1,703,700	71,166	49.3	71,187	xxxx	342,421	48.4	349,190	xxxx
Track spikes	10	9	373,200	13,052	41.3	13,265	xxxx	62,021	40.0	65,780	xxxx
Hot Rolled Bars—Carbon	36	10	xxxx	729,825	xxx	610,089	76,612	3,673,062	xxx	3,083,530	397,725
—Reinforcing—New billet	15	11	xxxx	43,631	xxx	46,911	xxxx	189,365	xxx	200,651	xxxx
—Rerolled	15	12	xxxx	4,799	xxx	5,435	xxxx	37,869	xxx	43,567	xxxx
—Alloy	22	13	xxxx	265,289	xxx	193,052	43,546	1,363,432	xxx	993,752	194,511
—Total	45	14	21,207,210	1,043,544	58.1	855,487	120,158	5,263,728	59.7	4,321,500	592,236
Cold Finished Bars—Carbon	25	15	xxxx	154,689	xxx	150,906	xxxx	772,734	xxx	760,723	xxxx
—Alloy	22	16	xxxx	33,446	xxx	28,757	xxxx	175,629	xxx	154,301	xxxx
—Total	31	17	2,694,110	188,135	82.4	179,663	xxxx	948,363	84.7	915,024	xxxx
Tool steel bars	18	18	214,970	12,316	67.6	11,756	xxxx	61,134	68.5	57,817	xxxx
Pipe and Tubes—Butt weld	16	19	2,289,130	119,225	61.5	121,226	xxxx	599,410	63.0	586,657	xxxx
—Lap weld	8	20	967,900	51,497	62.8	50,687	xxxx	251,968	62.7	249,273	xxxx
—Electric weld	9	21	1,225,170	73,679	71.0	73,874	xxxx	307,077	60.3	305,976	xxxx
—Seamless	15	22	2,659,250	201,113	89.2	202,589	xxxx	988,163	89.4	978,243	xxxx
—Conduit	7	23	184,500	4,018	25.7	4,923	xxxx	20,833	27.2	22,139	xxxx
—Mechanical tubing	11	24	1,004,450	68,080	80.0	67,783	xxxx	348,570	83.5	356,228	xxxx
Wire rods	25	25	6,840,210	386,323	66.6	107,127	27,615	1,857,691	65.4	522,608	140,043
Wire—Drawn	40	26	5,468,830	306,055	66.0	179,480	4,626	1,498,920	66.0	847,258	21,197
—Nails and staples	18	27	1,224,880	55,958	53.9	53,380	xxxx	293,567	57.7	284,417	xxxx
—Barbed and twisted	15	28	551,720	21,682	46.4	22,341	xxxx	106,764	46.6	105,667	xxxx
—Woven wire fence	15	29	1,101,090	32,788	35.1	32,083	xxxx	160,925	35.2	159,835	xxxx
—Bale ties	12	30	150,660	6,199	48.6	6,395	xxxx	33,957	54.3	32,531	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	46,692	216	xxxx	xxx	193,016	832
—Chemically treated	8	32	464,000	12,865	32.7	12,259	xxxx	70,941	36.8	67,281	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,530,650	166,808	55.8	171,011	xxxx	707,287	48.2	773,795	xxxx
—Electrolytic	10	34	1,962,500	67,445	40.6	60,010	xxxx	268,209	32.9	246,791	xxxx
Sheets—Hot rolled	28	35	20,137,270	1,098,379	64.4	528,144	17,150	5,242,857	62.7	2,664,199	106,388
—Cold rolled	14	36	7,318,780	326,391	52.6	170,140	xxxx	1,509,984	49.7	837,027	xxxx
—Galvanized	15	37	2,686,410	111,909	49.2	108,783	xxxx	520,488	46.6	513,576	xxxx
Strip—Hot rolled	22	38	8,507,280	233,745	32.4	139,910	24,861	1,112,388	31.5	715,224	117,928
—Cold rolled	34	39	3,278,940	99,783	35.9	96,815	xxxx	480,793	35.3	453,516	xxxx
Wheels (car, rolled steel)	5	40	348,800	24,579	83.2	24,022	xxxx	123,290	85.1	123,092	xxxx
Axles	6	41	416,170	18,785	53.3	15,804	xxxx	90,855	52.5	87,133	xxxx
All other	6	42	150,270	3,687	29.0	7,098	xxxx	16,643	26.7	27,976	xxxx
TOTAL STEEL PRODUCTS	154	43	xxxx	xxxx	xxx	5,059,786	346,991	xxxx	xxx	29,218,912	2,605,218
Effective steel finishing capacity	154	44	64,722,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	154	45	xxxx	xxxx	xxx	96.9 %	xxxx	xxxx	xxx	99.0%	xxxx

Drive To Relieve Labor Shortage In Foundries Being Intensified

Government officials and industry executives co-operating in effort to recruit 20,000 male workers over next 90 days. Critical, expanded, war production schedules reported threatened by manpower deficiency

DRIVE to relieve the manpower shortage in the foundry and forge industries continued to gain momentum last week, government officials and representatives of the industries co-operating to the fullest possible extent to recruit 20,000 male workers over the next 90 days.

That the War Department views the situation as extremely serious is seen in the fact that Lieut. Gen. Brehon Somervell, chief, Army Service Forces, last week held a special conference on heavy truck production with industry representatives, including foundrymen, and interested government officials, at which conference the time-urgency of meeting enlarged war production schedules was stressed.

It is pointed out that the heavy truck program for the armed forces, for instance, is 32 per cent behind schedule, 75 per cent of the lag being attributed to a shortage of gray iron and malleable iron castings. Unless demands for workers are met in full and without delay, it is claimed production of vital components will continue to lag dangerously, threatening the entire military program for mobile equipment.

About 85 per cent of the material going into a tank originates in foundries or forge shops. While forgings and castings represent only 1 per cent of the total United States war production in dollars, they are used in products which represent more than 50 per cent of the country's entire war output.

Production of castings must be increased 15 to 25 per cent above the past year's total if the war programs are to be met, it is said. The industry is in a position to attain its production goals, if sufficient manpower can be recruited to operate its facilities which have been expanded and modernized during the past two or three years. That portion of foundry output which applies to the "must" programs is centered in approximately 300 foundries. Therefore, if the labor situation can be improved in these comparatively few companies, the necessary volume of castings can be turned out on schedule.

Industry Assigned Top Ratings

The War Manpower Commission, War Production Board and other government agencies are co-operating closely in their efforts to solve the problem which they have placed in the No. 1 position in their lists of activities. The WMC has assigned the industry top priority ratings for employment under the Priority Referral plan which became effective July 1. Under this plan, WMC's United States Employment Service tries to induce qualified job applicants to accept referrals to such high-priority plants as the foundries. Applicants are not denied the right to select any job so long as it is not a nonessential one, however. If there is no rapid improvement in the labor supply for such critical activities as in military truck manufacture, it probably will be necessary for WMC to order a change from the minimum to the maximum stringency in the application of the priority referral program.

Gray Iron Founders' Society Inc. in executive session at its Manpower-Price Control conference in Chicago July 6 adopted a series of resolutions, urging Deferment by Selective Service Boards of skilled men under 26 years of age and all men over 26 years who work in gray iron foundries; furloughing to the foundries of former employes of skilled foundry classification now serving in the armed services as are located within the continental limits of the country and not occupying critical positions in such forces; OPA permit the optional use of the formula method of pricing in lieu of present base period prices as covered by maximum price regulation No. 224; consideration be given to current costs in the development of formula pricing.

The industry is confronted by the fact that increased production must be achieved in spite of the usual seasonal decline of about 10 per cent in foundry employment, higher absenteeism during the summer months, and a labor turnover that is 50 per cent higher than the average in other industries.

Women have made a substantial contribution to the war effort by taking production jobs in foundries and now account for approximately 18 per cent of the industry's working force, not including those employed in administrative and plant offices. WMC has again appealed for women to take jobs in the industry which must be filled in addition to the 20,000 jobs that only men can fill.

In recent years women have been employed only in light work in foundries. Breakdown of employment figures shows that women now constitute 18 per cent

Hundreds of women now working in foundries throughout the country are finding their occupations are not the disagreeable tasks they have been pictured in some quarters, including governmental. In the accompanying illustration two women workers in the Radford, Va. plant of the Lynchburg Foundry Co. are shown finishing a core

the workers against 16 per cent six months ago, an increase of two points. ased on WMC's records, forge and undry employers near Chicago and in leveland are employing women in conderable numbers. One foundry at Harey, Ill., is employing 500 women and as had as many as 650 on its payroll. An East Chicago, Ind., firm is employing 00 women while a Cleveland foundry employing about 300 women in heavy orge shop work.

The Harvey foundry is employing women in the production of parts used in he famous B-29 bomber engine. These women work in the heat treating and inishing departments of the plant; load and unload furnaces; operate trimmer presses. It has modern equipment facilitating the employment of women. Electric hoisting machinery has been revamped. through the use of clamps instead of hooks, so that women workers are able to handle castings weighing 400 pounds.

At the plant at East Chicago, some of the women employes do the heaviest kind of labor, including unloading and shoveling of sand. The Cleveland firm also is using women as common laborers, as well as in laboratory testing, as welding helpers and in other kinds of work.

Employment of Women Limited

Spokesmen for the industry are of the opinion, however, that the employment of women in foundries is approaching he saturation point. Some of the limitations on hiring of women are: State laws, anitation and other facilities; too heavy r hot work. In steel foundries, for instance, the maximum limit for employment of women is believed to be about 8 per cent. One of the limiting factors on the number of women in any one foundry is that men workers usually must be called from other departments in the plant to aid the regular workers in the pouring department during the actual pouring operations. This is a common practice, especially in the smaller foundries.

Experience in the employment of women has varied greatly in the various types of foundries (steel, gray iron and malleable) as well as in individual companies within these groups. The best results have been secured where management has exercised care in selecting the right woman for the right job, has provided adequate prework training, sympathetic supervision, and safeguards for their health. Also rigging has been provided in many shops which make it possible for women workers to perform their jobs with relatively little physical effort.

Women are best suited to jobs involving light, continuous or repetitive operations and those requiring a high degree of manual dexterity. They excel on small core work, for which they have been hired for many years by malleable and gray iron foundries. They have established especially good records on and grinding of small work, as power uck and truck-tractor operators, heat checkers, sand testers, crane operators, tool grinders, furnace tenders, chemists, x-ray operators, brinell testers, chart changers, test bar grinders, inspectors of castings, power saw and drill press operators, lathe hands, and time keepers.

Resale Iron, Steel Product Price Schedule Revised

Changes in the price schedule governing resale of iron or steel products that either reflect industry practice or clarify existing provisions were announced last week by the Office of Price Administration. The changes are all minor in nature, and will result in no increase in the general price level. This action becomes effective July 25.

A number of items are added to various price tables to correct inadvertent omissions from the schedule. For example, pickling extras heretofore set forth in appendix C for other bars will now apply to hot-rolled alloy bars. An extra of 25 cents is added for beveled edge sections of hot-rolled carbon bar flats, square and round edge. New size designations are added to the size extra tables in all zones for channels and half ovals.

Certain changes are made in previously-established extras. Among these is one extending the tables fixing extras for pickling in zones 1, 2, 3, and 4 to provide an extra in cases in which hot-rolled sheets and bars, plates, and hot-rolled strip have been job or warehoused pickled. This extra is already in effect for all other zones and is in accordance with industry practice.

Typical of the changes made for purposes of clarification is the rewriting of the freight tables in zones 5, 11 and 17 so as to clarify the application of the maximum freight absorption provisions. Descriptions of the Omaha, Duluth-Superior and St. Paul-Minneapolis free delivery areas have been added in order to facilitate the determination of maximum prices in those regions.

POSTWAR PREVIEWS

HOUSING— Legislation pends in Congress under which federal government would participate in nation's housing development on a permanent basis in the postwar period. See page 56.

AUTOMOBILES— Manufacturers expected to resume civilian automobile production in three principal stages: Under allocation; at the prewar level; and at the accelerated level now being projected, about 50 per cent beyond the previous peak. See page 63.

AIRPLANES— Disposal of surplus aircraft and major components will be major problem confronting the armed services when the war emergency is over. Recommendations made by Harvard University. See page 66.

WESTERN STEEL— Far West's expanded basic steel industry, if properly developed, could create employment for thousands in the area in the postwar period, according to new survey. Need to increase steel consuming industries in the western area believed imperative to keep existing facilities in operation. See page 73.

RUSSIA— Flourishing trade between the United States and Soviet Union after the war is forecast. Russia's rapid industrialization and intensive development of natural resources are expected to be continued, requiring huge imports of machinery, hydroelectric and roadbuilding equipment, railroad supplies, etc. See pages 74 and 76.

PROGRESSIVE HEAT TREAT—Procedure adopted for heat treatment of circular parts in turret ring line will be used for processing machine and heavy equipment parts in postwar era. Stock of large section is through-hardened at rate of 135 inches per hour and drawn at 3½ inches per minute, with overall cost reduced more than one-third and output tripled on same floor area. See page 82.

METAL POWDERS— Conspicuous success of powder metallurgy, from recent laboratory achievements to improved design of dies and presses, opens the door upon bright new vistas for products of the art. See page 90.

TOOLING DOCK— Principle of new master tooling dock for volume production of aircraft fixtures is expected to find wide application in industry because accurate and smooth contours can be attained without transits, surface plates, height gages, verniers and other aids generally associated with fixture building. See page 97.

Congress Giving Consideration to Various Postwar Housing Measures

Trend toward enactment of legislation under which the federal government would participate in program on permanent basis. View prevails that public aid should supplement private enterprise

SIGNIFICANT to manufacturers of building materials and supplies, particularly to those in the metal industries, is a trend in Congress to enact legislation under which the federal government would participate in the nation's housing development on a permanent basis in the postwar period.

There is a general feeling of satisfaction in Congress over the results of federal interest in housing since the government in 1932, as a by-product of the great depression, entered this field. This same feeling extends to the activities of the National Housing Administration, created in 1942 by executive order to take over and co-ordinate in one place the functions and responsibilities of 16 separate federal agencies that had come into being in the housing field.

The general feeling appears to be that the NHA may be regarded as the prototype of the permanent peacetime federal housing agency. The NHA is due to expire six months after the "end of the national emergency," and various congressional committees have been asked by real-estate organizations, financial institutions, labor organizations, public officials and home owners to sponsor legislation under which the federal government could prepare to meet large responsibilities of one kind or another in connection with postwar housing.

Most comprehensive application to this subject to date has been that of the Taft Housing and Urban Redevelopment Subcommittee of the Senate Special Committee on Postwar Economic Policy and Planning which, in June, warmly commended John B. Blandford, administrator of the National Housing Agency, over a program recommended by him, and which may be summarized briefly as follows:

"We must help communities provide decent housing for all our citizens, insofar as they cannot do so otherwise. Despite the conflict over methods, there is greater agreement in America today than ever before that public aid should supplement private enterprise to make sure slums are cleared and that families in the lowest income groups receive decent housing. The government must agree upon the fundamentals of our national housing policy to determine the basis on which the amount of subsidy per family rehoused may be figured. The NHA is studying the cost of bad housing to communities in terms of fire departments, police departments, etc."

The greater portion of our citizens, said Mr. Blandford, are in an income group enabling them to buy homes without government subsidy. Of these families, several millions, he said, are just above the lowest income group, and "constitute a challenge to private industry to improve its methods, reduce its costs, and increase its area of operations."

Urges Better and Cheaper Houses

Better houses, said Mr. Blandford, must be built for less money. The federal government can perform a technical service unavailable elsewhere in determining adequate and desirable housing standards, building materials and construction methods. While appreciating the value of our present houses, he said, we must encourage a housing psychology more willing to discard obsolescence.

"We must renovate the outmoded portions of building codes," he declare "We must move upon restrictive pra tices in production and distributio which increase the cost of constructi and greatly reduce its volume. W must be careful not to throw away t hard-won protection which worke have gained, but rather to offer the more employment, greater security an larger annual incomes through a mor stable housing industry.

"We must continue to improve home financing services. The custody an management of savings destined for hom construction and finance constitute trusteeship and public service of hig order and importance in the overall a proach to housing. We should look t ward full pooling and sharing of ber experience and practice and—mo pressing and pertinent today—sound ap praisal practice. This service to th home owner may well extend beyon the period of construction into a con tinuing service during the period maintenance, repair and modernization.

The slums, said Mr. Blandford, must go. Their economic and social cost i intolerably high; they must be replace gradually through a rounded progra which includes "decent housing withi the means of slum dwellers." Bette housing, he said, makes better towns an cities. Jobs and prosperity depend i large measure on housing; home buildin

REPAIRING ENEMY VEHICLES: This Army engineer welds a break in the chassis of a captured German vehicle at a depot in Normandy. It, as well as many others, will be pressed into war service against former owners. NEA photo

creates jobs, business opportunity, and income on a vast scale affecting the whole community.

"Housing," said Mr. Blandford, "is predominantly a job for private enterprise. The task is so big that any other approach would be unworkable and unrealistic. The federal government should constantly seek to reduce its ownership or operation of housing.

"The federal government's role in housing should be entirely supplementary; it should be aimed at making sure that decent housing for all the people is gradually achieved. The federal government should help private enterprise, stimulate local community planning, and it should use funds or credits to aid local low-rent housing projects when low-income families cannot otherwise be served."

While Mr. Blandford's recommendations were aimed at taking care of our housing development over the long future, he also mentioned that particular part of the housing program which would have to be executed immediately after the war to take care of cases of hardship and need which have been caused by war conditions or as a result of the curb on new building during the war.

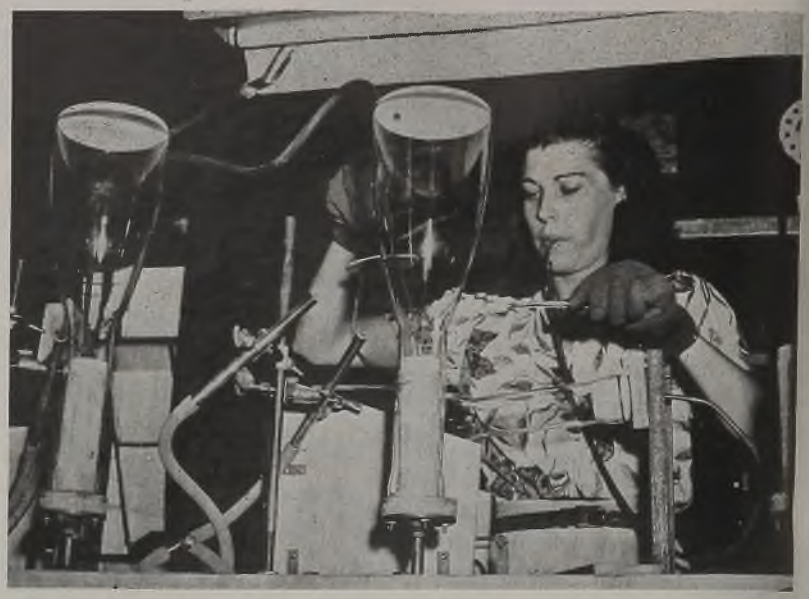
The War Production Board and the National Housing Agency, he said, have reached agreement as to this so-called transitional housing program. It will become active as soon as materials and labor become available; most of this program, he said, would be privately financed. At the same time action on suspended government-financed slum-clearance and low-rent housing projects would be resumed. This transitional period, said Mr. Blandford, will bring a gradual liberalization of housing standards and specifications "so that better houses can be built."

Need for 1,000,000 Homes Annually

Questioned as to the volume of home construction during the postwar period, Mr. Blandford said: "We need 1,000,000 to 1,500,000 houses annually in the first postwar decade."

Pending in the Senate are a number of postwar housing bills, the principal one being S. 2046, introduced just prior to the summer recess adjournment by Senators Harley M. Kilgore (Dem., W. Va.) and Robert F. Wagner (Dem., N. Y.). It would establish an "Office of Housing Research" which has been requested by many organizations interested in home building. This office would concern itself with matters of materials, fabrication and design.

Two other bills pending in the Senate call for federal financial aid to communities to enable the latter to acquire and redevelop slum areas. One of these S. 1163, introduced by Senator Wagner, is before the Senate Committee on Banking and Currency. The other, S. 953, by Senator Elbert Thomas (Dem., Utah), is before the Senate Committee on Education and Labor. The House has not done much on this subject.



"SHOOTING" ELECTRONS: This worker seals-in metallic buttons on large numbers of cathode ray tubes each day at the Dobbs Ferry plant of North American Philips Co. Inc., New York. She controls air pressure in the tube with her mouth while the gas burner is rotated around the button. These tubes literally "shoot" electrons at the fluorescent screen and are indispensable to our armed forces

What About Postwar Exports?

Government policy governing nation's participation in world markets after the war one of major unanswered questions of the moment. Stiff competitive conditions seen

WASHINGTON

THE status of United States foreign trade in the immediate postwar era is one of the big unanswered questions of the moment. This is of special importance because of the unanimity among manufacturers, labor leaders and government people that foreign trade will be vitally necessary if we are going to have the high productivity and employment after the war that generally is regarded as "must."

Chester Bowles, administrator of the Office of Price Administration, has this to say about export trade: "We must take steps now to insure that no barrier will stand in the way of a large volume of exports when the war is over. The world will need billions of dollars of our exports. Whether or not we will fill those needs may spell the difference between full production and collapse in the steel industry, in the light metals, in machine tools and, indeed, in a host of others.

"In the immediate years after the war, these export markets can be developed only if we are prepared to extend credit. That credit must be extended. I might say in passing that if we do not take advantage of these export opportunities our British friends will."

In the latter prediction, Mr. Bowles probably was right. American envoys report that the British are increasingly active all over the world in getting ready to export on a broad scale after the war is over. They report, in fact, that not only Great Britain, but the representatives of France, Poland, Czechoslovakia and some other countries are similarly drumming up good will in the foreign markets.

United States officials are somewhat at sea in attempting to envision our exact place in the export markets after the war. In the first place the power that promises to be a leading one in foreign trade, Great Britain, is giving indications that it will enter the world markets to a greater extent under government auspices than has been the case in the past. Great Britain, according to a recent white paper, proposes to have state ownership and operation of the basic raw materials industries after the war, such as coal and steel. This is taken to indicate that under such circumstances the operation of these basic industries will be guided more strongly by policies of national welfare than would be the case under private ownership and operation.

In the second place, the British expect to allocate foreign markets and control

world prices through cartel systems and some representatives of British business have gone so far as to say there is no hope for postwar co-operation between British and American business unless the American Sherman act is repealed. What the British have in mind is that under our antitrust laws the United States has brought suits against 88 international cartel arrangements within the past five years.

There now seems some likelihood that we may change our public policy with respect to cartels. Government people have come to realize within recent months that cartels have their meritorious as well as their objectionable features from our point of view. In recent discussions of a possible steel cartel, for example, it was pointed out that unless the United States had some sort of protection as a result of a cartel arrangement its domestic steel markets might be ruined after the war by substantial imports of low-priced steel from Great Britain and Europe. It may be said that very serious study is being given in appropriate government circles to this matter of a steel cartel and its position in relation to our antitrust laws.

American Goods in Demand

In the meantime, many countries are giving signs that they want our goods, and just as soon as they can start to get them. Many of the inquiries involve equipment for industrializing other countries. Australia, for example, which up to now has bought most of her tin plate from Britain, is eager to acquire a modern, continuous, American tin mill with which to supply her own requirements as well as those of a large portion of the Pacific area.

Most Latin American countries want to industrialize further, including particularly Mexico, Brazil, Chile, Colombia and Venezuela. Russian government leaders have assured Eric Johnston and other Americans that they propose to buy billions of dollars worth of American equipment after the war. Representatives of the Chinese government and of private interests in China have ambitious industrial plans calling for much American equipment to fulfill their postwar plans for development.

Turkey has shown signs of wanting to industrialize with American equipment. Egypt is eager to get certain types of American goods, particularly modern agricultural tools for one-man operation. Private firms in India are showing keen interest in American durable goods, particularly for the manufacturing industries. Hardly a day goes by but that questions in connection with actual or proposed foreign business are brought to the attention of the Department of State, the Foreign Economic Administration, the Export-Import Bank, the Office of the Co-ordinator of Inter-American Affairs, etc. These government departments are in the habit of calling on American industry for advice and information for use in these cases.

Big Machinery Exports Expected

Postwar sales to other Americas thought likely to double or triple after the war. Industrial expansion in Latin America seen spurring demand

POSTWAR sales of machinery to the other Americas reasonably can be expected to double or triple the prewar level which was somewhat in excess of $100,000,000 annually, according to W. H. Myer, chief of the Machinery and Motive Products Unit, Bureau of Foreign and Domestic Commerce, Department of Commerce, in a recent address.

This is due to the growth in industrialization of the Latin American republics. Those countries, he said, now have reserves of $3,000,000,000 in foreign exchange and gold and silver as a result of their heavy exports in the past few years.

A lot of equipment will be needed in working agricultural and mineral resources in the other Americas, said Mr. Myer, and he foresaw the likelihood that the processing of babassu nut oil would become a flourishing industry in Brazil. He anticipates that many more refrigeration plants will be built in those countries, and that a lot of electrical equipment will be needed.

Brazil and Argentina have begun to turn out some of the simpler types of machine tools due to difficulty of getting such equipment from the usual suppliers abroad, said Mr. Myer.

"Brazil," he said, "is now regularly making engine lathes up to 16-inch swing, and has produced some over 30 inches on special orders. Also, plants in the Sao Paulo area are now building milling machines, shapers, planers, radial and upright drilling machines and power metal saws."

Notwithstanding, many of these areas are hungry for metalworking equipment. The avenue of foreign trade, said Mr. Myer, should be a channel for the sale of more machine tools, both new and used, than have ever before been exported from the United States.

Ecuador To Provide Large Market

ECUADOR'S postwar projects for power plants, land irrigation and highways will open new markets for such United States products as tractors, bulldozers, graders, trucks, bridges and hydroelectric machinery, according to Dr. Manual Adrian Navarro, member of Ecuador's Inter-American Development Commission, and former president of the Guayaquil & Quito railway, in an address before the First Conference of the 22 Inter-American Development Commissions recently.

He added that a number of Ecuador's main industries "are awaiting propitious circumstances to expand to significant proportions." He listed mining, oil extraction and refining, textiles, panama hats, alcohol, carpets and specific drugs in this group.

The textile and shoemaking industries will need to renew and duplicate their machinery right after the war, he said. The municipalities are in the market for pipes to improve their water systems and for milk pasteurizing and bottling machinery. A good cement factory is needed in Ecuador at once. The country badly needs rails and rolling stock to complete the railway system; it also needs automobiles.

The rivers, said Mr. Navarro, should be harnessed with hydroelectric machinery to an extent of 100,000 horsepower in the next ten years. Farm machinery, implements and tools will be needed in quantities.

To promote this whole development program, Ecuador has established provincial agricultural and industrial banks at a number of points to assist private agricultural and industrial enterprise. Dr. Navarro expressed Ecuador's hope that the United States would continue an active buyer in that country, to make foreign trade a two-way affair.

Census of Manufacturers Is Planned for 1946

To provide a "reasonably complete inventory of the impact of the war on the nation's human and material resources" so that the essential facts are available to business and industry for planning reconversion, the Department of Commerce has decided to conduct in fiscal 1946 the Biennial Census of Manufactures, a Census of Mineral Industries (along the lines of the 1940 census), a Census of Business, and a Sample Census of Population. These census activities, together with the Quinquennial Census of Agriculture to be taken in 1945, it is believed, will provide business and industry with sufficient information with which to plan future operations.

The Biennial Census of Manufactures scheduled for 1941 and 1943, was suspended under provisions of the Second War Powers act by executive order so that the facilities of the Bureau of the Census could be devoted more fully to war work.

SWPA Adopts Price Policy for Sale of Government Surplus

Covers only standard general-purpose machine tools. Depreciation ranges from 10 per cent to 54.8 per cent, depending on length of time machine was in use and whether or not the tools are in purchaser's plant

A PRICE policy for disposal of government surplus machine tools was announced last week by W. L. Clayton, Surplus War Property Administrator.

The problem is a difficult one because of the engineering complexities and the large surplus of machine tools that will be held by the government when war production is cut back or completed. The objective is to establish a pricing policy that will put surplus machines back into production as quickly as possible, creating postwar jobs, stimulating national income and wealth, and, at the same time, recovering for the government as much of its investment as possible.

It is believed, SWPA said, that the adopted policy will facilitate prompt and orderly disposal of tools, with avoidance of expenses and losses arising from depreciation, obsolescence, warehousing and handling cost that would result from delayed disposal. It is also expected that the plan, with procedures that will be announced later, will prevent favoritism, speculation, and other inequitable results that might flow from unsound distribution.

Special Types Formula Pends

The price formula is for standard general-purpose machine tools. A price policy for special types of tools will be announced later.

The schedule has two bases: When tools are not in the purchaser's plant, they are sold with an immediate depreciation of 15 per cent, less 2½ per cent per month for the first six months, 1 per cent per month for the next four months and eight-tenths of one per cent per month for the next 26 months (Table A).

When tools are sold to a purchaser or lessee who has the tools in his own plant, the price is five points higher than the above formula (Table B). The five point difference arises from the fact that a purchaser of tools in his own plant not only has knowledge of their condition but is under no necessity of paying freight charges.

The depreciation price policy is based on the machine tool manufacturer's original price, inclusive of electric equipment and standard accessories, f.o.b. builder's plant. The price to the buyer is f.o.b. cars or trucks at storage location. Tooling is available for purchase at the customer's option on the above depreciated price formula.

The depreciation price period is fixed from the date a machine was originally put in use (actual or estimated) to the date of termination of the lessee's facilities contract, or to the time the machine is withdrawn from contract, placed in storage, or sold (whichever is earlier).

Table of prices in percentage of original price:

Months	A	B	Months	A	B
*	85.0	90.0	19	58.8	63.8
1	82.5	87.5	20	58.0	63.0
2	80.0	85.0	21	57.2	62.2
3	77.5	82.5	22	56.4	61.4
4	75.0	80.0	23	55.6	60.6
5	72.5	77.5	24	54.8	59.8
6	70.0	75.0	25	54.0	59.0
7	69.0	74.0	26	53.2	58.2
8	68.0	73.0	27	52.4	27.4
9	67.0	72.0	28	51.6	56.6
10	66.0	71.0	29	50.8	55.8
11	65.2	70.2	30	50.0	55.0
12	64.4	69.4	31	49.2	54.2
13	63.6	68.6	32	48.4	53.4
14	62.8	67.8	33	47.6	52.6
15	62.0	67.0	34	46.8	51.8
16	61.2	66.2	35	46.0	51.0
17	60.4	65.4	†	45.2	50.2
18	59.6	64.6			

* Less than one; †36 or more.

Appointments-Resignations

Dr. Donald B. Keyes has been appointed director of Office of Production Research and Development, War Production Board, succeeding Dr. Harvey N. Davis who resumes presidency of Stevens Institute of Technology, Hoboken, N. J.

This agency has tested many processes for the use of marginal and low grade mineral deposits, including manganese, chrome, tungsten, vanadium, mica and copper; reviewed about 50 processes for extracting alumina from low grade deposits and is making use of four of these processes; is developing a new method of making coke from middle western coal; has accomplished improvements in aircraft production methods, including spot welding, casting and forging of aluminum alloys, improvements of steels to make them more weldable, and improvement of inspection equipment, such as utilization of fluorescent inspection of metal parts.

* * *

Col. C. D. Wiman has resigned as director of the Farm Machinery Division, Equipment Bureau, War Production Board. Francis M. Shields, deputy director of the bureau has been named acting director of the division.

* * *

Shannon Kuhn has been appointed associate director, Division of Railway Transport, Office of Defense Transportation, in charge of the Mechanical Section. He succeeds Edward H. Hauer who is returning to his position with the Chesapeake & Ohio railroad.

* * *

William H. Russell has been appointed assistant director, Division of Traffic Movement, ODT, in charge of car utilization. He succeeds Charles F. Caley who has returned to his position with the New Haven railroad.

* * *

Howard C. Porter, Akron district manager, War Production Board, has been appointed as assistant deputy WPB director on the Production Executive Committee staff in Washington.

* * *

Merle D. Vincent has been appointed associate director, Office of the Price Administration's Consumer Goods Price Division.

United States Maritime Commission Awards Contracts for 262 Additional Ships

AT THE urgent request of the Joint Chiefs of Staff, contracts have been awarded for the construction of 262 additional ships, the United States Maritime Commission announced last week. All of these vessels must be completed before July 1, 1945.

Included in the contracts are 174 Victory ships, 30 ships of the C-1 type, 15 vessels of the C-2 type, 36 coastal cargo ships, and 7 large tankers.

Contracts for additional 10,500 deadweight ton Victory ships have been awarded as follows: Oregon Shipbuilding Corp., Portland, Oreg., 20; Permanente Metals Corp., Shipbuilding Division, Richmond, Calif., 65; California Shipbuilding Corp., Wilmington, Calif., 45; Bethlehem-Fairfield Shipyard Inc., Baltimore, 44. The commission has contracted now for a total of 520 Victory ships.

Contracts were awarded for construction of 5000 deadweight ton ships of the C1-M-AV1 type as follows: Pennsylvania Shipyards Inc., Beaumont, Tex., 4; Consolidated Steel Corp. Ltd., Wilmington, Calif., 26.

North Carolina Shipbuilding Corp., Wilmington, N. C., has been awarded a

contract for the construction of 15 additional C2-S-AJ1 type vessels of 9700 deadweight tons each.

A contract was made with the Alabama Dry Dock & Shipbuilding Co., Mobile, Ala., for the construction of seven large tankers of the commission's T-2 type. Contract for eight of these tankers to be built by the Marinship Corp., Sausalito, Calif., was announced June 12.

Contracts were awarded for coastal ships as follows: McCloskey & Co., Tampa, Fla., 15; Pendleton Shipyards Co. Inc., New Orleans, 6; Albina Engine & Machine Works Inc., Portland, Oreg., 4; Avondale Marine Ways Inc., Westwego, La., 8; and Ingalls Shipbuilding Corp., Decatur, Ala., 3.

Assigns Quotas for 278,500 Additional Electric Irons

Quotas for the production of 278,500 electric irons have been assigned to four additional manufacturers, the eighth group of manufacturers authorized to produce these items in fulfillment of the 1944 civilian program for 2,000,000 irons. This brings total authorized flat iron production to 2,037,383, or about 2 per cent in excess of the program.

The additional manufacturers and the quotas assigned them are: Siles Co., Circleville, O., 5000; Industrial Tool & Die Co., Minneapolis, 5000; Birtman Electric Co., Rock Island, Ill., 93,500; and Chicago Electric Co., Chicago, 175,000.

The latter company, which is in a group I labor area and could not produce electric irons in its own plant without interfering with war work, has arranged with the Dominion Electric Co., Galion, O., to have that company make its full quota of irons.

The Birtman Electric Co., which is in a group II labor area, is permitted by WPB to produce no more than 15 per cent of its quota in the Rock Island plant. The company is therefore likewise subcontracting part of its quota to the Dominion Electric Co.

Upon receiving WPB authorization to produce electric irons, manufacturers are permitted to place orders for needed materials and parts. A few manufacturers have begun production.

Cadmium Stocks Drop as Use Exceeds Production

Most recent survey by the War Production Board indicates that current uses of cadmium exceed production and existing stocks are being depleted in order to meet essential requirements. If, at the end of the third quarter, the present rate of use continues and appears likely to continue in 1945, further conservation measures may have to be taken, reports the Operating Committee on Aircraft Materials Conservation, representing the Army Air Forces, Navy Bureau of Aeronautics, and Aircraft Resources Control Office of WPB.

PRIORITIES–ALLOCATIONS–PRICES

Weekly summaries of orders and regulations, together with official interpretations and directives issued by War Production Board and Office of Price Administration

INSTRUCTIONS

TRANSPORTATION SYSTEMS: Items of productive capital equipment are not limited to rolling stock items, such as locomotives and cars, but include all items which the particular operator of a transportation system normally charges to his capital account. Order P-142 permits operators to use their MRO ratings under the order to buy minor items of productive capital equipment, not exceeding $500 per unit (excluding cost of labor), but operators needing to buy such capital items costing more than $500 per unit may not do so under the provisions of P-142. The usual way to obtain these items is by applying on forms WPB-541 (PD-1A), or WPB-1319, or other applicable forms (such as WPB-3131) for special items of equipment, or under P-41 if a construction job covered by that order is involved.

CANNERS: Date by which the 500,000 enameled cold pack canners scheduled for production in 1944 may be completed has been extended to Oct. 1.

HEAT REFLECTORS: Use of chromium-plated steel for heat reflectors in radiant reflectors is permitted under order L-28-c.

INDEX OF ORDER REVISIONS

Subject	Designations
Airplanes	L-48
Hardware, Joiner	L-236
Signal and Alarm Equipment	L-39
Tools, Hand	E-5-a
Price Regulations	
Instruments, Medical	No. 188
Iron Ore	No. 113
Plumbing and Heating Supplies	No. 546
Springs, Metal	No. 548
Used Machines and Vessels	Nos. 136, 375, 465

E ORDERS

HAND TOOLS: Planer and shaper gages and hardened steel squares have been added to exhibit A attached to order E-5-a, consisting of types of tools governed by the order. (E-5-a)

L ORDERS

SIGNAL AND ALARM EQUIPMENT: Use of copper and copper-base alloys is permitted now for specified parts of fire protective, signal and alarm equipment, chief of which are hose line fittings and fire hose couplings in sizes other than 1½ inches and 2½ inches.

Signal and alarm equipment costing less than $200 is exempt from restrictions on sale and installation; equipment costing $200 or more may be installed only to fill military orders and those orders which are authorized by WPB either through approval of form WPB-1319 or through approval of construction projects (form GA-1456) where this equipment has been specifically requested.

Brass fire hose couplings owned or controlled by manufacturers or distributors as of April 27, 1942, no longer are frozen. (L-39)

AIRPLANES: Controls of the Aircraft Production Board have been expanded to include all types of civilian aircraft. Provisions of order L-48 have been extended to cover engines, propellers, gliders, airframes and training devices that were not controlled previously by the order. The revised order does not control production to fill military schedules approved by the Joint Aircraft Committee and APB and it has no effect upon the private civilian plane owner whose requirements are not related to an essential activity.

The order (1) forbids manufacture of any aircraft and aircraft products, unless authorized in the manner provided in the order; (2) forbids the transfer of new training devices or those that have been in operational use for less than six months; (3) forbids the transfer of new aircraft or other aircraft products or those which have had less than 100 hours flying time. The last two items apply only to planes and aircraft products previously manufactured for civilian use, not to aircraft and aircraft products sold as supplies through the Surplus War Property Administration. (L-48)

JOINER HARDWARE: Restrictions on use of copper-base alloy in manufacture of marine joiner hardware have been relaxed. Most of the products now may be made of secondary brass, defined as copper-base alloy containing not more than 74 per cent copper and 2 per cent tin. Permitted sizes, types and grades of marine joiner hardware and materials that may be used in their manufacture are specified in the five tables of the order's schedule II. Hardware covered by the schedule comprises locks and latches; door, cabinet and lock trim; butts, hinges and hasps; cabinet locks, padlocks and miscellaneous items used aboard ship. (L-236)

PRICE REGULATIONS

IRON ORE: Provision of price regulation No. 113, dealing with maximum prices for special ores not specifically named and produced in Minnesota, Wisconsin or Michigan has been clarified. Maximum price for special ores not previously produced now shall be the price established by OPA upon application by the seller. (No. 113)

USED MACHINES AND VESSELS: Provisions of regulations requiring the filing of inventory and sales reports for second-hand machines and parts (No. 136), used industrial sewing machines (No. 375), and used enclosed atmospheric pressure vessels (No. 465) have been simplified and clarified. Changes are as follows: (1) Government agencies are not required to file inventory and sales reports; (2) division is made between inventory and sales reports: (a) Inventory reports need not be filed by auctioneers but they must be filed by every other person who sells any of the articles as an exclusive agent for the owner and (b) sales reports must be filed by every person who sells the articles; (3) reports now must be filed for any used part or subassembly of one of the listed machines or parts, where such a used part or subassembly has an "as is" maximum price in excess of $100 each. (Nos. 136, 375, 465)

MEDICAL INSTRUMENTS: Manufacturers of surgical, dental and optical instruments now may apply for individual adjustments in maximum prices for their products. (No. 188)

PLUMBING AND HEATING SUPPLIES: Specific prices have been set for 65 used and reconditioned plumbing and heating items, and maximum prices provided for most others by applying a specified percentage discount from the manufacturer's list price for the articles when new. (No. 546)

METAL SPRINGS: Manufacturers' maximum prices for metal springs, constructions and accessories for upholstered furniture have been established. (No. 548)

Battery of "Type D" 16" 6-spindle Mult-Au-Matics machining cylinder barrels for Wright Aeronautical Cyclone Engines. On this job 5 operations are completed in one cycle of 11 minutes.

Planes—Cou... of U. S. Na...

because of Production Batteries like this

Pictured here is one of the reasons why America is now getting the planes in the overwhelming numbers that we need. Each of these Mult-Au-Matics machines 5 airplane engine cylinder barrels at once . . . and remember that this battery is but one of scores like it, many of which are on jobs other than airplane engine work.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

First-hand information from some automotive industry executives who attended Washington conference indicates that while official reports were inconsequential, actually considerable progress was made toward resuming car production

FOR public consumption, the transpirings of the auto industry's committee of 18 in its July 14 conference with War Production Board made a dull diet. There was no news in the fact the industry regards war production as its immediate and primary task, or that it would be a difficult matter to find the necessary engineering personnel to develop brand new models at this time, or that orders for new machine tools can be placed on July 29.

First-hand information from some of the motor executives who attended the Washington conference indicates that while official reports were inconsequential, actually considerable progress was made on plans for resuming car production, possibly even before the defeat of the Nazis. The industry hopes it will be necessary to establish quotas for limited production at an annual rate of something over 2,000,000 cars for the first three months of production only, lifting the lid entirely after that period.

Suggested three-month quotas for individual producers met general acceptance, with the exception of those assigned Willys-Overland.

There will be three principal stages in resuming production: 1—under allocations, 2—at the prewar level, and 3—at the accelerated level now being projected, roughly 50 per cent beyond the previous peak.

The industry believes that a 25-50 per cent reduction in war production from the present volume would permit resumption of car production. It also prefers to make blanket material releases of materials covering a year's production, and hopes CMP controls can be done away with at least after the first three month's production. Machinery, manpower and materials are the three principal hurdles to be cleared, in order. It is felt the WPB will provide the necessary ratings on "bottleneck" machinery to insure its delivery when needed. Although industry executives have made no public statements on the conference, it is understood they were not pledged to secrecy by the WPB.

As a matter of fact, all companies in the industry have placed new machine orders with their regular suppliers weeks ago. Naturally, they are unrated as far as priority is concerned and most of them carry provisos that prices will be "as of date of shipment." The official WPB sanction to this policy seems a hollow gesture, since orders still will carry no priority, and tool builders will have to obtain WPB approval to produce the machines, or even ship them if they should be in stock. Penalties restrain both the buyer and the seller of new machines, and the recently enunciated approval of order-placing means nothing.

On the score of prices, one interest here suggests that the recently announced reduction of 7½ per cent in electric motor prices might conceivably be regarded as a hint that prices of new machinery will be lower, despite the fact many buyers are anticipating higher prices.

Not Readily Explained

The apparent rejection by industry of starting production quotas, along with the "blue order plan" which would have permitted the placement of orders for materials and components now for authorization at a later date when production can be started, is not readily explained. Officially it was stated the industry believed it pointless to try to settle on any projected rate of production in view of the continued absorption of the industry on war work for an indefinite period ahead.

It must be remembered that almost on the eve of the Washington conference, strongly worded statements were issued by the military chiefs of staff protesting against any plans for resumption of civilian production. Donald M. Nelson's "four points" leading to such resumption were denounced as ill-advised at this time. Just as suddenly, the military objections seemed to fade away, the four points were given official approval and dates established for their effectiveness. Actually, these four points (relaxing restrictions on aluminum and magnesium, permitting construction of developmental models, approving ordering of machine tools and sanctioning manufacture of a limited list of items where no interference to war production was involved) meant virtually nothing to the automotive industry, but the industry of course has worked in close co-operation with the armed forces, and still is pursuing such a policy. It does not want to see any impairment of this healthy relation, particularly insofar as public opinion is concerned. So it was only natural for the industry's top executives to conclude their meeting with WPB in about this vein:

"We are still very busy on war production and while we appreciate the invitation to come down here to discuss making some automobiles we really cannot go into that matter while our time is so taken up as at present. So sorry."

That is of course good public relations but there is doubt as to whether the viewpoint actually reflects what is going on. This is not to infer any underhanded methods or policies, but rather that the time is not propitious for detailed and open consideration of advance planning.

There are other angles. Such, for example, as the charge leveled at the in-

NEW TEAM: Charles E. Sorensen, new president of Willys-Overland Motors Inc., Toledo, O., and Ward M. Canaday, chairman, left, discuss future plans of the company, which in co-operation with the Army designed the renowned Jeep. Mr. Sorensen was elected president of the Toledo concern at a special stockholders' meeting July 12

dustry by R. J. Thomas, president of the UAW-CIO, that manufacturers are attempting to build up a labor surplus. "To use as a weapon against organized demands for decent working conditions and higher wages" by the process of refusing new military contracts. He added that thousands of women workers are now laid off and are unable to find work. The charge is preposterous because new contracts are being entered into regularly. George Romney, managing director of the Automotive Council for War Production, commented on Thomas' allegation by pointing out that "only last Friday the automobile industry rejected government proposals which might have diverted their concentration on their war production responsibilities. Unfortunately the government made Detroit a No. 1 critical labor area about two years ago and set up contract and manpower controls to which industry and particularly the automobile industry has strenuously objected because we knew that additional women workers were still available.

"We joined with all other Detroit groups in creating the Detroit Victory Council for the purpose of removing this limitation on incoming war work. We are concerned about the effect on employment of contract cancellations resulting from military changes and for more than a year have been pressing for the adoption of methods that will shorten the transition from war employment to employment in peacetime work, to the extent that such methods would not interfere with war production."

There is a definite tie-in between this opinion of a leading spokesman for the industry and developments at the Washington meeting with WPB. And there is a further tie-in with other problems currently being faced by industry, such as contract termination procedure and disposal of surplus materials.

Two days after the Washington meeting, the above-quoted Mr. Romney released another statement which was widely publicized, the gist of which was that government agencies must develop additional procedures quickly for the removal of war production machinery and materials from automotive plants, if the time lag between the halting of war production and the start of re-employment on peace-time manufacturing is to be minimized. Even now, as the result of production cutbacks, contract cancellations amounting to some $14 billions, and design modifications on war products, mountainous piles of obsolete parts, scrapped manufacturing equipment and idle materials are beginning to clutter up valuable plant space.

In an industry where plant space always is closely calculated, the situation now developing is paradoxical, for the whole automotive assembly system is built around the even flow of materials into the plant as needed. There never has been room for maintaining surplus inventories, and usually not more than a day's supply of one item or a week's bank of another has been kept on hand as a "float," to use industry parlance. Basic automotive production philosophy calls for suppliers to hold inventories, if any, in their own plants.

As an example of the surplus materials problem, Mr. Romney unfortunately cites the case of the canceled Ford tank contract, reviewed in this department in STEEL for June 5, p. 85. This $125,000 surplus is certainly not typical of disposal problems now facing the industry but its huge proportions do make an interesting case history, and as a case history it can be related to disposal questions in other plants. Principal requirement right now is a clearly defined general procedure for the orderly and prompt disposal of surpluses. The Murray-George contract termination law is a start but more specific recommendations and rules must be developed to meet the problem.

For instance, it would be helpful if procurement agencies and the WPB could indicate as soon as possible what facilities will be kept in operation indefinitely, what will be kept intact as stand-by capacity, and what will be allowed to reconvert, partially or completely. This would permit the tagging of various items of equipment pending its eventual removal to storage, transfer to another plant or resale.

Handle Problem Concertedly

Advance information on cutbacks and terminations would permit immediate slashing of inventories and a better distribution of surpluses now. Some of the motor plants on their own are moving in on this problem concertedly by furnishing detailed lists of surplus materials to original suppliers. In many cases suppliers are taking back appreciable quantities of these materials and parts, at list price less a certain percentage for re-handling.

Prompt and courageous decisions on scrapping of surplus parts and equipment could wipe out a major part of the plant clearance problem. To do this, responsible government officials would have to have complete information on prices, values, utility and technical aspects of surpluses, and they would have to be backed not by what some newspaper might print the next morning about scrapping of once-valuable material but rather by sound economic judgment and a realistic appreciation of the facts of the case.

A further need is for the establishment of specifications for storing government-owned property out-of-doors. After all, when industry converted to war work, many of its special-purpose automotive machines were moved out into the open and in some cases, because of fire hazards involved, could not even be kept covered with grease and waterproof paper. Now, as reconversion develops, it is only reasonable to expect the same policy will have to be followed with certain items of government-owned equipment. It may even be necessary to build some new warehouses to store such equipment or material.

Actually, the major automotive manufacturing plants are now going to be troubled as much with surpluses as the smaller subcontracting plants and parts suppliers.

INDUCTION HEATING: Rapid heating of propeller hubs before upsetting is accomplished in these five electric induction heaters at the aluminum forge plant of Chevrolet in Saginaw, Mich. The aluminum alloy blades are supported on the four-wheel fixtures, rolled into the heating units and in a matter of seconds brought to temperature for forging. An overhead hoist then moves them to the upsetter in the background

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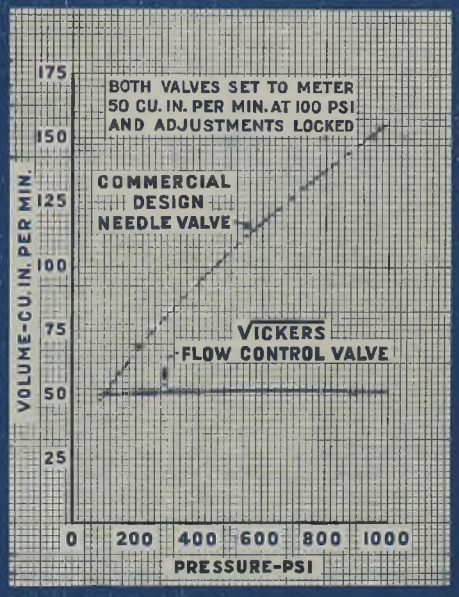

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WING TIPS

Major problem confronting the armed services when the war emergency is over will be disposal of surplus aircraft and major components. Exhaustive analysis of subject completed by Harvard University. Specific recommendations made

DISPOSAL of surplus air craft and major components such as engines, propellers, instruments, and the like is going to be a major problem confronting the armed services when the war emergency is over. Hence any analysis of the problem and recommendations for procedure made now represent at least an effort to alleviate the disposal headaches which are sure to come some day. In this category is a 100-page report on the subject prepared by Harvard University's Graduate School of Business Administration, under the direction of Dr. Melvin T. Copeland, director of research. A six-month period of investigations by the Harvard staff preceded publication of the findings.

Initiated at the request of the AAF with the concurrence of the War Department general staff, the report is an exhaustive analysis of surplus disposal in the aircraft field, and has been submitted as a report of the war contracts subcommittee to the Senate Committee on Military Affairs. Only a limited number of copies of the report thus far has been made available to the public.

The analysis is divided into three principal sections: Specific disposal policies for various types of equipment, reasons for and application of key policies; and a review of the disposal of surplus aircraft and engines after World War I. Equipment itself is subdivided into five categories—planes useful only for military purposes, planes primarily useful for scheduled transport operations, smaller planes with nonmilitary uses, major components, and all other planes and components.

With respect to basic disposal policies, it is observed that the rapid rate of obsolescence of aircraft makes timing the key to a sound disposal policy. The sooner surplus planes and components are made available to domestic and foreign markets during the latter phases of and immediately after the war, the more completely the desired objectives will be achieved. The immediate use commercially of surplus equipment before new improved models are generally available will tend to act as an incentive to technical development, not a drag; it will aid in broadening the demand for improved equipment; it will enable the U. S. better to meet foreign competition for export markets; and the sooner sales are made the greater the dollar return to the government.

The report recommends that specific preparatory steps be taken while the war is still in progress, such as arranging methods and determining standards for surveying conditions of surplus planes, permitting manufacturers to do engineering work in preparation for modification of models known to be commercially usable, etc.; also that insofar as military requirements permit, surpluses of equipment usable in the wartime civilian economy should be distributed as soon as their military essentiality is past.

In later postwar years, however, after new improved equipment is generally available, it is recommended that, in order to prevent interference with experimentation and new production, the distribution of surplus planes and components should cease. It is suggested that three to five years might be the proper interval before such a ban.

"Residual value", is recommended as the determinant of price of surplus equipment. It is defined as the estimated value of such additional service (or sales price by the government) which may be expected from each airplane, less the cost of putting the airplane in the required condition and location to render that service. Obviously, considerable study will be needed to determine accurately the residual value of the many different types of equipment which will be surplus.

Urges Widest Use of Surplus

The widest possible use of surplus aircraft can be helpful to the aircraft industry in two ways. First, the more widespread use of surpluses should aid in broadening the future demand for improved equipment with which to replace wartime models having high operating costs. Every additional plane in civil use is in effect an increase in the potential replacement market. Second, important military manufacturers can be given overhaul and sales work in connection with the disposal of surpluses. Immediate employment in aircraft manufacturing may therefore be almost as high as or conceivably even greater than if all surpluses were scrapped, a policy which some authorities have recommended.

In examining future value of various types of planes now being built, the Harvard report sees little hope of any commercial possibilities in the heavy and medium bomber class, such as the B-29, B-32, B-17, B-24, B-25, B-26, A-20 and A-26 models now in combat service (excepting the B-32). Cost of their conversion would be excessive, the converted plane would have a prohibitively high operating cost, even carrying full rated pay load. Moreover, the internal fuselage cubic content of the large bombers is inadequate to permit the stowage of either commercial cargo or passengers sufficient to utilize the rated pay load, except at very long ranges. Furthermore an oversupply of efficient and specially designed four-engine transports like the Douglas C-54 and the Lockheed C-69, not to mention thousands of highly efficient two-engine transports, will probably eventually become surplus so that converted bombers can be ruled out altogether.

One customer for our large stock of surplus bombers might be foreign governments, but whether considerations of military security should permit the sale or barter of these long-range weapons is

TIME SAVER: Production of B-26 bomb bay doors at the Glenn L. Martin Co., Baltimore, Md., already greatly speeded through the use of spot-welding in place of riveting, has been further simplified and accelerated with the introduction of a portable spotwelder to tackweld parts together in the assembly fixture. Here an employe is shown tackwelding the bomb bay door assemblies with a new portable spotwelder traveling on an overhead trolley

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FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

VERSATILE PLANE: New type of amphibious Douglas C-47 transport, developed at the company's Oklahoma City, Okla., modification center, has four retractable wheels set in the large pontoons, permitting a landing on water or land. At the rear of each pontoon is a small rudder which can be swung down 90 degrees from the flight position to aid in steering and braking in the water. There is even a small anchor carried in a well on the left-hand pontoon

a question which will have to be answered by the Air Forces.

Nonmilitary uses of surplus fighters likewise appear to Harvard's analysts to be of negligible import. Even though a small "sportsmen's" market for a few fighter types might be found, the interests of air safety as well as administrative problems involved suggest that no fighter types should be released for civilian use. The value of fighters in courier and "fast mail" service, for instance, appears more fanciful than real.

Foresees Vast Surplus of Transports

Considering airplane types which are readily adaptable to commercial transport operations, the report estimates as 5200 the maximum number of two-engine and four-engine transports which postwar commercial operators could absorb from surplus stocks. Barring unforeseen losses, there should be many times this number available. The U. S. is in a fortunate position in this respect, compared with the other United Nations which are concentrating their aircraft production almost altogether on combat types. This may mean the possible disposal of appreciable numbers of U. S. transports to England, Russia and China.

As a general guide to pricing of surplus sales, the report recommends that for the bulk of surplus planes, which probably will become obsolete in one to five years, the price should be set at a level which permits full amortization during the probable economic life at rates comparable with the established air-line amortization rates on similar equipment. Value in commercial use rather than cost to the government is obviously the soundest basis for establishing prices.

With respect to smaller planes having nonmilitary uses, it is pointed out that a careful inspection probably will reveal that in the interests of air safety a large number should be scrapped, but a number of models could be restored to airworthy condition and then auctioned to private buyers, with possibly a minimum price set below which no sales would be made.

A detailed analysis of disposal of surplus aircraft engines after the last war is included in the report for its possible assistance in determining sound disposal procedures in this war. During the last war there were 13,894 airplanes built for the Army, 2563 for the navy; 41,953 engines (20,609 Liberty-type) built for the Army, 2500 for the Navy. This indicates the relative insignificance of the size of surplus stocks in 1919 compared with what they will be in 194?. Even at that, the disposal of surpluses seriously disrupted the aircraft and engine industry, and it is doubtful if the receipts from sales more than made up the cost of warehousing and sales expense.

The case of the Liberty engine is interesting. The Army spent about $143,000,000 for these engines, which were designed by E. J. Hall of Hall-Scott Motor Co. and J. G. Vincent of Packard Motor Car Co. A water-cooled 400-horsepower V-type engine, it was designed by June, 1917, and the first engine delivered in November. In all, 20,609 were built, in two types—high compression for the Army and low compression for the Navy.

After the war, used Liberty engines were sold under sealed bids, but new engines were offered at $2000 each, just 50 per cent of the original cost. Few new engines were sold because the engine was too heavy and too expensive for most commercial purposes in the early twenties. In December, 1926, the Army still had 9784 Liberties on hand and proposed to sell a number of them to Russia, a deal which fell through because of objections by the State Department. Then the Army decided to scrap engines in use after 100 hours of operation, or when the first overhaul was needed. Frequent replacements depleted stocks to 3000 in June, 1928.

The Harvard report continues with the case: "The Army was tired of them, and Congress concurred by specifying that no planes designed for Liberty engines be purchased in 1930 and following years. In 1932 only 950 Liberties were left, and large amounts of spares were declared surplus. Shortly thereafter the engine disappeared from use."

Aviation Leadership Held Due To Impractical Ideas

"We have a group of young men here, engineers and scientists, with orders never to have a practical idea," was the surprising statement of Brig. Gen. Franklin O. Carroll, chief, Engineering Division, AAF Materiel Command, addressing a group of newspaper men recently.

"The reason for these instructions" General Carroll went on, "is that if what they are working on is practical, it can be done today and the sole function of this little group of dreamers is to look ahead and work on projects which cannot be realized for years."

The general picked up a model of the P-38 Lightning and remarked that there had been a time when that fighter plane was entirely impractical—that only years of research and development and test had made it the superior fighting machine it is today.

"These remarks can be made with equal truth about every American war plane," the general continued.

AAF, Aircraft Industry Set Up Liaison Office

Arrangements under which the Aircraft Manufacturers' Council will keep a permanent representative at AAF Materiel Command headquarters, Wright Field, O., for close co-operation with the command in contract termination problems, have been announced. R. D. Campbell, Curtiss-Wright Corp., has been named as the council's permanent representative in Dayton. He took up his duties on July 10.

At a conference conducted by Maj. Gen. Bennett E. Meyers, commanding general, Materiel Command, were representatives of principal aircraft manufacturers with John C. Lee of the manufacturers' council heading the delegation, and Col. E. W. Rawlings, head, Materiel Command's Readjustment division.

The industrial representatives indicated that Mr. Campbell would act in a liaison capacity between the Washington office of the council and the command, calling in various experts in industry to work out termination problems with the Command's new Readjustment division.

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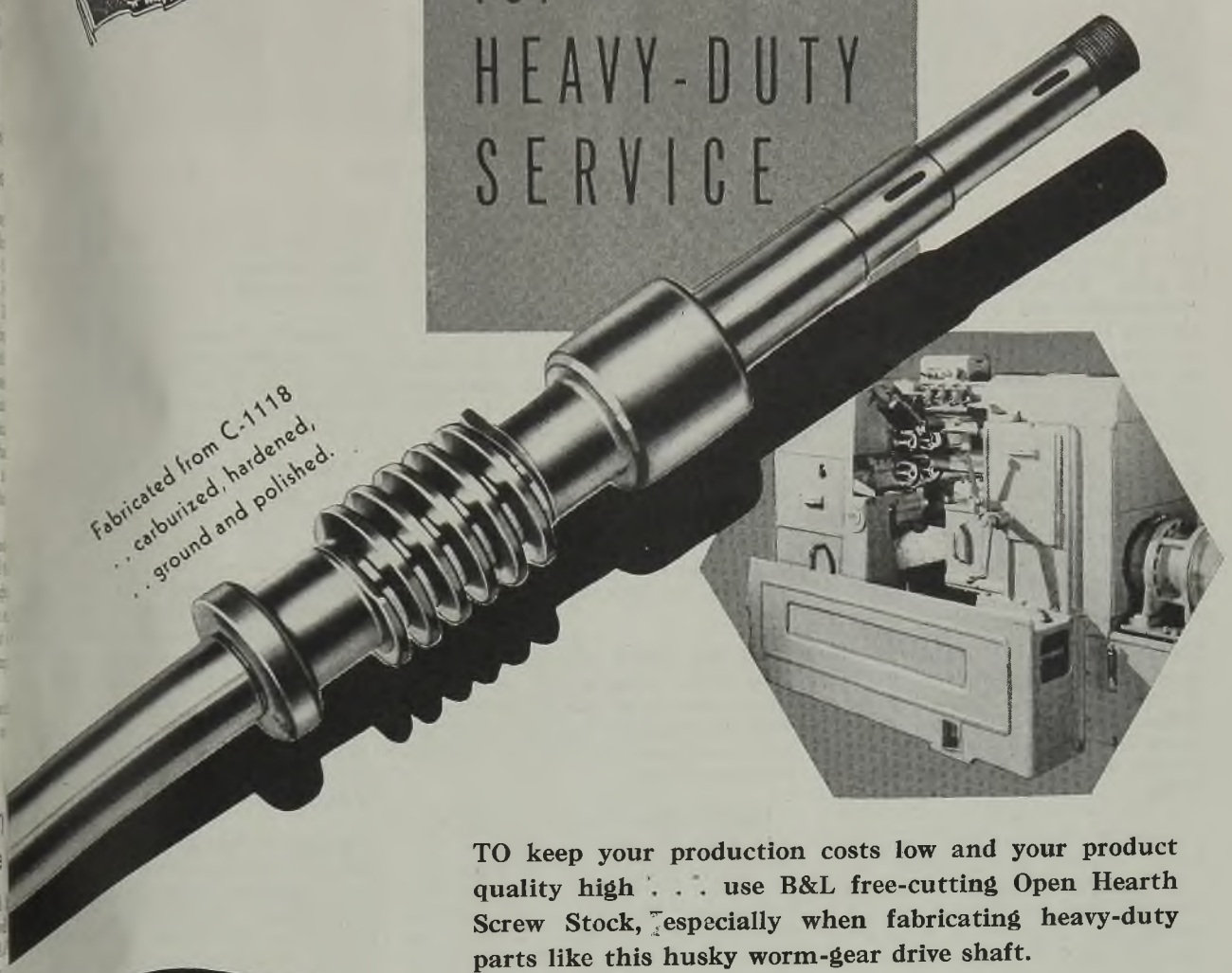

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MEN OF INDUSTRY

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JAMES D. VAUGHAN

PERRY T. EGBERT

Elias C. Atkins has been elected president of E. C. Atkins & Co., Indianapolis, Ind., to succeed his father, the late Henry C. Atkins. **Keyes W. Atkins,** since 1936 vice president and general sales manager, has been elected first vice president in charge of sales. **Donald H. Potter,** secretary and treasurer, was elected to the board of directors, filling the vacancy left by the late Henry Atkins' death. The company also has announced appointment of **Roland J. Schmitt** as manager of the Pacific Northwest division, succeeding **H. G. Mackenzie,** resigned. **A. Stanley Caster** has been made manager of the Portland, Oreg., office.

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American Locomotive Co., New York, has announced the following appointments: **Perry T. Egbert,** vice president in charge of diesel locomotive sales; **William S. Morris,** vice president in charge of steam locomotive and divisional sales, and **James D. Vaughan,** comptroller.

—o—

Joseph H. Hart has been named laboratory director, Kelite Products Inc., Los Angeles. **Meredith H. Fairchild** succeeds him as chief chemist, and **Donald W. Vance** has joined the company as analytical chemist.

—o—

Russell M. Richardson has joined La Salle Steel Co., Chicago., and will have headquarters at the company's Detroit offices in the New Center building. Formerly, Mr. Richardson was a metallurgical engineer and sales representative for American Steel & Wire Co. and Peninsular Grinding Wheel Co.

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Dr. Edward U. Condon, associate director of the research laboratories of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected to membership in the National Academy of Sciences, membership in which is based upon outstanding contribution to the field of science.

—o—

Ralph P. Fahey, since Pearl Harbor personnel director of the Bridgeport Propeller division, Remington Rand Inc., Buffalo, has been named national service manager of the Electric Shaver division, succeeding **E. C. Holloway,** who has resigned to establish his own business in Denver.

—o—

A. B. Johnson has been appointed plant manager, Cleveland Pneumatic Tool Co., Cleveland, and **C. M. Wallin** has been named plant manager of Cleveland Pneumatic Aerol Inc., Euclid, O., subsidiary of the first-mentioned company.

—o—

J. E. Swanson, general manager of sales, Graver Tank & Mfg. Co. Inc., East Chicago, Ind., has been elected a vice president.

—o—

Col. John Slezak, president of Turner Brass Works, Sycamore, Ill., on leave of absence since being called to active duty with the Army in January, 1942, has been appointed chief of the Chicago Ordnance district.

—o—

John W. Horne has been named manager of the Savannah, Ga., branch office of Graybar Electric Co. Inc., New York, succeeding **Harry B. Stanton,** retired. **George J. Cossmann,** Chicago district manager, has been elected a director of the company, and **E. W. Shepard,** treasurer, was appointed a member of the executive committee.

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E. J. Johnston has been appointed district manager of the newly-opened Detroit office of Nox-Rust Corp., Chicago. **N. J. Mollhagen** is associated with him as technical engineer.

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Albert Grindy has been appointed comptroller, Thermoid Co., Trenton, N. J. Formerly, he was associated with the Arnold Print Works, North Adams, Mass.

—o—

Frederick W. Mesinger has been elected vice president in charge of sales, Norma-Hoffmann Bearings Corp., Stamford, Conn., succeeding **H. J. Ritter,** resigned. For the past 16 years Mr. Mesinger has been New York district manager. **Robert L. Miller** has been appointed Eastern sales manager of the company, and **Carl W. Hedler** is Western sales manager, continuing his former duties as head of distributor sales.

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Joseip V. Tracy, formerly sales manager, Ashcroft Gauge division, Manning, Maxwell & Moore, Bridgeport, Conn., has become affiliated with Design Today Inc., New York.

—o—

Winfred L. Foss has been appointed Boston district sales manager, American Machine & Metals Inc., East Moline, Ill.

—o—

Appointments in the Steam division of Westinghouse Electric & Mfg. Co. Philadelphia, are: **Floyd T. Hague,** assistant to the vice president; **C. B. Campbell,** manager of engineering, and **J. S. Newton,** assistant manager of engineering.

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Dudley Rice has been named field engineer in the Chicago district for Eutectic Welding Alloys Co., New York.

—o—

Donald W. McGill has been appointed manager, Machinery Electrification section, Industrial department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. McGill has headed the annual Westinghouse Machine Tool Electrification Forum for the past two years.

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Guy M. MacVicar has been appointed by Builders of the West Inc., as district director for the nine San Francisco Bay area counties. He will assist municipalities and counties as well as private business to develop and blueprint postwar building and development projects.

—o—

Officers of Wickwire Spencer Metallurgical Corp., Newark, N. J., recently-acquired subsidiary of Wickwire Spencer Steel Co., New York, are the following: President, **E. P. Holder;** executive vice president, **Lt. Col. Cecil P. Young,** U. S. A. A. F., retired; treasurer, **George H. Creveling;** secretary, **Franklin Berwin.** Returning to inactive status after two years of active duty, Colonel Young became executive vice president of Wick-

JAMES J. MELLON

W. H. WILLIAMS

DAVID P. GRAHAM

wire Spencer Aviation Corp. in December, 1943. **L. D. Granger,** vice president of another subsidiary, American Wire Fabrics Corp., will be associated with the new subsidiary in an engineering capacity.

—o—

James J. Mellon has been elected president of Clark Controller Co., Cleveland, succeeding the late Primus C. Clark, founder of the company. **W. H. Williams,** a co-founder of the company, and former vice president in charge of sales, was elected executive vice president and general manager, a newly created position. For 15 years Mr. Mellon was assistant sales manager of the Clark company, and more recently he was a vice president.

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Frank R. Pierce has been named to the personnel staff of General Motors Corp., Detroit, and he is succeeded as manager of the corporation's Detroit public relations office by **John E. Johnson.**

—o—

Victor J. Hanson has been appointed director of training schools and safety engineer, Stamford division, Yale & Towne Mfg. Co., Stamford, Conn. He succeeds John B. Chalmers, who died May 23.

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William Todd, sales engineer at the Los Angeles branch office of Weatherhead Co., Cleveland, has resigned.

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Theodore L. Dodd, Chicago, has been appointed general manager of sales, Electro-Mechano Co., Wauwatosa, Wis.

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Harold C. Osman, since 1935 sales manager, Reading Steel Casting division, American Chain & Cable Co. Inc., Reading, Pa., has been appointed sales manager of Crucible Steel Casting Co., Lansdowne, Pa.

—o—

Howard R. Murphy, manager of the merchandise department, Caterpillar Tractor Co., Peoria, Ill., plans to resign July 31 to become associated as a principal with **W. K. Holt** in the "Caterpillar" distributorship in San Antonio and Corpus Christi, Tex.

—o—

Albert Olson, owner of the Albert Olson Co. Ltd., retired July 1 after representing Caterpillar Tractor Co., Peoria, Ill., in the Saskatchewan territory, Canada, for nearly 20 years.

—o—

J. E. Hansen has become editor of *The Enamelist,* a monthly trade paper for the porcelain enameling industry which is published in Cleveland. He succeeds **Robert A. Weaver,** president, Ferro Enamel Corp., Cleveland. Mr. Hansen also has become service director of Ferro Enamel Corp.

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A. F. Tenney has been appointed engineering service representative in Kentucky and the southern part of Ohio for Sterling Alloys Inc., Boston. **W. G. Merowit** has been named company representative in western New York.

—o—

Sherrod E. Skinner, general manager of the Olds Motor Works division, General Motors Corp., Detroit, and vice president of the corporation, has been elected, by unanimous vote, a life trustee of Rensselaer Polytechnic Institute, Troy, N. Y.

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M. C. Horine has returned to Mack Trucks Inc., Long Island City, N. Y., as sales promotion manager, after two years' leave of absence.

—o—

Col. E. V. Rawlings has been named chief of the newly-created Readjustment Division within the Materiel Command, Army Air Forces, Wright Field, O.

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George W. Gilliland has been appointed manager of the Los Angeles district sales office of Joseph T. Ryerson & Son Inc., Chicago. **E. F. Wood,** who is in charge of the company's Denver sales office, continues as representative in the Rocky Mountain states and the San Francisco area.

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Warren H. Clarke, executive assistant to the manager of the Georgia division, Bell Aircraft Corp., Buffalo, has been appointed works manager of the company's Ordnance division, Burlington, Vt. He succeeds **Carl F. Lozon,** who has been named manufacturing manager, Ordnance division.

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David P. Graham, for several years manager of the Gas Scrubber division, Peabody Engineering Corp., New York, has been made assistant to the president of the company. He will continue to direct the Scrubber division.

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James M. Straub has been elected president, Ft. Pitt Bridge Works, Pittsburgh, succeeding **George D. Wick,** who continues as a director. Other officers elected were: **H. R. Blickle,** vice president and consulting engineer, and **C. O. Miller,** treasurer. **P. B. Straub,** secretary of Campbell, Wick, Houck & Thomas, was named general counsel for the bridge company. New directors are: **William B. McFall, E. H. Millard, Paul B. Reinhold** and **J. H. Sorg.**

ESSINGTON LEWIS

Chief general manager of Broken Hill Proprietary Co. Ltd., Melbourne, Australia, and director-general of munitions and aircraft production in that country, Mr. Lewis recently was awarded the Bessemer Gold Medal for 1944 by the British Iron and Steel Institute, as announced in STEEL, May 1, p. 93.

HENRY W. PHELPS

FRANCIS P. GORMELY

GEORGE C. PURDY

Henry W. Phelps, 80, retired board chairman, American Can Co., New York, died July 7 in that city. When Union Can Co. merged with American Can in 1901, Mr. Phelps became director of the larger organization. He served the company successively as Chicago sales manager, general manager of the Pacific district, general sales manager, vice president, president and chairman.

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Harry L. Hough, 66, an executive with Crane Co., Chicago, for 49 years, died July 10 in Glendale, Calif.

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Frank B. Harris, 82, retired Chicago automobile accessory manufacturer and early day general manager of the Illinois Central railroad, died July 8 in Pasadena, Calif.

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Samuel H. Hedges, 78, for 23 years president of the Puget Sound Bridge & Dredging Co., died June 28 in Seattle.

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Charles Radley, 78, who retired in 1937 as president of Reliance Foundry Co., Cincinnati, died July 5 in Ft. Thomas, Ky.

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Edgar Ames, 76, president, Ames Shipbuilding Co., Seattle, died there June 28. He was a member of the Society of Naval Architects and Marine Engineers.

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John J. Klingel, general superintendent, Buffalo Foundry & Machine Co., Buffalo, N. Y., where he had been employed 35 years, died July 15 in Buffalo.

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Alfred E. Buelow, 53, chief consulting engineer, Lamson & Sessions Co., Cleveland, died July 2 in Chicago. Mr. Buelow was a former president of the Electrical Maintenance Engineers Association.

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Vincent H. Reiner, 49, chief accountant of the Central Furnaces and Coke Works, American Steel & Wire Co., Cleveland, died there July 7.

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William H. Smith, 74, president, W. M. Pattison Supply Co., Cleveland, died there July 11. A native of England, Mr. Smith came to this country when he was 20 and obtained work with the George Worthington Co., Cleveland, as an order filler. Nine years later he left Worthington's, where he had risen to the position of salesman, to join the new W. M. Pattison Supply Co. as vice president. In 1926 he succeeded the late Wallace M. Pattison as president. He was also president of Ohio Foundry Co., Cleveland.

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Francis P. Gormely, 56, president of Electro Metallurgical Co., Haynes Stellite Co., Michigan Northern Power Co. and several other units of Union Carbide & Carbon Corp., New York, died July 13 in New Rochelle, N. Y. He was a member of the American Iron and Steel Institute.

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Monroe F. McOmber, 53, an executive of the Jones & Laughlin Steel Corp., Pittsburgh, died in that city July 11.

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John Beller, 82, retired master mechanic of National Malleable & Steel Castings Co., Cleveland, died there July 12.

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S. P. Browning of Browning Mfg. Co., Maysville, Ky., and former president of the American Supply & Machinery Manufacturers' Association Inc., died recently.

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P. T. Dornbrook, 44, superintendent of production planning, American Steel & Wire Co., Cleveland, died July 6.

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Alexander P. Malozemoff, 65, consulting metallurgical and mining engineer, died July 13 in New York. He began his career in engineering at the Simsky District Iron and Steel Works, Ural Mountains, Russia. His office was at 63 Wall street, New York.

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Robert B. Stearns, 76, retired utility executive in both operating and construction branches, and at one time president, Pantex Pressing Machine Inc., Pawtucket, R. I., died July 12 in Boston.

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Richard B. Stephenson, 69, superintendent, ship repair, Bethlehem Steel Co. yards, Hoboken, N. J., died July 16 in New York. Mr. Stephenson, who had been identified with ship repair work in the New York area for 45 years, had retired two months ago because of poor health.

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George C. Purdy, 73, chairman of the board, Greenlee Bros. & Co., Rockford, Ill., died July 2. Associated with the company for more than 50 years, Mr. Purdy had served as president from 1919 until 1943. He was a member of the American Society of Mechanical Engineers, and had served as a director of the National Machine Tool Builders' Association and as president of the Association of Manufacturers of Woodworking Machinery.

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John S. Negus, 85, senior partner, T. S. & J. D. Negus, nautical instruments, New York, died July 14 in Brooklyn, N. Y.

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Robert Murray, 51, assistant director of metallurgy, Metallurgical division, American Steel & Wire Co., Cleveland, died July 9. Prior to 1943 Mr. Murray was superintendent of the company's New Haven, Conn., works.

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William H. Forbes, 62, former sales representative in Cleveland for Carnegie-Illinois Steel Corp., Pittsburgh, died July 17 in Cleveland.

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Leighton Forbes, 62, retired sales executive of Monroe Calculating Machine Co., Newark, N. J., died July 15 in Newark.

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Edwin B. Wheeler, 67, shipbuilding manager of the submarine plant, Electric Boat Co., Groton, Conn., died July 14 in New London, Conn.

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George B. Glassford, 41, purchasing agent, Lindberg Engineering Co., Chicago, since the company was established in 1937, died July 13 in that city. From 1929 to 1937 he had been purchasing agent for Claud S. Gordon Co., Chicago.

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Harry B. Hirsh, 79, a founder and former president of Belmont Iron Works, Philadelphia, died July 16.

Survey Seeks To Determine Future Possibilities for Western Steel

Study indicates that it will be imperative to increase district steel consumption if existing producing facilities are to be kept in full operation after the war. Total steelmaking capacity in 11 western states placed at 4,642,000 tons

SAN FRANCISCO

MOST recent of the attempts to survey the future for the Far West's war-expanded basic steel industry has just been made by Builders of the West Inc., a non-profit organization formed to plan and promote postwar development of western industry and resources.

This survey, by Lester S. Diehl, research chief of Builders of the West, concludes that the western iron and steel industry, if properly developed, could create employment for between 700,000 and 1,000,000 persons. But it is emphasized that it will be imperative to increase steel consuming industries in the western area in order to keep existing steel facilities in operation after X-Day.

Mr. Diehl, although pointing frequently to the problems involved in expanding consumption, believes that postwar utilization of a large part of producing capacity is feasible. (Opinion among some officials of steel companies here is not so optimistic, especially regarding outlets for the new government-financed plate capacity.)

The Builders of the West report estimates total steelmaking capacity of the 11 western states at 4,642,000 tons, and forecasts a postwar nation-wide demand at 70 million tons. On this basis it points out that western capacity would amount to only 6.63 per cent of total national consumption although the West has 11.5 per cent of the national population. Therefore it sees justification for an increase in heavy industries to narrow this ratio between steel production and population.

Discussing the types of industries which might be attracted to the West to supply the postwar market, the report lists expansion of mills producing structural shapes, tin plate plants, machinery companies, refrigerator and stove manufacturers, implement makers, etc. In fact, the survey says, nearly every secondary industry now operating in the East, possibly with the exception of automobile manufacturing, "could be advantageously operated in the West to supply the highly concentrated population along the coast, foreign markets and hundreds of thousands of tourists".

Mr. Diehl also points out that the West has more cheap hydroelectric power per capita than any other region of the country, and although low power costs are not a decisive factor in steel manufacture, cheap electricity can be used to attract some of the related steel-consuming industries to the Pacific Coast.

As for sources of raw materials, the report says great deposits of iron ore and coal as well as limestone are available in the Far West. The survey also concludes that steel can be produced more cheaply in the West than in the East, with the possible exception of Birmingham, Ala.

"It's true", Mr. Diehl says, "that the eastern steel industry will be over-expanded after the war ends. But the new basic steel industries of Utah and California must have the chance to give the West cheaper steel. Certain surplus eastern operations should be curtailed rather than robbing the West, which must have its own steel in order to develop fully. Western steel, moreover, can create brand new markets in the Orient and provide American competition with growing steel industries forecast for India, Australia, Africa and Russia."

STEEL INDEX READY

The index to Volume 114, STEEL, *for the first six months of* 1944, *is ready for distribution. Copies will be sent to all subscribers requesting them.*

Employment Declines in California During May

Employment in California manufacturing industries declined in May for the ninth successive month, showing a reduction of 13,100 workers, of whom 10,600 were employed in the various durable goods plants.

Virtually all of the decline resulted from further contraction in shipbuilding and aircraft payrolls. During May private shipyards in California had 246,900 workers on the job, 6100 fewer than in April and 35,600, or 12.6 per cent, less than the 1943 peak employment. Plane makers, concentrated chiefly in the Los Angeles area, showed a reduction of 6700 workers to 199,400, which was 45,300, or 18 per cent, under the 1943 high point.

At the beginning of June, 88 per cent of all durable goods employment was in the shipyards, 31 per cent in aircraft and 31 per cent in all other categories.

In the San Francisco Bay industrial area, factory employment totaled 252,600, as against 255,400 in April.

Countering the general employment downtrend, San Francisco area iron and steel industries reported an increase in number of workers for May, the total rising to 17,084 from 16,255 in April. Notwithstanding the gain San Francisco iron and steel plants still had a total demand for nearly 1100 workers at the end of May.

Battlefield Scrap Stockpiles Increasing in Los Angeles Area

LOS ANGELES

WHAT promises to be an important source of supply is an ever increasing stockpile of all types of metal scrap accumulating in the Army Salvage segregation center at South Gate.

This yard was established by the Army in November 1943, and received its first shiploads of battered war materials from the Pacific in February. The South Gate field is one of three set up on the Pacific Coast by the Army. Other fields are in Berkeley, Calif., and Seattle.

A stockpile of approximately 4000 tons of metal scrap, chiefly ferrous, has been accumulated and the volume is growing. During May, 375 tons of ferrous scrap were received. In June, 2500 tons of all types, mostly ferrous were unloaded, and 10,000 tons are expected to be received during the first two weeks of July.

The material consists of wrecked combat and construction machinery, and transportation equipment. There are airplanes, landing craft, tractors, bulldozers, trucks, jeeps, cannons, rifles, cartridge cases, clips, etc.

The Army attempts to dispose of some material to scrap dealers at the docks.

The material is inspected by army technicians. All usable and repairable parts and materials are set aside for the Army Ordnance and supply depots.

Occasionally a big gun arrives containing a live projectile. This is exploded in a pit by trained bomb disposal men. A hydraulic press built in the yard by the personnel of scrap parts is used to bend .50 and .30 calibre gun barrels to prevent reuse after sold as scrap.

Estimates of volume received of nonferrous metals are indicated by the following figures: On hand 68,978 pounds of brass. Total receipts of brass 666,440 pounds. During April, 60,000 pounds of aluminum from wrecked planes were segregated.

All scrap is offered to dealers on standard fifteen-day government offer-to-bid forms, but comparatively few sales have been made to scrap dealers in the area.

Industrialization of the Soviet Union Backs Her Military Might

By JOSEPH M. KURTZ
Assistant Editor, STEEL

DURING World War I Russia's industry was so inconsequential, relatively speaking, that her soldiers died by the thousands due to the lack of weapons. But this is not true of the Russia of today. A vast industrialization has occurred in the U. S. S. R. during the past 25 years, and Russia entered the present conflict as one of the most heavily armed nations in the world.

An indication of the munitions output of Russia is offered by statistics relating to the armament of her standard rifle corps (60,000 men). The corps, as early as 1939, had an artillery volley of 7100 kilograms, compared with 6300 for a French corps, and 6100 for a German corps. And it was capable of firing 66,000 kilograms of shells per minute in comparison to 51,000 for the French and 49,000 for the Germans.

For two years before the Nazis invaded the Soviet Union, Russia had a first line air force estimated at more than 4000 planes. There were also 48 brigades of tanks and 20 motorized divisions. She increased her tank production by 191 per cent in the five years from 1934 to 1939. At the same time anti-aircraft production was increased 169 per cent, heavy artillery 85 per cent, and light artillery about 34 per cent.

All of this had been accomplished in a relatively short time. Prior to World War I, Russia was predominantly an agricultural country. Since the fall of the Czarist regime, billions of rubles have been poured into the industrialization of the country. Many of the nation's industries completely destroyed during the revolution had to be rebuilt from the ground up. And new factories and steel plants were constructed under the supervison of some of the best American engineers.

Her industrialization has been accomplished through the use of three five year plans. The first began in 1928. And the third was interrupted by the war with Germany. During the years the first plan was in operation, output of metals increased about 300 per cent but steel production and pig iron production fell far below the goal by rising only 60 per cent.

The scars of the revolution remained on Russian industry as late as 1929. For not until that year did Russia reach her prewar position in the production of iron ore, pig iron and steel. In 1929 she produced 7,800,000 metric tons of iron ore, 4,300,000 tons of pig iron, 4,900,000 of steel ingots and 3,900,000 tons of rolled steel. But by emphasizing the iron and steel program during the thirties, steel production in 1941 reportedly jumped to 22,000,000 tons and pig iron to 18,000,000 tons. Marshal Stalin recently told American newspaper correspondents that Russia will have two five-year plans when peace comes which it is hoped will boost steel production to 60,000,000 tons annually.

The Russians have been highly secretive about production figures since the war started. But they recently revealed that during the first quarter of 1944 pig iron output went up 34 per cent over the last quarter of 1943, steel production increased 38 per cent, rolled steel, 36 per cent, and coke output, 39 per cent. These production gains were made possible by construction of new plants in the Urals and the repair of some steel mills recaptured from the Germans.

Russia's deputy commissar for the iron and steel industry reported recently that during 1942 Russia's iron and steel industry produced every type of steel required by war industries and was meeting all demands upon it. All of the plants were switched from "trade metal" production to the manufacture of high-quality "war metal" used in making tanks, guns, planes and shells.

The high rate of production of her steel industry was accomplished mostly by the transfer of plants and equipment from the southern Ukraine to the Urals. In the Urals now are located the

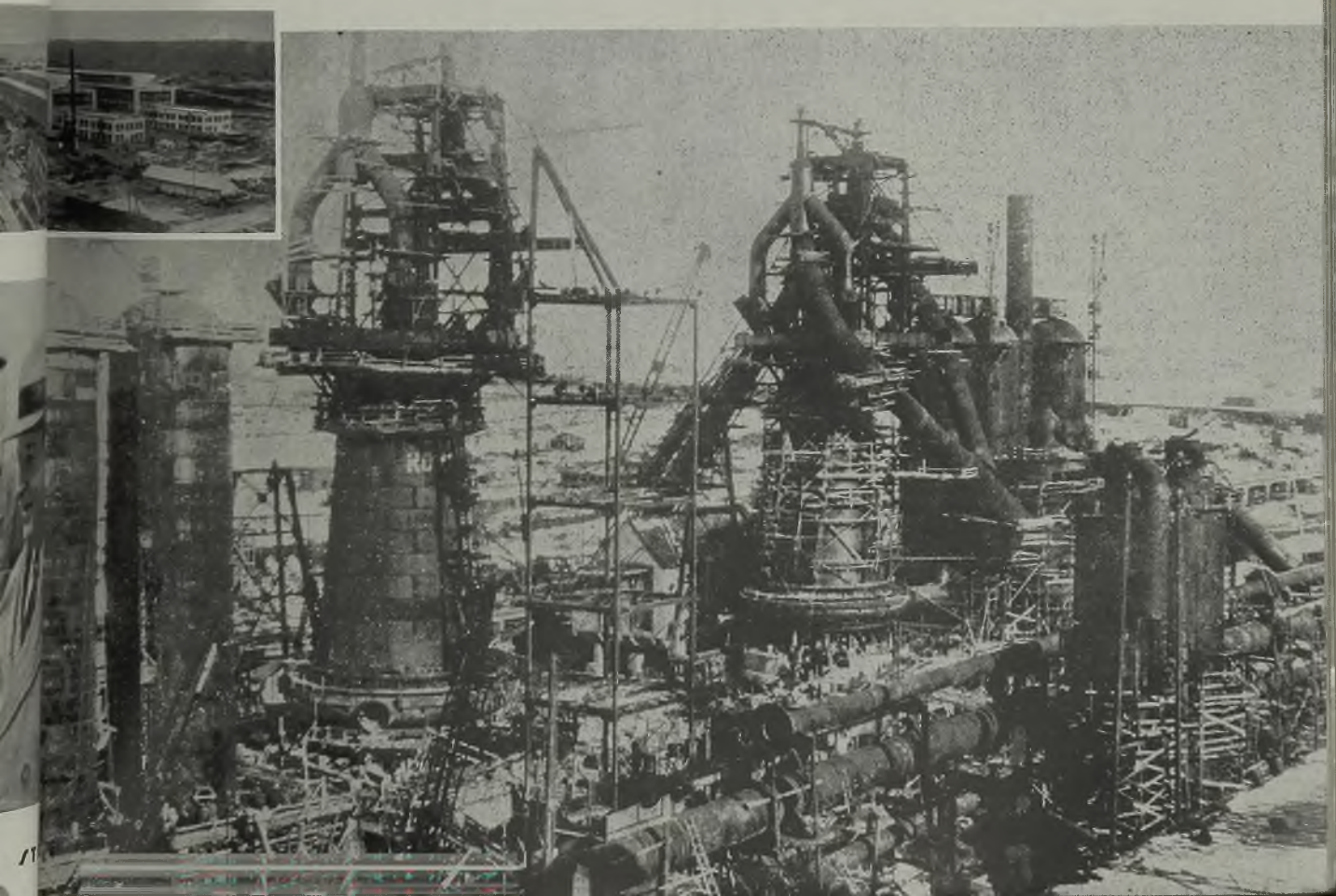
Above, right, is a view of the automobile plant at Gorki, located 270 miles east of Moscow, as it looked in the summer of 1930 when it was about 80 per cent completed. The plant was designed and built for Russia by the Austin Co., Cleveland

Eric Johnston, left, president of the United States Chamber of Commerce, is shown with Soviet officials as he inspects the Stalin automobile plant in Moscow during his recent visit to Russia. NEA radiophoto

Nation's war production record testifies to the extent and efficiency of the industrial machine which has been built up over the past 25 years. Country was well on the way to becoming first-rate industrial power when war broke out

The American engineer at the right is shown teaching a student at the great tractor works at Stalingrad how to operate one of the machines. NEA photo

Below are shown two of the blast furnaces under construction during the early 1930s at Magnitogorsk in Russia. It is now one of Russia's great metallurgical centers in the Urals. It was designed by Arthur G. McKee & Co., Cleveland. NEA photo



modern machinery and steel plants of Voronezh, Voroshilovgrad, Rostov and Stalingrad. The rolling mills and blast furnaces of the Ukraine have made relatively important additions to Siberia's industrial might. In removing the plants from the Ukraine, Russian engineers made the mistake of placing them in the middle Volga region. The early successes of the German armies forced the evacuation of these plants from the middle Volga region farther into the interior.

The Russians were able to withstand the loss of Krivoy Rog iron ore in the Ukraine, which amounted to about 60 per cent of the Soviet output, by severely curtailing pig iron production for non-essential purposes and limiting it only to armament needs. Stalin even ordered production radically cut on rolling stock.

A study of Russia's construction activities during the 1930s foretells the Russian realization that the Ukraine was in mortal danger in case of war. Russia began to whittle down her economic dependence on the Ukraine by constructing new plants in the Urals and by drilling mines deeper inside the Russian borders.

Typical of the development of industries in eastern Russia is that of Uzbekistan in central Asia. Since June, 1941, Uzbekistan has increased its industrial output by more than 150 per cent as a result of the influx of evacuated enterprises from the front-line zones and the expansion and construction of new plants. This area now has aircraft, arms and ammunition, tank building, heavy machine building and electrical equipment industries.

On the banks of the Syr Darya the first iron and steel works in the Soviet Uzbekistan has been constructed largely with substitute materials. Local building materials were used as much as possible in order to economize on timber, steel and all materials which had to be

transported from other parts of the country.

The industrial output of the Urals today probably is as great if not greater than that of any other region in the Soviet Union. Back in 1938 the Urals held third place in coal output in the Soviet Union, fourth place in oil output, second place in pig iron and steel, first place in copper smelting and fourth place in engineering, being outstripped in production at that time by the three great industrial regions of Moscow, Leningrad and the Ukraine. Output of complex rolling mill products in the Urals increased twenty-fold from 1927 to 1938.

Three major engineering plants were built in the Urals in prewar years, the Ural heavy machine building plant, Ural car works, and the Cheliabinsk tractor plant. The first of these plants manufactured smelting, mill and mining equipment and heavy machinery. The second concentrated prior to the war on 50-60-ton heavy railway cars. The Cheliabinsk plant formerly produced heavy caterpillar tractors.

Ural Plant Produces Heavy Machinery

An idea of the size of the Ural heavy machine building plant is provided by the fact that it is capable of producing 10,000-ton presses, heavy machines capable of working parts weighing over 100 tons and measuring 20 meters in length and 3 meters in diameter. It also reportedly is able to produce a complete set of equipment for a smelter of 1,500,000-ton capacity.

Two of Russia's outstanding steel plants are those at Kuznetz and Magnitogorsk. Blast furnaces and open hearths are modernly equipped. A fully mechanized and electrified rail and structural mill was constructed. As far back as 1936, Magnitogorsk boasted that its mill was one of the largest in Europe with production of 180 tons of steel per hour. At present, it reportedly has 20 open-hearth furnaces, two blooming mills, eight rolling mills and six coke batteries. Iron ore for Magnitogorsk is obtained from the magnetic mountain nearby, which Russians say has deposits of 300,000,000 tons with an iron content of 60 per cent, plus 85,000,000 tons of 45 per cent ore. The Kuznetz and Magnitogorsk steel districts were the backbone of Russia's steel supply when production was interrupted in the steel plants of the Ukraine by the invading German armies.

Russia's coke plants are among the most modern in the world. Technical assistance in the construction of these plants was given by the Koppers Construction Co., Pittsburgh. The coke plants were built in conjunction with the large steel mills at Stalinsk, Magnitogorsk, Petrovsky and Voroshilov. Capacity of some of the latest coke plants installed ranges as high as 1,300,000 tons annually. The Kuznetz coke is considered of a higher quality than Donetz coke. In prewar Russia, the ovens of the by-product type accounted for more than 90 per cent of the nation's coke capacity.

In the Cheliabinsk plant production of ferroalloys was begun in 1931. The Russians conducted successful experiments with the smelting of ferrotungsten and ferrovanadium. They placed a great deal of emphasis on electric steel production.

Russia's Azov steel mill, besides being fully equipped with blast furnaces, open hearths, and rolling mills, has a coke-chemical works and a large sintering and flotation plant. The flotation plant was designed to use the Kerch vanadium bearing ores. Annual output before the war was more than 500 tons of pure vanadium, which was about half the world's production of that metal.

In the construction of her steel plants, the Russians called in experienced American technicians. Construction of the great Magnitogorsk mill was supervised in part by Arthur G. McKee & Co., Cleveland. The Kuznetz mill and the designing and reorganization of other plants in the Soviet Union was completed with the help of the Freyn Engineering Co., Chicago.

One of Russia's oldest steel centers was that located in the southern Ukraine. The steel plants in that section were completely overhauled in the thirties. Mechanization of entire plants occurred in the Tomsky plant at Makeyevka, Dzerzhinsky plant at Kamenskaye, Voroshilov plant at Alchevsk, Petrovsky plant at Dniepropetrovsk, Stalino plant at Stalino, Rykov plant at Yenakievo, and the Andreyev plant at Taganrog. The Krivoy Rog, Zaporozhye, and Mariupol plants in the southern Ukraine prior to the war reportedly had a combined capacity of about 3,300,000 tons of pig iron. On the basis of high-grade steel production, the Zaporozhye plant reputedly was one of the largest in the world. It had ten electric furnaces and several blast furnaces and rolling mills.

Statistics reveal how thoroughly Russia's nonferrous metal industry had been devastated by the revolution. As late as 1925 only two smelting plants were in operation. They were the Kalata copper plant in the Urals and the Alagir zinc and lead plant in the north Caucasus. Restoration of her nonferrous production was speeded by her five year plans. In rebuilding her nonferrous metal output, Russia's greatest difficulty was lack of skilled technicians. This was due to the fact that foreigners had owned and operated this branch of Russia's industry

(*Please turn to Page* 152)

Flourishing Trade with Soviet Union Predicted by Eric Johnston

FLOURISHING trade between the United States and the Soviet Union after the war was predicted by Eric Johnston, president, Chamber of Commerce of the United States, at a press conference held immediately following his return from a visit to that country.

"The needs of the U. S. S. R.," he said, "will be infinitely greater after the war than before. That country has tasted industrialization and has learned the technique of developing her natural resources. In addition to being determined to go ahead with that program so as to elevate the plane of living for her people, she has an enormous job of rebuilding to do."

The Russians have a great desire to co-operate with the United States, said Mr. Johnston. They "revere" production, he said, and view the United States as the symbol of production on a mighty scale. They want to imitate us. Russia still has a lot to learn from us about technology and the utilization of labor.

"The Russians have a higher admiration for the American businessman than we have here at home," added Mr. Johnston with a grin. He said he could not foresee any chance of Russia being a competitor of the United States in world trade. "Their country is so big, their needs are so great, and their task of raising their standard of living so tremendous that I do not believe in our lifetime they will ever be a large exporter in the international markets like the United States and Britain."

Asked what Russia can be expected to buy in the United States, Mr. Johnston said she would want machinery from us; she will buy the machinery with which to manufacture her own consumer goods. The Russians will want from us, he said, mining machinery, industrial machinery, hydroelectric equipment, roadbuilding equipment, ships, trucks and railroad equipment, among other things. The Russians plan to more than double their prewar railroad plant, he said. Airfields are being developed all over Russia and Siberia, he said, and much future transportation will be by air, due to absence of highways and railroads; however, the Russians will build their own airplanes.

To sell to Russia, he said, we will have to extend long-range credits—and by long-range credits he meant payment in 10 to 30 years. Such credits, he said, should be extended by credit bankers, but he foresaw the possibility that government loans, possibly through the Export-Import Bank might be needed. When he was in the U. S. S. R., said Mr. Johnston, the Russians talked about barter, possibly selling us raw materials in exchange for our goods. But he felt sure the Russians would pay when payment is due. "I believe Russia's credit

(*Please turn to Page* 152)

Batcheller Lauds Steel Industry For War Record

Says import of 10,000 tons of steel plates monthly no reflection on industry's production record. Cites output figures

THE STEEL industry has not failed in any of its commitments for the war effort since Pearl Harbor and is deserving a "ribbon of recognition" for the job it has done, Hiland G. Batcheller, president, Allegheny Ludlum Steel Corp., Pittsburgh, told more than 70 district sales managers and key sales executives recently.

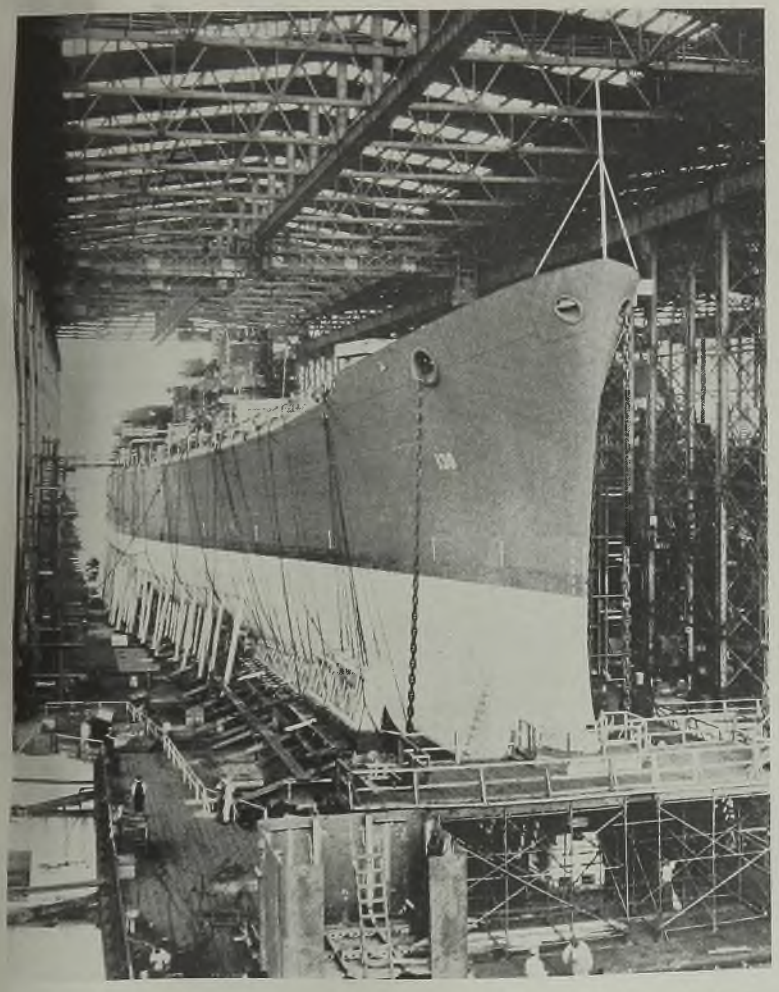
Mr. Batcheller's remarks were made when asked to comment on a report by the War Production Board that the United States has started importing 10,000 tons of steel plate monthly.

"I hope you will take it as a part of your job to make sure the many persons with whom you come in contact all over the country will understand the importing of 10,000 tons of plate monthly is but a drop in the bucket to America's total plate production," he said.

"It should be remembered that production of steel plate has been boosted from 475,000 tons annually before the war to more than 1,250,000 tons now.

"While we are grateful to our ally, England, for every pound of plate she can provide, it is not a reflection on our own ability to produce when the industry's fine record is kept in mind. We now are shipping abroad under lend-lease arrangements more than 100,000 tons monthly of steels of all types and some time ago when the requirements were greater this ran higher than 200,000 tons monthly.

"A look at steel's production record for the first half of this year is a further illustration of what I mean. In this period the industry produced more than 45,000,000 net tons of ingots, an increase over the same period last year of almost 2,000,000 tons—and a figure equal to that of all the rest of the world combined. All of this was done too, with 63,000 fewer men as of last May, than were available during the first half of last year."



ANOTHER AXIS HEADACHE: Shown is the heavy cruiser U. S. S. BREMERTON as she waited to be christened just before sliding off the ways into the Delaware river recently. The fighting vessel is on the covered ways at the New York Shipbuilding Corp., Camden, N. J. NEA photo

J. & L. To Build New Battery of 106 Coke Ovens

Construction of a new $7,500,000 battery of 106 by-product coke ovens was started last week at Aliquippa Works of the Jones & Laughlin Steel Corp., Pittsburgh.

Prompted by record demands for war steel and important chemical by-products the company has let a contract for the new ovens, which will increase its capacity for making metallurgical coke approximately 59,000 tons per month. This represents a 50 per cent increase in the coking capacity of the Aliquippa Works and a 20 per cent increase in the company's overall coking facilities.

In addition to producing the increased coke to be used as fuel in blast furnaces to make iron, the company will recover large additional quantities of by-product chemicals. These include benzol and tar products vital in making munitions, paints and plastics; medicines, such as sulfa drugs, and fabrics such as nylon.

The contract for the ovens has been let to the Koppers Co., Pittsburgh. The project will be completed in 14 months.

BRIEFS . . .

Cicero Screw Products Co., Chicago, has moved to remodeled and enlarged quarters at 4447 West Armitage avenue, Chicago.

—o—

Hamilton Engineering Co. Inc., Harvey, Ill., has established a branch operation at Lombard, Ill., for manufacture of shell shrapnel units.

—o—

Arthur C. Lynch & Co., Evanston, Ill., has occupied at 2350 West 136th street, Blue Island, Ill., a 105,000 square foot building recently used by Wickwire-Spencer Aviation Corp.

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Southern Research Institute, Montgomery, Ala., has published a brochure outlining the purposes and function of its organization.

—o—

Cutler-Hammer Inc., Milwaukee, has opened a drive-in warehouse at 1200 Walnut street, Cincinnati.

—o—

Edison General Electric Appliance Co., Chicago, has opened western regional headquarters at 1355 Market street, San Francisco. The region comprises Los Angeles, Salt Lake City, Utah, and Seattle.

Output Rebounds Sharply From Holiday Interruption

MOST industrial indicators have regained the ground lost during the Fourth of July holiday week. However, output of such key war programs as heavy trucks, tanks, airplanes, shipbuilding, heavy artillery and shells is falling further behind established quotas. Scheduled increase in the production of these items over the third and fourth quarter will make the job of meeting output goals still more difficult. At present the manpower shortage is being felt more keenly than at any other time.

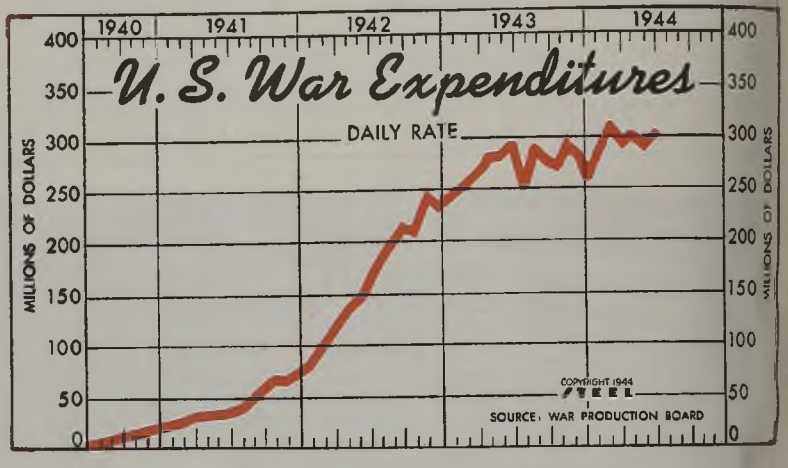
During the latest period the national steel rate advanced one-half point to 96.5 per cent of capacity, engineering construction awards rose sharply to $62,510,000, truck assemblies climbed to 19,420 units, while revenue freight carloadings and electric power consumption rebounded to an estimated 875,000 cars and 4,377,152,000 kilowatts respectively.

EMPLOYMENT — Meeting expanding war production schedules will require continued intensified utilization of the nation's manpower. On an overall basis, this is being achieved as is evidenced by the fact that unemployment in April was 770,000, the lowest recorded level. Declines in employment where they have occurred are thus the result of shrinkage in the labor force and of shifts of workers to other occupations.

Number of employes in the manufacturing industries during April continued the decline which has persisted since the peak of last November. The 14 million wage earners then employed declined to 13.2 million in April, the latest figures available. Among the war industries, all those included in the metal-fabricating group with one exception experienced maximum employment in that month and have since recorded declines.

FREIGHT MOVEMENT—Freight carloadings in the third quarter are expected to be slightly above actual loadings in the like 1943 period. Prior to the holiday week dip freight traffic had been tending upward. A rebound to the former level is expected for the latest week. Cars of export freight, other than coal and grain, unloaded at Atlantic, Gulf and Pacific ports during the first half of 1944 totaled 893,855 compared with 612,974 in the same period last year. Volume of freight transported by motor carriers increased during May after two months in which year-to-year decreases had been sustained.

WAR EXPENDITURES—Reflecting intensive efforts to increase output of key military programs, June expenditures for war hit a new monthly high of $7,957,000,000. This represents an increase of $39 million or 0.5 per cent over the May total, and compares with the former peak of $7,948,000,000 recorded during March this year. Average daily rate of expenditures last month totaled $306 million, or slightly below the peak level of $312.3 million registered last February. From July 1, 1940 through June 30 last, expenditures amounted to $199,900,000,000



War Expenditures
(millions)

	1944 Monthly Expenditures	1944 Daily Rate	1943 Monthly Expenditures	1943 Daily Rate	1942 Monthly Expenditures	1942 Daily Rate
January	$7,416	$285.2	$6,254	$240.5	$2,193	$ 81.2
February	7,808	312.3	6,081	253.4	2,401	100.0
March	7,948	294.4	7,112	263.4	3,025	116.3
April	7,493	299.7	7,290	280.4	3,461	133.1
May	7,918	293.3	7,373	283.6	3,824	147.1
June	7,957	306.0	7,688	295.7	4,213	162.0
July	.....	.....	6,746	249.9	4,708	181.1
August	.....	.....	7,529	289.6	5,163	198.6
September	.....	.....	7,212	277.4	5,459	218.4
October	.....	.....	7,105	273.3	5,722	211.9
November	.....	.....	7,794	299.8	6,112	244.5
December	.....	.....	6,951	267.3	6,125	235.6
Total		Av.	Tt'l. 85,135	Av. 272.9	Tt'l. 52,406	Av. 169.1

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96.5	96.0	98.0	97.0
Electric Power Distributed (million kilowatt hours)	4,377	3,941	4,098	4,184
Bituminous Coal Production (daily av.—1000 tons)	1,445	2,003	2,093	1,846
Petroleum Production (daily av.—1000 bbls.)	4,602	4,579	4,569	4,103
Construction Volume (ENR—unit $1,000,000)	$65.5	$18.9	$29.2	$104.0
Automobile and Truck Output (Ward's—number units)	19,420	14,600	18,985	19,485

*Dates on request.

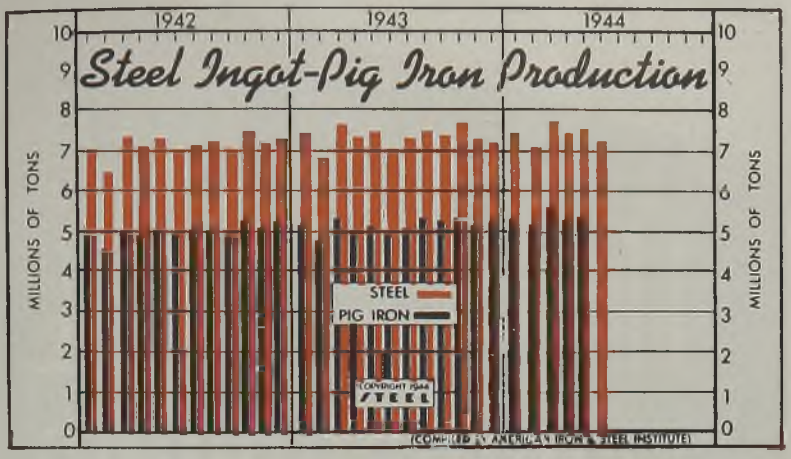
TRADE				
Freight Carloadings (unit—1000 cars)	875†	745	879	877
Business Failures (Dun & Bradstreet, number)	15	21	30	48
Money in Circulation (in millions of dollars)‡	$22,561	$22,598	$22,333	$17,658
Department Store Sales (change from like week a year ago)‡	+12%	+14%	+7%	+39%

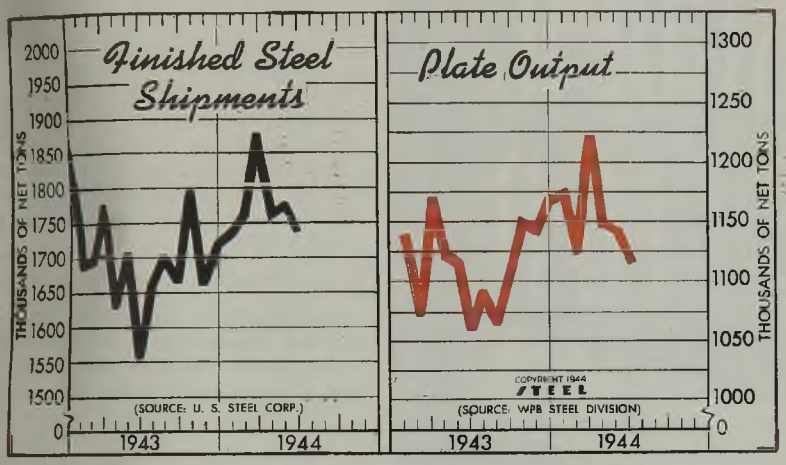
†Preliminary. ‡Federal Reserve Board.

Iron, Steel Production

(Net tons—000 omitted)

	Steel Ingots		Pig Iron	
	1944	1943	1944	1943
Jan.	7,587	7,425	5,276	5,194
Feb.	7,189	6,825	5,026	4,766
Mar.	7,820	7,675	5,484	5,314
Apr.	7,569	7,374	5,243	5,035
May	7,680	7,545	5,343	5,173
June	7,217	7,027	.....	4,836
July	.....	7,376	.....	5,023
Aug.	.....	7,562	.....	5,316
Sept.	.....	7,489	.....	5,226
Oct.	.....	7,786	.....	5,324
Nov.	.....	7,374	.....	5,096
Dec.	.....	7,266	.....	5,213
Total	.....	88,873	.....	61,777





Steel Shipments†—Plate Production‡

(Net tons; 000 omitted)

	—Shipments—		Plate Output	
	1944	1943	1944	1943
Jan.	1,731	1,686	1,173	1,185
Feb.	1,756	1,692	1,122	1,072
Mar.	1,875	1,772	1,223	1,168
Apr.	1,757	1,631	1,142	1,122
May	1,777	1,707	1,132	1,115
June	1,738	1,553	1,112	1,056
July	.....	1,661	.....	1,090
Aug.	.....	1,705	.....	1,061
Sept.	.....	1,665	.....	1,106
Oct.	.....	1,795	.....	1,147
Nov.	.....	1,661	.....	1,142
Dec.	.....	1,720	.....	1,169
Total	.....	20,245	.....	13,382

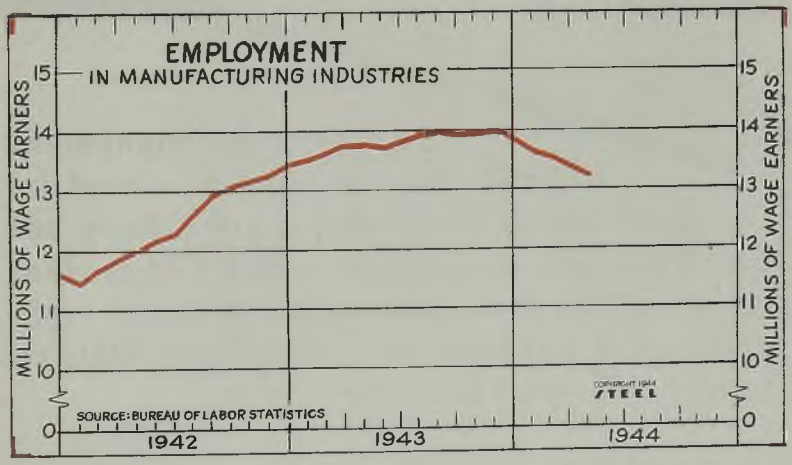
†U. S. Steel Corp. ‡War Production Board.

Factory Employment†

(000)

	1944	1943	1942
Jan.	13,669	13,503	11,456
Feb.	13,594	13,633	11,654
March	13,410	13,727	11,821
April	13,203	13,735	11,988
May	.....	13,700	12,127
June	.....	13,827	12,282
July	.....	13,911	12,564
Aug.	.....	13,990	12,869
Sept.	.....	13,935	13,079
Oct.	.....	13,965	13,166
Nov.	.....	14,007	13,267
Dec.	.....	13,878	13,474

†Source: U. S. Dept. of Labor.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,832	$9,478	$8,737	$8,916
Federal Gross Debt (billions)	$207.8	$204.0	$189.2	$76.0
Bond Volume, NYSE (millions)	$55.5	$40.6	$61.7	$63.7
Stocks Sales, NYSE (thousands)	7,486	7,844	11,443	6,788
Loans and Investments (millions)†	$56,262	$55,036	$50,032	$45,563
United States Government Obligations Held (millions)†	$41,048	$39,917	$37,027	$32,987

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's 15 items)†	248.3	249.3	250.0	248.7
Industrial Raw Materials (Bureau of Labor index)‡	113.8	114.6	114.4	114.0
Manufactured Products (Bureau of Labor index)‡	101.1	101.1	101.0	99.6

†1931 = 100; Friday series. ‡1926 = 100.

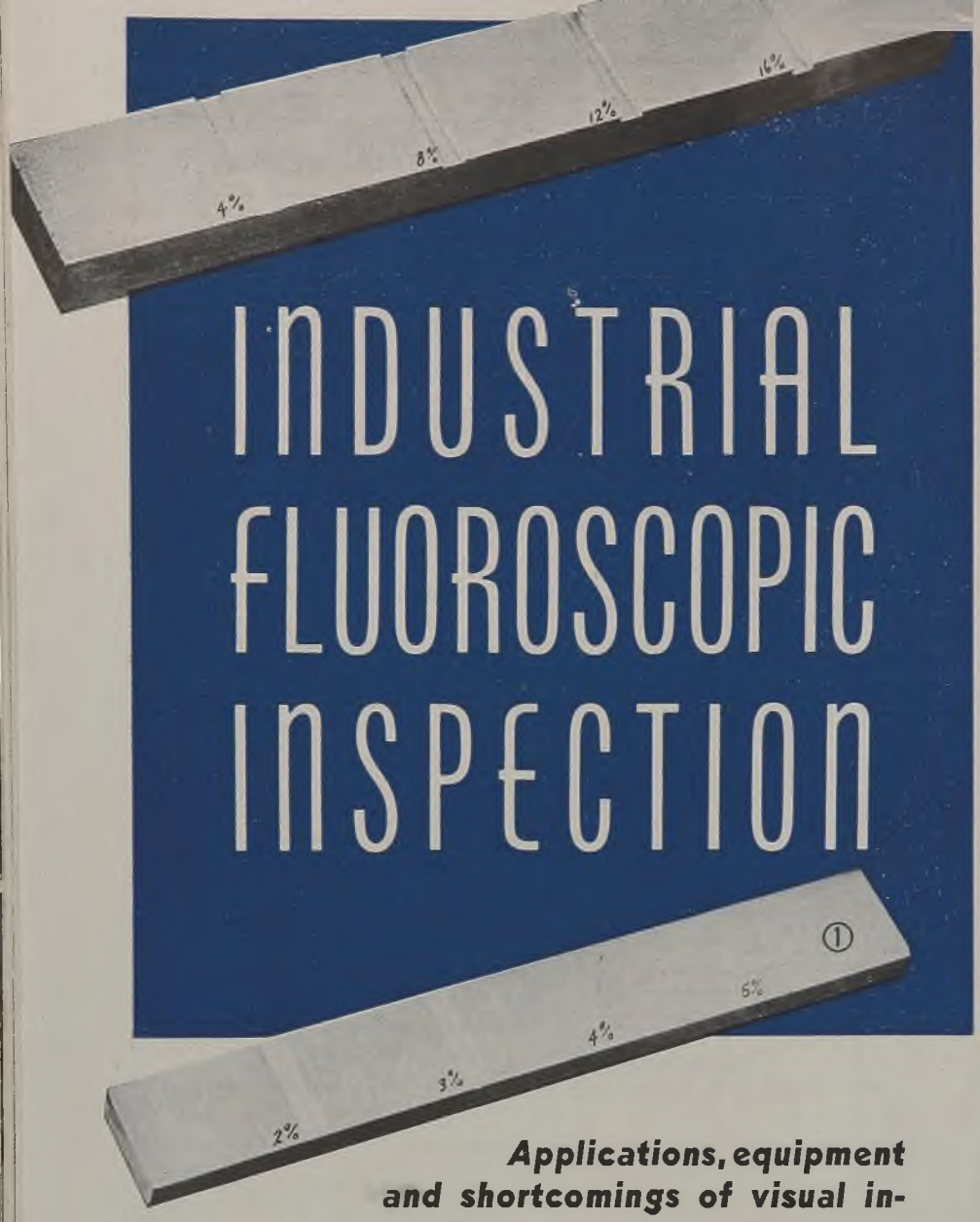


Fig. 1—Photograph of test gage, a satisfactory device for determining the sensitivity of fluoroscopic inspection

Applications, equipment and shortcomings of visual inspection by fluoroscopy are clearly set forth by author. Method not suitable at present for inspection of ferrous metals although higher-powered machines may make it possible to inspect thin steel sections

By ROBERT TAYLOR
Manager, Light Metal Alloy Foundry
Washington State College
Pullman, Wash.

AT the present writing considerable interest is being shown as to the practicability of fluoroscopic inspection as supplemented to radiographic inspection for the purpose of inspecting light alloy castings.

Considerable pressure has been applied to our film manufacturing industry to the extent that everyone requiring X-ray film could have their orders filled with the minimum of delay. Film manufacturers have certainly performed a miraculous job in fulfilling ever increasing industrial needs. Approval of use of the fluoroscope for the inspection of even a small percentage of the requirements of industry would obviously relieve the burdens imposed upon an industry already taxed to its limits.

One of the important features for consideration in the event approval of fluoroscopy for specified light alloy castings is granted should be the incident facilitating of such inspection. Together with the economies involved wherein the cost of film and processing solutions would be eliminated no doubt the method will be looked upon with great favor by industry.

In Great Britain fluoroscopic inspection has been approved as a suitable method of inspection for specified types of light alloy castings with prime consideration given to the shape and maximum cross section thickness. The limits as imposed state "that cross section does not exceed 2 inches in any part of the casting."

Specifically, there are two ways in which radiological examination can be performed, namely by radiography or fluoroscopy.

Radiography requires the use of film, which when excited by X-ray radiation will produce an image of a casting after proper processing of the film in developing and fixing solution. This provides a permanent record on film of the casting in question.

Fluoroscopy requires that a casting be placed upon an intensifying screen of cadmium tungstate crystals which when excited by X-ray radiation gives off a fluorescence providing an image of the part placed upon the screen which can be viewed directly in a darkened booth.

Formation of the Image

The images, as produced by radiography and fluoroscopy, are formed in an unlike manner and this must be considered when comparing the two methods if a clear understanding of contrast and density is to be the result of any experiment to evaluate either method.

In radiography the resultant image is produced by a build-up of exposure factors where the film emulsion is radiated over a considerable period of time from 5 seconds to hours.

The fluoroscopic image differs to the extent that it is an instantaneous one wherein a given voltage plus milliamperage and time of exposure will produce a given contrast and density. This product of exposure factors may be suitable to visually perceive the image on the screen or it may be the reverse. A careful choice of machine power output, as well as exposure factors and good diaphragming of the incident beam are essential to secure sensitivity in the neighborhood of 4 per cent.

A radiograph that might be considered as totally underexposed with 1 minute of exposure might be very satisfactory with a 5-minute exposure. Such is not the case in fluoroscopy where lengthening the time of viewing has no relation to the improvement of density or contrast. Increasing the penetration (voltage) or milliamperage may provide for better contrast between one area and its surroundings but these are the only two variables for use. The method has previously been confined to inspection of citrus fruits, packaged goods, automobile tires and shoe-fitting and it was but recently that consideration was given to utilizing the method as a means of facilitating a more economic inspection procedure for light alloys.

As a further example for studying the

type of equipment carefully it might be stated that a 100-kilovolt X-ray machine is perfectly adequate for radiographically inspecting aluminum up to 2 inches in thickness whereas it is inadequate for fluoroscopically inspecting magnesium over ¾-inch in thickness. Therefore for a given thickness of material higher power is required for fluoroscopically examining a specimen than would be required for radiography.

Method of Viewing

There are precisely two methods which may be utilized for viewing the image of the fluoroscopic screen:

1—Direct viewing
2—Indirect viewing

In the former method the operator views the fluoroscopic screen through a suitable lead glass directly, whereas in the latter method viewing is accomplished by viewing the image of the screen as projected upon a mirror which image is viewed through a lead glass window. Note Figs. 2 and 3.

By personal experiment I prefer the latter method. There are numerous reasons for individual preference which do not portend to intimate that the method preferred is precisely the best method. This will depend on the amount of work and type of work being inspected. However, the efficiency of the method will in part be dependent upon the comfort of the operator. Any method which will reduce fatigue should naturally be preferable. An operator placed in such a position that bending the head or craning the neck is not required should obviously perform his duties more efficiently.

The indirect method of viewing allows placing the X-ray tube above, rather than below the work and by so doing makes it possible to perform both fluoroscopic inspection and radiographic inspection with *one machine*. In order that operating personnel be isolated from stray radiation a periscope principle is employed in the indirect method using a highly polished front surface mirror placed at approximately a 45-degree angle which the technician views through a lead glass window as illustrated in Fig. 2. It has been found advantageous to place the fluorescent screen and mirror into one unit, gasketed so as to be both fume and dust-proof. The lead glass window should be of such size that the interior can be adequately viewed regardless of the height of the screen.

In order to improve visibility the bright uncovered area of the screen should be masked out by incorporating a lead adjustable shutter within the assembly. The operator's efficiency should improve considerably as he becomes

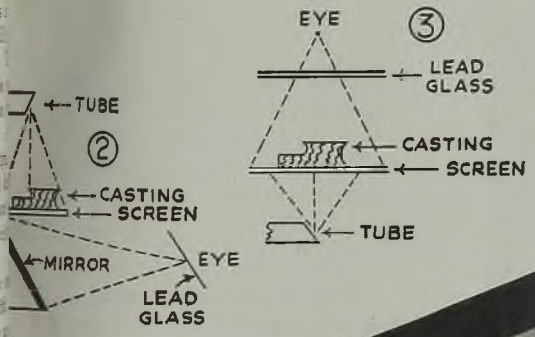
(*Please turn to Page* 124)

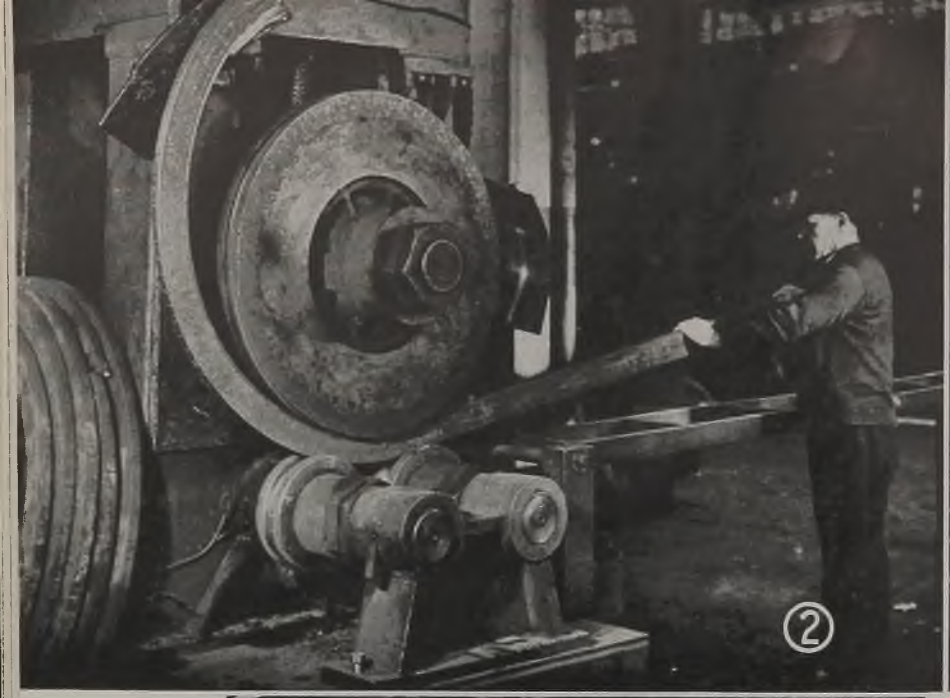
Fig. 2—Diagram showing indirect method of viewing by fluoroscopy employing a front surface mirror

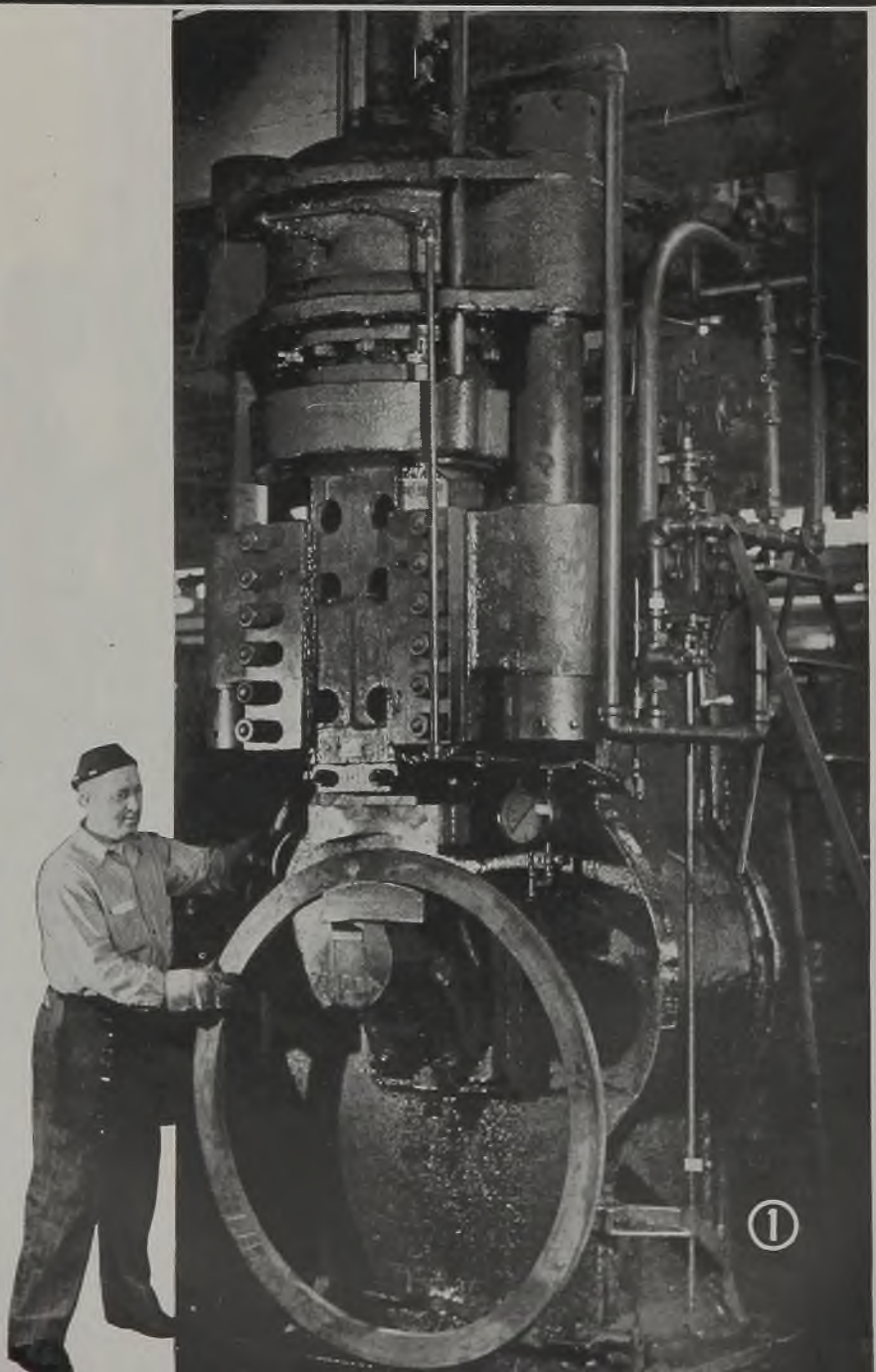
Fig. 3—Diagram showing direct method of viewing with fluoroscopic method

Fig. 4—Combination radiographic-fluoroscopic machine where with mirror placed inside the tower and lead glass placed outside and indirect method of viewing may be established in conjunction with both radiography and fluoroscopy. Photo courtesy Kelly-Koett Mfg. Co. Inc.

Fig. 5—Radiograph of 1-inch penetrameter placed on step-tablet. This sensitivity gage unsatisfactory for fluoroscopy







Turret Ring

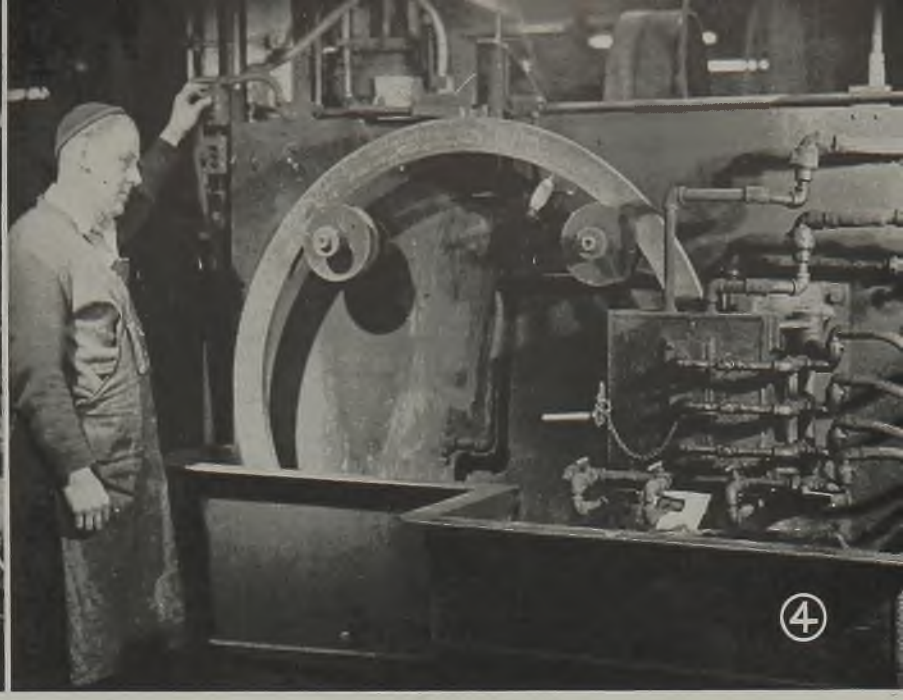
UNIQUE

Fig. 1—This 400-ton hydraulic "bumper" employs curved dies to form bar ends, completing ring shape at joint for welding

Fig. 2—Heavy duty rolling machine forms bar to circle. Two bottom rolls are driven by a 50-horsepower motor. Rolls are grooved to take bar on edge. Photos by Birdsall

Fig. 3—Huge flash welding machine is rated 800 kilovolt-amperes, exerts 150 tons maximum pressure on joint during final upsetting. Automatic operation cycle controlled by cam under cylinder at extreme right

Fig. 4—Overall view of machine for progressively hardening large rings throughout entire cross section measuring 1 5/16 by 3 7/16 inches. See Diagram "B" for arrangement of burners



urret Line Features . . .

NIQ HEAT-TREATING METHOD For Circular Parts

By G. W. BIRDSALL
Associate Editor, STEEL

Progressive heating method avoids distortion in circular ring-type parts by allowing cold portion of ring to control heated section. Overall heat-treating cost reported reduced more than one-third with output tripled on same floor area. Significantly, stock more than 4¼ inches in cross section is through hardened progressively at rate of 2¼ lineal inches per minute or 135 inches per hour. Stock subsequently is drawn progressively at rate of 3½ inches per minute. Method is reported to have wide application possibilities

BECAUSE of its long experience in oducing circular parts from bar stock, lled to a circle and electric butt elded, Cleveland Welding Co. was re- ested to see if an improved method ould be developed for producing large eavy rings for tank turrets. Consider- le difficulty was being encountered the time with distortion, heat treat- ent resulting in an out-of-round con- tion. This necessitated use of enough tra stock in the ring to allow for ma- ining to correct the error or else a fficult truing operation after heat treat- ent. These rings must be absolutely e so that the tank turrets rotate freely on them without binding.

Conventional flame-hardening equip- nt could be used if only surface hard- s was required, but here the work d to be hardened and tempered oughout the entire cross section ich measured 1 5/16 x 3 7/16 inches (a ss-sectional area of approximately 4¼ are inches). Some method had to be vised with sufficient heat input and th sufficient "soaking" time to al- the entire section to come to heat, with sufficient speed to treat the ire ring of 54 inches outside diame- ter in a reasonably short period of time.

Homer Mueller, vice president, reports the job was tackled successfully by working out a method for heating only a small portion of the ring at a time, followed by immediate quenching—done as a progressive and continuous operation till entire ring is treated. Significance of the development, says Mr. Mueller, is that it cuts overall heat-treating costs at least one-third and triples the output obtainable from a given floor area. This is accomplished using the unique setup shown in Figs. 4 to 8.

But before we examine this unusual heat-treating method, it might be well to look at the production operations prior to heat treating.

Made From Bar Stock: Like many other circular parts produced by Cleveland Welding Co., the turret ring is made from alloy steel bar stock. This arrives at the Cleveland plant in lengths sufficient to make five pieces, each 157 inches long. Cross section measures 1 5/16 x 3 7/16 inches.

Cold Rolled To Shape: After cutting to length, the stock is rolled cold to circular shape with the flat bar on edge. The heavy duty Kane & Roach rolling machine shown in Fig. 2 is driven by a 50-horsepower motor and easily handles this operation cold. Both the two small bottom rolls are power driven and are grooved to take the bar on edge and hold it so finished shape is almost a true circle except for the small portion at beginning and end of the bar which cannot be bent due to necessary roll clearance.

These portions of the bar are subsequently formed to shape wanted on the 400-ton hydraulic "bumper" shown in Fig. 1. Made by French Oil Mill Machy. Co., this machine employs a hydraulic system operating under maximum pressure of 2500 pounds per square inch.

Fig. 5—Closeup of superheat burners (immediately below main housing at top), with spray quench and further below the post-heating burners at "D" and "E", Diagram "B"

As can be seen in Fig. 1, the ends of the bar which are to be welded are formed to same radius as remainder of bar by squeezing or "bumping" the work between the curved dies of the machine.

An electric hoist travels on an overhead monorail system that extends down this processing line to facilitate loading the machines and moving the work from machine to machine.

"Bumper" Forms Ends: The lower die of the bumper is stationary so work is hung on that, then positioned by the operator who pushes a button to "squeeze" the work. While bumper is rated 400 tons, working pressures on this job rarely exceed 200 tons. Operator usually employs five successive "squeezes", two at different points of both ends and the final one with the joint centered under the dies.

The finish formed ring resulting from these operations may have abutting ends touching at inner diameter open in a slight Vee to outer diameter—or the ends may align perfectly. The flash welder takes care of any variation when removing excess stock during the "burn-off" period.

Flash Butt-Welding The Joint: The electric resistance or "flash" welder shown in Fig. 3 is one of the newest and largest electric welding machines in this plant where huge flash welders of latest types are seen on every hand. Rated at 800 kilovolt-amperes, this National welder easily handles 10 or more rings per hour.

Men in Fig. 3 are positioning a ring in the jaws of the machine by use of electric hoist on overhead monorail line. All controls are grouped at a station alongside the operator at the right. When lined up in the dies, operator trips valve controlling hydraulic cylinders that cause dies to grip the work securely under a pressure of about 75 tons.

Tripping the start switch causes the weld to be made automatically by a cam which operates valves and electric contactors to handle the following sequence of operations under precise control:

Apply current to dies, advance dies slowly during "burn-off", shut off current, advance dies further to "forge" the hot metal in the abutting ends—the "upsetting" period, release work by opening dies. Maximum upsetting pressure is approximately 150 tons.

From the welder, the ring is placed in an air clamp setup which holds it while burned metal upset around the flash is chipped from the weld.

Hot Sizing On A Bulldozer: Next the ring is placed in a gas-fired furnace for 1¾ hours where it reaches a temperature of 1760 to 1800 degrees Fahr., sufficient to normalize the weld and to soften the metal for subsequent flattening and sizing operations.

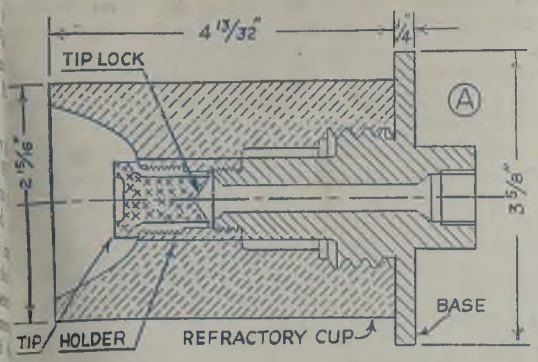
Hot ring is first flattened by hand on a solid steel plate which is 3½ inches thick and resting on a platform to bring it to convenient working level.

Next, while still hot, the ring goes on to a Grotnes bulldozer, tooled to produce the correct inside diameter by expanding a series of radially moving elements against the inside of the ring. A 20-horsepower motor drives heavy gearing that operates a crank. This in turn pulls a tapered plug through the center of the radially moving sections, causing them to expand the ring to the exact size, 47$\frac{3}{32}$ inches inside diameter.

Expanded ring is placed flat on a 3½-inch thick steel plate and allowed to cool to room temperature. After inspection, ring is ready for heat treating.

Unique Heat-Treating Machines: Fig. 4 is an overall view of one of the special heat-treating machines built by Cleveland Welding Co. and designed by the Selas Co., Philadelphia, makers of the special gas burners employed. These burners are fed a gas-air mixture premixed in correct proportions by a special unit shown in Fig. 8. Two types of heat-treating machines are used—one with 15 burners for hardening, the other with 6 burners for drawing. Both are essentially the same except for number and arrangement of burners.

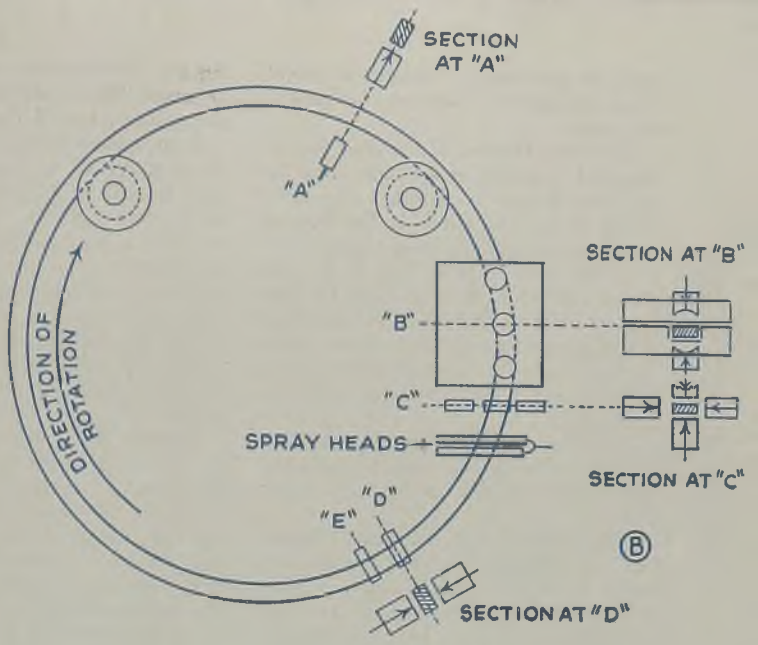
Frame of the machine consists of a heavy steel plate forming the vertical base or backbone. A splash tank extends up around the lower portion as shown in the illustrations. The ring to be treated is hung on the two grooved rollers shown at shoulder level in Fig. 4. These are driven from the back side of the machine by ½-horsepower electric motor through a variable-speed transmission at such a rate that the ring makes a complete revolution in 70 min-



ites during the hardening cycle, 45 nutes during the drawing cycle.

Six Round Radiants in "Box": To insert a ring in the machine, the burner box shown surrounding the righthand center section of the ring in Fig. 4 is opened up as seen in Fig. 6. This main burner housing contains six circular type Selas Duradiant burner units. These burners have a round, somewhat cone-shaped radiating face, as seen in Fig. 6. Diagram A presents a cross section engthwise to show how the premixed air-gas mixture is deflected by the tip against the face of the refractory cup where it burns completely. There is no flame extending from the cup, practically all of the heat being radiated by the incandescent surface of the refractory cup. Heat output of such burners is tremendous, especially when the radiant cup is mounted close to the work. All burners are spaced about ½-inch from the ring.

Burner housing is built up of arc welded steel plates. Both housing base and housing door are double walled and are arranged for circulation of cooling water. Three of these burners are mounted in the door, three more in the housing base. A high duty mastic refractory material surrounds the burners and is also shaped to confine heating chamber to shape of ring section enclosed by the housing. This helps cut heat loss and also improves heating efficiency of the arrange-



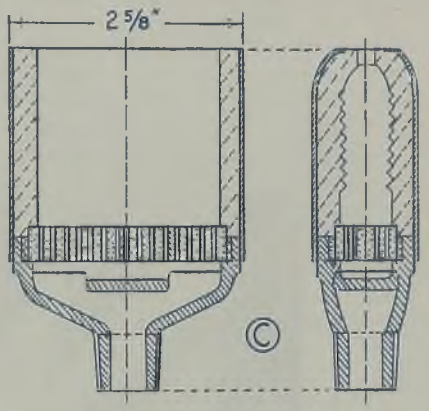


Diagram "A"—Cross section through round radiant burner, six of which are used in main burner housing. Gas-air fuel is premixed, burns against cone-shaped refractory cup face to liberate great amount of heat in small amount of space

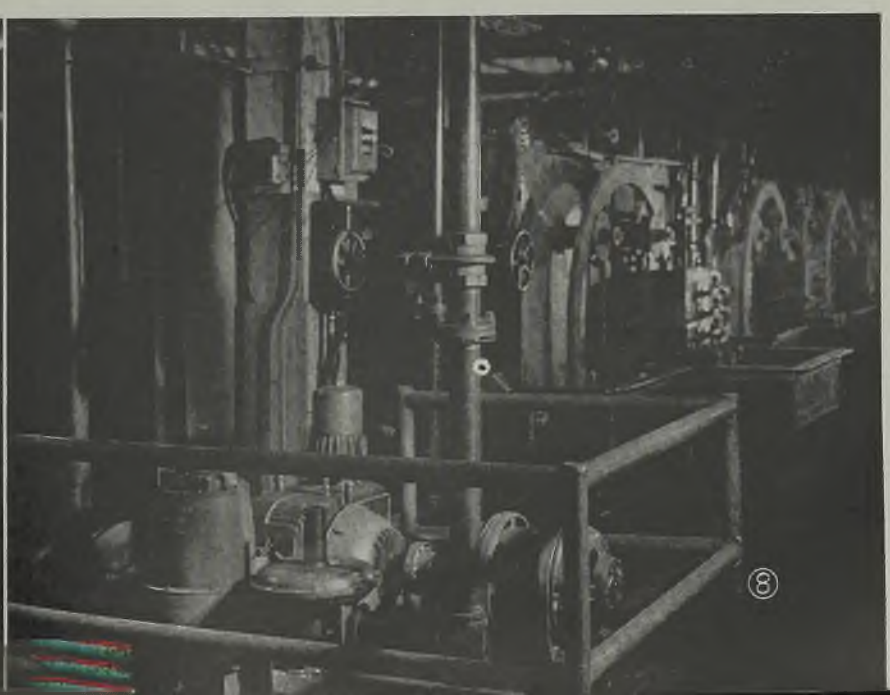
Diagram "B"—Schematic showing arrangement of various burners on the hardening machines. Sections at each burner location indicate direction of heat radiation

Diagram "C"—In the slot type gas burner, a different heat pattern is obtained, corresponding to rectangular shape of opening at burner mouth

Fig. 6—Main burner housing here opened to show how six radiant burners and surrounding refractory lining form a "radiant envelope" that completely encloses the ring at this point. Note lack of scale formation on ring. Speed and lack of exposure to air for any period of time discourage formation of scale

Fig. 7—Many details of piping and control valves can be seen here. See text

Fig. 8—Natural gas is mixed with correct amount of air here for proper combustion in the heat-treating machines by means of Selas mixing and combustion control equipment. Line of heat treating machines includes hardening as well as separate draw units



ment by providing a "radiant envelope" which completely encloses the ring at this point.

The three burners in the door are not mounted vertically in a straight line but are offset slightly to conform to the curve of the ring. The three in the housing base are arranged in same manner.

As can be seen from Fig. 6, the ring attains full white heat of 1750 to 1800 degrees Fahr. before it has traversed half of the burner housing. This allows ample "soaking" time for ring interior to come to heat as it travels through remainder of housing.

This same burner housing and six radiant elements are used in both the hardening machines and the drawing units.

"Slot" Burners For Post And Preheating: In addition to the six round radiants in the housing enclosures, nine ceramic-lined cell-type burners are also employed in the hardening machines, the drawing units not needing these supplementary heat sources.

Diagram "B" shows arrangement of burner groups on the machine in approximately the same perspective as in Fig. 4. Pre-heating is done by a single slot type burner at "A" directed against the inside edge of the ring.

Immediately below the main burner housing at "B" is a group of four slot type burners at "C", one directed at each of the ring surfaces. These "superheat" burners assure precise control of ring temperature upon quenching by preventing heat loss during travel to the quench. They also provide a high velocity screen of hot combustion products to prevent splash and steam from entering the "radiant envelope" of the main burner assembly.

Directly below the superheat burners are the spray heads for water quenching the heated ring section. Then further below at "D" and "E" are two more pairs of slot type burners for post heating, directed against the sides of the ring. Their purpose is to "stress relieve" the hardened ring.

Fig. 5 shows what the workman in Fig. 4 sees as he looks down at the ring section coming from the main burner housing which can be seen at top of Fig. 5. Directly below the housing are the superheat burners. Then a few inches further on appear the spray heads fo quenching, with the post heating burn ers below them.

Flexible Connections: In order to per mit the main burner housing cover t swing open, all connections to it an made through short lengths of flexibl hose and through rotary couplings shown in Fig. 7. Three of the superhea burners at "C", Diagram "B", are sup ported from the door structure, th fourth (striking against the back face o the ring) being mounted on the mai base plate.

Thus, connections to the door inclu incoming and outgoing cooling wate three individual gas lines for each o the main burners, and a fourth gas lin for the superheat burners.

Valves and Operating Controls: Th three valves with round handles in up per center of Fig. 7 control flow of wate to the housing cover, to the housing base and to the spray quenching heads, top to bottom respectively.

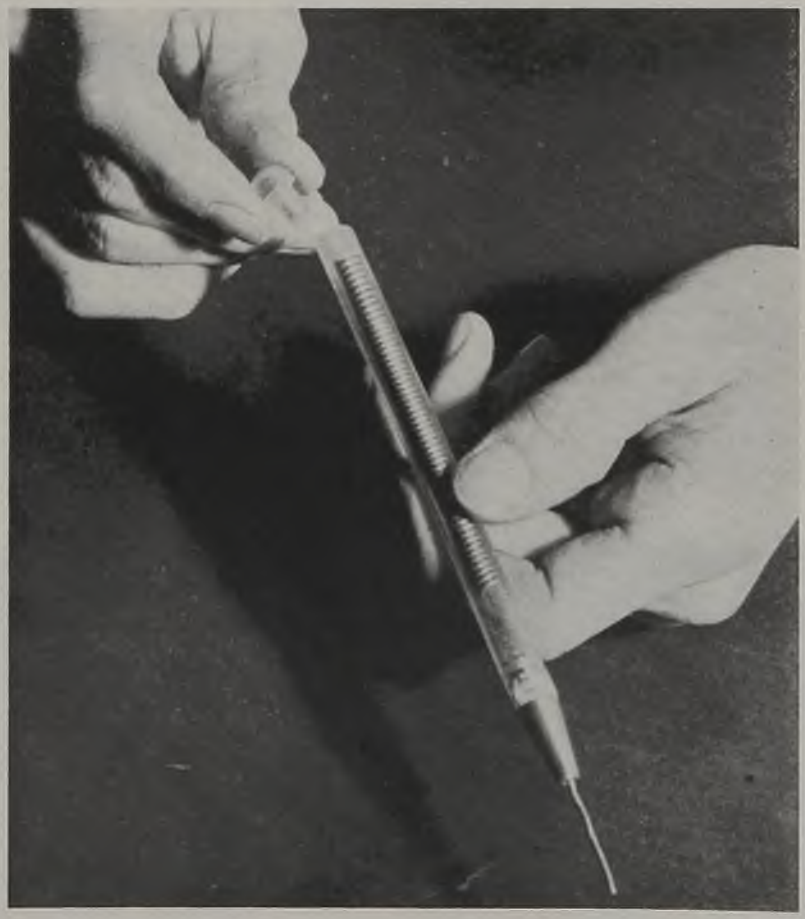
Incoming fuel gas (natural gas) ha been pre-mixed with correct quantity o air for most efficient combustion ha equipment in left foreground, Fig. 8 which discharges into a common mani fold feeding the entire line of heat-treat ing machines in Fig. 8. Details of valv ing and control typical of those found at each machine are seen in Fig. 7.

Gas-air mixture coming from manifold first passes through cut-off valve with round handle seen at extreme upper center, Fig. 7, then goes through a 2-inch automatic fire check, also seen at extreme upper center, Fig. 7. Then -½-inch pipe comes down to a header where four ¾-inch lines lead off to the various burners through 1-inch solenoid valves, electrically operated for automatic control of the entire machine.

Top or No. 1 line goes to pre-heat burner "A" (see Diagram "B") and also serves top burner in housing cover and top burner in housing base. No. 2 line feeds center burner in cover and center burner in housing base. No. 3 line serves bottom burner in cover, bottom burner in housing base and the two front burners at "D" and "E". No. 4 line feeds all four super-heat burners and also the two back burners at "D" and "E". In addition to these solenoid operated group valves, each individual burner has a hand shut-off valve mounted adjacent to it. An extra hand valve also permits the three superheat burners mounted on the cover to be turned off as a unit.

Sequence Of Operation: When a ring is inserted for treatment, all burners operating. But as the ring completes travel, it is necessary to shut off the bu ers in proper sequence to prevent o lapping which would draw the previ ly hardened portion by reheating.

This is done by hand or automatically For hand operation, the attendant watch ing the machine makes a chalk ma radially on the front face of the ring line with a mark on the back plate b fore he starts the ring to move by act ing the driving motor. All controls ar grouped together for convenient ope



SOLDER "PENCIL": Before solder is loaded into the pencil-type dispenser shown above, it is wound on a drill rod in a bench lathe. It is then inserted in the methyl methacrylate resin tube, which has a brass nozzle cemented into the body with a press fit, and plastic cap plug closes the other end. Operator uses pliers to pull out solder as needed. Dispenser was devised at General Electric Co.'s Schenectady Works

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tion at upper left of the machine as shown in Fig. 4. There are also three other marks on the back plate.

As the ring completes its journey and the chalk mark on the ring reaches the first mark on the back plate, the operator trips the first switch actuating solenoid valve No. 1 and shutting off the preheat burner and pair of top burners in the housing. When the ring mark reaches the second reference line, the operator trips the switch releasing solenoid valve No. 2 and shutting off the center pair of burners in the housing. As the ring mark arrives opposite the third reference line, operator similarly shuts off valve No. 3 controlling lower pair of burners in the housing and front burners at "D" and "E". Lastly solenoid No. 4 is released as ring mark reaches last reference line, shutting off preheat burners and back burners at "D" and "E".

Automatic Operation: Some of the heat-treating machines are set up for automatically turning the burners off in proper sequence. This is accomplished by tack welding a short nub on the ring at the starting point. Then as this nub comes around upon completion of ring travel, it actuates a series of limit switches so placed as to release the solenoid valves in correct sequence. A portion of the electrical relay board employed with this scheme is seen back of the piping connections in Fig. 7 where the switchboard cover has been removed to show them.

Drawing Hardened Rings: Rings hardened as described above need to be tempered before machining. This drawing is done in a machine exactly duplicating that described except that the preheat, superheat and post heat burners are not used, all heating being accomplished by the six burners in the main housing. These are turned off in sequence to prevent overlap as in hardening.

Temperature attained by the work here is approximately 1200 degrees Fahr. Since the ring does not have to reach such a high temperature as in hardening (1800 degrees Fahr.), it can be moved through the burner housing at a faster rate. Result is that the same burner setup as employed in the housing for the hardening machines can be used for drawing yet the whole drawing operation requires only 45 minutes, instead of 70 as needed for hardening.

Fuel Consumption: About 500 cubic feet per hour of Cleveland natural gas (1100 B.t.u.) is used by each hardening machine, and 250 cubic feet per hour by each drawing machine. Burner life is quite satisfactory.

Checking And Inspection: After hardening and drawing, each ring is checked for hardness at three points on the flat sides by first grinding off approximately 1/16-inch and testing with a brinell machine. Test must show values within the range of 302-341 brinell.

No Distortion: Importance of this method of heat treating is that it practically eliminates heat-treat distortion. In fact the entire ring, which measures 53 31/32 inches outside diameter, 47 3/32 inches inside diameter, retains its shape within 1/32-inch. Thus no straightening is needed.

This contrasts with the need for straightening 40 per cent or more of the rings produced by previous methods.

Important Savings: Also of great value is the fact that heat-treating costs are cut fully one-third. Company officials also report that use of this method permits doing three times the work in the same floor area. Those three advantages indicate the significance of this heat-treating development.

Safe Welding and Cutting Methods Topic of Booklet

The 32-page booklet on "Safety in Electric and Gas Welding and Cutting Operations" recently published at the instance of the International Acetylene Association, the American Welding Society, the National Electrical Manufacturers Association and the Division of Labor Standards of the Department of Labor is another in the series of American War Standards developed by the American Standards Association.

Booklet is designed to serve as a guide for the protection of the individual operator from injury or illness and for the protection of property from fire or other damage arising out of improper methods of installation, operation, etc. It covers every phase of safety applicable to all ordinary welding, cutting, brazing, lead burning and flame-treating operations, but does not attempt to cover any hazards inherent in special industries such as explosives, etc. Copies may be ordered from American Standards Association, 29 West Thirty-ninth street, New York 18.

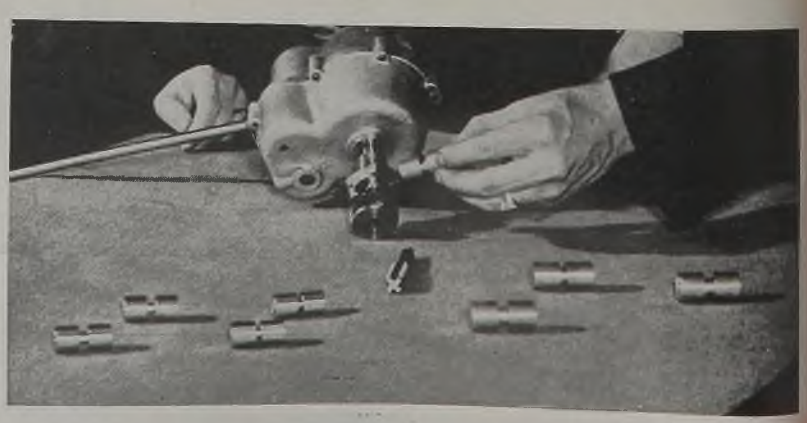
Safety Insert Sounds "Knell" of Tap Breakage

SAFETY INSERT for tapping heads developed by employes of Glenn Martin Co., Baltimore, has almost completely eliminated tap breakage on jobs where this factor previously ran as high as six taps per 8-hour shift. Breakage was particularly high in tapping hard, heat-treated steel gun-charger plates and bomb-bay window racks. Furthermore, broken taps would so jam into the holes being threaded that 50 per cent of this work had to be scrapped. Man-hour and material losses were considerable.

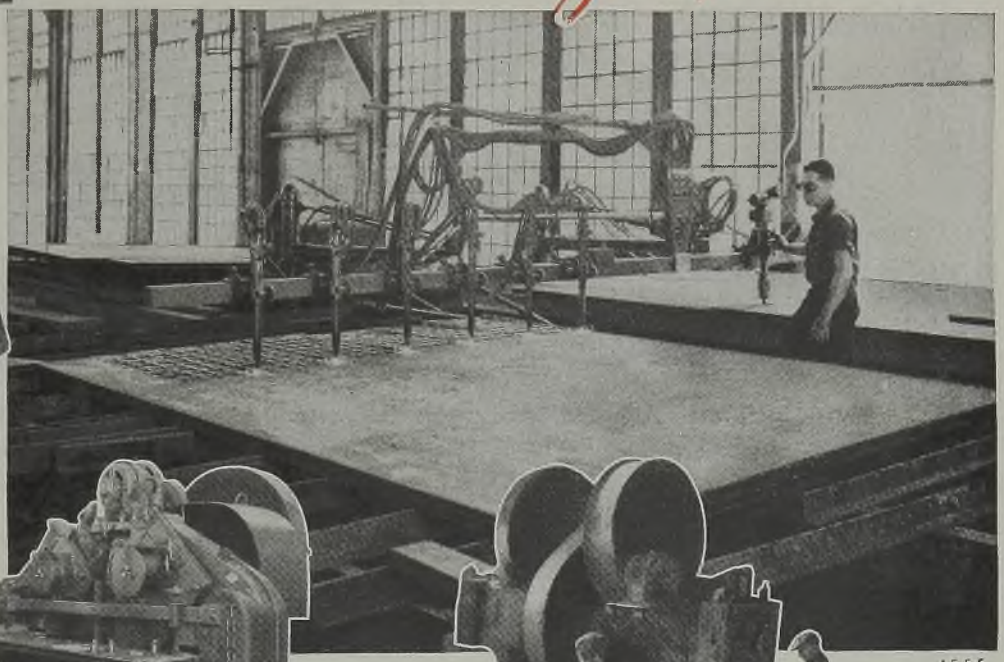
The new insert, duplicates of which are shown with tapping head in accompanying illustration, is a grooved piece of Zamak—a die-cast zinc alloy—which replaces steel jaws formerly used to hold the tap in place. It is identical to the jaws it replaces with the exception that it is cast in one piece and each insert can be used only with the size tap for which it is designed, whereas standard jaws are in two pieces and are adjustable for various sizes of taps.

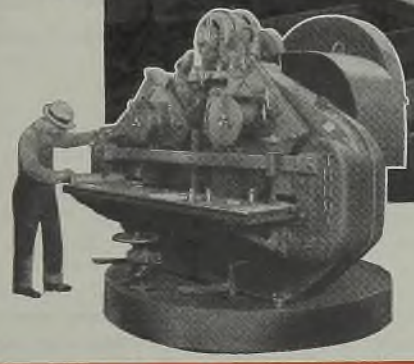
When tap jams with the new insert, the soft metal of the insert slot wears away, permitting the tap to remain stationary while the tapping head continues to rotate. The metal is soft enough so that it gives way before sufficient force to break the tap is generated, yet it is hard enough to hold tap in place during normal operations. By rotating insert to a new position each time a tap jams, the same insert may be used about 15 times, after which it is melted and recast.

The Zamak insert can be used in any kind of tapping head.



A look-in on our Modern Cutting Operations





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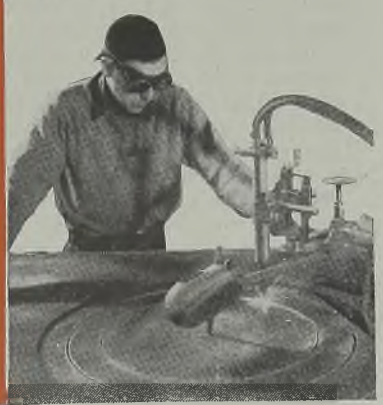

POWDER METALLURGY is the art of producing metal powders and of making shaped objects from individual, mixed, or alloyed metal powders, with or without the inclusion of nonmetallic constituents, by pressing or forming these objects and simultaneously or subsequently heating them to produce a coalesced, sintered, alloyed, brazed, or welded mass, characterized by either the absence of fusion, or by the fusion of a minor component only.

It may be noted that the art is definitely not limited to pure metals. The methods include those of producing ceramic parts, which are largely metal oxides, as well as cutting dies and drawing dies of metal carbides. Abrasives made of carbides or oxides are inseparable in their similarity.

An iron powder is automatically weighed in proper charges in cups on precision scale. The operator pours each charge of powder into the die, levels

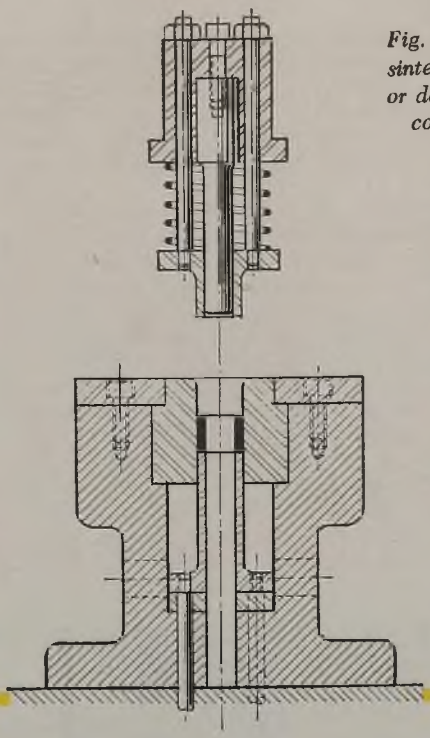

Fig. 1—Sizing of porous metal bushings after sintering, as pre-formed in either single-action or double-action mechanical presses with direct connected liftout or cam bottom knockout

cal or chemical means of a metal powder, and the consolidation of this powder at a temperature below the melting point of the major constituent into a reasonably strong solid form. The coalescence of the particles requires the application of mechanical pressure and heat except with metals having a low thermoplastic range.

Many metallic elements were first commercially produced in powder form. Among the metals produced either for or within a few years of their discovery in powder form are: Boron, beryllium, magnesium, aluminum, silicon, iron, cobalt, nickel, zirconium, niobium, molybdenum, ruthenium, rhodium, palladium, barium, calcium, titanium, vana-

Processes for Making
METAL-POWDER PRODUCTS

Prepared as a comprehensive exposition of powder metallurgy art as it exists in America today, this presentation, also made before the Electrochemical Society, includes description of standard methods and equipment for making a wide diversity of powder-metal machine parts and products

By E. V. CRANE
And
A. G. BUREAU
E. W. Bliss Co.
Brooklyn, N. Y.

it properly, compresses it (the press applies about 25 tons per square inch in this case) and then removes the compressed briquette gently. Thereafter, it must be sintered or baked at high temperature in a controlled atmosphere furnace to join the particles properly. While the parts are quite fragile before sintering, their ductility afterward is high. The heat-treated parts may then be straightened under relatively light pressure or subjected to a high cold flowing or sizing pressure in a press.

Powder metallurgy was used in Europe at the end of the 18th century for working the then infusible platinum metal. It is astonishing to find it had been used for the same purpose by predecessors of the Incas in Ecuador and by the Incas themselves in that locality for a considerable period before Columbus made his famous voyage. Several samples of Inca platinum have been found that had evidently been worked by a process not unlike that used in preparing sintered hard carbides today.

Powder metallurgy was in profitable use by dentists in the middle of the 19th century. Gold leaf (flake) fillings for teeth are extremely old. The dentists' use of powdered tin-silver alloys mixed with mercury in making amalgam fillings must also be considered as a definite antecedent to the production of solid alloys by diffusion above the melting point of one of the constituents.

The essential features of powder metallurgy are the production by mechanical or chemical means of a metal powder, and the consolidation of this powder at a temperature below the melting point of the major constituent into a reasonably strong solid form. The coalescence of the particles requires the application of mechanical pressure and heat except with metals having a low thermoplastic range.

Many metallic elements were first commercially produced in powder form. Among the metals produced either for or within a few years of their discovery in powder form are: Boron, beryllium, magnesium, aluminum, silicon, iron, cobalt, nickel, zirconium, niobium, molybdenum, ruthenium, rhodium, palladium, barium, calcium, titanium, vanadium, chromium, manganese, cerium, lanthanum, neodymium, dysprosium, tantalum, tungsten, osmium, iridium, platinum, thorium, and uranium.

Metal powders of almost every known metal are now available. Most metal powders are produced by either electrolysis, atomization or gaseous reduction of metal oxides or other salts. Tungsten metal powder, for instance, is manufactured by the reduction of tungsten trioxide by either carbon or hydrogen. Iron, nickel and copper metal powders are usually produced by the reduction of their oxides by gas (hydrogen or

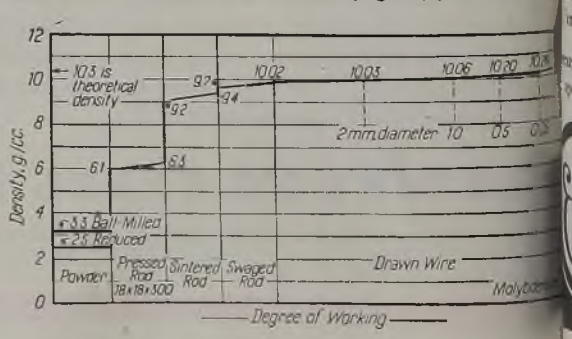

Fig. 2—Improvement in density as molybdenum powder is cold pressed at 60,000 p.s.i., then "sintered" above its recrystallization temperature and worked with intermediate annealings

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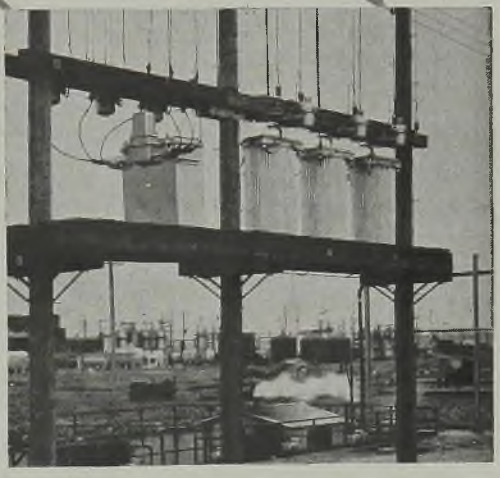

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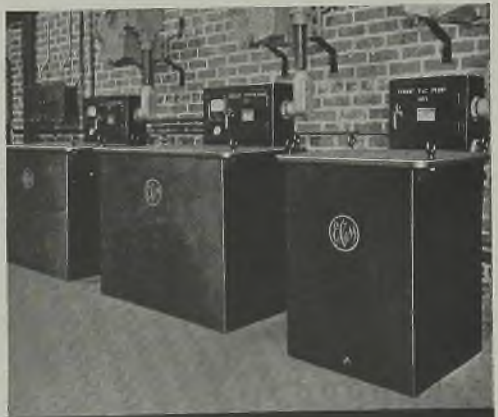

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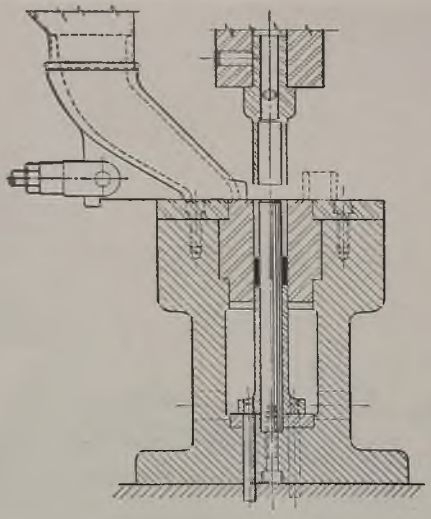


Fig. 3—Die with highly polished walls for measuring (flush fill) and briquetting porous bronze and iron bushings in mechanical presses fitted with hopper, vibrator and timed knockout

bon monoxide) or by electrolysis. Low melting point metals such as aluminum, zinc, and lead are frequently produced in powder form by atomization of the molten metal. There are other methods but the above methods provide more satisfactory materials for the fabricators of metal powder compacts.

Particle Size and Shape: In the preparation of powders purity, size, and proportion of sizes are important factors for compounding alloys or mixtures with nonmetallic components. A wide variety of powders and powder mixtures is available. Correct particle size of powders, as usually gaged by the standard screen mesh through which they will pass, is highly essential to proper flowing and filling of mold or die and the relation of voids in initial compacting. The method of powder preparation also governs whether particles are more or less equiaxed or relatively flat. The metal powders are successfully handled in much smaller average grain size than the synthetic resin mixtures.

The tendency of powder particles to arch and lock during compression, leaving local voids and nonuniformities, has led to some preference in thin walled sections to compact both from the top and bottom, using hydraulic cylinders or mechanical movements above and below in the press. A similar effect may be obtained in properly timed hydraulic or faster mechanical double action presses, or by moving floating die walls down half the working travel of the compressing punch, slide or ram. More general and simpler practice, however, for metals and organic and ceramic mixtures is to compress from the top with suitable "knockouts" below.

The shape of metal powder particles is determined, for the most part, by the method of preparation. Aluminum powder made by granulation is quite different from that made by stamping. Copper powder made by reduction of copper oxide is decidedly different from that made by electrolysis. The shape of particle of metal powders is spherical when produced by condensation, as in the case of zinc, or by the decomposition of carbonyls, as in the case of iron or nickel.

Where the powders are sufficiently coarse, the particle size and the particle size distribution may be determined by the use of metal sieves; however, this method is not applicable for particles finer than 400 mesh. The diameter of a particle passing a 300-mesh sieve is about 53 microns.

In the case of powders finer than 400 mesh, microscopic examination may be employed, or a measurement of the light-blocking action of the powder in the suspension in a liquid. This is especially true in the case of finished powders used in the hard carbide industry where the particle size may range between 1 and 5 microns, or even finer.

Pressing: The powders may be pressed either hot or cold, but in the majority of cases the operation is carried out at room temperatures. The powder is pressed in dies or molds made of hardened or special steel, selected to have as low a coefficient of friction as possible. In some cases, where small pieces are pressed from highly abrasive powders, the dies are made of hard carbide compositions produced in turn by powder-metal methods. Shrunk ring die construction is often used with pre-stressed wall members to minimize deflections.

The depth of the die will depend to a certain extent upon the compression ratio of the powder which is usually in the neighborhood of 3:1. In some cases, however, where fine powders are used, the compression ratio may be as high as 6:1, or even 8:1.

The pressures required vary between 5 and 100 tons per square inch and are related to the yield point of the metals and density and flow shape of the part.

Strange as it may seem, slow compression is not as satisfactory as a qu stroke. A fast powerful stroke tends greater uniformity or working. A br dwell may be required to relieve bursting compression of trapped air less the powder hopper is evacu The timing of presses such as the speed hydraulic press has proven h satisfactory.

Price is of vital importance in progress of powder metallurgy.

Under the Electron Microscope: co-operation with Dr. James Hillier the Radio Corp. of America laborato at Princeton, the Hardy Metallurg Co. recently investigated metal powd particles and sintered parts made the from with the aid of the electron micr scope at magnifications ranging up 20,000 diameters. The photomicrograp reveal that particle boundaries und proper sintering conditions are com pletely obliterated to produce a contin ous metallic structure.

Pressing Non-Metallics: In conside ing the process of molding or compre ing metal powders it should be remem bered that they have much in comm with ceramic powders, as well as wi cemented carbide, grinding-abrasive a synthetic resin powders. The met themselves are subject to advantag alloying for many purposes.

An interesting transition bet molded ceramics and powder m lurgy is found in certain (perm telephone and radio cores. Here, high magnetic permeability, gra of iron and nickel or molybdenum prepared and coated with a thin (0.00002-inch) of ceramic clay as insulator of eddy current losses. T coated granules are die-pressed to sh under about 100 tons per square inc pressure to an apparent density of ab 7.75 grams per cubic centimeter then annealed to restore magnetic qu ty and, incidentally, at a temper which permanently sets the ceramic as binder.

Abrasive wheels are molded wit pressure, temperature and time co

TABLE I—COPPER AND IRON ARTICLES FROM POWDERED METALS

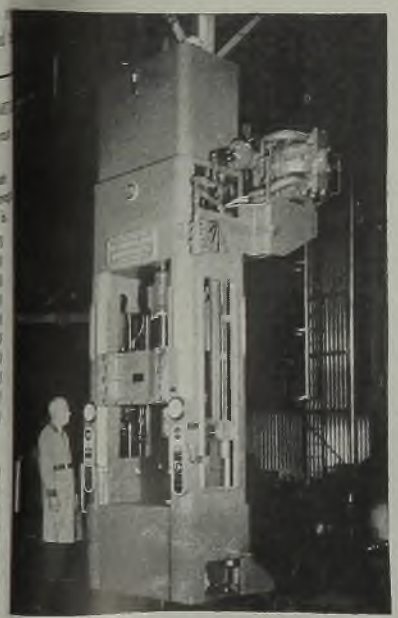
Stages in the improvement of properties of compacts with experimental alternate compr and recrystallization.

	Apparent Density grams/cc.	Brinell Hardness	Ultimate Tensile Strength lb./sq. in.	Elong in 2 per
COPPER				
Pressed, at 50 tons/sq. in. (70 kg./mm.²)	7.47	73	970	
Sintered, at 1470°F. (800°C.) 8 hr.	7.90	34	16.000	
Re-pressed, at 50 tons/sq. in. (70 kg./mm.²)	8.39	70	22,200	
Re-sintered, at 1470°F. (800°C.) 8 hr.	8.37	39	25.500	
Cold rolled, 25% reduction	8.33	97	37,300	
Re-annealed, after 25% red	8.35	39	17,000	
Cold rolled, 50% reduction	8.57	109	44,400	
Re-annealed, after 50% red	8.59	41	24 600	
Cold rolled. 75% reduction	8.80	117	49,000	
Re-annealed, after 75% red	8.82	44	32,700	
IRON				
Pressed, at 50 tons/sq. in. (70 kg./mm.²)	6.23	69	470	
Sintered at 1830°F. (999°C.) 8 hr.	6.68	47	27,000	
Re-pressed, at 50 tons/sq. in. (70 kg./mm.²)	7.27	67	30.500	
Re-sintered at 1830°F. (999°C.) 8 hr.	7.23	63	34,900	
Cold rolled, 25% reduction	7.39	107	50 500	
Re-annealed, after 25% red	7.40	63.5	30,600	
Cold rolled, 50% reduction	7.67	133	63,000	
Re-annealed, after 50% red	7.69	68.5	32,800	
Cold rolled, 75% reduction	7.74	161	77,700	
Re-annealed, after 75% red	7.75	68.5	33,800	

HIS HELIXAUST MANIFOLD for diesel engines, fabricated by ayton Fabricated Steel Co., increases engine efficiency by reducing ack pressure. 3/16" fillet welds are made with Murex Type FHP lectrodes, selected because of their excellent "hot" rod characteristics. ll-position Vertex rods are used for the circumferential butt welds.

INSPECTING MUREX ELECTRODES. Careful production control—from raw materials to packing—is one of the reasons for uniform results with Murex.

THE DRAFT SILL ASSEMBLY of a freight car is being welded with Murex Electrodes in the plant of Pullman-Standard Car Manufacturing Company. Downhand rods are used because they are ideal for long, horizontal fillets and deposit sound X-ray clean weld metal at a rapid rate.



ARC WELDING, with Murex Electrodes, speeds the fabrication of cartridge case drawing presses for The Hydraulic Press Manufacturing Company. Instead of using steel castings throughout (the conventional method), the cylinder, slide and numerous other parts are arc welded. Vital production time is saved and the company is not dependent on outside casting facilities. Positioning equipment permits the use of "hot," downhand Murex Electrodes, resulting in fast deposition, low cost and sound, X-ray clean welds.

uations to suit the particular mixture. The fillers in the mix are the hard, sharp crystal particles, as of silicon carbide or aluminum oxide, in iron oxide, with such binders as rubber, clay, phenol-formaldehyde or other thermosetting resins. Heated dies in hydraulic presses are used for the resins and rubber, or cold pressing followed by drying and baking, for the ceramic clays.

For cutting edges, drawing, extrusion, heading and cold forging dies, spot-welding tips and other points of applications of severe and abrasive stress, cemented carbides combine such hard filler materials as tungsten carbide, tantalum carbide and titanium carbide, with such binders as cobalt, nickel and copper. Suitably sized and shaped powders are cold compressed in steel dies and hydraulic presses; and sintered or baked in a reducing atmosphere, well up in the recrystallization range of the binder, or hot-pressed at similar temperatures in low pressure (1000 pounds per square inch) graphite molds, with time allowances for recrystallization of the binder. The latter method would make for greater density, if die materials were available which would stand up properly to both the pressures and temperatures desired.

While compressive strengths of the cured mixtures reach 500,000 to nearly 900,000 pounds per square inch, the much lower tensile strengths are derived from the 3 to 20 per cent of relatively low strength binder so that the carbides are often molded directly into steel holders or rings. Similarly, powdered copper-tungsten carbide tips molded directly on copper electrodes combine conductivity and wear resistance.

Pressure Welding: The compression molding of metal powders follows much the same rules as govern the synthetic resins. Pressure-welding of powders of thermoplastic materials, both metallic and organic, takes advantage of intermolecular attraction for bonding purposes. Distinction should be noted between such pressure-welding of similar

From a report to the Electrochemical Society.

STAINLESS ANNEALING TUBES: Fabricated of stainless clad steel, the annealing pipe in the center of the illustration has been in constant service for 2½ years. This compares to the two carbon steel tubes on either side, which have been in use only 10 heats. The tubes are used in annealing tool steel bars at Jessop Steel Co., Washington, Pa. Bars are packed in the tube to prevent decarburizing in the annealing furnace, and tube life is relatively short. In 1941 the stainless clad tube was put into service. It is clad on one side only, 20 per cent of its thickness being stainless. It is 14½ feet long, 14 inches in diameter and ⅜-inch in wall thickness. Based on its present condition, the company expects at least 4 more years of service from this veteran of the furnace

tragments and the bonding of powe mixtures in which some filler powde are bound together by other constituen introduced as adhesives or binders an in which the reaction may be consi ered to be thermosetting.

The four essentials of thermoplasti pressure-welding are: (1) Intimate con tact of (2) clean particles at (3) suitabl temperatures within their thermoplastic range and for (4) sufficient time to per mit adjacent particles to improve the relative alignment and bring into pla cohesive forces for bonding. Such pre sure-welding can occur almost instanth between particles of a steel shaft in steel bearing or of a steel sheet in steel draw die when the insulating film of lubricant breaks down.

Pressure above the yield point of the material assures intimate contact. Fur ther improvement may be accomplished by mechanical working of the compact forging granules into even more uni form compactness and filling cavities which molecular or atomic forces could not close. Oxidation of particle surfaces forms an effective barrier against form ing molecular bonds and accordingly a protective atmosphere such as hydro gen is usually required during the weld ing or sintering period.

Porosity and Density: Where porosity is desired, the particles need only join at random points of contact. However, voids among the cohesive particles may be reduced by pressure or substantially eliminated by plastic working during or between applications of heat sufficient for recrystallization. The thermoplastic range begins at initial recrystallization temperatures and continues to the melting point. As lead and tin recrystallize below atmospheric temperatures, it is reported that their powders may be pressure-welded without added heat at pressures as low as 500 pounds per square inch. Tungsten is an outstanding commercial example of converting metal powder into practically flawless, ductile wire without ever attaining the melting point (3387 degrees Cent.) though temperatures are necessarily high dur ing processing.

Fig. 2 indicates the progressive steps in the conversion of molybdenum pow der to drawn wire four times as dense. The density is plotted to show elimination of voids and gradual approach to ward perfect packing of the crystals. Along similar lines and more familiar to sheet metal workers are the comparisons in Table I in which are shown experimental steps and changes of prop erties in conversion of copper and iron particles to ductile form.

Fundamentally, in common powder metallurgy practice, suitably prepared powders are pressed in dies to suitable density and intimacy of particle contact. Heat for the interatomic welding or bonding may be applied either during pressing or more commonly after press ing in the sintering (baking or recrys tallizing) furnace. For porous bushings filters, etc., subsequent sizing or squeez

(*Please turn to Page* 128)

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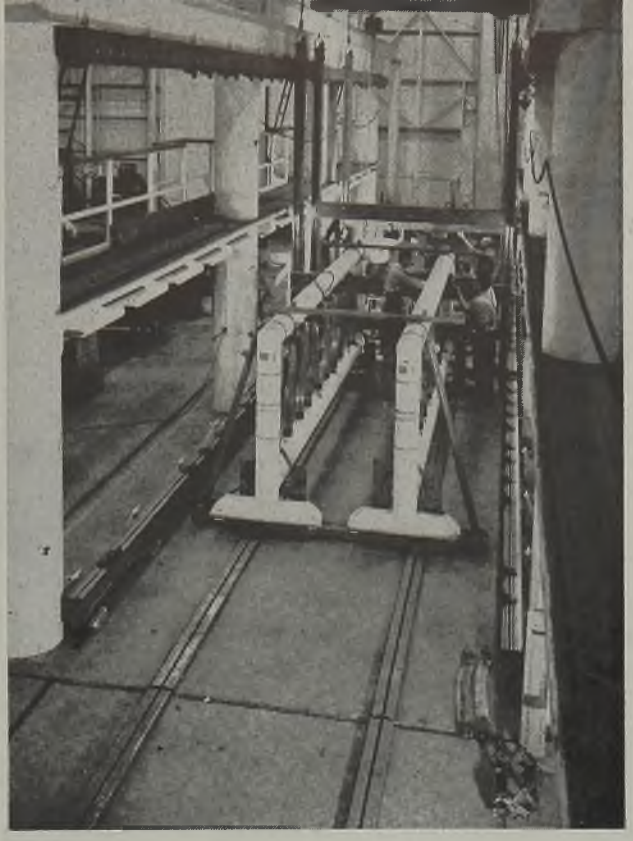
Master Tooling Dock

permits fabrication of fixtures on volume production basis

By C. W. GREAVES
Consolidated Vultee Aircraft Corp.
San Diego, Calif.



TOOLING is the basis of mass production, and now construction of tools themselves in the fixture field is approaching a volume production basis with a tooling dock invented by L. A. Bryant and licensed for use by Consolidated Vultee. The flow of fixtures through the master tooling dock is akin to that of a production assembly line.

This "fixture in which to make fixtures" is designed to construct 3-dimensional assembly fixtures from loft information without the use of transits, surface plates, piano wire, oil bobs, scales, height gages, verniers and other aids generally used in the construction of fixtures.

Features of the new tool manufacturing device are its simplicity and extreme accuracy, making it possible to fabricate fixtures to micrometer tolerances. It greatly reduces the effort on the part of workmen to achieve precision in their work. It reduces the time required for an aircraft plant to tool up for a new model from many months to several weeks. The large dock installed at the San Diego plant of Consolidated Vultee has completed approximately 80 fixtures in the three or four months it has been in service. It has proved so useful that other units are being planned for installation at the Fort Worth, Tex.; Nashville, Tenn. and Wayne, Mich., plants of Consolidated Vultee.

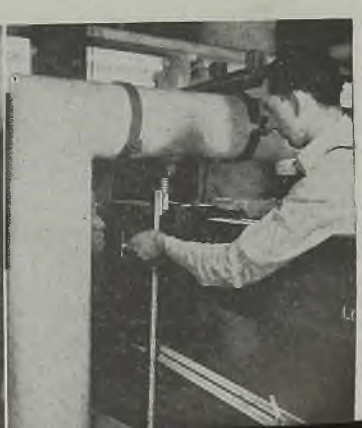
The San Diego dock may be visualized as a steel framed structure, 60 feet long, 15 feet high and 10 feet wide. The dock comprises a steel superstructure built on a firm foundation to isolate it from earth movements or vibrations caused by traffic. The structure includes supporting columns and members called straight edges. Four of the members are longitudinal straight edges which are level, parallel and rigidly fixed to the dock superstructure. These longitudinal straight edges are 60 feet long, built in 20-foot sections. The 15-foot vertical straight edges are movable to any position on the longitudinal members. The 10-foot transverse straight edges are also movable and are held in position by ground dowels

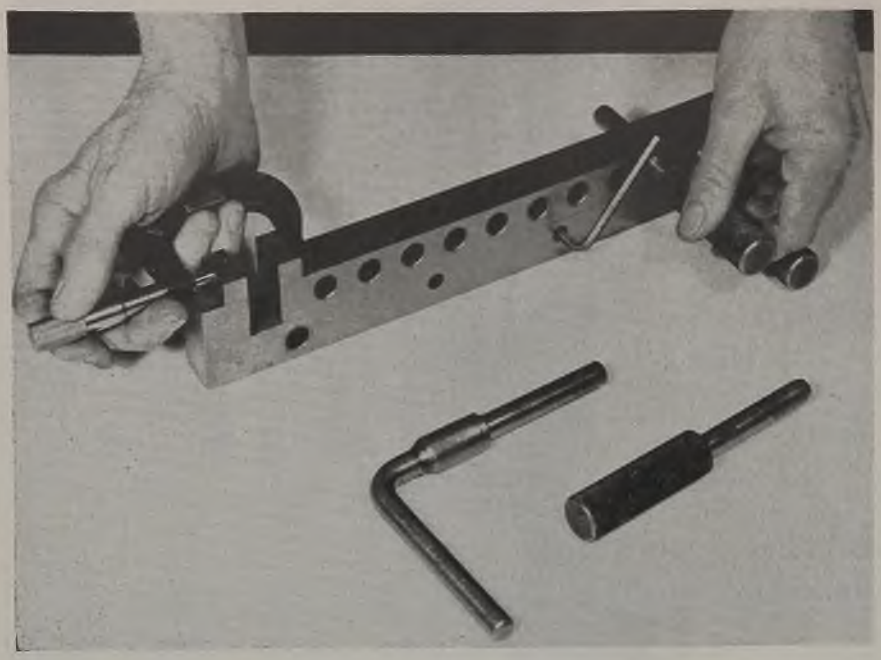
(Above)—This view of the 60-foot tooling dock shows two panel fixtures being built up with formers. The columns supporting the superstructure are 45 feet in length with 12-foot penetration in firm earth. The columns are poured full of concrete to maintain stability

(Below, left)—Two fixtures are being built up at the same time in this tooling dock. Formers have been located on both right and left fixtures, and workmen are shown locating the two last formers by means of the transverse straight edges and fittings

(Below, center)—Station fittings can be positioned accurately by means of this adjustable gage and ground dowels. The dowels hold the fitting in place while the workman clamps the T-bolt

(Below, right)—Standard fittings have been placed on this transverse straight edge on which to locate the former. Workman here is inserting the former bar into the coupler pot in which Prestalloy will be poured to hold the former on the fixture frame





Adjustable gage used to locate station fittings on the straight edges. Bushed holes in the movable section on top are precision drilled at 1-inch centers. The lower part of the bar has bushed holes drilled at 10-inch spacing to match holes in the straight edges. Lock nuts are used to hold the bar in position after adjustment with the micrometer. The ground pins are inserted to assist the toolmaker in adjusting the bar

inserted in station fittings attached to the vertical edges.

A similar dock being designed for the Fort Worth plant will be even larger, having an overall length of 80 feet and equipped with vertical straight edges of 18 feet and transverse straight edges of 15 feet.

Design of the docks is based on a grid plane system, allowing fixture builders to locate reference points anywhere in space in a minimum of time and to tolerances of 0.005-inch. The feature of the dock makes it particularly useful in the aircraft industry where the maintaining of contours is so important and where close tolerances are required in the mating of parts and major assemblies. Where master fixtures require tolerances closer than 0.005-inch, they are prepared by setting up one side to the nominal dimensions stipulated and the mating side is then coordinated to the stipulated limits.

The dock installed at San Diego includes one 60-foot unit and one 20-foot unit, with loading rails running the full length. Overhead cranes for hoisting fixture frames and moving the vertical and transverse straight edges are provided.

The 60-foot unit is equipped as follows: Twelve 20-foot longitudinal straight edges; six 15-foot vertical straight edges; six 10-foot transverse straight edges; three overhead cranes mounted on the dock superstructure.

Each of the steel straight edges has a series of 0.500-inch diameter bushed index holes, jig bored on 10.000-inch centers corresponding to the grid lines of the master loft. The four longitudinal straight edges are secured by micrometric adjusting screws used to line the straight edges accurately in plane parallel relationship to each other. An electronic leveling device is used to accomplish this with extremely close tolerances. Trammel gages are used to position the bushed holes diametrically opposite each other in transverse plane parallel relationship. With this equipment it has been found practical to align the fixed straight edges to a tolerance of plus-or-minus 0.001-inch up to lengths of 60 feet.

Several features are common to all of the straight edges. A T-slot running the full length is provided in each to which certain accessories can be firmly clamped after they have first been positioned. Each has a ribbed working surface which is carefully machined and then scraped or ground to reduce surface irregularities. The 0.500-inch holes run the full length of the straight edge and form the basis for accurate positioning. Each hole is numbered for reference and identification. It has been found desirable to make the longitudinal straight edges in units of 20 feet because of machining limitations.

In order to accomplish precision work,

After formers have been located accurately by means of the straight edges and standard fittings, they are firmly attached to the fixture frame by pouring Prestalloy into coupler pots. Upon cooling, the Prestalloy expands slightly, resulting in a solid attachment

the dock is constructed on a solid foundation to isolate it from earth tremors and vibrations caused by traffic. The foundation of the San Diego installation consists of a reinforced concrete slab 60 x 17 x 3 feet. This mass is tied in and supported by eight 11-gage steel shell piles, 18 inches in diameter at the top and tapered to 10 inches at the bottom. They are 45 feet long, with a 12-foot penetration in firm ground to provide a safe bearing of 70,000 pounds each, or 560,000 pounds for the whole unit. The entire area (60 x 17 feet) is surrounded with an expansion joint of 2-inch soft fiber board asphalt as insulation from the building floor.

The superstructure of the 60-foot unit consists of:

(a) Eight 22-inch diameter by 180-inch BI pipe posts tied into each pile with ¾-inch diameter reinforcing steel rods and the inside diameter filled with concrete to the top of each post.

(b) Six 12-inch diameter by 200-inch BI pipe posts doweled to foundation with six ¾-inch diameter reinforcing steel rods in each post and filled with concrete to the top.

(c) Ten 15 x 240-inch 42.9-pound steel I-beam track supports for overhead cranes.

(d) Six 18 x 240-inch 54.7-pound steel I-beam supports for upper longitudinal straight edges.

(e) Thirty steel adjustable supports for lower longitudinal straight edges.

(f) Two 48 x 960-inch catwalks with hand rails and 24 fluorescent lighting fixtures on the under side.

All longitudinal straight edges are set true to line and leveled with a Bryant electronic leveling apparatus to a tolerance of 0.0005-inch. The lower and upper longitudinal straight edges are tool proofed for parallel relation to each other vertically by means of an electric light indicator and checking gages to a tolerance of 0.0005-inch. All checking operations are made at 4-inch intervals on each of the lower and upper longitudinal edges. An expansion gap is allowed between each of the 20-foot members, and a master gage is used to insure continuity of the 10-foot increments.

An important feature of the dock is its simplicity of operation. The transverse straight edges are mounted upon two vertical straight edges with counter balance, and are analogous to a conventional parallel used on a drafting board

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except that their movement is in the perpendicular plane. The vertical straight edges simulate the face of a vertical drafting board. An overhead crane is provided to move the set of vertical and transverse straight edges to any desired transverse-perpendicular plane. They are secured in place by station fittings, which in turn are secured by tightening the T-bolts which lock them to the straight edge. The straight edges are accurately positioned by means of ground pins which pass through the bushed holes of the corresponding station fitting and into bushed holes of the straight edges.

Dimensional control is obtained through the use of loft templates and location gages. These gages are of two kinds, namely, fixed and adjustable. The fixed gages sometimes known as strip templates are made of ⅜ x 2-inch cold rolled steel strips in convenient lengths. They are prepared for use by jig-drilled 0.500-inch reamed holes at 10.000-inch centers in one margin, which match the bushed holes in the straight edges upon which they are mounted by means of ground pins. In the opposite margin, holes are jig bored to the precise offsets called for by the basic dimensions of the airplane. These fixed gages are used for the purpose of providing automatic co-ordination when a given dimension occurs repeatedly throughout a number of fixtures.

The adjustable gage is an instrument 13 inches long with a series of 0.500-inch bushed holes spaced 1 inch apart on one section and two 0.500-inch bushed holes spaced 10 inches apart in the other to match the bushed holes in the straight edges. Provision is made to adjust the bar with a micrometer, making precise dimensions over exceptional distances possible.

The third dimension in space is established by means of a suitable fitting accurately positioned upon the transverse straight edge. These fittings are of various kinds, particularly suited to their purpose such as cant blocks, dummy fittings of opposite sex, template locaters etc. The majority of settings may be accomplished with a relatively small number of standard fittings.

Where a series of flat contour locators (formers) are to be projected successively into the third dimension, thereby establishing the compound contour of fuselage and wing, a flat steel index template is used. This index template carries the aggregation of construction or tool holes which appear in the several locators. The index template is akin to the body plan of loft upon which the contour lines are indicated in nested view. By mounting the index template upon a pair of transverse straight edges in the tooling dock, it is readily possible to move it from station to station and successively establish the position of each former. This is done by matching the tool or construction holes of each former with the corresponding holes in the index template, using ground pins. As each former is positioned, it is securely attached to the structure of the fixture. The most common method of doing this is by pouring Prestalloy into a coupler pot which is welded to the frame structure. The Prestalloy is a low-temperature alloy of high strength and expands slightly upon cooling, making a firm attachment of the former to the frame.

Before work is started on a fixture, the frame must be located inside the dock and securely held in position. Dollies are used to receive the fixture frame, and these are used in connection with loading rails for securely bolting the fixture in place. The frame is located in reference to the center line of the dock and is checked for level, plumb and height. The loading rails consist of two pairs of steel channels spaced to provide T-bolts. The rails are embedded in the thick concrete base to which they are securely anchored.

Fixtures completed in this new tooling dock can be depended upon to produce assemblies with the smooth and accurate contours which are so painstakingly developed in loft.

The tooling dock is a valuable contribution of the aircraft industry to the art of assembly tooling. Its principle may find extensive application.

Inventor of the tooling dock described in the accompanying article is Leland A. Bryant, consulting engineer for Consolidated Vultee Aircraft Corp., San Diego, Calif. In 1940, Mr. Bryant became interested in improving aircraft tooling methods and introduced a number of innovations at Lockheed. His methods cut the time for constructing a major jig or fixture to 70 per cent of the time originally required. His most recent contribution to aircraft tooling is the tooling dock, considered one of the most important developments in recent years.—*The Editors.*

Stretch-Straightener

. . . . removes kinks in structural aluminum shapes as they emerge from heat-treating processes

MAMMOTH machine pictured has a story to tell over and above the feeling of adequacy it conveys for work of straightening and stretching structural aluminum members for airplanes. Its size bears mute testimony to the fluidity of war's requirements and the trend toward bigger and bigger bombers and cargo carriers with greater range. As the proportions of the end product increase, so grows the machine with capacity to fabricate it.

Material handled by these machines at the present time practically all goes into our large bombers. Overall length of each machine is 110 feet. The maximum pull is 350 tons. Weight is 250,000 pounds. The stretcher is engineered by the Sutton Engineering Co., Pittsburgh, under license from Aluminum Co. of America.

Heavy-gage steel base plates were fabricated originally into seven sections, these in turn being joined to make a single base by arc welding with mild steel shielded arc electrodes.

Equipment like that illustrated here is used in aluminum extrusion plants to stretch-straighten stringers and other large parts of the airframe as they come from the heat-treating processes. As this material emerges from heat treatment, it is both extremely crooked and twisted. It is gripped at one end by the tailstock in 2-way grip jaws. The headstock, which does the pulling and rotating necessary to take the kinks out of parts, is powered from an oil hydraulic cylinder. It has a stroke of 8 feet, but actually the machine can stretch bars up to 58 feet in length by moving the tailstock along the bed to take care of the length of shapes to be processed.

Tailstock is secured to the bed in operating position. Positioning of the headstock is accomplished by means of an electric motor. Clamping device is actuated by compressed air. Photo courtesy of Lincoln Electric Co.

The photo above shows the parachute bomb coupling forged by Phoenix for Pittsburgh DuBois Company, manufacturers of the container and suspension equipment.

WHERE SO MUCH DEPENDS ON SO LITTLE

PARACHUTE bombing has proved to be one of the most effective weapons of the Allied forces. Attached to a small parachute, the 23 pound fragmentation bomb is dropped from extremely fast, low-flying planes. The delaying action of the 'chute permits the plane to clear the area before the explosion occurs.

One of the vital parts of this assembly is the coupling, which provides the connecting link between 'chute and bomb. Any failure on its part would allow the bomb to plummet to earth immediately, resulting in a premature explosion extremely dangerous to the plane. Drop-forged by Phoenix, this coupling has the strength and stamina to withstand the sudden shock which occurs when the parachute opens, providing the extra safety factor so essential to this type of low-level bombing.

To date, Phoenix has delivered approximately 200,000 of these couplings, demonstrating their ability to meet, consistently, the rigid specifications set up for this part.

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Forging Division of

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Forgings by **PHOENIX**

How the NAVY SPECIFIES STEEL

By LIEUTENANT COMMANDER
E. G. TOUCEDA*
Research and Standards Branch
Bureau of Ships, Navy Department
Washington

WITH THE exception of certain ballistic steels, certain high-temperature alloys, and certain ordnance parts, the problems of the Navy are primarily concerned with the utilization of such steels as are readily available. For this reason, light can be shed on the "overall" problem, namely,—that of the procurement of steel to specifications which truly reflect the desired characteristics. It also is felt that much may be accomplished if an attempt be made to explain "why we think as we do" and "react the way we react."

Why do we require all the testing we do? Why is it necessary to test hundreds of thousands of specimens and run chemical analyses on a comparable number of specimens? Why cannot requirements be waived in certain instances, when it may be pointed out that they were waived in other instances? The "whys" go on and I suppose we might suggest some too, but most assuredly the thinking of the Bureau at present is concerned essentially with the establishment of ways and means of making the problem of inspection and testing less of a burden on the manufacturer, by making what testing we do more significant. We appreciate fully the tremendous handicap under which the steel industry is working and while it seems time-consuming and wasteful to conduct as many tests as are being conducted, it is nevertheless, inadvisable to make such modifications as we may have in mind until the various studies being undertaken by the Bureau have been completed, and the results analyzed.

Essentially it is the object of this discussion:

A—To acquaint the steel industry with the procedure followed by the Bureau in establishing criteria for the acceptability of steel for certain specific applications.

B—To acquaint the industry with the character of data the Bureau is analyzing in connection with its procurement of steel plate.

C—To discuss in brief the character of information desired to be obtained from future research and to outline the proposed method of attack.

Topics A, B, and C will be expanded in sequence, as follows:

A. Acceptability of Steel for Specific Application

When steel is bought to specification at the present time it is conventional to set forth requirements for the following:

(a) Ultimate strength.
(b) Yield point.
(c) Elongation.
(d) Reduction of area.
(e) Chemistry.

If the properties for any given steel fall within the scope of the specification it may be assumed that it will perform satisfactorily, as in many instances experience has shown that it will. However, conditions change and it is well known that while specification requirements may be met, it is still possible to obtain steels within specification having significantly different properties when interpreted in terms of endurance, ballistic properties, notch sensitivity, weldability, and resistance to high temperatures. Therefore, when it was desired to substitute one steel for another, which was the case with the NE and triple alloy steels, it became necessary to provide a series of special tests for the purpose of evaluating properties not conventionally considered. For example, in connection with the NE steels, a considerable number of these steels of different analysis were submitted to the Engineering Experiment Station, Annapolis, Md., for examination and report. The steels submitted, represented the product of many mills and in certain instances similar steels were obtained from different sources for the purpose of determining the effect of manufacturing variables.

A considerable amount of information has been obtained on these steels to date but all tests have not as yet been completed. Samples chosen for test were in general 1-inch diameter rods and 8-inch diameter forgings. The chemical composition of various steels was first determined. Tension tests were made of standard 0.505-inch diameter specimens taken at various distances from the center of the forging. Tests were made of specimens taken in the longitudinal direction and, in some instances, in the transverse direction. The effect of heat treatment on physical properties was investigated. On account of the inherent hardenability of steels, most of the heat treatment consisted of normalizing and tempering. The static torsional properties were determined for representative steels. Charpy impact tests were made. Hardness surveys were made over the full cross section of the forgings. The endurance properties of representative steels were determined in rotating flexure and alternating torsion. End quench hardenability tests were made and the response to tempering was investigated using 1-inch diameter specimens. Differential expansion curves were obtained for the various steels.

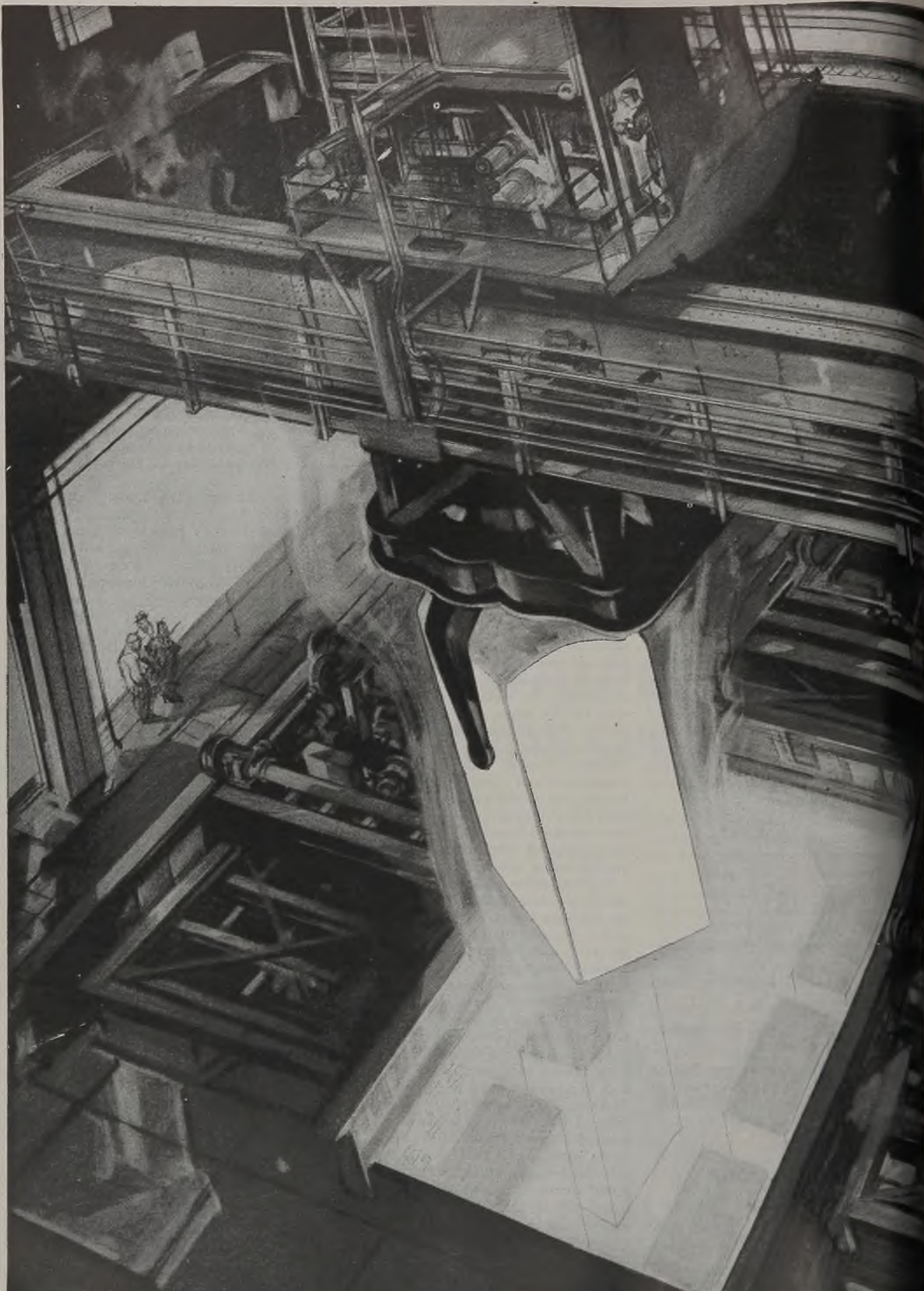
National Emergency steels of the 8600 and 8700 series in diameters up to 8 inches offer much promise as alternate materials for forgings classes "AN" and "HG" of Navy Department specifications 49S2 which forgings have heretofore been required to be made of nickel or molybdenum-vanadium steels. Of the seven steels of this series, one is of the semi-through hardening grade (NE-8630) and the others of the through-hardening grade. All within this range of sizes have shown to good advantage when properly heat treated. Of the less hardenable steels NE-8739 is a good representative material. Of the steels of greater hardenability NE-8749 has shown good properties. These steels are well adapted for heat treatment by normalizing and tempering. This procedure is desirable for large sections and the tempering temperature is not critical. The tempering temperature is more critical after oil quenching. In general, desirable properties can be obtained by normalizing and tempering at 1200 to 1300 degrees Fahr.

Endurance Ratio Below Expectations

Of the steels tested, steels NE-9445 and -9450 were less satisfactory. These steels failed to meet either class "AN" or "HG" physical requirements when normalized and tempered at 1200 degrees Fahr. However, one of the 9445 steels met class "AN" requirements when normalized and tempered at 1300 degrees Fahr. Steel NE-9450 failed to meet either "AN" or "HG" requirements when normalized and tempered at 1200 to 1300 degrees Fahr. None of the samples showed excessive amounts of nonmetallic inclusions. Likewise, no flakes or cracks were encountered in the forgings.

The average endurance ratio (ratio of endurance limit to tensile strength) for the 20 steels tested in rotating flexure was 0.48. This is somewhat lower than is expected for low alloy steel. In regard to the endurance ratios in alternating tor-

*The remarks made by the author before members of the American Iron and Steel Institute are not to be construed as official or reflecting the views of the Navy Department.



FROM AN ORIGINAL DRAWING AND SKETCHES BY ORISON MACPHERSON AT J&L ALIQUIPPA WORKS

SOAKING PITS

Holes in the ground were the first device for evenly distributing throughout the steel ingot, the heat from its molten interior to its solid exterior, to make it ready for rolling. John Gjers, Swedish-born steel engineer of England, in 1882, seeking to avoid time-wasting, costly practice of allowing ingots to cool and then reheating them to rolling temperatures, placed each ingot in a brick-lined, covered hole in the ground. These heat-retaining holes, forerunners of modern, complex steel ingot-heating furnaces, were called "soaking pits." The holes have long been obsolete, but the name lingers on.

Gjers' idea was successful from the start and the new practice spread from England to the Continent and to the United States within a dozen years. The Henry Bessemer medal was awarded Gjers in 1894 by the British Iron and Steel Institute "for great service" to the industry by his soaking-pit invention and other improvements in iron and steel production.

The baptism of fire given steel ingots today in modern, intricate, scientifically heat-controlled and skilfully tended ingot heating furnaces, is a far cry from the holes in the ground put to use by the son of a Swedish army officer in England back in the 80's. The soaking of ingots in pits is one of the most important steps today in the march of steel from iron ore to finished product. Without soaking pits there could not have been the present record production of steel for war—90,000,000 tons last year in the United States, more than all the rest of the world.

Shriller than a bo'sun's in a gale, is the whistle piercing the deep undertones of a steel mill that is the signal to start ingots coming up from the soaking pits to the blooming mill to be rolled into long blooms or wide slabs. After this first rolling, the steel passes on through other mills and other processes to wind up in many sizes, shapes and grades adaptable for manufacture of countless articles useful in peace, as well as war.

Only 15% of surgical instruments sold in this country before the war were made here. Now most instruments and hospital equipment for our armed forces are American made. The industry is producing about 60,000 tons of special steels for some 5,000 applications required by Army and Navy Medical Corps. This entailed learning how to achieve production of many highly specialized steels formerly imported from Europe.

Conquering new horizons in metallurgy since World War I, American scientists have put the U.S.A. far ahead in production of better industrial steels, and in development of super-fine special steels. For example they have (1) Created new high temperature and corrosion-resistant steels for hospital and laboratory; (2) Helped make possible the mass fabrication of these steels into surgical instruments of unparalleled efficiency; (3) Materially aided vast life-saving developments within the pharmaceutical industry.

sion, these were not appreciably different from those for standard low alloy steels. The NE steels of the 8600-8700 and 9400 series are inferior to the steels which the Navy has been using for high-temperature bolting stocks. In this type of material, the high-temperature characteristics desired require the addition of molybdenum or tungsten. The NE steels contain no tungsten and the molybdenum is not present in sufficient amounts.

In speaking about special steels it might be well to mention that the Bureau has spent more time in co-operatively working with the several manufacturers of ballistic plate for landing craft and shielding purposes. Although this steel is produced in several analyses it is all heat treated to meet certain definite ballistic requirements. As it is of light gage and large dimensionally, the problem of maintaining uniform heat treatment and preserving flatness is serious. Accomplishments in the past few months in the production of this type of steel have been noteworthy and the manufacturers can justly feel that many lives have been saved by effective improvement in this type of ballistic plate.

B. Statistical Analysis of Test Data as Applied to the Development and Improvement of Steel Specifications

The statistical method of attack upon problems pertaining to steel quality dates back to 1942 when the Navy's high-tensile steel was changed from a manganese-vanadium steel to a manganese-titanium steel for the purpose of conserving vanadium, then on the critical list of elements. As the Bureau of Ships had no operating experience with the use of the substitute steel for ship construction, it was considered desirable to investigate its characteristics and to establish whether or not it could be made uniformly by a number of different producers. To provide data for this purpose, a program of product and process quality testing was instituted. By statistical analyses of the data, it was possible (1) to maintain a running picture of the quality of steel being produced, (2) to spot sources of potential trouble, and (3) to suggest certain corrective measures which would be adopted. As a result of the information obtained in specification development, the Bureau is now in a position to utilize the properties of the steel more intelligently than heretofore.

One of the most important properties in connection with the utilization of high-tensile steel is its weldability, which is measured at the present time in terms of the Navy T-bend test results. Unfortunately, there is a certain amount of disagreement among the experts as to what constitutes good welding steel. It is interesting to note, however, that at the present time we have found a very significant correlation between certain elements in chemistry and T-bend properties as measured by the "well known test." The problem involves the organization of large amount of data, and it is felt that statistical methods will prove to be of great value in unraveling the mysteries thought to be associated with welding. The following are the main advantages to be derived from application of these methods to the problems of specifying and procuring steel:

A—Specifications can be set which have definite and fair producer and consumer risks.

B—Such acceptance-rejection tests as are required can be made with representative material.

C—Producers may be relieved of a large amount of testing.

D—The relevant information contained in large masses of data can be expressed in simple terms.

E—Conclusions can be drawn concerning the independent and interrelated effects of many factors which are simultaneously varying.

F—Sources of trouble can be located and solutions can be suggested more quickly and more efficiently than by other methods.

In time of war it is absolutely essential that the maximum of information be obtained with a minimum of time and manpower. To accomplish this, experimental programs should be so organized as to employ modern principles of experimental design. Unfortunately, much steel research now in progress is not efficiently planned and consequently the results obtained will be inconclusive in such cases. It is felt that the more extensive use of modern statistical principles will greatly improve the situation.

C. Further Research and Method of Attack

In connection with current and future research, the Navy probably has access to more facilities for investigating and testing materials which go into construction of naval vessels than any other agency in the world. These facilities include a great number of well-equipped laboratories scattered throughout this country and abroad. Our research is essentially concerned, not only with the development of new materials and mechanisms for the conduct of modern warfare; but also with the incidental problems relating to the maintenance of our large fleet. As steel is one of the most widely used materials of construction, considerable research is being directed to the application of various steels for naval construction. The behavior of steels under various conditions of operation is being investigated for the purpose of establishing basic information.

Most specifications are based primarily on the so-called static properties of steel because these are easily and quickly measured, yet much steel is subjected to dynamic conditions of loading in service. The justification for doing this is the assumption that if the static properties fall within certain limits set up in the specification the steel will possess certain dynamic characteristics. Generally speaking, this assumption is not erroneous, but we feel that there is much correlating still to do in special instances. As a check on the dynamic properties of materials, the Navy runs thousands of fatigue and impact tests in its establishments.

At the present time, we have reason to believe that the statistical approach will help to establish the significance of a multitude of possible relationships between such properties as have been evaluated by specific tests. The properties of which we are speaking are: Hardenability, notch sensitivity, grain size, particle size and distribution, included gas content, etc. By proper means of analyses, it is felt that measurements taken on the aforementioned properties can be related to end use performance.

In the development of a steel for a given purpose, it is thought that many factors other than those set forth in a specification must be considered. For example, certain steels should have a maximum resistance to shock blast and a maximum resistance to notch sensitivity. The fact that the physical properties of a steel may fall within certain limits as measured by the conventional tensile test does not indicate how these properties will react under conditions of rapid loading or at subzero temperatures. The information derived in pulling a test specimen does not necessarily indicate what may be expected if the specimen had been subjected to a condition such as tri-axial loading.

In the light of future development, specifications may some day be modified to include such things as hardenability tests or Charpy impact tests. At the present time the Bureau has no thought of incorporating these into a specification because it realizes that the advisability of making such a move has not been thoroughly established. It will only be done after cooperative discussion with manufacturers, as it is the Bureau's thought that nothing worthwhile can be obtained unless both producers and consumers are satisfied with such specifications as are finally drawn.

Applying this line of thinking to a specific case, it is felt that an ideal high tensile steel for naval construction should be capable of fulfilling the following conditions:

1—When rolled to plate it should have the tensile strength and yield point required by design in both longitudinal and transverse direction and it should maintain its properties as nearly as possible in all ranges of operating temperature.

2—When rolled to shapes, it should be of such a character as to provide for the minimum drop in tensile strength and yield point after normalizing, as many shapes are hot-formed.

3—It should have a maximum resistance to notch sensitivity over all operating temperatures.

4—It should have a maximum resistance to shock blast over all operating temperatures.

5—It should be a steel capable of being manufactured by conventional open hearth and mill practices.

6—It should be as free as possible of critical elements as the tonnages under consideration are great.

(*Please turn to Page* 127)

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AN ANALYSIS made to serve as a basis for a full program for regional power development in the Pacific Northwest recently has been completed*. The chief aim of the report is to indicate a pattern of development so as to create a stronger and better balanced economy for the region, a more reasonable economy that will eliminate waste of resources and improve efficiency of resource utilization, add to wealth and raise living standards. More immediate it is an attempt to show how employment can be provided for the postwar transition in productive and enduring industries. Innumerable opportunities for private enterprise emerge out of the analysis.

Although the report is specifically meant for those interested in the Pacific Northwest region, preliminary reactions indicate that the method of analysis and the approach used may have national applicability.

A series of charts and texts show in what fields opportunities can be developed for private enterprise, for wide employment, and for the beneficial use of power and resources. Each textual analysis sets forth the present status, the limitations of the present status, desirable future developments and research and development needs to strengthen the regional situation. Each flow chart depicts a complete industrial structure for each field, emphasizing the elements which already exist and sketching the desirable new elements.

The whole series of charts is introduced by a general chart indicating the chief factors involved in the development of the land and agriculture, industry and commerce, domestic and commercial power, with the direct results of each development and the total overall results indicated.

In tabular form a broad view is given of the industries that have reached average stages of development in the Northwest as compared with the rest of the United States. A second table lists industries of below average development. A third tabulation provides another check-list for the businessman.

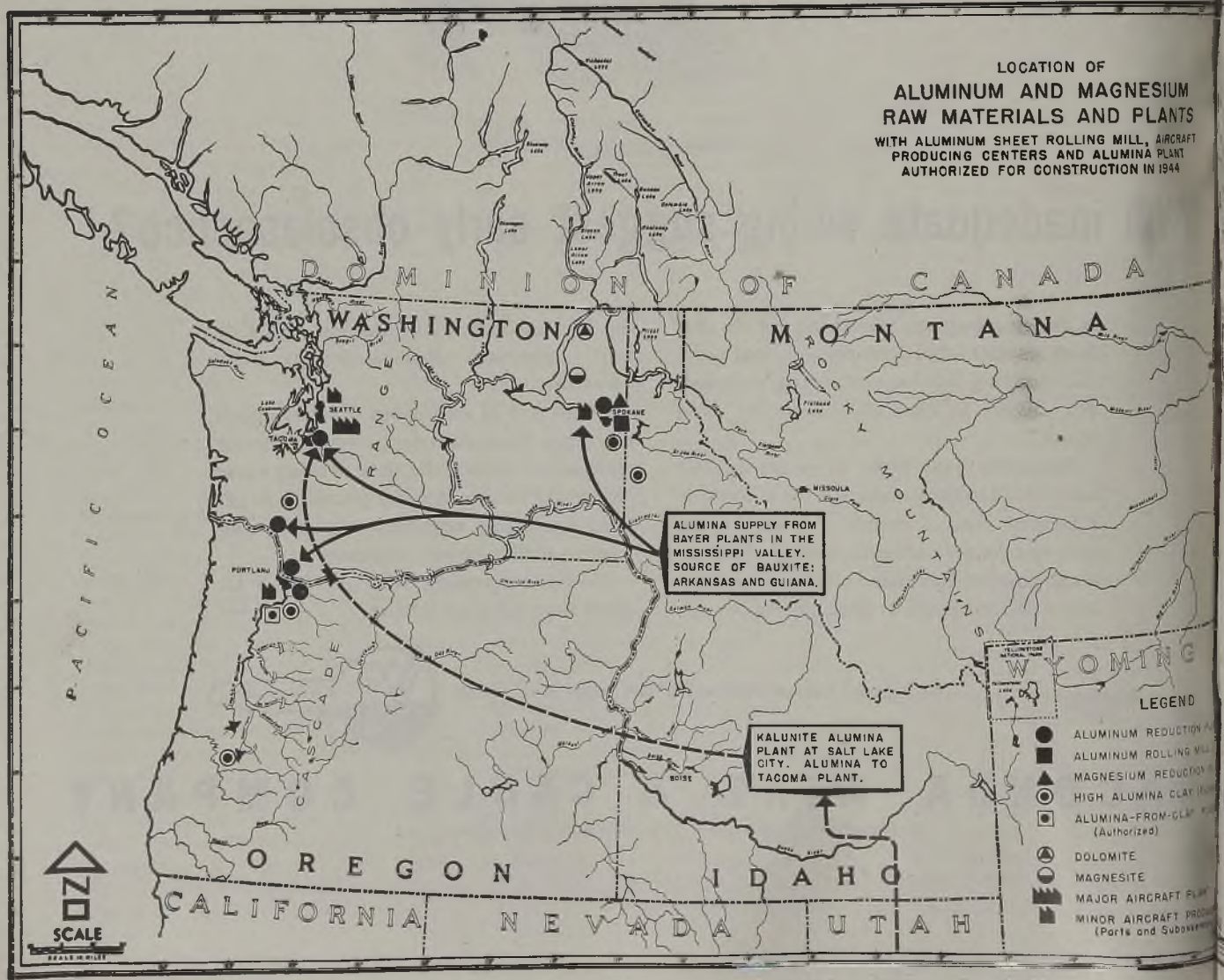
The report has the following to say concerning the light metal and ferrous groups:

Nonferrous Metals

Alumina is shipped in to Pacific Northwest reduction plants from various alumina plants located in the eastern part of the United States, such as the Bayer alumina plants of the Aluminum Co. of America, East St. Louis, Mo., and Mobile, Ala.; the Bayer alumina plant

*Study is entitled "Pacific Northwest Opportunities"—a 104-page booklet prepared under the supervision of Ivan Block, Chief, Division of Industrial and Resources Development, Bonneville Power Administration, Portland 8, Oreg.

Pattern of Development in the PACIFIC



of the Reynolds Metals Co., Sheffield, Ala.; and the Bayer alumina plants of the Defense Plant Corp., Hurricane Creek, Ark., and Baton Rouge, La.

Cryolite is obtained from eastern refining points after shipment from the cryolite deposits of Greenland.

The basic high-grade carbon for electrodes is principally calcined petroleum coke, most of which is obtained from the petroleum coke calcination plant of the Great Lakes Carbon Co., Wilmington, Calif.

Binding pitch is obtained from western oil gas, and coal coking plants.

The Pacific Northwest has only one magnesium plant—that located at Spokane, Wash. This plant uses dolomite and ferrosilicon as its raw materials. Dolomite is obtained in Stevens county, north of Spokane. Ferrosilicon is produced at the plant from silica obtained at Denison, a short distance north of the plant. Carbon coke for ferrosilicon is obtained from Utah and Fernie, B. C.

The following plants (with data on each) are located in the Pacific Northwest:

I. Aluminum

1. Vancouver, Wash.—Aluminum Co. of America—182,000,000 pounds per year, 182,000 kilowatts. utilizing prebaked electrodes. Approximate plant investment, $17,000,000, 800 employes.

2. Troutdale, Ore.—Defense Plant Corp., operated by Aluminum Co. of America—130,000,000 pounds per year, 130,000 kilowatts, using prebaked electrodes. Approximate plant investment $20,000,000, 800 employes.

3. Spokane, Wash.—Defense Plant Corp., operated by Aluminum Co. of America—195,000,000 pounds per year, 195,000 kilowatts of power, using prebaked electrodes. Approximate plant investment $25,000,000, 1050 employes.

4. Tacoma, Wash. — Defense Plant Corp., operated by Olin Corp.—42,000,000 pounds of aluminum, 42,000 kilowatts, self-baking electrode plant. Approximate plant investment $6,500,000, 490 employes.

5. Longview, Wash.—Reynolds Metals Co.—66,000,000 pounds per year, 66,000 kilowatts, self-baking electrode plant. Approximate plant investment $5,000,000. Total number of employes, 580.

II. Magnesium

Spokane, Wash.—Defense Plant Corp., operated by Electro Metallurgical Co., utilizing an electro thermal ferrosilicon reduction process—18,000 tons per year of magnesium, and about same amount of ferrosilicon, 56,000 kilowatts (or roughly 25,000 kilowatt hours per ton of magnesium for ferrosilicon and magnesium reduction combined). Approximate plant investment $20,000,000, 1060 employes.

III. Fabrication Plants

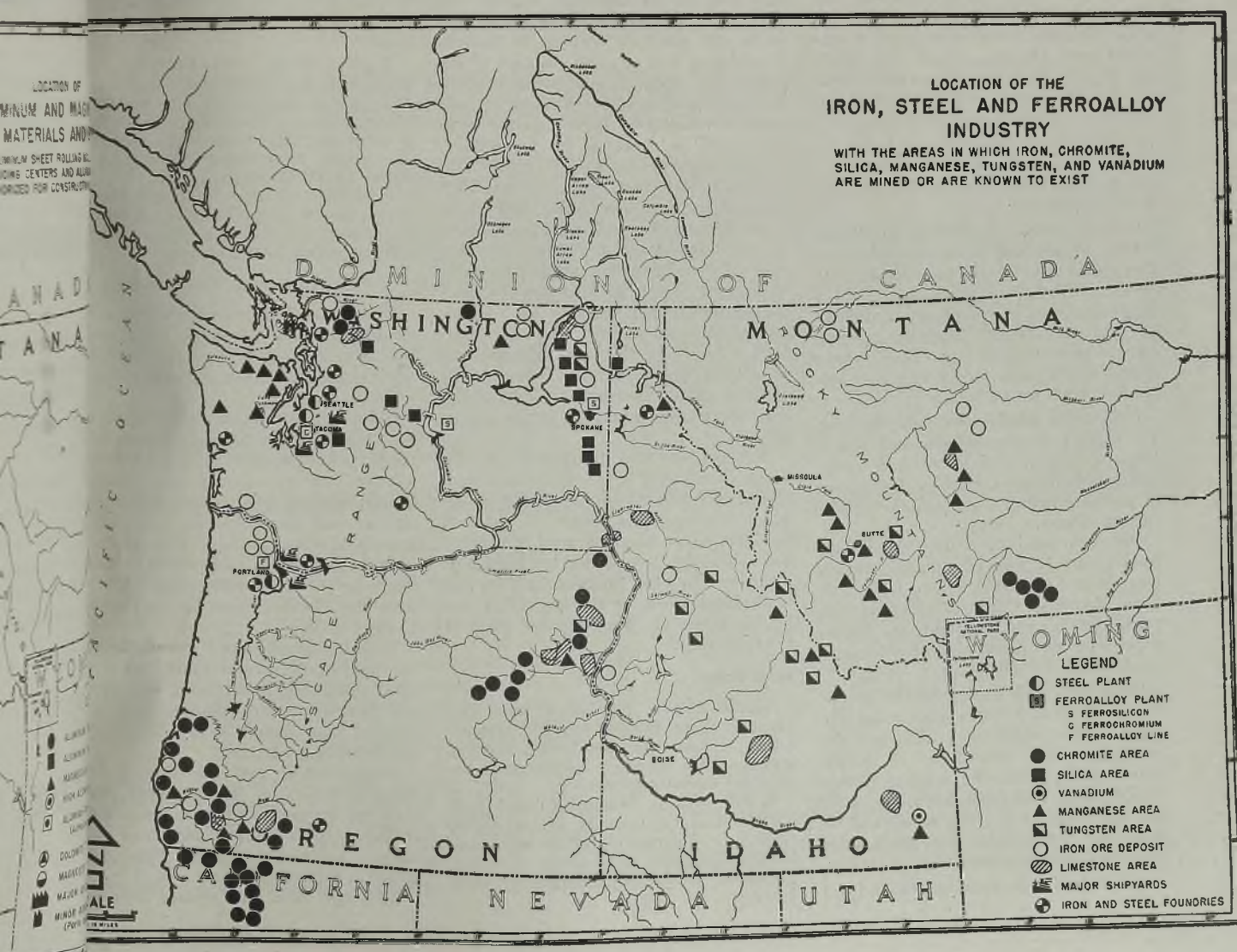
Spokane, Wash.—Defense Plant Corp., operated by Aluminum Co. of America—rolling mill for aluminum sheets and plates, 240,000,000 pounds per year, 50,000 kilowatts. Approximate plant investment $56,000,000, 1950 employes.

IV. Manufacturing Plants

No major manufacturing plants are located in the Northwest making aluminum or magnesium products. However, Boeing Aircraft Co., Seattle, uses aluminum and magnesium alloys in the form

in the

CIFNORTHWEST



of sheet, tubing, forgings and castings, obtained from all parts of the United States.

The aluminum capacity in the Pacific Northwest totals 315,000 tons of metal annually, which is double the total U. S. capacity prior to 1940. The magnesium capacity totals 18,000 tons annually. Resources in the region are adequate for much expanded production of either metal depending on growth of future requirements.

The Pacific Northwest has one large modern continuous sheet mill which appears to be adequate for any sheet requirements the region may develop for several years to come. The region has no extrusion presses, nor forging hammers, and has no large castings plants, although a few small foundries are making light metal sand and die castings.

The Boeing Aircraft Co. is the only large regional user of light metal sheet, extrusions, forgings, and castings, although some subcontracting firms are making subassemblies for Boeing and other aircraft companies. Commercial light metalworking shops are absent.

Iron and Steel

Magnetite iron ores occur in Washington, Idaho, British Columbia, and Southeastern Alaska. Limonite beds of some importance are located in Columbia county, Ore., near Portland. Black sands are found along Oregon's coast in the vicinity of Marshfield, Coos county, Ore. A few pyrite deposits are known in the Cascade Range of western Washington and Oregon. Near Cle Elum and Blewett Pass are chrome-nickel-iron ore deposits, which are believed to be important for alloy steel production.

None of these ore sources is being exploited for iron smelting although several have been explored and found to be of substantial size.

Coking coals are located in Pierce county, Wash. and in British Columbia. By-product coke ovens are operating at Tacoma, Wash. and at Fernie, B. C., supplying coke for metallurgical, domestic and commercial purposes. Some coke is also obtained from Utah, where coke ovens of both the beehive and by-product type are operating.

Limestones suitable for iron smelting are located in northeastern and southwestern Oregon, northeastern and northwestern Washington, northern Idaho, and in southern British Columbia and southeastern Alaska.

Pig iron used by Pacific Northwest steel plants is shipped into the region from blast furnaces at Provo, Utah, and from Fontana, Calif. During prewar years some pig was shipped to the Northwest from the Atlantic coast. None is produced in the region.

Scrap iron and steel gathered in the Pacific Northwest are adequate for the three existing small steel mills and the existing foundry operations. It is obtained chiefly from the logging camps, lumber mills, and from the mines, mills and shipyards of the region, as well as from the automobile graveyards, and other miscellaneous sources.

Chromite for ferrochromium and for direct smelting to stainless steel occurs in Oregon, Washington, Montana and Alaska, and can be imported from trans-Pacific sources. Most of the Northwest ores are low grade, requiring concentration to bring the chromium content up to 45 to 48 per cent. They are characteristically high in iron and in most cases cannot be concentrated to the standard 3:1 chrome-iron ratio needed for the standard ferrochromium. However, they can be used for making the ferroalloy known as Chrom-X, or for direct smelting to stainless steel. By a special chemical treatment developed by the U. S. Bureau of Mines, such ores can be brought to the 3:1 ratio with iron elimination.

Chromite-bearing beach sands along the Oregon Coast have been treated for recovery of their chromite content by mechanical concentration.

Manganese occurs in varying quantities and quality in all Northwest states. Montana, however, is the principal source of ferrograde ore and concentrates. Some ferrograde ore is mined on the Olympic Peninsula in Washington, but in general Olympic Peninsula ores are siliceous, of low grade, high in iron, and are unsuitable for the production of standard ferromanganese.

Silica deposits are practically inexhaustible in the Pacific Northwest, and generally are of a grade suitable for ferrosilicon production. The larger deposits are quartzite located in Eastern Washington, but in other districts of the Northwest, notably southwestern Oregon and Northwestern Washington, are found a number of barren quartz veins that could be exploited for ferrosilicon, or other silica products.

The Pacific Northwest has no blast furnaces but has three small steel plants with rolling mills, and a larger number of iron foundries and steel castings plants. Four ferroalloy plants have been established during the war: three for producing ferrosilicon and two for producing ferrochromium. No alloy steel production has been developed, although all of its underlying factors are favorable for establishment. The various plants of the iron, steel, and ferroalloy group are as follows:

The nearest iron production to the Pacific Northwest is the Columbia Steel Co. blast furnace plant at Provo, Utah, which has been the source of pig iron for West Coast iron and steel industries. The Provo plant production has been supplemented by blast furnaces built by Defense Plant Corp. at Geneva, Utah and by the Kaiser Co. blast furnace plant at Fontana, Calif.

Steel Plants

Seattle, Wash., Bethlehem Steel Co., capacity about 180,000 tons of ingot annually. Plant uses open-hearth melting, and thus has no power requirement except for motive power.

Seattle, Wash., Northwest Steel Rolling Mills, Inc.; capacity about 35,000 tons of ingot annually. Plant uses electric furnaces for steelmaking, with approximate power requirements of 5000 kilowatts.

Portland, Ore., Oregon Electric Rolling Mills; capacity: Present, tons of ingot annually; ultimate, tons of ingot annually. Plant is equ with a 15-ton 5000-kilowatt electri nace for steelmaking, with space able for a second furnace for the mate development. The rolling mill quires an additional 3000 kilowatts.

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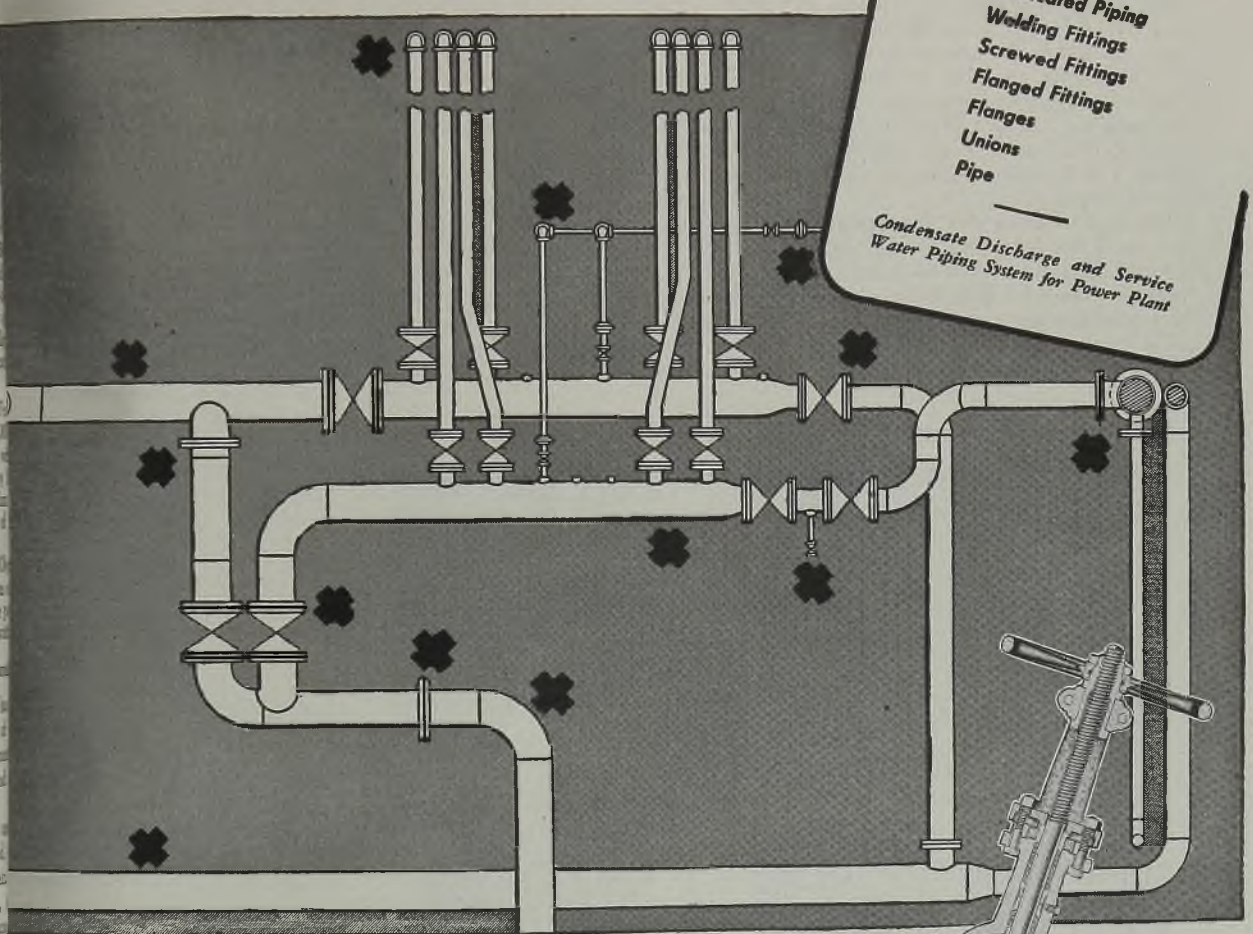

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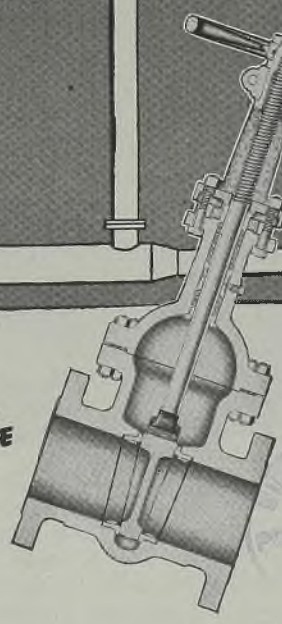

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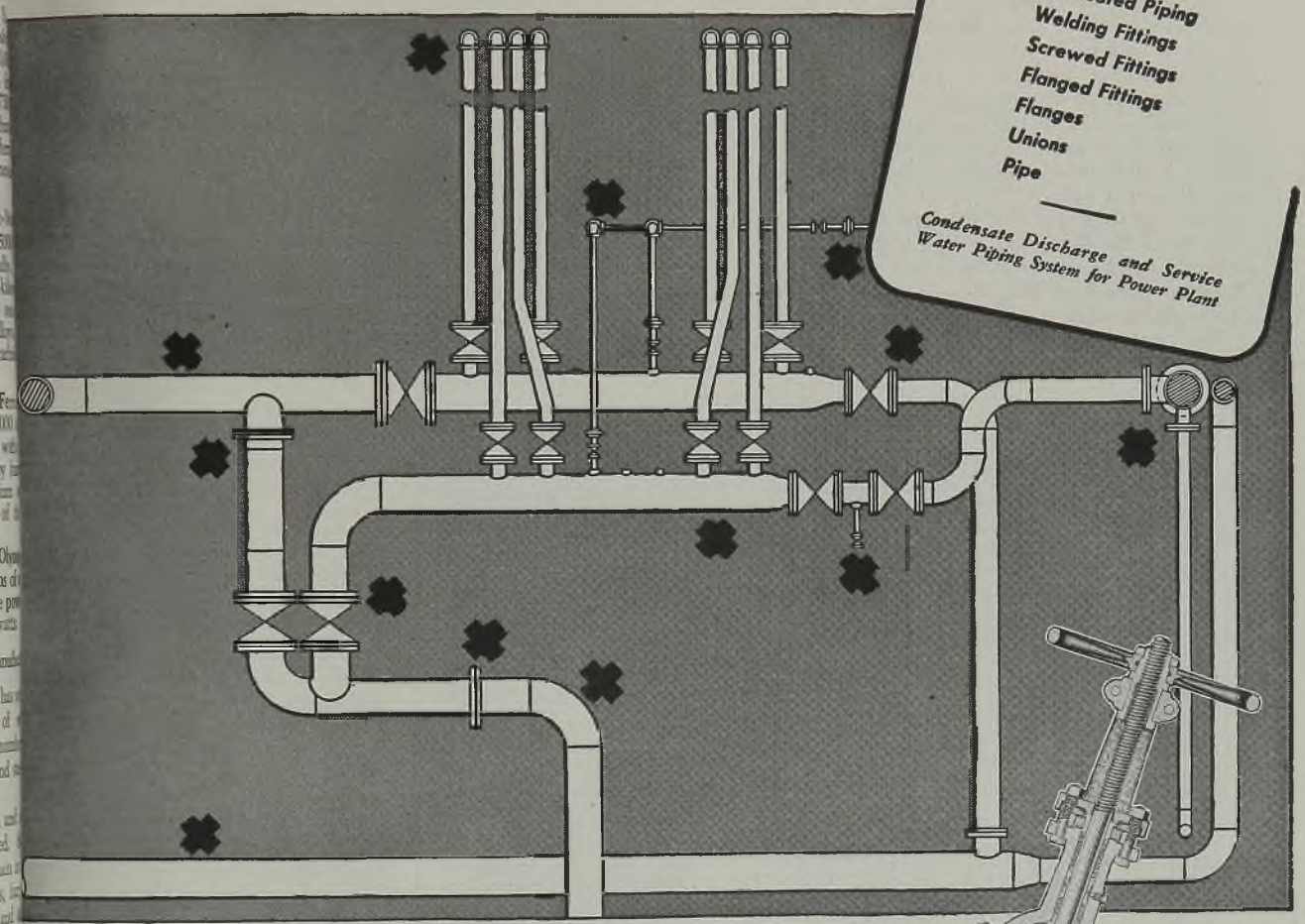
- Pipe

Condensate Discharge and Service Water Piping System for Power Plant



ONE STANDARD OF QUALITY

Equipping completely with Crane materials insures one high standard of quality in every part of piping systems. That dependable quality is exemplified in Crane Steel Gate Valves: Finest flow behavior results from their straight-through ports. Severest line stresses are overcome with rugged bodies. Smooth operation is maintained by a ball-joint type stuffing box gland, strong tee-head disc-stem connection, and ample stem bearings. Positive seating is aided by extra long guide ribs.

CAST STEEL WEDGE GATE VALVES

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

sources in the Pacific Northwest, too little is known of their extent to warrant projection of a large iron smelting operation. However, a few deposits are known that will justify small scale iron smelting operations utilizing the electric pig iron furnace. An important factor that has retarded iron smelting development has been the lack of a low-ash coking coal which could be made into a high-strength blast furnace coke. However, the region has a high-ash coking coal that will make a reasonably strong coke suitable either for the blast furnace or the electric furnace. This coal is available in sufficient volume and is now being coked in a by-product plant at Tacoma. The utilization of wood charcoal and wood cokes has been under investigation. No limitation exists on the availability of limestone for fluxing purposes.

The region has been an exporter of scrap iron for many years, but obviously there is a limit to the amount that would be continuously available to new steel capacity. The present steel operations in the region use nearly 100 per cent scrap iron, and could use part pig iron in the charge if such were available in the region at proper cost.

The limit to which steel ingot production could be developed in the region depends upon the extent to which the operators would be able to supplement the available scrap iron with pig iron.

The local chromite supply is predominantly of low grade with a high ratio of iron to chromium. It therefore is limited in its application to the "direct from ore" stainless steel process, or to the special, ferroalloy product "Chrom-X". To be used in the production of standard ferrochromium, it must be treated to eliminate part of the iron; the U. S. Bureau of Mines has developed experimentally such a process but it has not yet been used commercially. Producers of standard ferrochromium in the Northwest ferroalloy plants are thus limited to the use of ferrograde ores from such sources as Alaska and New Caledonia.

Unlimited Silica Available

Ferrograde manganese ore is mined in the Northwest on the Olympic Peninsula and in the Butte district of Montana. Standard ferromanganese, however, is a blast furnace product produced almost entirely in the East. A limited amount could be produced in the Northwest ferroalloy plants for local consumption, but it could not be economically shipped to Eastern markets to compete with the blast furnace output.

No limit exists on the amount of silica available for ferrosilicon. Ferrosilicon markets, however, are largely in the Eastern steel industry. Western production must be limited to the small tonnage of ferrosilicon that can be locally consumed, and to the high-silicon ferrosilicons on which high Eastbound freight costs can be offset by power cost savings.

Potential pig iron capacity is at pre-
ent limited by the regional market
lets which are small due to the h
use of scrap iron in both steel
and iron castings production. B
this, additional capacity would de
upon developing: (1) an integrated
and steel plant; or (2) new iron fou
operations such as the production of
iron soil pipe.

Present Northwest steel ingot capac
is inadequate for the steel require
of the region. Aside from the war
ficiencies of ship plate and heavy st
turals, there is inadequate bar and s
tural capacity and no sheet or tin p
no wire, nor pipe or tubing produc
capacity in the region.

Ferroalloy capacity in the North
is more than adequate for the needs o
the present iron and steel industry. It
can be expanded, however, to give ad-
ditional ferrochromium production fo
Eastern shipment.

Although a stainless steel plant pro-
ducing direct from ore would be pos-
sible on the basis of available raw ma-
terials, it has not been established. One
limitation of the region in this respect
is lack of stainless scrap and nickel pig
to make the finished ingot for rolling and
finishing.

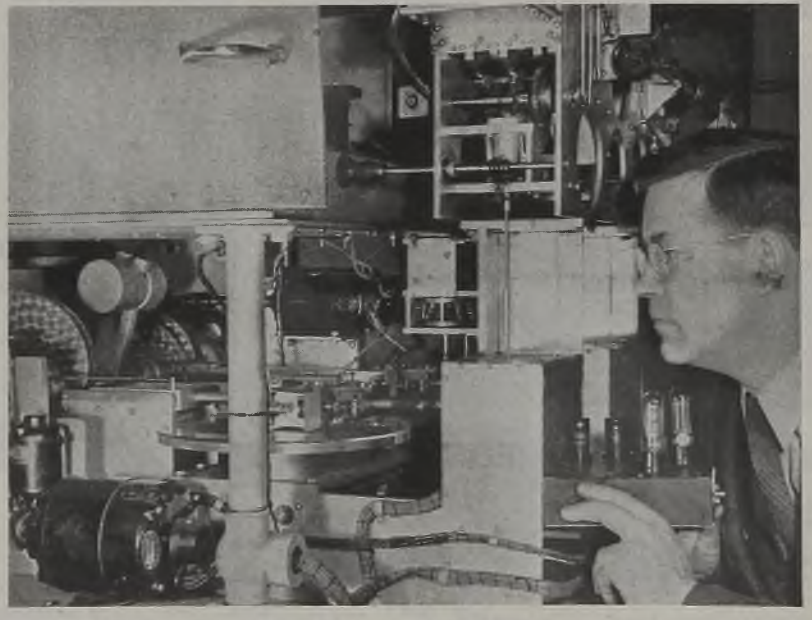
The iron and steel industrial structure
can never develop in the Northwest to
the same degree of importance as in the
Great Lakes states. It is desirable, how-
ever, to bring about the maximum de-
gree of metal manufactures of which the
Northwest is capable. The deficiencies in
rolled steel capacity should be made up
by new steel plants or by additions to
present plants, and a greater degree of
fabrication and manufacture should be
developed.

Additional plant capacity would be
desirable to produce such products as
black and galvanized sheet for sheet
metal manufacturers; wire for nails and
barbed and woven wire; bolts, nuts and
screws. Alloy steels and stainless in-
got with a strip, bar and rod rolling mill
are particularly desirable units. Pig iron
for cast-iron pipe is a logical develop-
ment. Additional metalworking plants
are desirable for forging, casting, ma-
chining and assembling parts for manu-
facturing a variety of machines, and
equipment used by the Western indus-
tries, shops, farms and homes.

In the absence of adequate informa-
tion on the iron ore deposits in the re-
gion, a program of field investigations
with enough drilling to prove ore ton-
nage and grade is a primary requirement
for establishment of iron smelting. Ex-
perimental work is required also to de-
velop the feasibility of electric smelt-
ing the various ores with Northwest coal
and coke.

Special research and experiment is
needed on the metallurgical treatment
of chrome-nickel-iron ores of west
Washington, and the chrome-titan
iron sands of Oregon and Washing

The manganese deposits of the re
are too little known, and should be m
carefully examined to determine
full extent.



TESTS TURBINE NOZZLES: Devised by General Electric Co. engineers to test the efficiency of steam turbine nozzles used in power plants, this machine measures, records and adds up energies generated in a nozzle sample when compressed air is blown through it at various pressures. Phonograph-turntable disk (behind post) turns, and varying pressures move tiny upright wheels mounted upon it back and forth. Rotation is conveyed to the wheels by rotating shafts of light which shine through a special sheet of glass known as a light polarizer to the photoelectric tubes held by T. M. Berry, G.E. engineer. Tubes control a series of cams and gears, or servo-mechanism, which operates the printer above his head

1. "Replaces expensive machines"

2. "Replaces experienced workers"

3. "Sturdily built"

4. "Wide application"

5. "Maintains accuracy"

6. "Up-keep very light"

● The above advantages of Oster "RAPIDUCTION" Turret Lathes were mentioned by an owner of these *simplified*, low cost machines as important contributing *"reasons why"* his company has kept in pace with war production schedules under conditions of labor shortage obstacles. The case is typical of scores of other war production plants whose orders for more Oster "RAPIDUCTION" Lathes must be delivered before new customers can be supplied. Our distributors will be glad to explain the many advantages of Oster "RAPIDUCTION" Lathes but commitments on delivery dates cannot be made definite under existing conditions.

It is significant that the popularity of Oster "RAPIDUCTION" Lathes is the greatest "obstacle" to our desire to serve you promptly. The Oster Manufacturing Company, 2037 East 61st Street, Cleveland 3, Ohio, U.S.A.

OSTER

"Rapiduction" LATHES

ALIEN PATENTS

Available to Industry

STEEL is presenting a list of enemy patents of interest to the metalworking industries. Many of these are available on a nonexclusive royalty-free basis under simple licensing terms. Copies of any patents listed may be obtained by addressing the Commissioner of Patents, United States Patent Office, Washington 25. Include 10 cents for each patent, specifying serial number.

These patents are classified by types of operation, such as metal founding, metalworking, metal rolling, metal bending, metallurgy, metal treatment, metal forging and welding and the like. Included are enemy patents, patents pending and patents in enemy-occupied countries.

CLASS NO. 76—METALLURGY

LIST OF ENEMY PATENTS

DESCRIPTION	PATENT NO.
orging machine	1969317
pparatus for the production of files and file casings	1896199
ethod for producing the teeth on files, saws and similar tools	1776711
reatment of steel tools	1965037
ethod of making double cut files	2068622
ethod for whetting files, rasps and the like	2173218
tting, setting and sharpening saws	1968352
eans for cutting, setting and sharpening circular saws	2030225
w sharpening tool	1906881
sitively actuated grinding wheel feed for saw sharpening machines and the like	1850331
w sharpening machine	1748686
achine for swaging saw teeth	1716241
aw setting machine	1569023
aw set device	2154987
ethod of manufacturing backcut screw dies made in two parts with four chasers or cutting edges	1564591
ethod of manufacturing staple driving punches	1887079
ethod of making and hardening steel tools provided with hard metal members	1902513
rocess of making plug gages	2243608
anufacturing scissors and the like	1565340
ethod of manufacturing the knives of razors	1635614
le wire and method of making the same	1748522
cissors and method of manufacturing the same	1942324
anufacture of scissors	1947964
ethod of making household articles	1638902
ethod of manufacturing spoons and similar articles	1864003
rocess for the production of rolled and stamped table and kitchen articles	2186602
ocess of producing an embossing roller for manufacturing lenticular film	2097971
ethod of manufacturing forks with two and more prongs	1733260
ethod for the production of saw blades	1732692
ethod of making circular saws with inserted teeth	1842789
ethod of manufacturing files for stencilizing stencil sheets	1892984
Method of manufacturing scissors	Re20525
Process of making razor blades	1881334

Class 76: Metal Tools—Implements Making

LIST OF PENDING PATENT APPLICATIONS

DESCRIPTION	SER. NO.
Stamping die	368 873
Method of producing tools	406,948

LIST OF PATENTS FROM ENEMY-OCCUPIED COUNTRIES

DESCRIPTION	PATENT NO.
Process of making files	1645895
Machine for sharpening of saws	1874315
Method of making screw dies	1796925
Process of mounting the dies used as in production of metal threads or wires	1751382
Process for the manufacture of tools or implements	1579027
Method of making adjustable spanners	1916605

Class 78: Metal Forging and Welding

LIST OF ALIEN PATENTS

DESCRIPTION	PATENT NO.
Hammer tup	1977420
Mandrel upsetting press	1691075
Forging machine and the like	1749334
Process of and apparatus for producing pressed railway car axles and similar forgings	1738593
Swaging hammer	1979931
Drop hammer	1752141
Drop hammer	1957021
Spring hammer	1639459
Tongs	2133984
Engaging and disengaging device for presses stamping machines and similar machine tools	1956658
Blow striking implement	1841781
Power press	1971937
Bundling press	1812797
Briquetting press	1879356
Air hammer	2167320
Riveting device	1752799
Flush or countersunk riveting	2147763
Riveting method and apparatus	2263283
Riveting machine	2215388
Machine with pressure medium drive for riveting perforated workpieces	2230518
Holder up for riveting	2244047
Rivet guiding means	2244048
Riveting device	1802719
Apparatus for crosswise riveting and for other striking work	2147687
Riveting apparatus	2218805
Riveting device	2221830
Riveting device	1951914
Riveted joint	2181550
Method and means for upsetting sheet metal	1761887
Method and means for upsetting sheet metal	1761888
Tool for upsetting or stretching sheet metal	1809168
Tool for producing a change of form in sheet metal	2010996
Manufacture of skate blades with thickened edges	1684950
Process and apparatus for thickening tube ends	1837097
Method of making round compound metallic articles	2177435
Method of producing welded joints	2231027
Process of welding aluminium or alloys thereof to other metals	1898917
Method for plating metals and alloys	2138982
Forging apparatus	1793938
Device for bringing and holding heavy welding pieces in a suitable position during the welding process	1684128
Collapsible draw mandrel	1713962
Mandrel for tube rolling mills	1819257
Riveting device	1895668
Riveting tool	2245806
Tongs	2245856
Riveting machine	2310836
Riveting tool	2251389
Rivet connection	2317794
Apparatus for contracting the ends of hollow bodies	2325522
Self propelled machine for handling forgings	2257546

LIST OF PATENTS FROM ENEMY-OCCUPIED COUNTRIES

DESCRIPTION	PATENT NO.
Apparatus for swaging dental plates	1804318
Power hammer for stamping with counter tup	2117575
Process of and apparatus for engrav-	

ing printing cylinders	1695617
Device for the lateral maintenance of the lifting rods of forging hammers to prevent their distortion	1599984
Stamping machine	2196782
Percussive tool	1580202
Impact device	1645477
Rotary hammer	1707887
Centrifugal hammer	1812692
Riveting machine	1895883
Riveting apparatus	1906595
Guiding means especially in machines for delivering rivets	2244595
Means for assembling elements by riveting	2246494
Forging or stamping swage	2305803
Asbestos drier felt	1638721

LIST OF PENDING PATENT APPLICATIONS

DESCRIPTION	SER. NO.
Hot forging	191,168
Riveting machine	318,164
Method and apparatus for contracting the ends of hollow bodies	348,274
Riveting apparatus	376,385
Riveted joints	418,834
Methods of producing articles by hot pressing or extruding and apparatus for their performance	428,844

Booklet Reveals Steel Ties Save 40 Per Cent

A new 8-page booklet released by Koppers Co., Wood Preserving Division, Pittsburgh 19, reveals a 40 per cent monthly savings in tie costs by mines using their Ar-Moored steel ties. These ties are constructed with a creosote pressure-treated oak base to which is fitted a Bethlehem steel mine tie secured to base with special features.

Available in 2, 3 and 4-inch bases for a variety of mine haulage tasks, the ties are furnished with either staggered clips or outside stationary clips. Generally, staggered clips are applied more readily to curved rails in working sections while outside stationary clips are best fitted for main haulage.

They are suitable for use in temporary track for working sections and for main line haulage, inside the mine or out. When sections are worked out, ties can be removed quickly and relaid without bending, distortion or spike-kill. They maintain track gage permanently, eliminating the need for gage rods or tie forks when track is being laid. Mine accidents and injuries are avoided as the track stays in line "ballasted" with wood.

Engineers, construction men and mine operators desiring additional information should write to the company requesting a copy of "Ar-Moored Ties for High Track Capacity".

Electronic Dynamometer Checks Rotating Parts

Electronically controlled dynamometer is relied upon at Pesco Products Co., Cleveland manufacturer of pumps and power units, to test parts which must be checked under rotating conditions and for checking design of power equipment. Built by Electric Products Co., it is favored over other testing devices because it can be set at a predetermined speed and will maintain testing conditions at all times within approximately 2 per cent. Speed ranges of 50 to 5000 revolutions per minute are available.

The electronic dynamometer has a direct-current motor or generator mounted in bearings and able to produce a necessary driving power or absorb the developed power of a prime mover. With separate bearing mountings, frame of unit is free and independent of the motor armature. In operation, frame is connected to torque arm of a conventional scale so that pounds of pressure can be indicated. In this way, back torque is made easily readable. An electronic tachometer records speed of motor rotation, and thus with these two results, elements necessary for computing horsepower developed or absorbed is available. It has been found to be extremely accurate.

Microfilm Booklet Out

"Hold Everything", a new bulletin issued by Microcopy Corp., 2800 West Olive avenue, Burbank, Calif., describes a new and improved application of microfilming to pencil engineering drawings made on transparent paper, documents, drawings, etc. The bulletin points out advantages in time, savings in money and document insurance provided by this Translite Hi-Reduction Microfilm process.

Wick Feed Oilers Described in Bulletin

A modernized line of wick feed oilers supplying visible, automatic lubrication to solid, wick and waste-packed bearings is illustrated and described in a new Bulletin No. 27-A. Helpful hints on how to eliminate needless shutdowns for hand-oiling, end bearing failures, splattering of oil, etc. are given.

A copy may be obtained by writing Trico Fuse Mfg. Co., 2948 North Fifth street, Milwaukee 12.

"Brighter" Side of War

Products become out-of-date and must be redesigned every so often. Services go to seed and must be revamped. Organizations get into a rut and need revitalizing. Policies become obsolete. Methods become set, cumbersome and inefficient.

Every business needs to be overhauled and "redesigned" every few years.

Every item of its philosophy needs to be challenged.

Every policy needs to be examined for fungus growth.

Every method needs to be checked for necessity, cost, and efficiency.

Every product or service needs to be calibrated against the public's changing needs and tastes.

From a business standpoint, one beneficial result of the war is that this overhauling process is being forced upon industry. Just as the scrap drive has cleared the junk from the cellars and attics of our homes, the war effort is clearing industry of many of the barnacles of method, policy and prejudice which had accumulated.—from *Private Wire*.

A plant for the purification of tungsten concentrates is being completed at Boise, Idaho—the first to be built in the west. The product as it comes from the mill will be converted by the use of hydrochloric acid to 75 per cent tungstic oxide to meet the requirements of steel, electronic and other wartime consumers.

A TOUGH TEST: Plunged into a wooden post, these bayonets produced at Bayonet Plant, American Fork & Hoe Co., Ashtabula, O., must be capable of supporting the entire weight of the standard service rifle by the bayonet tip, as shown here. Blades must not break or take permanent set