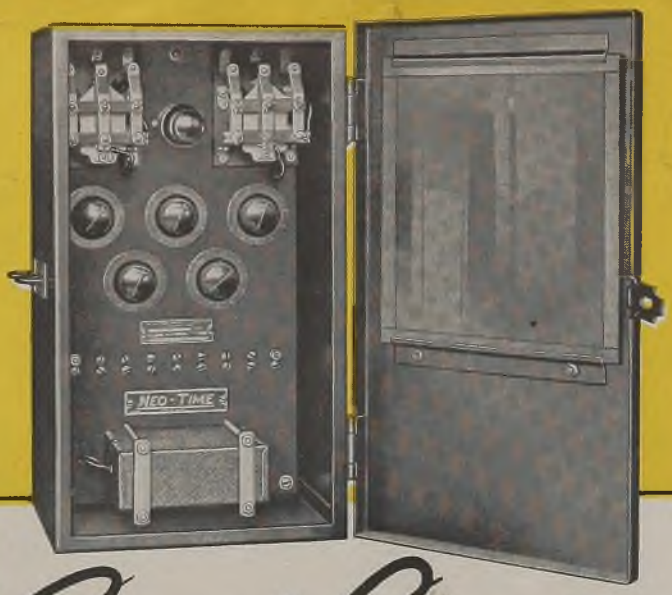
December 25, 1944

STEEL

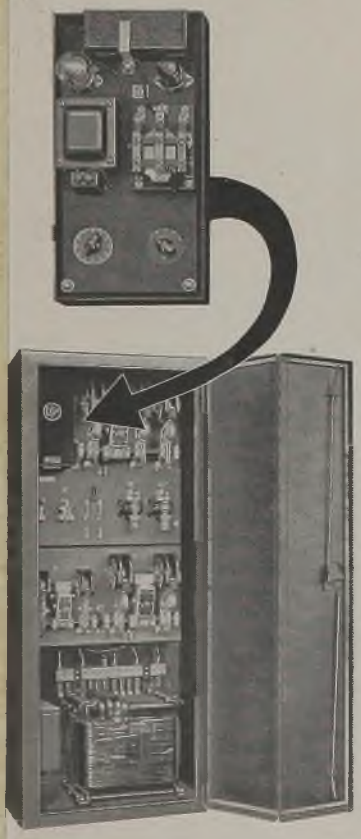
The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

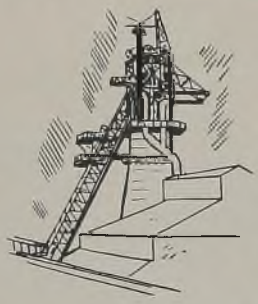
A size "NT" Lectromelt top-charge type furnace for pouring heats of 15 to 20 tons.



THIS *Simple Control* ELIMINATED THE *GAS MASK . . .*



EC&M 125 HP Motor Starter with NEO-TIME acceleration



ABOVE you see an EC&M NEO-TIME unit which operates the distributor-top of a blast furnace—stopping it at any selected position.

It controls the length of time for application of power, allowing the motor to operate only long enough to move the top from one position to the next. And it is *mounted at the ground level*—hence, readily accessible.

What a remarkable improvement over the former method whereby the motor was stopped by limit switches attached to the mechanism *at the top of the blast furnace,* requiring frequent inspection and maintenance in this dangerous area.

The EC&M NEO-TIME unit has numerous applications in industry. It's a simple, flexible method for (1) timing acceleration of A-c and D-c motor control and (2) timing application of D-c field on synchronous motors as well as for standard timing problems. Simply turning a dial changes the timing interval. Booklet 88 shows typical applications of NEO-TIMED motor control. Ask for a copy. The Electric Controller & Mfg. Co., Cleveland, Ohio.

THE ELECTRIC CONTROLLER & MFG. CO. E&M CLEVELAND, OHIO

NEO-TIME CONTROL FOR ACCELERATION • FOR INDUSTRIAL TIMING PROBLEMS

STEEL

The Magazine of Metalworking and Metalproducing

JULY 3, 1944

Volume 115—Number 1

NEWS

TECHNICAL

FEATURES

MARKETS

NICKEL AIDS THE COMMUNICATIONS INDUSTRY

to KEEP 'EM IN TOUCH!

In the tradition of Morse and Bell and Marconi, the communications engineer carries on today.

His work, always valuable, now is vital.

No military campaign proceeds without it. The close teamwork between air, ground, and sea arms is possible only through instruments and equipment that keep them in touch though scattered throughout the four quarters of the globe.

And the vastly increased pace of modern war production brings with it increased use of every home-front circuit, line and wave-length.

All branches of the communications industry . . . telephone, telegraph, radio . . . are *meeting* the tremendous demand for their products. In war, communication engineers are taking advantage of their long peacetime experience with metals and alloys.

Time and time again this experience has shown them that a little Nickel goes a long way in improving other metals.

So now, when the dependability of what this industry makes is of supreme importance to the Nation, it favors more than ever the use of Nickel.

In repeaters, relays, magnetos, loading coils, transformers, loud-speakers and modern cables . . . even in the molds that form plastic radio parts . . . they call upon Nickel and its alloys for several unique advantages.

When other metals lack toughness, Nickel often supplies it. When they lack strength and fatigue resistance or corrode too easily, adding Nickel provides the needed qualities. Under abrasion, wear, shock and stress metals perform better *with* Nickel than *without*.

In the communications industry, as in many another, the knowledge, experience and cooperation of our staff has been at the disposal of technical men. Whatever *your* industry may be . . . if you want help in the selection, fabrication, and heat treatment of alloys . . . similar counsel and data are at your service.

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makes it easy for you to get Nickel literature. It gives you capsule synopses of booklets and bulletins on a wide variety of subjects — from industrial applications to metallurgical data and working instructions. Why not send for your copy of Catalog C today?

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THE INTERNATIONAL NICKEL COMPANY, INC., *67 Wall St., New York 5, N. Y.*

STEEL
July 3, 1944

Candidate Dewey's Pledges

On this page in the April 17 issue we asked readers for their ideas of what would be an ideal environment in which to conduct business after the war. The replies, summarized in the issue of June 19, indicated that industrialists want primarily laws affecting business which once established are not changed by personal whim but are modified only when substantially altered circumstances warrant a change. In short, industry wants a fair, reasonably stable set of rules and an honest referee.

It will be interesting to analyze the platforms and statements of the candidates of the major political parties and to check their promises or policies with this desire of industrial executives. We can evaluate the Republican attitude on the basis of last week's convention. Later we can appraise the position of the Democrats.

At the outset we must recognize the historical fact that one cannot place too much reliance upon a party platform. At best, platforms are compromises drafted by harassed committeemen to please as many factions as possible. At their worst they are promises often repudiated in large part by administrations which have ridden into office on their planks.

Therefore we shall not place too much emphasis upon the Republican platform of 1944. It is not too good, nor too bad. Its labor plank is weak. Its plank on "business and industry" is sound, but not convincing. Its plank on taxation and finance is good as to over-all policy but is silent as to urgently needed reforms in tax determination and administration. In matters of efficiency and integrity in government and of rule by law instead of by personal whim, the platform is satisfactory.

What of the candidate? Within the not too restrictive framework of the platform, what can Candidate Dewey offer to American industry?

He has several strong guarantees to offer. He has no known commitments to bosses of any kind. He is a good administrator. He pledges a cabinet of "the ablest men and women to be found in America" and they will "receive full delegation of the powers of their offices." He pledges unity—an end to government-fomented class feuds. He has vision—"America is just fighting its way to new horizons." He believes thoroughly in private enterprise.

These pledges breathe the spirit of stability in government by law and of honest refereeing which industry wants. In July we will see what the Democrats have to offer.

PAN-AMERICAN TRADE: Industrialists in the United States view trade opportunities in Latin America with mixed feelings. A minority believes that European ties with people below the Rio Grande are so strong that we will never win a substantial portion of their business. A majority, knowing that many South Americans really prefer our goods, believes we can develop important markets among them if we go at it intelligently.

Nelson A. Rockefeller, Co-ordinator of Inter-American Affairs, is enthusiastic about prospects in Latin America. Appearing before the House Appropriations Committee, he outlined the opportunities and emphasized the problems involved in developing mutually advantageous inter-American business relations. Not the least of the problems is the fact that the United States has only 51,000 nationals in Latin America, whereas the Axis nations have 9,500,000 descendants in the area.

Obviously the forerunner of wholesome trade re-

(OVER)

lations between the Americas must be a spirit of friendliness and respect, which comes from a better understanding among the peoples of all American countries. The Rockefeller organization has been promoting this spirit aggressively.

The real test will come when our manufacturers are required to pit their skill in the technic of foreign trade against that of European competitors. Will our export market cultivation and salesmanship match the quality of our products? —p. 58

* * *

AMBIDEXTROUS STEEL: When the American public thinks of industry's contribution to the war effort, it usually credits the steel industry with having produced the material. It does not know that in addition to turning out steel, the plants of steel companies and their subsidiaries also turn out fabricated and manufactured items.

At least 40 different types of ship components have been produced by steel companies not operating shipyards. Steel companies have manufactured great quantities of all kinds of shells, ammunition boxes, bombs, airplane bomb bay doors and bomb racks, hangars, prefabricated steel buildings, landing mats and scores of other products.

Approximately 50 steel companies have been engaged in the double task of making these numerous war essentials at the same time they were producing steel. This is ambidexterity of a high order. —p. 50

* * *

AN UNBIASED UMPIRE: In the concluding sessions on the affirmative arguments of steel companies in the steel wage case, W. H. Harvey, representing Jones & Laughlin Steel Corp., suggested that a permanent salaried arbitrator be given authority to fix the responsibility for any work stoppage and to assess penalties against the offenders.

This arbitrator, whose salary would be paid jointly by the company and the union, would have complete freedom of action to apply penalties against individual employes for unauthorized work stoppages, against unions for the acts of union leadership or against companies in case of lockouts. The suggestion was voiced as a part of the steel companies' effort to impress the War Labor Board panel with the necessity of imposing some definite form of check against unjustified and hastily-considered work stoppages.

In view of the government bias apparent in many labor disputes, the idea of an arbitrator who is not on the government payroll holds interesting possibilities. —p. 54

WHERE STEEL GOES: According to an analysis of shipments of rolled steel compiled by the American Iron and Steel Institute, more than one-fifth of the total tonnage shipped during the first quarter of 1944 went to shipbuilders. This indicates that the leadership of ship construction, a modest consumer of steel in peacetime, is being carried over from 1943 into 1944.

Producers and consumers of steel should be grateful to the institute for making these distribution figures available on a quarterly basis. This publication, with the help of Judge E. H. Gary, inaugurated distribution figures in 1922. A few years ago, the task of compilation was taken over by the institute. We know from experience that inquiries from producers and consumers as to where rolled steel goes top almost every other type of inquiry received from persons interested in steel. Thus we are convinced that the quarterly figures, supplementing the annual reports, will be received enthusiastically by the industry. —p. 56

* * *

HEAT TREATING DELUXE: Most manufacturers who have been watching the rapid progress of the induction-heating process during the past decade will not be surprised to know that it now has been adapted to the continuous heat treatment of steel bars. The four-unit installation in the plant of the Caterpillar Tractor Co. at Peoria, Ill., is easily the most pretentious application of induction heating to date.

In each unit, bars first pass through a cylindrical spray washer and then are carried by positively driven rolls through an induction coil which heats the steel to a hardening temperature of 1600 degrees Fahr. Next they enter a quenching ring which subjects the metal to a solid cone of water under high pressure. Then they pass through another coil which heats the material to a tempering temperature of slightly above 1100 degrees Fahr., after which they are lightly quenched for cooling and fed to a conveyor leading to storage.

The installation is heat treating bars so uniformly that hardness throughout the length of a 20-foot bar can be held within three points on the Rockwell C scale. —p. 84

E. L. Shaner

EDITOR-IN-CHIEF

Positive Identification of Ryerson Alloys

Confirms Quality . . . . . Prevents Shop Errors

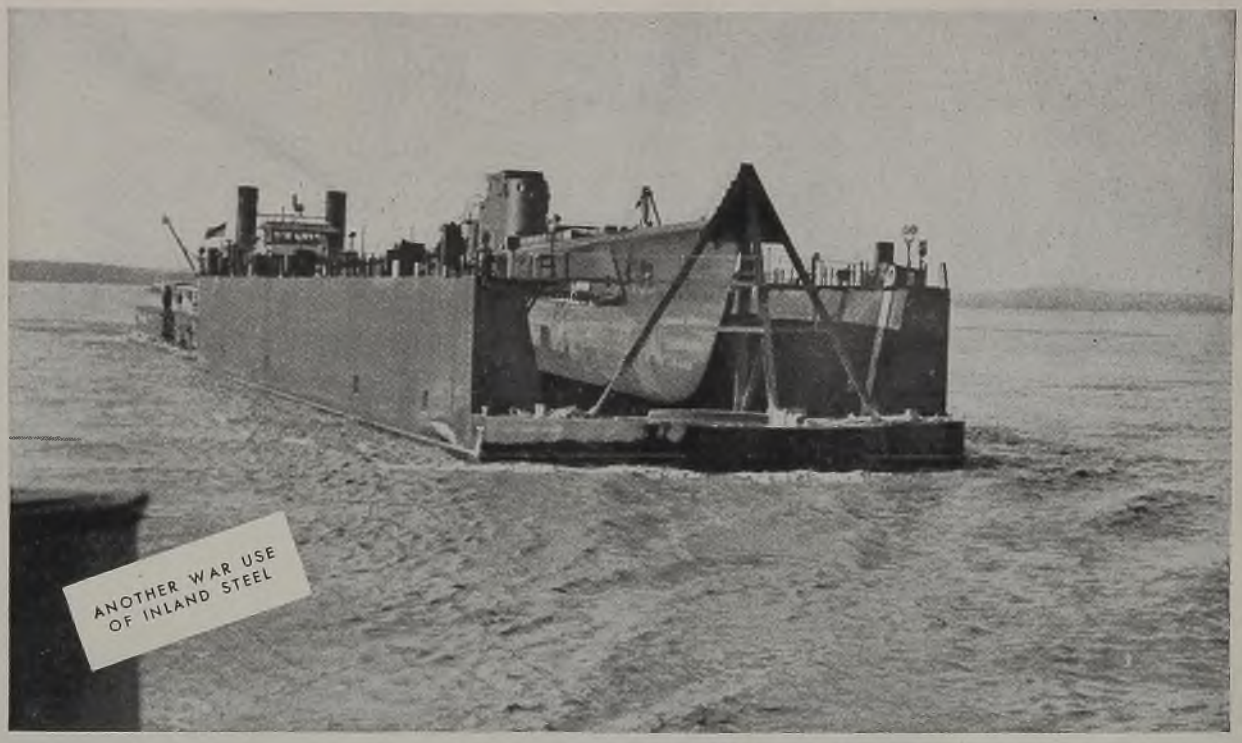
Each bar of alloy steel in Ryerson stock is painted on the end to indicate the type of alloy . . . and then stamped on the side near the end with the number of the heat from which the bar was rolled. Smaller size bars are bundled and tagged with similar identification.

This is important to you, because it offers an unmistakable means of verifying the alloy steel you receive from Ryerson. Also, both heat number and color marking are recorded on the Ryerson Alloy Steel Report that is furnished with each alloy shipment. The Report Sheet contains accurate data on the analysis, working temperatures and the heat treatment response for quenched [illegible] of the steel you receive. This gives you reliable information for heat treatment that will produce the desired result.

This unique and valuable Ryerson alloy service is one of many reasons why it will pay you to concentrate your steel purchases with us.

Joseph T. Ryerson & Son, Inc., Plants at: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City.

RYERSON



Official U. S. Navy photograph.

Ferry float transporting a submarine down the Mississippi for delivery at New Orleans.

FLOATING SUBS TO THE SEA

"Floating Palaces" of Mark Twain's Mississippi River days have given way to watercraft of many kinds. These vessels, built on the Great Lakes, travel down the river to the sea to join the fight against America's enemies. Among these fighting ships are submarines that are transferred down the Illinois - Mississippi Waterway on a ferry float. When a sub has been delivered at New Orleans the ferry is towed upstream to Lake Michigan where it takes on another "fighting" cargo.

Many floating dry docks, as well as the ferry float above, were built by the Chicago Bridge & Iron Co. of plates furnished by Inland. The dry docks are made in three parts; a large center section and two smaller end sections. When necessary to examine or repair the bottom plates of the dock, the center section can be docked on the two end sections. Likewise, the two end sections can be docked on the center section. When in tow, the end sections are usually docked on the center section.

Before the war, Inland shipped large tonnages of plates to structural shops, tank builders, pipe manufacturers, etc., for peacetime products. When our fighting fleets return to home waters, Inland again will furnish steel for the growing needs of America at peace.

Sheets • Strip • Tin Plate • Bars • Plates • Floor Plates • Structurals
Piling • Rails • Track Accessories • Reinforcing Bars

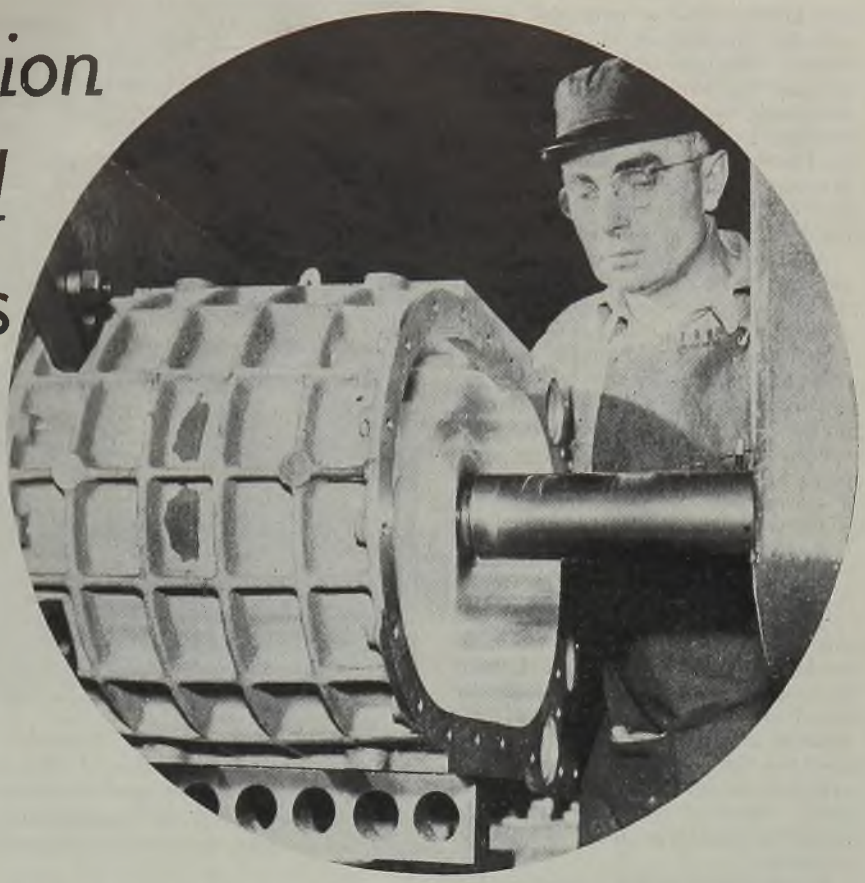
INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Ill.

Branch Offices: **Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul**

Tool Production Lags Behind New Orders

Upturn in unfilled bookings reflects builders' difficulties in boosting output to match heavier war needs



Rotor blower housing taking shape, soon to become an important part of a naval diesel engine. This is but one of the many subcontract war jobs undertaken by machine tool builders

CLEVELAND

LATEST industry statistics reflect the difficult time the machine tool builders are having in meeting accelerated war production schedules.

Tool shipments declined in both April and May despite an upturn in net new orders of 35 per cent in April and 4 per cent in May. And with the industry committed to the manufacture of a large volume of war work foreign to tool shops, the feeling prevails among builders that tool production is not likely to score a substantial increase until late in the summer.

For the first five months this year machine tool output totaled $239,971,000, or less than half the $589,312,000 recorded in the like 1943 period. Estimated production for May of $40,500,000, compares with $41,201,000 in April and $113,859,000 in the same month last year. Output will have to be stepped up to around $60,00,000 monthly soon if the newly projected 1944 goal is to be met.

Unfilled tool orders on May 31 were estimated at slightly over $180,000,000, or equivalent to 4½-months output at the May rate. Order backlogs now are the largest since last December, and compare with the peak of $1,392,803,000 registered in March, 1942.

Despite pressure from machine tool builders, the government has not seen fit to issue additional pool orders. Unassigned pool orders of close to 2000 units at the close of May, show a moderate decline from the preceding month's total and compare with slightly over 4000 units on Jan. 31 this year.

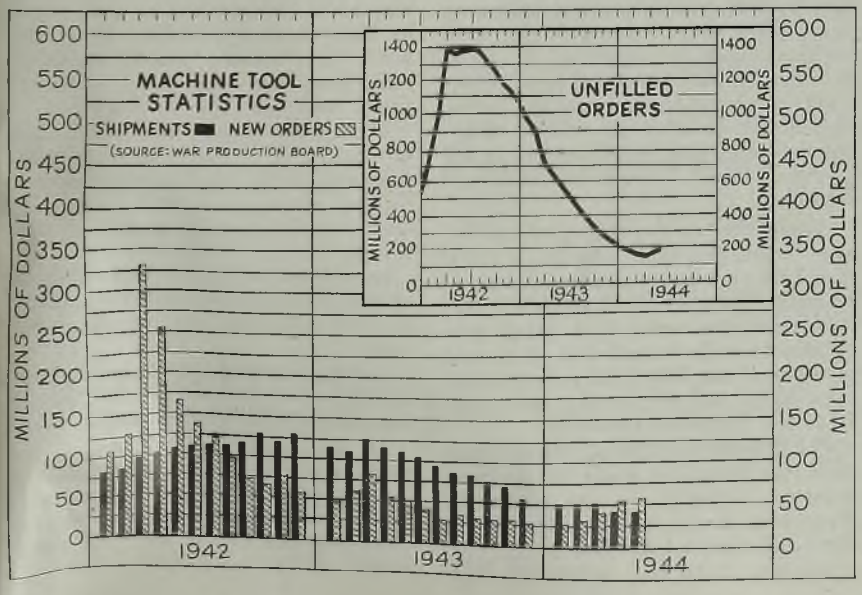
As tentatively set up, the current machine tool program calls for tool production this year valued at $485,000,000, with slightly over $100 million additional tools to meet aggregate 1944 requirements to be obtained from idle machinery stocks.

Sharply augmented demand for heavy shells, trucks, artillery, and aircraft engines, have boosted requirements for lathes of various kinds, including many special machines and automatics, also supplementary units for production of fuses and boosters.

Another important factor in the current and postwar machine tool trade situation and outlook is the steadily increasing volume of purchases by Russia. Negotiations are said to be under way for huge industrial equipment orders for Russia for delivery after the war ends, estimated at $2 to $3 billion a year for a decade.

Growing manpower shortage, difficulty in lining up subcontractors, scarcity of antifriction bearings and fractional horsepower motors, plus the fact its facilities have been converted 25 to 30 per cent to other war work, are the major problems being wrestled with by the machine tool industry in meeting the sharply expanded tool production program.

During the period of declining shipments which started in June, 1943, most



tool builders had to relinquish a considerable proportion of their highly trained employes because the supplementary war work did not require the manpower needed in the production of machine tools. Much of their subcontract work, which at one time represented between 15 and 20 per cent of machine tool output, was returned to the tool builders' plants.

Another phase of the situation being met in attaining production goals is the relation of outside war contracts to machine tool work. Conflict exists priority-wise between these contracts and machine tool orders. There are also serious situations in some plants due to heavy pressure to increase schedules on general war work, or due to over-estimates by plants as to their ability to produce, with a consequent crowded order position which cannot be relieved due usually to lack of manpower. In a growing number of instances miscellaneous war work is falling behind schedule.

There has been improving co-operation by all concerned in trying to uncover machines available for transfer. In total, however, the number of idle tools disclosed to date by contractors and as a result of a War Production Board survey, has been far below that thought to be available, amounting to less than 10,000 units. Many of these are not of the special purpose type required to meet war needs.

British manufacturing interests in this country are said to have 15,000 to 20,000 machine tools installed in American plants, many of which tools are now being liquidated as war contracts are completed.

No definite action has been taken on WPB's plan permitting manufacturers beginning July 1 to purchase machinery, tools and dies for civilian production, whenever possible out of existing surpluses, but if necessary, through placing orders for production at times and under conditions that will not interfere with the war effort.

Production of 50,000 Cast Iron Bathtubs Authorized

Production of 50,000 cast iron bathtubs during the third quarter of 1944 has been authorized for limited distribution. Sale of these bathtubs will be limited to orders for or ultimate delivery to the Army or Navy, for export authorized by the Foreign Economic Administration, or for installation in construction projects that have been authorized by preference ratings regularly assigned to war housing and other construction projects for which tubs are essential, such as hospitals and institutions.

Each of the following five manufacturers has been assigned the job of producing 10,000 tubs during the third quarter: American Radiator & Standard Sanitary Corp., Louisville, Ky.; Crane Co., Chattanooga, Tenn.; Eljer Co., Salem, O.; Kohler Co., Kohler, Wis.; and Richmond Radiator Co., Uniontown, Pa.

Machine tool interests have succeeded in scheduling their production lines to smoothly handle a steady flow of both normal lines of machine tools and a variety of other war work. Combined operations are shown above in a radial drill department. Diesel chain drive housings and rotor blower housings in the foreground; at the rear turret lathe aprons and tools are shown ready for drilling

Steel Companies Producing War Goods on Unprecedented Scale

NEW YORK

JUST as steel output has risen to unprecedented levels during the war so has a new record been set for the steel industry's production of finished military equipment in large varieties and quantities, according to the American Iron and Steel Institute.

In peacetime such diverse products as barrels, ships, railroad cars, garbage cans and houses have been made by steel companies and subsidiaries. In every war the industry has turned out armament, but in the current war the industry's output of shell, ships, aviation equipment, bombs, guns, buildings and scores of other items has been astonishingly large.

Among the types of shell produced by steel companies and subsidiaries have been such varieties as antiaircraft, armor-piercing, bursters, chemical high explosive rocket and mortar shell. High production has also been achieved in ammunition boxes, belt links and cartridge clips, bullet jackets, cartridge case cups, fuses and bangalore torpedoes.

For assaults from the air, many types of bombs have been made by the steel industry, including the armor-piercing, demolition, depth, fragmentation, incendiary and chemical varieties.

Aviation parts and equipment have been produced on a large scale by the fabricating plants and shops operated by members of the steel industry. Among the items produced in this category are airborne radio chassis, bomb bay doors, bomb racks, bomber wing parts, control cables, engine cowling, engine cylinders, engine filters, piston pin plugs, engine mounts, fuselages, instrument panels, jettison tanks, hangars, landing gear, propeller blade sections, propeller domes, side panels for training planes, stabilizers, turret parts, and wing flaps. Steel companies have also made landing mats.

During the current war, shipbuilding subsidiaries of two large steel companies expanded their facilities tremendously for the construction of fighting ships, cargo vessels, landing craft and other vessels.

In addition, at least 40 different types of ship components have been produced by steel companies not operating shipyards.

Another big field for the steel industry has been the manufacture of tens of thousands of prefabricated steel buildings.

All told, around 50 individual steel companies assumed the double burden during the war of making not only steel in tremendous tonnages, but also of fabricating that steel into war equipment.

Urges Industry Speed Up Claims

Government desires to be in position where it is being pressed for settlements instead of where it is pushing contractors to present claims, says termination officer

NEW YORK

INDUSTRY as a whole is not ready to accomplish its part of the job in termination of war contracts, Col. Curtis G. Pratt, deputy director, Readjustment Division of the armed forces, declared in Brooklyn, N. Y., recently.

The War Department, he indicated, was much better prepared, adding that the government "would like to be in that position where contractors are pushing us with claims, instead of us pushing them to get claims in."

Industry must be better prepared, he emphasized, if 60 per cent of the nation's industrial capacity is not to remain "in a state of suspended animation." Only $131,000,000 of claims had been filed on $500,000,000 awaiting contractors in settlement of fixed price contracts already terminated, he asserted. At the same time, Colonel Pratt indicated that his division did not expect widespread "horizontal settlements."

Studies "Horizontal" Plan

"The War Department," he explained, "now has under consideration the so-called company-wide or horizontal settlement. It would be fine if we could go into one company and settle its contracts all the way down, one at a time. I wish we could. Maybe we can.

"However, so far we have adopted a skeptical attitude. We are making a very thorough investigation by a field experiment with 29 companies to gather facts on this important data. There are many difficulties to be ironed out before anyone knows how it will work."

Again emphasizing the need for greater preparation of industry in meeting the termination problem he said: "Termination is not a responsibility of some nebulous tomorrow," he declared. "It is upon us. Success in keeping industry from being tied up waiting for settlements will depend a good deal on war contractors."

Fred Tompkins, chief, Industrial Division, New York Ordnance District, said that of the approximately 1000 terminations which have been authorized in the district, 800 have been completed. No terminations, he said, have been pending more than six months, and only a small percentage have been pending more than three months after claims have been submitted.

Economical Ship Operation In Postwar Era Predicted

Declaring that wartime research was going to contribute greatly to the economy of construction and operation of the American Merchant Marine after the war, Reginald E. Gillmor, president, Sperry Gyroscope Co., Brooklyn, N. Y., recently declared that inspection of the jet-propulsion engine, which is still a closely guarded military secret, showed that it was "remarkable in its simplicity and in the ease and flexibility of its control of very large power."

These engines, he added, have also led to other research which will contribute to the evolution of an efficient gas turbine and other propulsion machinery with possibilities for decreasing capital cost and improving operating economy. Refinements in processes of rolling ship plates and of transforming inexpensive soft woods into hard woods are also going to prove to be factors in reducing ship costs.

Mr. Gillmor also outlined the developments in remote and automatic control which should contribute to economy and safety of operating of a wide variety of transportation equipment.

Present, Past and Pending

■ FRANK R. FROST, SUPERIOR STEEL PRESIDENT, DIES

PITTSBURGH—Frank R. Frost, president, Superior Steel Corp., Pittsburgh, since 1927, died June 27 after an illness of several months. Mr. Frost, who was 61, had joined Superior Steel in 1917 as a salesman and had become successively assistant sales manager, general manager of sales, vice president and president.

■ SHIP 145 LOCOMOTIVES TO INDIA

TORONTO, ONT.—Canadian locomotive builders have completed a contract for 145 locomotives for India and have received a large contract for additional units.

■ EXPECT 38,000,000 CARS ON ROADS BY 1950

WASHINGTON—Even though the war lasts through 1945, there will be 38,000,000 motor vehicles on the highways by 1950, according to estimates of the American Road Builders' Association.

■ HIGH-GRADE SCRAP SHORTAGE THREATENS STEEL OUTPUT

FREDERICK, MD.—The steel industry may face a serious production crisis because of a shortage of high-grade scrap next winter, E. C. Barringer, president, Institute of Scrap Iron and Steel, told a conference of Army officers here. Consumers' and suppliers' inventories of scrap declined 400,000 tons during the first four months of 1944.

■ SECRET FLEET OF TROOP CARRIERS UNDER CONSTRUCTION

WASHINGTON—A large fleet of new and deadly attack-transports, each capable of landing 1000 troops with a full complement of tanks and heavy guns, is under construction in American yards. Although details of the new ships are secret, it is known they are intended for use in the Pacific war. Several hundred are being built.

■ POSTWAR BRIDGES TO REQUIRE 1,300,000 TONS OF STEEL

NEW YORK—Structural steel amounting to 1,300,000 tons will be required for the postwar bridge program as soon as steel is released from war priorities, the American Institute of Steel Construction estimates. The bridge requirements vary from 1750 tons in Nevada to 264,975 tons in New York.

■ PROHIBITS CHROMIUM IN RESISTANCE WIRE

WASHINGTON—Prohibition on the use of chromium in making nickel-chromium resistance wire for use in domestic or commercial electric appliances was made effective by WPB last week.

■ CASTINGS SHORTAGE FORCES EMPLOYMENT CUT AT WHITE

CLEVELAND—Shortage of malleable iron castings and forgings has caused White Motor Co. to reduce its employment by almost 400 workers since May 1 to about 5000. Company plans to further contract its working force by another 150 to 200 employes in the immediate future.

■ NEW WAR CONTRACTS TO NECESSITATE RETOOLING

PHILADELPHIA—A large number of plants will have to accept war contracts in the next few months that will necessitate retooling and, in some cases, conversion to entirely new items, according to C. Jared Ingersoll, chief of the Philadelphia ordnance district.

Improved, Speedier Testing Methods Attract Interest

Centrifugal castings, classification of industrial waters, colorimetric and photometric methods of analysis discussed at meeting of American Society for Testing Materials

P. H. BATES ARTHUR W. CARPENTER

Mr. Bates, chief, clay and silica products division, National Bureau of Standards, has been elected president of the American Society for Testing Materials. Mr. Carpenter, manager, testing laboratories, B. F. Goodrich Co., Akron, O., has been elected vice president of the society.

NEW YORK

MORE than 1800 members of the American Society for Testing Materials gathered at the Waldorf-Astoria hotel last week for the forty-seventh annual meeting to hear more than 100 addresses, technical papers and reports presented at 16 technical sessions. Attendance exceeded the previous record of 1500 set in 1937.

While the activities of the society include nonmetallics as well as the metals, preponderant interest was centered in the latter. Features of the convention, at which action was taken on a number of the society's widely used specifications and tests, were round-table discussions on centrifugal castings and classification of industrial waters, a symposium on colorimetric and photometric methods of analysis and several addresses, including one on "Minerals in War and Peace" by Dr. C. K. Leith, mineral consultant to the War Production Board, and another by Dean Harvey, outgoing president, and associated with the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Leading producers of centrifugal castings and those concerned with their use participated in the round-table discussion sponsored by a committee headed by N. L. Mochel, manager, metallurgical engineering, Westinghouse Electric & Mfg. Co. and members including A. E. Schuh, United States Pipe & Foundry Co., Burlington, N. J., and J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham, Ala. The discussion centered around stress factors involved in determining quality such as type of test specimens, the best means of obtaining them, whether they are representative of a particular series of parts and the like. The American Foundrymen's Association also has been doing some work on centrifugal castings and participated officially in this discussion.

Through the work of Committee D-19 on Water for Industrial Uses, of which Max Hecht, consultant, Pittsburgh, is chairman, there have been developed practical, accurate and standardized procedures for sampling and determining essentially all the significant constituents in waters. More important, however, is the necessity for making the analysis of a water sample an understandable and useful tool for industrial users of water and even for those who are not specialists in this field. The relationship of water analysis to a given industrial process was the subject of one of the featured round-table discussions which created considerable interest since practically all plants are consumers.

So far, nine waters, representative of

NEW MEMBERS OF ASTM EXECUTIVE COMMITTEE

J. G. MORROW
Metallurgical engineer, Steel Co. of Canada Ltd., Hamilton, Ont.

W. C. HANN
Chief chemist, California Portland Cement Co., Colton, Calif.

J. T. MacKENZIE
Chief metallurgist, American Cast Iron Pipe Co., Birmingham, Ala.

SAM TOUR
President, Sam Tour & Co., New York

L. B. JONES
Engineer of tests, Pennsylvania railroad, Altoona, Pa.

those that may be used industrially throughout the United States, have been selected as standards. The plan for classification involves descriptions of the effects of these waters in various industrial processes. Analysis of a given sample can be compared with the analyses of the standards, thus making it possible to arrive at a conclusion as to the behavior of the sample.

Industry more recently has found it necessary to speed up chemical analysis of steel and other materials as part of the program for generally accelerated production. Steel now is being regularly analyzed in a few minutes by shorter test methods such as by analytical colorimetry and photometry and one entire session was devoted to this subject. Apparatus has been improved rapidly recently.

Another session on fatigue and methods of testing largely involved presentation of reports of activities of the several committees during the past year, such as on chemical analysis of metals, radiographic testing, factors affecting hardness, fatigue of metals, etc.

Although Committee A-1 on steel, of which Mr. Mochel of Westinghouse also is chairman, suggested two years ago that changes in standards be kept at a minimum during the war, a rather large number was submitted at the meeting this year.

This was occasioned by the fact that many are of importance in connection with high sustained steel production and therefore should be placed in effect as soon as possible and also by the necessity for publishing the new book of ASTM standards this year, rather than in 1945 as scheduled. Therefore some 130 specifications under the jurisdiction of the committee will appear in the new book in their latest form.

A few emergency alternate steel standards are being withdrawn but most of them are being continued. Many of the emergency provisions are covered in WPB Limitation Order L-211 and it is believed eventually they will be largely incorporated in ASTM specifications on a permanent basis.

The detailed changes in specifications are too lengthy to enumerate here but it may be well to note that revisions of tentative standards include welded alloy open-hearth iron pipe; light gage structural quality flat hot-rolled carbon steel; alloy steel bolting materials for high temperature service; heat-treated carbon steel bolting material; and lapwelded and seamless steel pipe for high temperature service.

Tentative revisions of present standards include alloy steel forgings for industrial use and carbon steel and alloy steel ring and disk forgings.

Revision of standards recommended for immediate adoption include steel music spring wire; carbon steel bars for springs; welded and seamless steel pipe; black and hot-dipped zinc-coated welded and seamless steel pipe for ordinary pressure vessels; locomotive boiler and firebox steel; carbon steel plates for stationary boilers and pressure vessels; carbon-silicon plates of ordinary tensile ranges for fusion-welded boilers and other pressure vessels and chromium-manganese-silicon alloy steel plates for boilers and pressure vessels; high tensile strength carbon-silicon steel plates for boilers and other pressure vessels; alloy steel bolting for high temperature service; and wrought steel wheels.

A few standards are being withdrawn, covering carbon and alloy steel blooms, billets and slabs for forgings, forge-welded steel pipe and riveted steel and wrought iron pipe.

The report of Committee A-10 on iron-chromium, iron-chromium-nickel and related alloys indicated that excellent progress is being made on four specifications covering stainless tubing for various applications. New specifications also are being prepared for stainless spring steel and for hot-rolled and cold-drawn bars. Jerome Strauss, vice president, Vanadium Corp. of America, New York is chairman of this committee.

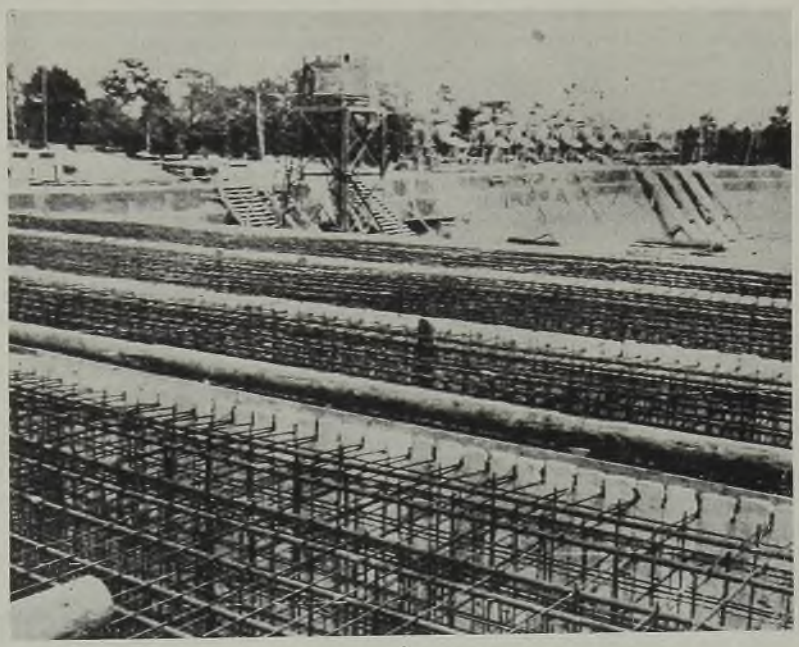
Committee A-5 headed by C. D. Hocker, Bell Telephone Laboratories Inc., Murray Hill, N. J., has recommended that emergency specifications for hot-dip lead coatings on iron and steel hardware be revised and published by the society as tentative. Proposed specifications also have been set up for lead-coated iron and steel sheets.

A number of changes in copper and copper alloy specifications also are being made by Committee B-5, of which Lieut. Col. C. H. Greenall, officer in charge of the laboratory division at Frankford Arsenal, Philadelphia, is chairman. Revisions in seven standard specifications have been recommended by the committee as well as in 21 tentative specifications. Sixteen emergency alternate specifications are scheduled for withdrawal, largely involving use of fire-refined copper.

In view of the increasing interest in powder metallurgy, a committee, B-9, has been set up under the chairmanship of W. A. Reich, General Electric Co., Schenectady, N. Y., to formulate specifications and methods of tests for metal powders and metal powder products. Approximately 40 interested producers and consumers are represented on the committee.

Methods of tests and specifications for metal powder products will be developed by a subcommittee headed by R. P. Koehring, research engineer, Moraine Products Division, General Motors Corp., Dayton, O.

Subcommittee of Committee A-3 has been appointed to write simplified specifications for foundry pig iron. Present specifications are regarded as obsolete. J. T. MacKenzie is chairman and Thomas Johnson, Republic Steel Corp., Cleveland, and Dr. C. H. Lorig, Battelle Memorial Institute, Columbus, O., are members. A subcommittee also has been set up to establish specifications for automotive castings.



ROCKET LAUNCHER: Intended for the launching of the Nazis' rocket-propelled missiles, this huge steel and concrete construction was captured by the Allied invading forces in Normandy before being completed. In the background is the main ramp, 750 feet long, with concrete mixers left by fleeing Nazi workmen. Pouring of concrete had not yet been started on structure in foreground. NEA photo

Sanctions Against Work Stoppages Demanded by Steel Producers

Salaried arbitrator, to be supported jointly by companies and union, asked at War Labor Board hearing. Industry seeks elimination of maintenance of membership and dues checkoff provisions in future bargaining contracts

PROPOSAL for the establishment of a permanent salaried arbitrator who would be empowered to impose penalties and sanctions upon steel companies, the union or employes found to be responsible for strikes or work stoppages was advanced before the steel case panel of the War Labor Board in the concluding sessions on the companies' affirmative arguments.

In asking that sanctions against strikes be made a part of the contract with the United Steelworkers of America, W. H. Harvey, representing Jones & Laughlin Steel Corp., Pittsburgh, suggested that the arbitrator, whose salary and expenses should be paid jointly by the company and the union, would fix the responsibility for any work stoppage and apply sanctions against offenders. Employes participating in a strike would be considered as having voluntarily quit their employment. Employes found by the arbitrator to be "not guilty" would be reinstated without prejudice. Those employes found to be responsible for the strike would be penalized by any one or combination of the following: A reprimand; placement on probation; a fine of $5 or less for each day of offense; removal of vacation allowance at a rate not to exceed loss of one day's vacation for each day of offense; loss of seniority at a rate not to exceed loss of one year's seniority for each day of offense; or suspension from work at rate not to exceed two weeks for each day of offense: or by discharge.

Would Evaluate Leadership

The proposed procedure provides that if the arbitrator finds that the strike occurred as result of union leadership he may rule that the leadership is irresponsible and should not enjoy the benefits of maintenance of membership and checkoff (if they are part of the contract). He may also direct that any loss suffered by the company and the employe be reimbursed by the union, and may also find and fix sanctions if the union fails to take action to prevent strikes or have production resumed in event of a strike.

As a sanction against a lockout by the company, the arbitrator may order that the employes be reimbursed for their wages lost while locked out.

Mr. Harvey contended that the inclusion of this procedure in a contract would "do much toward actually averting many of the work stoppages that now occur because it would be made clear to all concerned that neither the corporation nor the union was in favor of any strikes to the point that they had established penalties for their prevention. In respect to those stoppages that would occur, they would be of short duration because the time element involved in the strike would naturally be an important factor in the award."

A freshet of briefs and statements by individual companies wound up the presentation of the producers' affirmative arguments. In general, these subscribe to the general arguments presented under direction of the Steel Case Research Committee against the union's demands and outlined certain circumstances peculiar to the individual companies which would make granting of the union's demands an undue hardship.

J. M. Larkin, vice president, Bethlehem Steel Co., stated that the 17-cent hourly increase asked by the union would add $120,000,000 annually to his company's employment costs. A guaranteed annual wage for the approximately 300,000 men on the Bethlehem payroll would mean employment costs of $727,000,000, Mr. Larkin stated, figuring their pay at 40 hours a week and at their average hourly straight time earnings. Assuming a postwar year equivalent to 1937, the best peacetime year in Bethlehem's history in respect to total receipts, this guaranteed payroll alone would be $302,500,000 in excess of total receipts.

Giving further examples of how a guaranteed annual wage would affect the resources of Bethlehem in a low year following a high year, Mr. Larkin compared figures for 1937 and 1938, saying:

"In 1938 alone the additional employment costs which would have been incurred by Bethlehem under the guaranteed annual wage demanded by the union would have been more than ten times Bethlehem's total income before taxes in that year."

J. C. Argetsinger, vice president and general counsel, Youngstown Sheet & Tube Co., Youngstown, O., asked that the union furnish "proper and adequate guarantees" that it will perform its covenants.

Citing the disappointment of his company's management in the record of the union in observing its contract, Mr. Argetsinger said Sheet & Tube underwent 74 work stoppages from Aug. 13, 1942, to March 31, 1944. More than 248,000 tons of production was lost, as were 330,000 man-hours of labor.

"There seems to be a lack of organization and lack of effective overhead planning within and by the union," said Mr. Argetsinger. "The union has become overconfident and overstrong politically because of government-imposed mainte-

Iron Mining Companies Cite Threat Of Union's Demands to Production

DULUTH, MINN.

PRODUCTION of iron ore for war purposes would be jeopardized if the 17-cent hourly wage increase demand by the United Steelworkers of America-CIO for workers in the ore mines were granted, Clarence J. Hartley, attorney for the Oliver Iron Mining Co., told a special panel of the War Labor Board conducting hearings of the iron ore wage case here last week.

Exclusive of the increase in social security taxes, the total additional labor cost upon the basis of 1943 operations would amount to $9,780,842.

The 42 companies involved employ more than 20,000 iron ore miners in operating approximately 170 iron ore mines in the Mesabi, Vermilion, Cuyuna, Gogebic, Menominee and Marquette ranges. Economic problems of each, particularly costs of production and heavy tax loads, were brought before the panel.

In the picture is the effect increased costs of operation will have on further employment and developments of mineral ranges in the area—particularly the underground mines and low-grade ore holdings.

Mr. Hartley emphasized that while production between 1940 and 1943 increased 38.8 per cent the number of employes increased 49.8 per cent, the total man-hours increased 68.5 per cent and total payroll increased 117.3 per cent. The figures show a very substantial increase in the man-hours per ton for producing ore, which have increased costs to an additional amount over and above any wage increases. The annual payroll increased from $20,870,726 in 1940 to $45,344,023 in 1943.

The statement by Philip Murray before the steel panel that steelworkers and all those involved in the present wage controversy live "in areas where prices have gone up beyond those in rural communities" has no application in the iron ore case, said Earl E. Hunner, representative of M. A. Hanna Co.

Mr. Hunner refuted the ideas that

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nance of membership and a goverment-fostered treasury. I cannot believe that it is in the best interest of the nation that the government compel the payment by employes and the collection by employers of union dues which immediately are used in part at least for major political purposes. I cannot believe that a union which boasts that it will control national, state and local elections is doing its members a great service. I cannot believe that such a union should have the umbrella of maintenance of membership, maintenance of revenue income and maintenance of revenue collection held over it by the federal government."

Colorado Fuel & Iron Corp., Denver, in a statement by W. A. Maxwell Jr., president, outlined the difficulties faced by it, because of its geographical location. Demand for steel in the area where it can compete with eastern and southern mills as well as the new steelworks in the west is limited. The company's capacity exceeds the demand in which the company can compete on an even freight rate basis with other companies.

Inland Steel Co., Chicago, charged that the WLB has no authority to require an employer to enter into a maintenance of membership contract as such a provision violates the National Labor Relations act. The company asked the panel to recommend the membership maintenance clause and the checkoff be eliminated from any future contract between the company and the union.

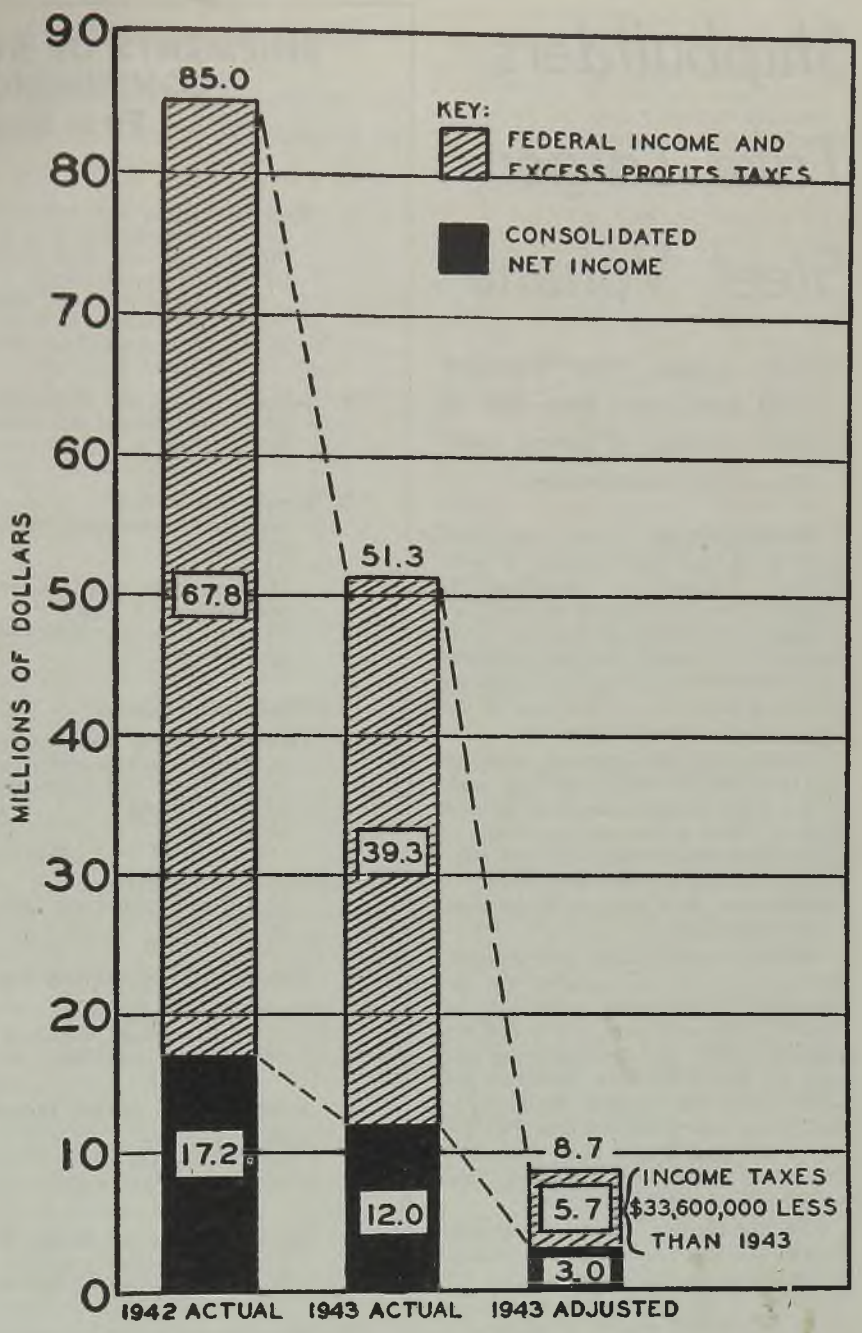
Owners Forego Returns

Mercer Tube & Mfg. Co., Sharon, Pa., informed the panel that the owners of the company have received no dividends in the company's 11 years of existence. All earnings have gone to improve working conditions, implement opportunities for increased incentive earnings, and to generally strengthen the company.

Listing the added costs that would face Mercer Tube if the union's demands were granted, the company estimated the price of pipe would have to be increased an average of $15 a ton.

Wickwire Spencer Steel Co., New York, presented figures showing that if the union's demands were granted and if operations should revert to the level of 1936 through 1939, the company would incur a total deficit of $11,521,000 over such four-year period. The company argued that increased steel prices would offer no solution to the problem as higher prices would only price steel out of the market in peacetime.

Lukens Steel Co., Coatesville, Pa., offered statistics showing that its net earnings before taxes for the past two years, when operations and employment were the highest in history, amounted to $0.107 per straight man-hour. If the union's demand for a straight wage increase of $0.17 an hour alone were granted, the company would have to operate at a loss of $0.063 per man-hour. If the 17-cent wage increase were denied, the union's demands for shift differentials, sick leave with pay and group insurance would be more than enough to convert the company's earnings into a loss.



This exhibit by Republic Steel Corp., Cleveland, shows the effect the union's demands, if granted, would have had on the company's 1943 net income and on federal taxes. The exhibit does not take into consideration the cost of the guaranteed annual wage

Granite City Steel Co., Granite City, Ill., presented figures showing that the granting of the union's demands, or even part of them, would simply eliminate the company as an entity of the steel industry. Taking 1940 as a "normal" year, the company showed how a $406,200 profit before federal income tax would be converted into a $2,393,725 loss if the union's demand were granted.

Timken Roller Bearing Co., Canton, O., protested its inclusion in the case as a basic steel producer, inasmuch as 75 per cent of its employes are engaged in the production of roller bearings and only 25 per cent in steel production, which steel is primarily used in the production of the company's bearings. The company's brief constituted a rebuttal to all 14 of the union's demands and included a break-down of the cost of these demands to the company, if granted.

Republic Steel Corp., Cleveland, estimated the added cost to that company of the union's demands, exclusive of the guaranteed annual wage, would be $42,600,000 annually. Deducting this cost from Republic's 1943 total earnings be-

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Shipbuilders Take Larger Steel Volume

First quarter 1944 shipment data show more than fifth of total tonnage in period went into vessel construction

SHIPBUILDERS received more than one-fifth of the total tonnage of steel products shipped to consuming industries in the first quarter of 1944, according to the American Iron and Steel Institute in a report covering shipments of 15,539,000 tons of steel by companies producing more than 95 per cent of the total output of finished products.

Nearly 3,221,000 tons of steel, or 20.7 per cent of total shipments, went to the shipbuilding industry in the first quarter. Both in tons and percentage of total, shipbuilding's share of steel shipments exceeded the 1943 rate, when 11,509,000 tons, 19.3 per cent of the total, went to shipyards.

Ranking second among steel consuming outlets in the first quarter was the so-called "miscellaneous industries and export" group, in which are included, for security reasons, the tonnages going into such war uses as ordnance, projectiles and tanks. Total first quarter shipments to that group were 3,032,000 tons, 19.5 per cent of the total. During 1943, about 23.7 per cent of total shipments went to "miscellaneous industries and export."

The construction industry continued to take a smaller proportion of total shipments. About 1,048,000 tons of steel, 6.7 per cent of the total, went to that industry in the first quarter as against 7.5 per cent during 1943.

Railroads, however, received substantially more in the first quarter. Over 1,482,000 tons, 9.5 per cent of the total, were shipped to railroads and car and locomotive builders in that quarter as against 7.6 per cent in 1943.

Similarly, the agricultural industry received more steel in the first quarter of this year than in 1943. Almost 280,000 tons, 1.8 per cent of the total, went to the agricultural industry in the first quarter as against a quarterly average of 178,000 tons, 1.2 per cent of the total, 1943.

Shipments to other industry groups in the first quarter 1944 were: Steel converting and processing industries, 1,441,000 tons, including 163,000 to wire product, 298,000 to bolt, nut and rivet, and 594,000 to forging manufacturers, jobbers, dealers and distributors, 1,849,000 tons; pressing, forming and stamping industry, 721,000 tons; container industry, 894,000 tons; machinery and tools, 598,000 tons; automotive and aircraft, 582,000 tons; oil, gas and mining, 391,000 tons.

SHIPMENTS OF STEEL PRODUCTS BY CONSUMING INDUSTRIES
First Quarter 1944

		Total Net tons
1.	**Steel Converting and Processing Industries**	
	(a) Wire drawers and wire product mfrs.	163,238
	(b) Bolt, nut, and rivet manufacturers	297,716
	(c) Forging manufacturers	
	(1) Automotive and Aircraft	166,120
	(2) All other	427,447
	(d) All other steel plants and foundries	386,876
	Total	1,441,397
2.	**Jobbers, Dealers and Distributors**	
	(a) Oil and natural gas industry	114,437
	(b) All other	1,734,295
	Total	1,848,732
3.	**Construction Industry**	
	(a) Public (Municipal, State, National)	16,710
	(b) Highways	35,342
	(c) Railways	17,391
	(d) Automotive and Aircraft	37,805
	(e) Utilities	49,932
	(f) Bldg. trim, accessories and builders' hdwe.	98,883
	(g) All other	791,600
	Total	1,047,663
4.	**Shipbuilding Industry**	3,220,901
5.	**Pressing, Forming and Stamping Industry**	
	(a) Metal furniture and office equipment	30,100
	(b) Hardware and household equipment	80,343
	(c) Automotive	339,679
	(d) All other	271,315
	Total	721,437
6.	**Container Industry**	
	(a) Oil and natural gas industry	129,558
	(b) All other	764,602
	Total	894,160
7.	**Agricultural, Incl. Impl. & Equip. Mfrs.**	279,561
8.	**Machinery and Tools**	
	(a) Machinery and tools, not incl. elect. equip.	412,905
	(b) Electrical machinery and equipment	184,595
	Total	597,500
9.	**Automotive and Aircraft Industry**	582,054
10.	**Railroad Industry**	
	(a) All railroads	1,013,039
	(b) Car and loco. builders and parts mfrs.	469,163
	Total	1,482,202
11.	**Oil, Natural Gas and Mining Industry**	
	(a) Oil and natural gas, incl. pipe lines	338,263
	(b) Mining, quarrying and lumbering	53,074
	Total	391,337
12.	**Miscellaneous Industries and Export**	3,032,040
13.	**Total (Items 1 to 12)**	15,538,984

Republic Steel Purchases 25,000 Different Items

Republic Steel Corp., Cleveland, in turning out unprecedented amounts of war material, is using 25,000 different commodities purchased from 10,000 suppliers, according to the current issue of *Republic Reports*, the company's magazine distributed to employes.

Civilian Goods Resumption Checked by Steel Shortage

New shortage has developed in steel as the result of invasion demands for landing craft, heavy artillery shells and more tanks which will affect all consumers' goods made of that metal, Director William Y. Elliott of the Office of Civilian Requirements, WPB, declared.

He said that expected munitions cutbacks have not materialized and that consequently production programs for civilian durable goods will have to be revised. One outcome of this is indefinite deferment of plans to remove cooking and heating stoves from rationing.

Labor Shortage Curtailing Output

Thirty open hearths shut down due to lack of manpower. Industry and labor advisory committees called to Washington in attempt to solve problem. Mills have lost 30 per cent of workers to armed forces

STEEL ingot production has declined to a rate of 95.7 per cent of rated capacity, compared with 99 per cent the middle of May, the War Production Board announced last week. The decline was attributed chiefly to a shortage of labor and the WPB announced that a meeting of the Iron and Steel Industry Advisory Committee has been called for July 7, to be followed a few days later by a meeting of the Steel Labor Advisory Committee, to seek an answer to the critical labor supply problem.

WPB pointed out that the Production Executive Committee had an extensive discussion of the steel problem at its most recent meeting, and expressed concern over the fact that as of today 30 open-hearth furnaces are shut down for lack of labor to operate them, representing a loss of about 200,000 ingot tons a month. To this loss must be added several hundred thousand additional tons of monthly production which might normally be expected from facilities now in operation but which cannot at this time be counted on due to the fact that today it takes double the time—about 30 days—that it formerly took to repair an open-hearth furnace.

WPB Executive Vice Chairman Charles E. Wilson told the PEC that because of the acute manpower situation, with the advent of hot weather and its effect on individual worker's productivity, it now looks as if the industry might fall short of meeting allotments already made for the coming three months.

Of the labor force of 600,000, employed at the 100 per cent operating rate required of the steel industry during the past three years, approximately 180,000 men, or roughly 30 per cent of the total employed, have been inducted into the military services. Present deficit in employment in the industry is placed at 50,000 workers.

POSTWAR PREVIEWS

MACHINE TOOLS—Negotiations believed under way for huge industrial equipment sales to Russia for delivery after the war ends, estimated at $2 to $3 billion a year for a decade. See page 49.

LATIN AMERICA—This country's aid in developing natural resources and industrial capacities of Latin American countries is expected to provide a much-needed market in the immediate postwar period for excess capital equipment accumulated here during the war. See page 58.

AUTOMOBILES—Pontiac is planning $35 million postwar expansion in foundry, motor and axle plant facilities, new salvage department and conversion of present aircraft torpedo plant into a large parts building. Will build 500,000 cars in first full year of unrestricted output. See page 67.

CONSUMER GOODS—Brewster Aeronautical will employ 4000 workers when it completes conversion of its two Long Island City plants and War Production Board specifically releases the company's $8 million stock of aluminum for civilian goods manufacture. See page 77.

WEST COAST—Western metals and other industries face difficult postwar task of finding and developing entirely new markets and devising alternative uses for the labor and equipment which have been accumulated on the Pacific Coast during the past four years. See page 78.

MACHINE TOOLS—President of Heintz Mfg. Co. proposes plan for orderly liquidation of government-owned machine tools through extension of tax depreciation advantages to manufacturers anticipating a flourishing postwar era. See page 81.

CONTINUOUS HARDENING—Setup for continuous electric induction heat treatment of steel bars is looked upon as development with much promise for immediate future. Four parallel hardening and tempering lines now handle production on commercial scale. See page 84.

CLEVER DIE OPERATIONS—Striking departures from conventional practice enable manufacturer to raise output, trim costs and adapt smaller machines to big jobs. Improvement in efficiency seen as boon in reconversion. See page 86.

PREFERRED STEELS—With over 300 standard steels on SAE, AISI and NE lists, reclassification and simplification are reviewed as "musts" for war's end. Need for list of preferred steels for machinery designers and builders emphasized. See page 88.

HIGH-TEMPERATURE VALVES—Successful operation of high-octane and synthetic rubber plants hinges on working metals at high temperatures. Heat-flow studies reveal key to problem of valve design to meet packing limitations, point way to still higher operating temperatures in new processes now under development. See page 90.

WPB Munitions Production Index Is Revised

Munitions production index, compiled by the War Production Board, has been revised on the basis of using average monthly output in 1943 as equaling 100, and is based on more than 3500 separate munitions items.

The revised index is made up by weighting output data (numbers of Garand rifles, rounds of each type of ammunition, etc.) by a fixed list of unit prices. In general, the prices used are those of August, 1943.

New Munitions Index

(1943 Monthly Average = 100)

Month	1940	1941	1942	1943	1944
Jan.	–	–	29	78	114
Feb.	–	–	31	82	112
Mar.	–	–	11* 36	90	117
Apr.	–	–	42	95	†114
May	–	–	47	95	
June	–	–	52	97	
July	–	–	58	101	
Aug.	–	–	64	105	
Sept.	– 7*	–	18* 67	108	
Oct.	–	–	69	113	
Nov.	–	–	76	118	
Dec.	–	–	84	117	

*6-Month average. †Preliminary.

Old Munitions Index

(November 1941 = 100)

Month	1940	1941	1942	1943	1944
Jan.		41	166	453	646
Feb.		45	182	476	636
Mar.		52	213	518	667
Apr.		60	247	547	*652
May		57	276	548	
June		59	309	560	
July	23	64	339	587	
Aug.	22	72	372	609	
Sept.	22	83	387	611	
Oct.	27	91	403	644	
Nov.	34	100	448	673	
Dec.	50	133	497	670	

*Preliminary.

Cultivation of Latin American Nations Seen Paying Dividends

Inter-American Affairs Co-ordinator tells House group of agency's activities and services promoting friendship and trade with nations below Rio Grande. Says intensified effort required to solve economic problems stemming from war

WHEN Co-ordinator of Inter-American Affairs Nelson A. Rockefeller and a number of his colleagues appeared before the House Appropriations Committee to obtain funds to continue their work for another year, they had a typical American success story to tell. They cited numerous instances to prove that the old feeling of hostility in the Latin American countries toward the United States has been replaced by a feeling of confidence and friendship.

Mr. Rockefeller, a frequent visitor to those countries, and only recently returned from a trip to Central America, said that when he recently sat in numerous labor, cabinet and other meetings, the participants talked very frankly in his hearing about their aspirations, their fears. They are thoroughly sold on the good neighbor policy, he said, and want to see it continued on a permanent basis.

"They are seeking capital to come to their countries, which is a shift in the attitude which you know very well—seeking American finance to come down there to help them," said Mr. Rockefeller. "They are looking for advice, counsel and co-operation—and this is from people who do not look for those things and do not want those things unless they trust the people to whom they go for assistance."

Mr. Rockefeller recited how we had succeeded in eliminating the Axis powers as dominant factors in the Latin American economy—how we at least have driven the Axis underground. By a program of truth to answer enemy lies, we have done this to a large extent by the intelligent use of motion pictures, the radio and other communications.

Today the hemisphere problem is one caused by the war's disruption of normal economics. Transportation problems, shortage of consumer and other goods and inflation are creating difficult social and economic conditions.

"The Axis is capitalizing on these conditions and blaming them on us," said Mr. Rockefeller. "It is not easy to explain the real reasons to the people and correct misapprehensions. That is why we feel that it is essential to intensify as much as possible our efforts today."

Therefore, the program for the coming year is to be directly related to the increased seriousness of these economic problems, declared John B. McClintock, assistant co-ordinator.

"One of the most serious consequences of the war is inflation which is marked in all the countries, and unchecked in some so far," said Mr. McClintock. "In Chile in the last year and a half the cost of living has gone up in excess of 300 per cent. In Ecuador the cost of living has increased 400 per cent. The economic unrest caused by wartime dislocations in certain of these countries gives us cause for concern. We think we would be remiss in our duty and responsibility if we were not prepared to work in co-operation with these countries to take such economic measures as may be desirable to maintain at least minimum economic stability while the war is on."

Hence the program of information, said Mr. Rockefeller, "to bring to our neighbors a greater realization that what is happening and has happened is a part of the war; that we in this country are suffering from the same problems they are; that we are making a tremendous sacrifice in men, money and equipment; that we are spending and borrowing for war in a way the world has never known before."

But this is not enough under present conditions. Other positive action must be taken. Mr. McClintock pointed out how a year ago the president of the Bank of Mexico attacked the United States for not shipping manufactured products to Mexico when we were taking out large quantities of raw materials, thereby creating a tremendous dollar balance in Mexico's favor, and a consequent inflationary pressure. This complaint has resulted in a number of actions.

"We are setting up a model mill to act as a guide for the development of the fine-yarn textile industry in Mexico," said Mr. McClintock. "Mexico has a large textile industry but they operate almost entirely with antiquated equipment and hand looms. The purpose of providing this model mill is to portray the advantages of modern machinery; to show that it is to Mexico's economic advantage to modernize her industry.

"Our considered judgment is that the only way you can build up buying power is to increase the purchasing power of those countries," continued Mr. McClintock. "Now, that can be done by increasing the standards of living and in-

NELSON A. ROCKEFELLER . . . . . Co-ordinator

creasing the sources of productivity in those countries. It is our feeling, based on the relationship between this country and England, and this country and Canada, that as other countries build up their standard of living and build up their buying power they become better customers."

The Mexican-American Commission for Economic Co-operation, set up by Presidents Roosevelt and Avila Camacho, it was shown, already has accomplished a great deal to lay the foundation for stabilizing the economic life of Mexico, and on a basis that will be mutually beneficial to the United States.

This international commission, said Mr. McClintock, has approved 13 projects urgently needed for the economic development of Mexico. For example, arrangements have been made for the sale to Mexico of equipment from this country costing approximately $12,500,000, of which approximately $9,700,000 represents new equipment and the remainder used equipment.

Mexican Industrial Program

It is significant to note that the entire cost of this equipment will be defrayed by Mexico. Following approval of this initial program, representatives of the office of the co-ordinator, with representatives of the War Production Board and the Foreign Economic Administration, will go to Mexico to join with representatives of the Mexican government to prepare an overall industrial program for Mexico.

"In this way," said Mr. McClintock, "the United States will co-operate with Mexico through making available capital equipment to the extent consonant with the war effort, thus absorbing to the extent possible the large dollar balance which Mexico has accumulated by reason of the procurement program. The way will thus be paved for long-term economic co-operation between the two countries along complementary lines and will provide a much-needed market in the immediate postwar period for excess capital equipment accumulated in this country during the war."

For development of the Latin American countries foreign capital is vitally needed, it was made clear by Horace Graham, chairman of the co-ordination committee for Chile. A United States businessman who has lived in Latin America for 33 years, Mr. Graham is vice president, Anglo-Chilean Nitrate Corp., and president, Chilean Chamber of Commerce.

"It is impossible," said Mr. Graham, "to expect the Chileans to spend a lot of money to explore ways and means of developing their resources. They have not the facilities. We have the self-interest and the facilities, and we should provide the necessary funds to carry on."

The same attitude expressed last year in Mexico also prevails in Chile, and it is essential that something be done about it soon, said Mr. Graham. "We are getting nitrate and copper from Chile, close to half a million tons of copper a year," he said. "The Chileans are fearful that with the end of the war suddenly we will say we have plenty of copper, and that we will cut copper off quickly. They are scared for fear that somebody is going to cut the life-root and just let everybody sink or swim."

The Chileans, Mr. Graham went on, are almost instinctively beginning to look around for other means of help, with some signs they may be getting it. All of the free nations are becoming very active as the postwar period begins to loom in the distance.

"The other day the British Chamber of Commerce gave a big luncheon to the president of Chile," said Mr. Graham. "The head of the British organization in Chile presided and he said that after the war British-Chilean relations would be on the same basis as they had been before the war, and that the British efforts to trade with other countries and develop new outlets in Latin-American countries would be greater than they ever had been. The expenditures they are making, film and press activities, and in teaching English over the radio, have been increased lately, so instead of diminishing their activities now they are carrying them on on a much greater scale.

"At the same time," continued Mr. Graham, "the smaller nations are beginning to be very active also, including the Poles, the Czechoslovaks and the French." But Mr. Graham was convinced that the United States is making headway with the Chileans and that we will do business with them on a substantial scale after the war if we in the meantime do not toss them overboard.

It was brought out during the hearings that only some 51,000 United States nationals reside in the various Latin American countries, as against 9,500,000 Axis descendants. Yet our nationals in those countries are so enthusiastic about the work the Co-ordinator of Inter-American Affairs is doing to implement the good neighbor policy; and they are so optimistic about its potentialitites that they themselves contribute to it out of their own pockets.

"The best evidence of its necessity and usefulness," said Mr. Graham, "is the fact that United States nationals in Chile, where we have only about 1400, from their own pockets, or from their companies, give a sum of 60,000 to 70,000 pesos a month toward carrying on the work."

"We present a program called Frente al Conflicto (Face to Face with the Conflict) in which the news is given truthfully. The president of Chile told me that he feels he gets a better outline of what is really taking place by listening to a United States newscast and that he makes it a point to listen to it regularly. We have other radio broadcasts, we give lessons in English, we send films that are shown all over Chile and we illustrate various United States activities in the war."

Praises Co-operative Spirit

Mr. Graham spoke glowingly of the Chilean spirit of co-operation. "If you are courteous and decent and co-operative with the people they will deal with you the same way."

Our communications to Chile always bring out clearly that the United States is in a position to help the Chileans elevate their plane of living, said Mr. Graham.

The co-ordinator's office, declared Mr. Rockefeller, simply acts as the channel by which the Latin American countries and their needs are brought into contact with the business and financial interests in the United States. The co-ordinator, he said, is in close contact with the State Department, the Foreign Economic Administration and all other interested government agencies, thus integrating activities and preventing duplication and confusion.

"It endeavors to bring together private enterprises in the United States with private enterprises in the other American republics for economic development on a mutually profitable basis," he said. "It recognizes that it is in the best interest of the United States that, by developing the natural resources and industrial capacities of the other Americas, the resulting rising standard of living and increase of buying power would not only strengthen the nations of the Western Hemisphere measurably, but also provide greater outlets for United States capital, technical skill and goods than have existed heretofore. It seeks to remove barriers of trade and commerce, to improve and enlarge markets for United States goods and to make

(*Please turn to Page* 62)

ARMY SALVAGE

As a result of the accelerated salvage program being conducted by the Army Service Forces, savings aggregating $20,772,000 have been effected during the 3-month period ending April 1, 1944, through the sale of scrap and refuse material collected by the Army in the United States.

Materials saved and sold in March included 60,866,000 pounds nonferrous metals, including fired cartridge cases, sold for $4,292,000; 47,226 gross tons ferrous metals sold at $667,000; 3827 gross tin cans sold for $24,000. Large quantities of rubber, textile and paper scrap, egg cases, fruit and vegetable containers, bottles, jars and jugs were collected and sold.

A new Army salvage item is "selected edible hog garbage," a nourishing, clean food sold to hog raisers.

HYDRO-TEL automatical mills FOUR PROFILES at th same time

THE 360° AUTOMATIC PROFILING UNIT DOES THE TRICK • • • •

Now, a 360° Automatic Profiling Unit may be built into CINCINNATI Hydro-Tel Millers for work requiring the milling of complex external or internal profiles. A tracer finger, extending from the bottom of the unit, accurately follows around the contour of a master template, releasing hydraulic power to the table and cross slide hydraulic circuits. In effect, this unit guides the milling cutters around the work in the same path as the shape of the master template. ¶ The illustration on the opposite page shows a CINCINNATI 28" Vertical Hydro-Tel Miller equipped with the 360° Automatic Profiling Unit, a four spindle head and fixtures for two banks of parts. You will notice a template for each fixture. While one series of parts is being milled, another is loaded. The table is then rapid traversed to the right, the tracer finger positioned and the second series milled. Think what this arrangement does to a production problem! ¶ Perhaps you have jobs requiring 360° profiling that could be milled to better advantage on such a setup. The engineers here at Milling Headquarters will be glad to talk it over with you.

THE CINCINNAT

MILLING MACHIN

will assist the other American republics in their industrialization and in the development and conservation of their national resources for mutual benefit."

If the total cost of all this work, $850,000, is related to the present volume of trade with Latin America, which is in excess of $2,100,000,000, the percentage thus spent to develop additional markets for the United States works out to be about 0.004 per cent, Mr. McClintock stated.

The $500,000 to be spent in economic development work in the fiscal year ending June 30, 1945, is earmarked for the various countries as follows:

Brazil	$ 75,000
Mexico	75,000
Chile	50 000
Bolivia	50,000
Ecuador	20,000
Paraguay (one-half year)	10,000
Colombia, Peru and Venezuela ($40.000 in each country)	120,000
Costa Rica, Cuba, Dominican Republic, Uruguay, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, Panama ($10,000 in each country)	100,000
Total	$500,000

These programs are not all entirely frozen and the Department of Economic Development will have latitude to adjust its activities so as to concern itself at all times with needs as they may become urgent.

It was pointed out that the programs in the various countries will be paid for jointly by the United States and by the governments of the other American republics concerned. The belief was expressed that the contribution in both funds and personnel of the other American republics will be, at minimum, two to three times as much as the total amount of United States participation. It also was stated that private interests, both United States and Latin American, are expected to contribute a substantial part of the technical assistance required at no cost to the United States government.

Emphasis was laid on the fact that the plants which the other Americas are building now or propose to build are not war plants but, rather, plants aimed at maintaining the balance of the economy.

As an example of the way in which United States companies benefit when they co-operate in this development work, P. L. Douglas, assistant administrator, cited some experiences in increasing the efficiency of the Mexican railroads.

"The Mexican railroads," he said, "were operating nine large foundries. The mission suggested they could do a better job with three. Two leading United States companies were called in and sent representatives down there. One of these companies now has a contract to consolidate and operate these plants. In water treatment they called in two of the leading United States companies also, and both of them received contracts for establishing modern water-treatment plants. On accounting, we called in the two United States organizations specializing in railroad accounting methods, and they will both receive contracts, one already having been engaged."

In sending technicians to Mexico and Brazil during the coming fiscal year, the co-ordinator's office will be specially interested in helping those countries plan their future steelmaking and distribution activities. Mexico will get further help in developing her rayon industry, Brazil will be assisted in development of a number of industries. In particular, the plans call for training of a substantial number of Brazilian technicians in the United States.

Tentative plans call for a mission to go to Chile to help that country prepare to absorb the shock to her economy which will result when present contracts for nitrate and copper are cut back. The co-ordinator's office, incidentally, is inclined to expect such cutbacks in 1945.

Price control experts also are to be sent to Chile, following similar successful missions to Bolivia and Cuba. A handbook on price control will be printed in Spanish and Portuguese for use throughout Latin America. Studies are to be aimed at distribution so as to get goods moved in such a way as to discourage asking excessive prices. Information programs are being drafted to counteract the impression in many parts of Latin America that high prices there stem from United States profiteering.

Asked whether American industries have any complaints to make about establishment of manufacturing plants in Latin American countries, Mr. Rockefeller said they give real co-operation. When the co-ordinator was asked to help in establishing a modern textile plant in Haiti, the textile industry here delegated a competent engineer to take charge of the program.

The appropriation for the fiscal year ending June 30, 1945, carries $500,000 for transportation development in the Latin American countries to be spent on railroads, highways, and air and water transportation. The transportation systems of all the Latin American countries were in bad shape before the war, it was pointed out. When the war came their loads were increased, whereas their supply of equipment and repair parts was cut off. Some rehabilitation work has been done in Mexico, Brazil and Chile but the job remains to be done almost in its entirety in the vast majority of cases. By way of illustration, it was pointed out that we shipped 600 trucks to Mexico and 1400 to Brazil in 1943 as against 1600 and 4580, respectively, in 1938.

The appropriation calls for $75,000 to be spent on entertainment and education of Latin American newspapermen in the United States; this policy, it was said, pays big dividends. A $37,000 item will take care of a staff of citizens of the other Americas who advise the co-ordinator's office about trends in their countries. Another item of $200,000 will take care of confidential projects; this item was $300,000 last year and $500,000 the first year.

Mr. Rockefeller expressed the belief that this may be the last time his agency, as a war agency, will call for an appropriation. It already has turned over the health, sanitation and food production programs to the Institute of Inter-American Affairs. The cultural program has been turned over to the State Department. It remains to be determined by the President and by Congress what other inter-American programs should be turned over to other government agencies as permanent policies.

As to the information program, including radio, movies and press activities, this is a matter for the government to determine. "In my opinion, other governments of the world are going to carry them on," said Mr. Rockefeller, "and therefore it seems to me that our government will have to carry on certain parts of these activities." He added, however, that many of them can be continued by private interests.

Many of the radio programs developed by the co-ordinator's office have turned out to be highly successful, said Mr. Rockefeller, and these are being turned over as rapidly as possible to private advertisers who can carry on the themes and objectives as originally set up. The co-ordinator's office, he said, is trying to arrange for private distribution of 16-millimeter motion pictures; there is under consideration the formation of a hemispheric film corporation which might be able to take over at least some of this work. Five United States newsreels released weekly to the other American republics, he hoped, would be taken over by the newsreel companies.

The appropriation included $1,035,000 to continue the publication known as *En Garde* in the Spanish tongue and *Em Garde* in Portuguese. This paper is received eagerly in Latin America and Mr. Rockefeller hoped it can be disposed of in such a way as to keep it as a permanent venture. The 1945 plan also calls for $20,000 for a new bimonthly magazine to feature the economic life and military activities of the American republics; this will be addresed to military authorities and establishments.

"The good relations that have been established will stand the shock and stress of competitive business which will follow the close of the war—if we take an intelligent attitude," Mr. Rockefeller concluded. He was anxious that none of the values developed during the war be lost. In particular, he urged that the average United States citizen be kept better informed about Latin America. Many Latin Americans speak English, he said, and he felt that more of our people should learn to speak Portuguese and Spanish. The Latin American newspapers, he said, devote more space to us than our newspapers devote to them. By proceeding intelligently, he felt, we can hold the friendship of Latin America, with beneficial results all through the Western Hemisphere.

Small Plants To Get Partial Relief From Production Quota Restrictions

Smaller War Plants Corp. formulates plan which permits small plants to increase their operations to a rate equal to the overall industry rate of production for any permitted civilian item. File applications not later than July 10

WAR Production Board last week approved a plan designed to give small plants a greater participation in essential civilian production. Under this plan, small plants will be granted partial relief from production quota restrictions, said Maury Maverick, chairman, Smaller War Plants Corp.

In broad terms, the objective of this plan is to permit small plants to increase their operations to a rate which is equal to the overall industry rate of production for any given civilian item. Both production for civilian use and for military end use are to be taken into account in computing the overall rate of production of a civilian item for the entire industry.

Under present conditions, quotas of allowed production for civilian end use are set by WPB limitation orders. Production of a civilian item for military use is excepted. The tendency over the past year or two has been to place military orders with larger plants, Mr. Maverick said. As a result, small plants had to be satisfied with a certain minimum percentage of their base year production.

Small plants will be permitted under the new program a rate of production on civilian items by the relaxation of quotas, so that no small plant in the industry will be operating below the overall average production level of the industry, including excepted military production. However, excepted production consisting of items such as mobile kitchens and laundry units not ordinarily produced for civilian use are not to be counted as part of the civilian type production of the industry in calculating the overall rate of production.

SWPC will recommend plants which are qualified to engage in production of permitted items to WPB, which will grant materials sufficient to allow such small plants to produce up to the overall rate for the industry.

Applications for materials must be filed on the usual forms prescribed by WPB orders and regulations and are to be accompanied by SWPC's form SWPC-2. Applications should be made not later than July 10.

In instances where it will be necessary to increase overall industrywide production of civilian items, or to relax controls in order to meet requirements of this new program, a formal letter of exception will be issued by WPB.

SWPC will recommend small plants which are qualified to participate in ex-quota production increases. It is intended that total exception granted under this program shall not raise total production of any industry for civilian uses by more than 5 per cent.

Requests for relaxation of orders under this program will be limited to applicants whose plants are located: In the critical West Coast areas of San Diego, Los Angeles, San Francisco, Portland and Seattle, and where total employment in the plant does not exceed 50 wage earners and will not be increased by the proposed production; or in some other critical No. 1 labor area and where total employment in the plant does not exceed 100 wage earners and will not be increased by the proposed production; or elsewhere where total employment in the plant after giving effect to the proposed production will not exceed 100 wage earners.

New Price Schedule Issued Covering Machine Tools

Pricing provisions covering sales of new machine tools, attachments and parts have been revised and broadened and issued in the form of a new price regulation, No. 67. It will not change the present level of prices for the articles covered, and was designed to simplify the pricing of these articles, Office of Price Administration said.

Sales of machine tool parts by manufacturers of, or dealers in, new machine tools have been added to the coverage of the regulation. The regulation now specifically covers the supplying of services that result in the production of a complete new machine tool or attachment.

The regulation freezes all prices in effect on Oct. 1, 1941. The addition is now permitted of resale discount or commission to the price in effect on that date on the last contract price during the period from Jan. 1 to Oct. 1, 1941, in the case of new machine tools or parts which the manufacturer intends to distribute through dealers for the first time.

Maximum prices for new tools and parts which represent more than a modification of an article for which a maximum is established may be determined by the use of the pricing formula the manufacturer had in effect on Oct. 1, 1941.

200,000 New Workers Must Be Recruited, Says McNutt

It will be necessary during 1944 to recruit 200,000 workers not in the labor force on April 1 and to maintain full strength throughout the year, Paul V. McNutt, chairman, War Manpower Commission, said recently. Despite an anticipated decline in labor requirements of the munitions industries, he said, it still will be necessary to place thousands of workers in critical industries and areas.

Among the activities in which labor scarcities prevail are foundries and forge shops and heavy duty truck plants.

War Agencies Appointments-Resignations

Philip D. Wilson has been appointed vice chairman for metals and minerals, War Production Board. He has been serving as director, Aluminum and Magnesium Division. His experience since 1911 included positions with Phelps-Dodge Corp., Calumet & Arizona Mining Co., American Metal Co. Ltd. and Pardners Mines Corp.

* * *

Arthur H. Bunker, who has been serving as vice chairman for metals and minerals and who recently was appointed vice chairman of the Production Executive Committee and director of the newly formed PEC staff, has been appointed deputy executive vice chairman, WPB.

* * *

George Heikes, who for three years served with WPB and its predecessor agencies, is returning to government service as director of the Aluminum and Magnesium Division, WPB, from his post with the Olin Corp., Tacoma, Wash., makers of aluminum ingot.

* * *

Ernest W. Heilmann, formerly head of the Radio and Miscellaneous Unit, OPA, has been appointed section head with supervision over pricing actions for radios and musical instruments, sporting goods, bicycles, dry batteries and related miscellaneous items, housewares, hardware, luggage, watches and other personal accessories. He succeeds George S. Ujlaki, resigned.

* * *

Charles M. Hay, St. Louis, Mo., has been installed as deputy chairman and executive director of the War Manpower Commission, succeeding Lawrence A. Appley.

* * *

Lieut. Col. William B. Harding has been appointed director of the Surplus War Property Administration's Aviation Division. Before entering the Army in July, 1942, Colonel Harding was vice president of Defense Supplies Corp.

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

CONSTRUCTION: Applicants who normally use form WPB-617 to obtain WPB permission under conservation order L-41 to acquire or construct facilities have been advised to follow revised instructions for the filing of this form. Revised instructions, bearing printing date June 17 on the instruction sheet, apply to the filing of the form only. Four copies of the form must be filed rather than three copies as formerly.

E ORDERS

MACHINE TOOLS: Requirement that a certified or photostatic copy of the preference rating certificate be supplied to the machine tool builder has been abolished. Limitation restricting delivery of machine tools to orders rated on certain specifically listed types of preference rating certificates has been eliminated and all valid forms of preference ratings now may be used. A machine tool producer who has filed all rated orders may deliver a total of not more than 10 machines among his various dealers. Any dealer so receiving a machine may resell it only on a rating of AA-5 or better and may not extend the rating received from his customer to replace the machine in his inventory. The lowest rating acceptable on an order for a machine tool has been raised from A-10 to AA-5 to conform to existing WPB policy. Until Sept. 1, each producer is to maintain his schedules as established on June 22, 1944, except as modified by specific diversions or other directions of the WPB. Deliveries after Sept. 1 are to be rescheduled in accordance with simplified mechanics for determining the individual quotas of the different branches of the armed services. (E-1-b)

L ORDERS

COOKING APPLIANCES, HEATING STOVES: All manufacturers of nonelectric domestic cooking appliances and heating stoves now are classified uniformly and any manufacturer may be granted permission to produce, provided that such production will not interfere with his war work. Overall production quotas for the entire industry have been established for the various types of equipment, and individual manufacturers will be granted quotas on the basis of their capacity to produce and the labor situation in their areas. Any manufacturer wishing to produce these items should apply for authorization to the WPB, Plumbing and Heating Division. Each producer will be allowed to produce stoves only in those fuel types that he manufactured during the year ended June 30, 1941. The revised order also permits an additional gas range model. Besides the two standard full size models, an apartment size cooker now may be made. Restrictions on the use of thermometers has been removed. Thermostats are still prohibited by orders L-28-c and M-9-c, but thermostats which are already in stock and those which are produced on appeal may be used. (L-23-c)

ELECTRIC LAMPS: Ninety-nine types of military incandescent, fluorescent, and other electric discharge lamps have been added to the list of lamps permitted to be made, bringing the list to a total of 1800. Manufacturers who wish to appeal for relief under the order will file form WPB-1477 in triplicate with WPB district field office in which the plant or branch is situated. Any manufacturer who wishes to make lamps not listed in the schedule is still required to apply by letter to WPB in Washington. (L-28-a)

GALVANIZED WARE: Increased use of iron and steel to make galvanized ware for civilians is now permitted, restrictions on types of iron and steel that may be used have been removed, size and gage restrictions have been liberalized, and coal hods and scuttles have been added to the list of permitted civilian items. Eight classes of items may be made for civilians: Garbage and ash cans and pails; pails, buckets, and tubs; washtubs; wash boilers; storage cans for petroleum products; fire shovels; funnels; coal hods and scuttles. In making any of these items, manufacturers are permitted to use 100 per cent as much iron and steel as they used for the same classes of items in the year ended June 30, 1941.

Within given and expanded size ranges, manufacturers may make the permitted items in any number of sizes they choose. Any available type of iron and steel now may be used to make galvanized ware for civilians. None of the restrictions placed upon the production of galvanized ware for civilians apply to production in fulfillment of military orders. (L-30-a)

PLUMBING FIXTURES: Limitations on the use of metals in plumbing fixture fittings and trim apply to the assembly and finishing of such equipment as well as to the manufacture. Exceptions to the restrictions on the use of metals for plumbing fixture fittings have been extended to include all buildings that comprise a hospital building. (L-42)

DRY CLEANING, PRESSING EQUIPMENT: Four additional items of commercial dry cleaning and tailors' pressing equipment may now be manufactured for civilian use. Velvet and nap pressing boards, steam boards, garment steamers, and velvet steamers have been removed from restrictions that prohibited production for civilian use, except to fill specifically approved orders by assembling the equipment from parts completely fabricated before July 1, 1942. Monorail conveyors have been removed from restrictions of this order since such equipment is controlled by the General Industrial Equipment Division. (L-91)

PLASTICS MOLDING MACHINERY: Control of new plastics molding machinery has been transferred to M-293 from L-159, revoked. (L-159, M-293)

PLUMBING AND HEATING TANKS: Production quotas for range boilers, expansion tanks and hot water storage tanks have been set for the period from June 2 through Dec. 31, 1944. Production for the seven-month period is set at 7/12 of the quota provided for each calendar year. Each manufacturer's calendar year production of range boilers and expansion tanks is limited to 70 per cent of his unit output during 1941, while production of hot water storage tanks is permitted each manufacturer at the rate of 75 per cent of his 1941 unit output. (L-199)

INDEX OF ORDER REVISIONS

P ORDERS

SEWERAGE FACILITIES: Operators of public sanitary sewerage systems now may construct, without authorization from WPB, additions or expansions wherein the cost of materials does not exceed $1500. Previous restriction on the use of more than 100 pounds of aluminum in any one quarter has been removed and aluminum may be obtained and used as freely, but subject to the same restrictions, as steel and copper. An operator who during 1942 did not use more than $5000 worth of materials now may obtain and use up to $5000 worth of the same without special authorization from WPB. (P-141)

PRICE REGULATIONS

MACHINES AND PARTS: Bearings and bushings made of ferrous and nonferrous metals have been added to the list of articles covered by provisions of price schedule No. 136. Pipe and tub fittings, subject to price regulation No. 188, and ferrous and nonferrous castings, subject to price schedule No. 41, 125, 241, or 244 are not affected by amendment to price schedule No. 136.

A new method for pricing rebuilt fractional horsepower electric motors has been issued. Retail prices for rebuilt motors of ¾ horsepower or less are established at: (1) 75 per cent of the list price of the nearest equivalent new motor, (2) plus an additional sum of $7, (3) less the following allowance for the exchange, transfer or trade-in of a used motor: $1 for ¼ horsepower or less; $2 for over ¼ horsepower and including ½ horsepower; and $3 for over ½ and including ¾ horsepower.

For sales of rebuilt fractional horsepower motors at levels other than at retail, the maximum price will be 85 per cent of the retail price determined by the new pricing method described above. (No. 136)

WARM AIR FURNACES: An increase of 9 per cent in manufacturers' lowest published list prices in effect on Aug. 4, 1943, for cast iron warm-air furnaces burning wood, gas, or oil, with a B.t.u. output of 900,000 or less at the register or outlet has been authorized. A like increase has been granted manufacturers of repair parts for both cast iron and steel warm-air furnaces. Increases apply only to sales made on an uninstalled basis. Dollars-and-cents increases resulting from the higher manufacturers' prices may be passed on by jobbers and retailers of the furnaces and parts. (No. 188)

MALLEABLE IRON CASTINGS: Sellers of malleable iron castings now may use either the pre-base period method or the formula method of pricing on all deliveries made on orders received or contracts entered into prior to June 30, 1944. In all other cases, if the seller elects to sell or deliver castings on or after this date at his pre-base period maximum prices, he cannot afterwards shift to formula prices. Base period for pricing purposes is Oct. 1-15, 1941. The "formula" method establishes maximum prices for the castings not contracted for sale or quoted in a published price list during the base period by use of the seller's pricing formula which he used on Oct. 15, 1941 (with overhead rates based on operations in the first six months of 1942.) Under the "pre-base period" method, the seller uses as his maximum prices for a casting not contracted for sale or quoted in a published price list during the base period, the price at which he last delivered the casting prior to Oct. 1, 1941. (No. 241)

USED MOTOR VEHICLES: Maximum prices for 450 types and models of used Army vehicles now may be established by the same method as that provided by the regulation governing sales of used commercial motor vehicles. Maximum prices are computed by depreciating the base prices of the vehicles which include the extra equipment when new and the transportation allowances. (No. 341)

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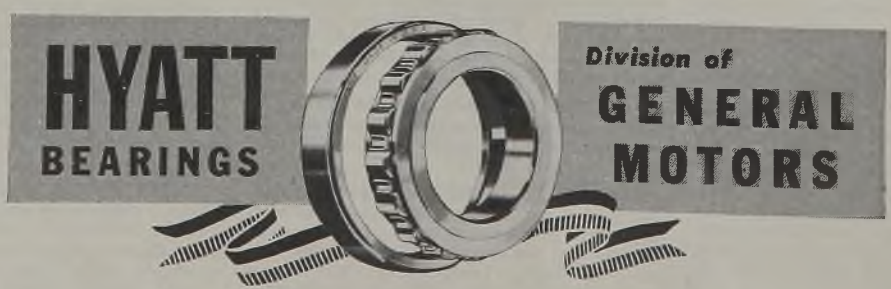


HYATT BEARINGS DIVISION · GENERAL MOTORS CORPORATION · HARRISON, NEW JERSEY

EL

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Authorization for manufacture of passenger cars at rate of about 2,000,000 annually, provided builders can line up equipment, materials and labor without interference with war production, expected from WPB within few weeks

ALL prospects point to WPB authorization within a couple of weeks for the manufacture of roughly 2,000,000 passenger cars, provided manufacturers can line up equipment, material and labor without interference to war production. Official announcement will await a meeting in Washington around July 15, at which quotas probably will be worked out and official approval to the program voiced.

Tipoff came in a recent New Jersey speech by GM's Alfred P. Sloan Jr. in which he stated: "We are now preparing plans for the WPB to contemplate returning to civilian production in automobiles to the extent of 2,000,000 cars a year on an annual basis. Just when that will take place I don't know, but I rather think that it will come very quickly."

He further implied that this partial resumption of production will mean reconversion "in two bites"—first at slow speed, and then at full speed. This will boost the cost of the switchover—$50,000,000, or about 10 per cent of the total announced reconversion outlay for General Motors—but it appears necessary because of the double ending to the war now generally considered likely. Mr. Sloan looks for a 50-60 per cent reduction in war demands when Germany is defeated.

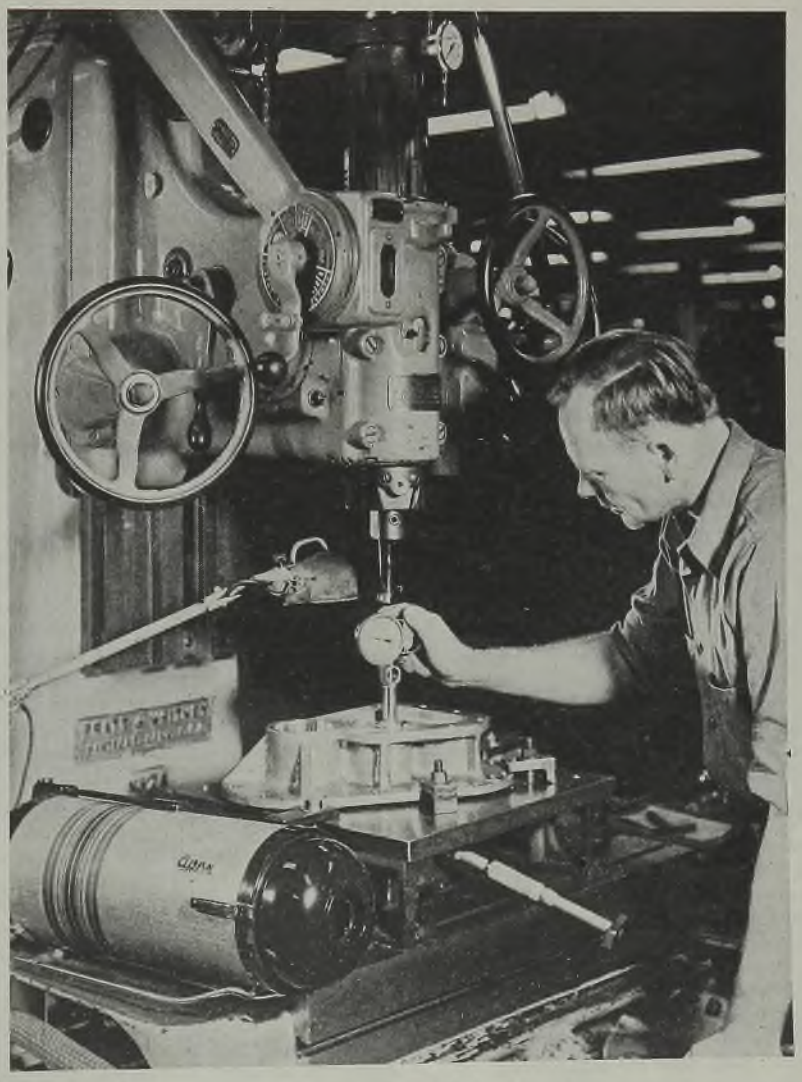
The whole picture naturally is fraught with "ifs" because anything can happen on the military fronts.

Assignment of individual quotas for various manufacturers likely will prove nearly as difficult as was the scaling down of production late in 1941. If 1941 production is to be the gage, and percentages of calendar year production of passenger cars allowed against an overall total of 2,000,000, then the breakdown might be something like this . . .

General Motors	800,000
Chrysler Corp.	400,000
Ford	400,000
Hudson	75,000
Nash	75,000
Packard	75,000
Studebaker	100,000
Willys	75,000
Total	2,000,000

A word of explanation on this breakdown is in order. In the first place, it is nowise official, being simply a reasonable apportionment of a 2,000,000 allotment on the basis of cars built in the calendar year of 1941, as far as the first three are concerned. For the smaller independents, it is obviously impractical to assign quotas based on actual percentage of production in 1941, for they might be so small as to preclude the economic possibility of retooling for production on any basis. As a matter of fact, the 75,000 figure mentioned for Hudson, Nash and Packard is almost the equivalent of full 1941 production, which gives them a break when it is considered the big three have been cut down to only 50 per cent of their 1941 production. Willys also is being given a break, when it is considered that 1941 production there was only 37,400-odd. However, the fact that Willys is well tooled for jeep production, and in fact is currently building close to 9000 jeeps a month must be taken into consideration. This production doubtless will be due for an early sharp cutback, possibly even before the end of the European war, so the reconversion to civilian production would not be so much of a problem as in the case of other producers. Studebaker's allowance of 100,000 may be overly generous, since this is about the level of 1941 passenger car production, but this producer currently is building 5000-odd Army trucks monthly, which might indicate a reasonably smooth reconversion outlook.

Whatever the final decision, the three large producers certainly are not going to quibble over raising the quotas of the independents, since the total number of units involved is not large enough to make much difference when calculations are being based on a 400,000 or 800,000 basis. Of course, General Motors will have to break its 800,000 down among its five passenger car divisions, possibly



INCREASES OUTPUT: When machine operators at the Apex Electrical Mfg. Co., Cleveland, found it difficult to make accurate measurements because of surplus chip dust in precision-made aircraft parts, they drafted into service an Apex vacuum tank cleaner. Now the operator presses a button and chips are whisked away, boosting efficiency 8 per cent

about as follows . . . . Chevrolet, 400,000; Pontiac, 125,000; Buick, 125,000; Oldsmobile, 100,000, and Cadillac, 50,000. Chrysler's 400,000 could be subdivided into Plymouth, 200,000; Dodge, 75,000; Chrysler, 75,000, and DeSoto, 50,000.

On this basis, with the exception of DeSoto and Cadillac, the minimum production of any producer would be on the basis of approximately 6250 units a month or about 1500 a week and 300 per day on a 5-day basis. This figure runs upward to the equivalent of something over 1500 daily in the case of Chevrolet.

The difficulty is not going to be with what allowable production quotas are, but rather with establishing sources of supply for essential components and insuring delivery of these parts and materials without interference to war production. That is the problem of the automobile builders. They know best how to solve it, and they realize full well that war production comes first. They have nothing to gain by following any other policy.

Already the principal builders have made a general round-up of their principal suppliers with respect to automotive orders. The replies sentimentally have been heartening, but actually many tough hurdles are on the horizon right now. A simple thing like chrome plating looks hopeless now, for there is no nickel available, little copper, and probably even less chrome for nonwar use. It might be possible to substitute cadmium or bright zinc or even paint, as was done on the final 1942 models, but the public, no matter how hungry it is for new cars, is not going to take long to "conservation" models.

Many Bottlenecks Loom

Innumerable other bottlenecks to resumption of automobile production are foreseeable. Castings, forgings, gears, electrical accessories, radiators, and so on down the list are items which war appetites are still consuming almost altogether.

On the other hand there must come soon a realistic appraisal of actual war requirements and a scaling down of orders to somewhere near these estimates. Today, the apparent over-ordering in many lines is little short of appalling. There are actual instances of subcontractors' shipments to aviation manufacturers, for example, having shipments rejected by the prime contractor for no other actual reason than that the prime contractor has too many on hand and has no room in his plant for them. Often these rejected shipments are routed right back to the prime contractor and by that time he may be in the mood to accept them. This does not make sense.

There are other cases of insignificant quantities of materials being ordered for shipment as far ahead as September, 1945, and follow-up men spending their valuable time checking to see if these dribbling items are going through on schedule at suppliers' plants. There is talk among some subcontractors of insisting on 60-day acceptance clauses in contracts, requiring prime contractors to accept material—and no questions asked—within 60 days after ordering if shipment can be made in this time.

ALVAN MACAULEY

It must be kept in mind that all the foregoing is largely speculative. Automobiles are not just around the corner; but conceivably there could be some available for sale before the end of this year. It is a further good bet that General Motors will probably be the first to get into the civilian market. Already some of its divisions are coming out with their respective plans for reconversion. Pontiac, for example, has announced it will spend $35,000,000 ultimately for expansion, and in the first full year of unrestricted output will build 500,000 cars. Included in the postwar expansion program are increases in foundry capacity (Pontiac already has a gray iron foundry capable of pouring around 800 tons of iron daily), increase in motor plant capacity, larger facilities for axle production, a new salvage department, and conversion of the present aircraft torpedo plant into a large parts building.

H. J. Klingler, Pontiac general manager, emphasizes that planning now is essential to the maintenance of postwar employment, even though war production continued the No. 1 job. As he says, "You don't sell automobiles to the unemployed."

Official statements by the WPB that steel sheet and strip are in the tightest spots yet experienced since the start of the war, due to requirements of landing barges and other invasion craft, are given a little salt treatment in steel circles here. While there is no disposition to indicate that shipments of these commodities could be made in the near term, one source declares that, depending upon size and gage, it is possible to work in a little tonnage here and there, and once the pressure eases on plates, continuous mills can revert to wide sheets without much delay, since their conversion was more a matter of "adding to" than tearing down.

For the seventeenth consecutive year, Alvan Macauley, chairman, Packard Motor Car Co., has been chosen to head the Automobile Manufacturers Association, and its offspring, the Automotive Council for War Production. A.M.A. vice presidents are Paul G. Hoffman of Studebaker, and Robert B. Black of White Motor. Treasurer is George W. Mason of Nash-Kelvinator, and secretary, Albert Bradley of General Motors. The A.C.W.P. vice presidents include Hoffman, Black, C. W. Avery of Murray Corp. and C. C. Carlton of Motor Wheel Corp. Mr. Mason is treasurer and John W. Anderson of the Anderson Co. is secretary.

War Goods Output Records

Fisher Body's Ternstedt manufacturing unit in Detroit has announced completion of the 100,000th gyro-horizon indicator, used on the B-29 Superfortress and other war planes. At the same time it was noted the 100,000th directional gyro-indicator, companion instrument, soon would be shipped. The division also produces remote reading magnetic compass transmitters and indicators, as well as a number of other small parts for aviation and ordnance. Seventy-eight per cent of production workers on instruments are women.

Ford has announced building of the 10,000th 500-horsepower medium tank engine at its Lincoln plant. The engines are the V-8 type, made up of five major subassemblies to facilitate field service.

George T. Christopher, president of Packard, told a recent meeting of the company's dealer advisory council that plans are being drawn for postwar production of 200,000 cars annually, twice the highest level of production yet achieved. Packard's problem of reconversion to automobile production, even on a limited basis, is a particularly tough one, and there have been rumors of the company seeking plant space outside Detroit for this purpose.

ICC Transfers Rationing Of Motor Vehicles to ODT

Operators of commercial motor vehicles who need to purchase new equipment after July 1 should file their applications through the 142 district offices of the Office of Defense Transportation throughout the country instead of the 80 offices maintained by the Bureau of Motor Carriers of the Interstate Commerce Commission.

All field work incidental to the rationing of new commercial vehicles will be handled by the Highway Transport Department of the ODT.

Opens Contract Settlement Training Program in East

A contract settlement training program for war contractors and government representatives opened June 19 at the University of Pennsylvania. This project is to serve as a model for a nationwide training program which will use an estimated 50 colleges and universities.

WING TIPS

Carrier current communication system at Boeing aircraft plant operates on installed power lines, rather than separate telephone wires. Links all overhead traveling cranes with central dispatching office and factory floor stations

LINKING all overhead traveling cranes at Boeing Aircraft Co.'s plant No. 2 in Seattle, a communication system has been installed with a central dispatching office and factor floor stations. The new system is designed primarily to speed output through faster crane operation, and will be of particular value in the present conversion of plant 2 from B-17 to B-29 production.

The system is called a carrier current telephone and is one in which already-installed power lines, rather than separate telephone lines, are used to carry the voice impulse.

Transmitting and receiving instruments are connected with the power lines through a capacitor, which acts like a check valve, allowing the high-frequency low-voltage voice impulse to pass through but keeping the low-frequency high-voltage current of the power lines from reaching the instruments.

The voice impulse is carried to and from the cranes through the rails which supply power to the crane motors. Any installation of direct telephone lines to the crane would be impossible because the cranes constantly are traveling and changing from one set of tracks to another. But they always are connected to the power system, so with the carrier current telephone they always can keep in touch with the dispatching booth.

Formerly the cranes were directed to jobs in the plant through a system of hand signals given by hook tenders on the factory floor. This plan proved inadequate because a crane operator could not be given the entire picture of the job through signals. With the communication system, a hooktender telephones the main dispatching booth, asking that a crane be directed to a certain job at a certain point. The dispatcher then calls the crane, explains the job to the operator.

The dispatching booth is situated on the edge of the plant balcony and every crane in the assembly area can be seen from this position.

Crane operators declare there are several advantages to the new system, including the fact that the earphones keep out a lot of the shop noise.

Crane operator at Boeing receives instructions over the carrier current telephone which recently was installed to link overhead cranes with central dispatching office and floor stations. Regular power lines, rather than separate telephone lines, are used to carry the voice impulses

AAF Simplifies Acceptance Of Off-Tolerance Items

Army Air Forces Materiel Command, Wright Field, O., has announced a program designed to simplify procedure covering acceptance of articles manufactured for the AAF which do not exactly comply with specifications but which are substantially sound in quality.

Col. B. L. Boatner, chief, Inspection Division, said the new policy is necessary in order to conserve both materials and manpower and to avoid delay in the production and delivery of supplies. In the past, he said, such acceptance has been controlled by the somewhat cumbersome and elaborate "salvage board" procedure, time-consuming for contractors and AAF inspectors alike, who were sometimes unable to keep abreast of the flow of articles demanding attention.

Under the new program, salvage boards, and even the word "salvage" itself as heretofore used by the AAF will be done away with, and the AAF will accept marginal articles in which, in their judgment, variation from specifications does not adversely affect safety, performance, durability, weight, or interchangeability.

Under the old system, all articles not complying with specifications were set aside until such time as the local salvage board could meet in formal session and determine the disposition of each article. Under the new system, there are two principal innovations. Certain contractors' inspectors will be authorized to use special, standardized limits, to be known as "Materials Review Limits," which are to be developed for each kind of article. And members of groups which will administer these limits will be permitted to operate independently without convening in formal sessions. These groups will be known as "Materials Review Boards."

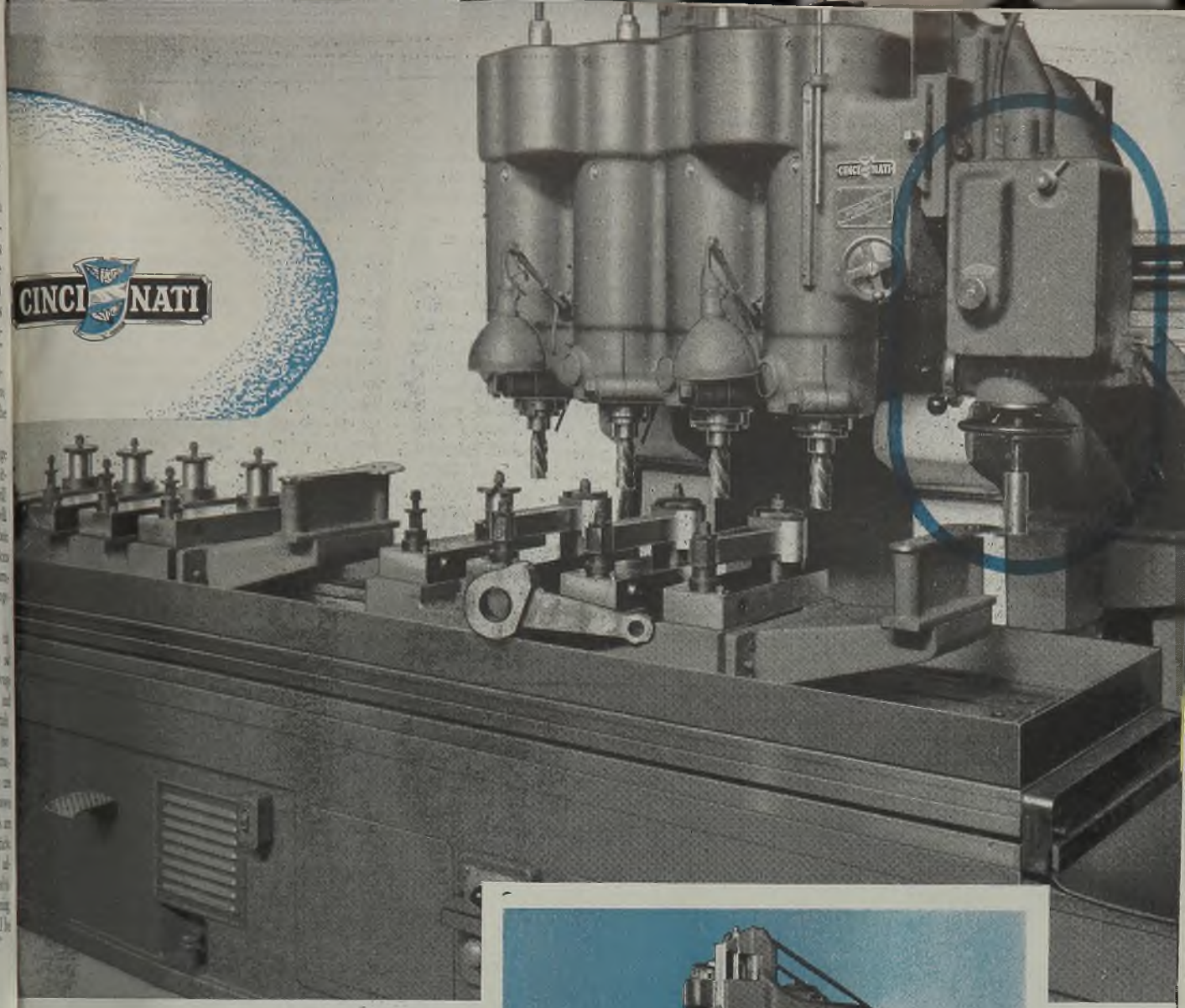
Rubber Mounting Reduces Vibration to Minimum

By reducing vibration to a minimum, a new rubber mounting for radial aircraft engines, developed by the Goodyear research laboratory of Goodyear Tire & Rubber Co., Akron, O., is expected to make smoother the operation of large bombers, decrease the strain on structural parts, lessen the nervous tension and fatigue of pilots and crew, and increase the accuracy of precision instruments resulting in more accurate bombing and gunfire.

The new mounting represents the successful culmination of two years of study and investigation, the idea originating with L. J. Amsdell of the Goodyear mechanical goods department.

Everyone is familiar with the improvement achieved in the riding qualities of automobiles with the introduction of rubber mountings for their engines. For airplanes, the problem is tougher for several reasons. One, of course, is the fact that airplanes use engines much larger than those of automobiles. The problem is still greater with the radial engine whose design makes it necessary to support its mass behind the center of gravity.

Another reason is the method of utiliz-



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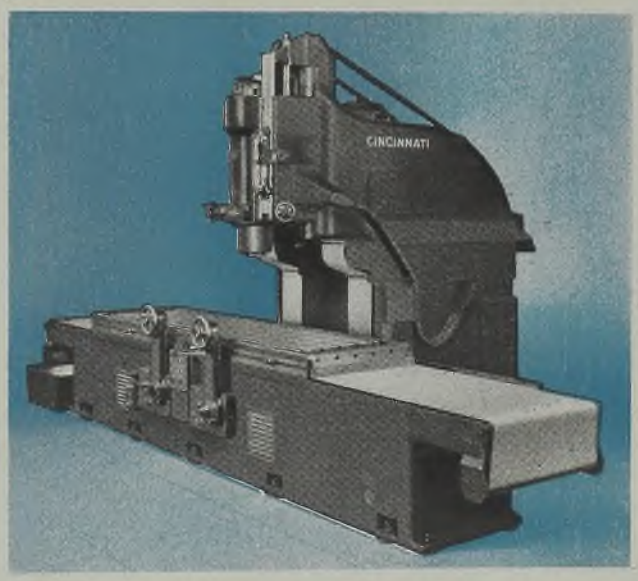

ght: CINCINNATI *28" x 60" Hydro-Tel Milling Ma- ne. For a brief description of this Miller and all other* NCINNATI *Milling Machines, look in Sweet's Catalog for Mechanical Industries.*

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possible a greater flow of raw materials to the United States. It regards it as fundamental that without economic stability and well-being there will not exist the political and social stability which is requisite for international security."

Mr. Rockefeller mentioned diverse ways in which his organization strives to help those Americans who are interested in doing business in Latin America. For example, it co-operates with American manufacturers in regard to the advertising they address to the Latin American countries during the emergency period.

His office, said Mr. Rockefeller, has worked in closer co-operation with the Inter-American Financial and Economic Advisory Committee and the Inter-American Development Commission in implementing the resolutions adopted at the meeting of foreign ministers of the American republics held at Rio de Janeiro in January of 1942. It will seek further to implement the far reaching recommendations of the Conference of the Inter-American Development Commissions held in New York in May, 1944, and it will take similar action with respect to recommendations formulated at the Conference of the Governments of the American Republics on Technical and Economic Matters, tentatively scheduled to be convened in Washington on Sept. 6, 1944.

Mr. Rockefeller made it clear that the functioning of his office is sufficiently broad to enable it to "make available upon request such technical missions as may be required." He also explained that it is the practice of his office to secure from the other American republics contributions to the extent of their ability in funds, personnel and material.

In asking an appropriation of $500,000 to be spent on economic development work in the fiscal year ending June 30, 1945, as contrasted with the $165,000 appropriation for the fiscal year ending June 30, 1944, Mr. McClintock explained that the method of procedure is to be changed considerably.

"We have operated up to the present time pretty much on a project basis," he said. "But we now have to meet all of these changes in the economic situation which are coming to fruition as a direct result of the war. We will now have to move over to a program basis." Instead of operating through a corporation of the government, it is intended to "encourage private enterprise to undertake sound programs utilizing private capital for the purpose." The work will be carried on either directly through the co-ordinator's office, or through the Inter-American Development Commission. The latter, said Mr. McClintock, offers an advantage in that it does not operate as a government agency but as an international body; also it represents private as well as government interests.

The Department of Economic Development of the co-ordinator's office, said Mr. McClintock, "will assist in the development of these programs and will in the initial stages make available the services of technical personnel in planning sound programs. This personnel

POSTWAR RESEARCH GROUP: Making sure that vigilance in scientific research will continue after the war, Secretary of War Stimson and Secretary of Navy Forestal have appointed a committee of scientists and Army and Navy officers to formulate plans for postwar research, headed by Charles E. Wilson, executive vice chairman of the War Production Board. Left to right: Col. R. M. Osborne, Army Service Forces; Rear Adm. G. F. Hussey Jr., Navy Bureau of Ordnance; Dr. K. T. Compton, Massachusetts Institute of Technology; Brig. Gen. W. F. Tompkins, Special Planning Division of the Army; Rear Adm. J. A. Furer, Co-ordinator of Research and Development; Dr. F. B. Jewett, president, National Academy of Sciences; Mr. Wilson; Dr. J. C. Hunsaker, chairman, National Advisory Committee for Aeronautics; Maj. Gen. O. P. Echols, assistant chief of air staff; Rear Adm. E. L. Cochrane, chief of Bureau of Ships; Dr. M. A. Tuve, Office of Scientific Research and Development; two unidentified officers. Official United States Navy photo from NEA

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Doubles Drill Life . . . Improves Finish . . . Increases Speeds

Round, perfect holes — 300 of them per drill grind — that's the present production rate on a certain drilling operation at this large plant. But the rate wasn't always that high . . . as the following facts of the case show.

Poor finish and short drill life had been common complaints of the operators. On the SAE 4140 steel being machined, 150 pieces were the maximum they could get per drill grind . . . the finish was rough, despite the use of a well-known high grade cutting oil. Finally, they made a change in cutting oil at the suggestion of a Sun Oil Engineer. They switched to clear, transparent, sulphurized SUNICUT.

100% improvement in drill life and much better finish were immediate results of the change. They are now able to drill 300 pieces before drills need regrinding. As an *extra* bonus they find SUNICUT permits increased spindle speeds . . . further stepping up their output.

Savings in time and money are direct result of the increased production and longer drill life made possible by SUNICUT in this plant. Similar savings are possible on many other metal-cutting operations in your plant. Why not consult with a Sun Oil Engineer today on selecting the right cutting oil for these operations. Call or write

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SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

"BLACK WIDOW": This picture of the Northrop P-61, or "Black Widow" night fighter, has just been released by the Army Air Forces—after being censored (note blank spots). The plane is virtually a flying gun platform, combines pursuit speed with low landing speed and easy handling characteristics necessary for a night fighter. Details as to speed, range, maneuverability, number of crew, firepower and armor still are restricted. NEA photo

ing the power developed by the engine. In an airplane, the propeller is on a shaft which is essentially an extension of the crankshaft. It may be said, therefore, the propeller pulls the engine through the air and the engine drags along the rest of the plane.

A third condition met by aviation engine mounts not encountered in automobiles is that the plane not only flies in its normal position but must often fly upside down and in all other intervening positions.

Radial engines are supported at the rear by a tubular mounting ring, attached to the plane structure by suitable struts and braces welded to it. The engine then is attached to this ring by a series of mounts. For some time now mounts have been used which employ rubber to take up the vibration. The new Goodyear mounts, however, are claimed to be improvements on those now in use.

Used in Flying Fortresses

A number of the new Goodyear mounts are used to attach the engine of a Flying Fortress to the tubular mounting ring. Each mount consists of two main parts. There is a collar, lined with a rubber bushing. This collar is attached to lugs welded to the ring. This collar has a socket which is at right angles to the collar itself. The other half of the mounting, a small unit attached to the engine, ends in a ball which fits into this socket.

Vibrations developing in the engine are isolated by two features of the mounting, the ball and socket joint just described, and the rubber bushing in the collar. The ball and socket, as used, produces a unique rocking motion in the rubber bushing.

Budd Retooling Plant For Shell Production

Following recent cancellation of a number of cargo planes by the War and Navy departments, the Edward G. Budd Mfg. Co., Philadelphia, has announced that it has begun retooling and rearranging it facilities in expectation of an order for large shells for the Army. The contract has not been finally awarded, Edward G. Budd, president, said, but he predicted shells will be turned out in small numbers soon and mass production will start in about five months.

Frank L. McNamee, regional director, War Manpower Commission, Philadelphia, said recently that he had been notified by the Budd company that it will lay off 2000 employes at its Hunting Park avenue plant, at the rate of 200 a day. However, Mr. Budd, in his statement, which came a day later, said that eventually the company will need "more men than ever."

Consolidated Vultee Not Building B-29s

Up-to-the-minute review of production activity in the various plants of Consolidated Vultee Aircraft Corp., presented at San Diego recently by Harry Woodhead, president, scotched reports C-V might be building the B-29 Superfortress at its Fort Worth, Tex., plant. Production at Fort Worth now involves, he said, "the B-24 Liberator and three equally large or larger planes, no one of which is the Boeing B-29. Consolidated Vultee Aircraft has no plans to build this plane."

This statement also runs contrary to earlier reports that B-24 production at Fort Worth, involving assemblies of knockdown bombers from the Ford Willow Run plant, will be terminated shortly.

Woodhead disclosed C-V on June 12 had built over 7000 B-24 bombers and transports (C-87), 5000 of them at San Diego. Since Pearl Harbor, the corporation has delivered 227,000,000 pounds or air frames, 17 per cent of the industry total, and has employed an average of 76,000.

The executive reported that the San Diego plant currently was engaged in production of the Consolidated B-24 Liberator, the C-87 transport version of it and "four other four-motored planes."

SAE Aeronautics Division Staff Personnel Expanded

Appointment of George H. Compter as staff engineer in the Aeronautics Division, Society of Automotive Engineers, has been announced by SAE General Manager John A. C. Warner. Mr. Compter, until recently manager, Inspection Salvage Department, Brewster Aeronautical Corp., Long Island City, N.Y., will be under the direction of Aeronautics Division Manager J. D. Redding at SAE headquarters.

The appointment enlarges SAE Aeronautics Division personnel to keep pace with an expanding program.

Mr. Compter, graduate of University of Michigan, entered Brewster employ in 1938 as junior stress engineer, and served successively as project stress engineer on airplane development, liaison structural engineer on shop problems, and inspection salvage manager. He has been a member of the aeronautics engineering faculty of the Engineering, Science, and Management War Training Program, member of Eastern Aircraft War Production Council's Survey Committee for Manpower Utilization, and president, Brewster's Supervisors' Club.

Hupp Motor To Acquire Globe Machine & Stamping

Hupp Motor Car Corp., Detroit, as of June 30 will acquire the assets and business of the Globe Machine & Stamping Co., Cleveland, it was announced last week. R. S. Geddes, president of Globe, will become president of Hupp when the acquisition becomes effective.

Globe, a forty-two year old company, has been a producer of ordnance materiels under prime government contracts. In peace-time Globe serves primarily the automotive, refrigeration, and air-conditioning industries.

Hupp plants are now operating at near capacity in producing brake, clutch, motor, and other machine parts for the war effort.

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Inherent reactance, resulting from the special design of the Hobart Multi-Range Welding Generators, is responsible for the exceptional arc stability throughout their wide welding range.

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Inherent Reactance
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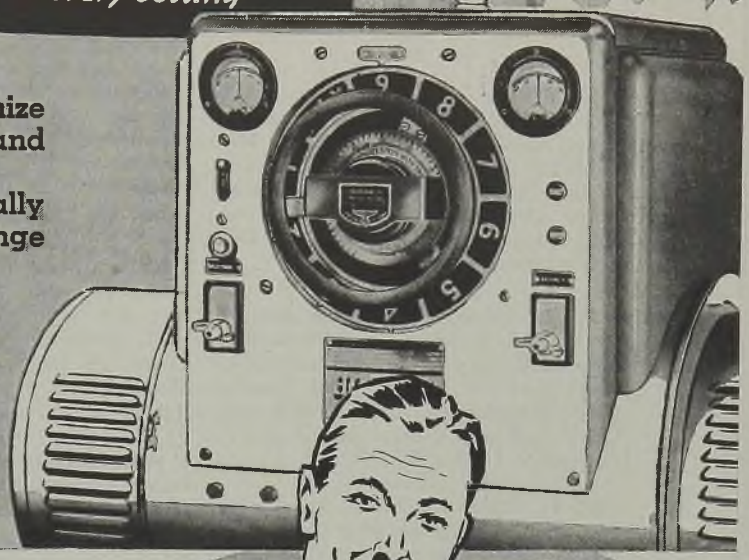

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MEN of INDUSTRY

LEE STRATTON

RICHARD T. COYNE

Lee Stratton has been appointed manager of refrigeration, Manufacturing division, Crosley Corp., Cincinnati. Mr. Stratton's merchandising experience includes affiliation with Nash-Kelvinator Corp., Detroit, and several years as branch manager in London for a Detroit company.

—o—

Ed. R. Galvin, general sales manager for R. G. LeTourneau Inc., Peoria, Ill., since 1938, has become president and a director of the Tyson Roller Bearing Corp., Massillon, O. Prior to 1938, Mr. Galvin had been general sales manager, Caterpillar Tractor Co., Peoria.

—o—

H. H. Fuller has been elected vice president in charge of West Coast steel activities of Bethlehem Steel Co., Bethlehem, Pa. Mr. Fuller succeeds **W. H. Stewart**, who is retiring from active duty but will continue in an advisory capacity. **C. M. Mackall** succeeds Mr. Fuller as manager of sales, New York district. Mr. Mackall is succeeded as general manager of central sales by **Bennett C. Macgregor**. At St. Louis, **C. H. Cecil** becomes district manager of sales, succeeding Mr. Macgregor.

—o—

W. R. Hucks has been named production manager of all government synthetic rubber plants. Since 1942, he has been with the operating division of the Rubber Reserve Co. and was manager of the raw materials division of the B. F. Goodrich Co. before accepting the government assignment.

—o—

Richard T. Coyne has been appointed manager of sales for Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., division of H. K. Porter Co. Inc., Pittsburgh. Mr. Coyne will assume the duties of **C. M. Wright**, vice president, who has resigned.

—o—

New directors recently elected to the board of Cherry Rivet Co., Los Angeles, are: **James R. Page, Robert S. Burns, George B. White** and **Howard F. Isham.**

—o—

C. F. LaMarche has been appointed president and general manager of Marion Steam Shovel Co., Marion, O., filling the vacancy left by the death of D. J. Shelton. **J. M. Strelitz**, a director of the company since 1931 and its general counsel for the past 20 years, has been named board chairman.

—o—

Charles H. McGrath, chief of the General Procurement Branch, AAF Materiel Command, Wright Field, O., has been promoted to the rank of colonel. Under Colonel McGrath's supervision the Materiel Command's General Procurement branch is responsible for procurement of all aircraft accessories, aeronautical and organizational equipment for the Army Air Forces. At the time of his entry into military service, Colonel McGrath was assistant to the president, American Brake Shoe Co., New York.

—o—

Harry A. Fennerty has been elected president, Alliance Machine Co., Alliance, O., succeeding the late W. H. Purcell. **G. W. Shem**, director and president of Alliance Structural Steel Co., has been named board chairman of Alliance Machine Co. Other new appointments are: **R. J. Harry**, vice president; **R. R. Stuckey**, secretary, and **B. A. Tuttle**, treasurer.

—o—

Newly-elected officers of the Automotive Engine Rebuilders Association, Indianapolis, Ind., are: **E. M. Sheehan**, president; **J. C. Rogers**, first vice president; **P. J. Sawyer**, second vice president; **J. J. Eldridge**, secretary; **C. W. Yount**, treasurer, and **R. G. Patterson**, executive vice president.

—o—

Charles O. Drayton, formerly general sales manager, American Screw Co., Providence, R. I., has been elected vice president in charge of sales, and **George H. Reama**, formerly factory manager, has been elected vice president in charge of manufacturing.

—o—

Clarence E. Baittinger has been appointed vice president in charge of research and engineering, Penn Metal Corp. of Penna., Philadelphia, and **J. Howard Shain** has been named production manager.

—o—

D. W. McGeorge has been elected vice president and general sales manager, Edgewater Steel Co., Pittsburgh, and **L. M. Forncrook** has been elected secretary.

—o—

Homer Addams, president of the Fitzgibbons Boiler Co. Inc., New York, has been re-elected president of the Steel

H. H. FULLER

C. H. CECIL

W. H. STEWART

B. C. MACGREGOR

Heating Boiler Institute. **R. B. Dickson,** president of Kewanee Boiler Corp., Kewanee, Ill., has been elected vice president, and **W. J. Parker** and **Montie L. Heminway** have been re-elected secretary-treasurer and executive secretary, respectively.

—o—

Benjamin Schwartz, formerly director general of the Institute of Scrap Iron and Steel, and for the past two years chief of the Scrap Metals Section, Foreign Economic Administration, has been elected executive vice president and member of the board, New York Commodities Corp., New York. As chief of the Scrap Metals Section of FEA, Mr. Schwartz organized the flow of strategic scrap metals from more than thirty countries to the United States. He will continue as scrap consultant to FEA. The New York Commodities Corp. was organized to develop foreign and domestic markets for basic commodities, including primary and secondary metals.

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F. J. Wilkey has been appointed manager of the central district, Crane Co., Chicago, with headquarters there. He will be in charge of the 25 Crane branch offices and warehouses in the central district.

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C. S. Snider, export manager, American Hard Rubber Co., New York, has been elected president of the Export Managers Club of New York Inc.; **W. P. Raye,** Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., and **J. C. Tweedell,** York Corp., York, Pa., were elected vice presidents.

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Frederick W. Mesinger, for the past 16 years manager of the New York office, has been elected vice president, Norma-Hoffmann Bearings Corp., Stamford, Conn.

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Charles E. Letts has been named president of the National Drop Forging Association, and **J. H. Greene** has been elected a director.

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M. E. (Jim) Adams has been appointed West Coast representative for Huck Mfg. Co., Detroit. Formerly associated with Cherry Rivet Co., Los Angeles, Mr. Adams assumes responsibility for sales and engineering service in the Pacific Coast territory for the Huck company's line of rivets.

C. M. MACKALL

BENJAMIN SCHWARTZ

M. J. ZIVIAN

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J. R. Kindig has been appointed manufacturers' representative for Reading Chain & Block Corp., Reading, Pa., and will be responsible for sales through distributors in the southeastern states.

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A. C. Scott has been appointed vice president in charge of sales, Apex Electrical Mfg. Co., Cleveland.

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John H. Rowe has been made vice president in charge of western sales, Boston Woven Hose & Rubber Co., Boston. **Stuart A. Guild** succeeds Mr. Rowe as manager of the company's Chicago office.

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George M. Lange, who for the past two years has served as consulting engineer in the office of the deputy vice chairman for production, War Production Board, Washington, is now affiliated with the Fuel Injection Division, Ex-Cell-O Corp., Detroit. Prior to his service with the government, Mr. Lange had been associated with Timken Roller Bearing Co., Canton, O.

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C. T. Siebert Jr. has been appointed manager of sales, Lorain Products Division, Carnegie-Illinois Steel Corp., Pittsburgh, and **W. H. Friedline** has been named assistant manager of sales.

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David L. Golden, former assistant director of personnel, Pullman-Standard Car Mfg. Co., Chicago, has been appointed director of personnel, succeeding **William McLaren,** retired.

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D. M. Davidson has been appointed assistant general sales manager, Fafnir Bearing Co., New Britain, Conn.

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Maj. Gen. Bennett E. Meyers, deputy assistant chief of the Air Staff, has assumed command of the AAF Materiel Command during the absence of **Maj. Gen. Charles E. Branshaw.** General Branshaw is on sick leave in Florida and upon his return will resume his post in Washington. General Meyers' regular assignment is deputy to **Maj. Gen. O. P. Echols,** assistant chief of the Air Staff in charge of materiel, maintenance and distribution.

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New officers of Detroit Steel Corp., Detroit, which merged July 1 with Reliance Steel Corp., Cleveland, are: **M. J. Zivian,** president; **J. B. Ribakoff,** executive vice president; **Joseph P. Pulte,** executive vice president; **Robert D. Kelley,** vice president; **Philip P. Brown,** vice president; **Anton G. Pulte,** vice president; **Roger A. Yoder,** secretary and treasurer. The foregoing officers and **Paul Friedman** and **Jason L. Honigman** comprise the board of directors of the corporation. **J. B. Ribakoff,** former president of Reliance, will head the Reliance Steel division of Detroit Steel as general manager. General offices of Reliance Steel, at Cleveland, will be continued as headquarters of the Reliance division. **Joseph P. Pulte** will be general manager of the Mill division located at Detroit, and **Robert D. Kelley** will be president of the Craine-Schrage Steel Co., a wholly owned subsidiary of Detroit Steel Corp., with offices at Detroit.

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C. P. Randall has been appointed service engineer in New England for Hickman, Williams & Co., New York. For the past three years Mr. Randall has been service engineer for Eastern Clay Products Inc., Eifort, O., and for 18 years prior to that he was affiliated with Hunt-Spiller Mfg. Corp., Boston.

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James D. Glenn has been appointed assistant general manager of sales, Sharon Steel Corp., Sharon, Pa.

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G. M. Williams, senior vice president, Curtiss Wright Corp., New York, will succeed **Myron L. Gordon,** who recently resigned as vice president and general manager of the Wright Aeronautical Corp., Paterson, N. J., in the direction of the engine company's activities. With this change, the executive administra-

tion of Wright Aeronautical Corp. will be carried out by Mr. Williams and **Philip B. Taylor**, vice president and assistant general manager.

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M. K. DeWitt, traffic manager for Lamson & Sessions Co., Cleveland, has been elected president of the Traffic Club of Cleveland.

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Nominee for president of the American Society of Mechanical Engineers is **Alex D. Bailey**, vice president, Commonwealth Edison Co., Chicago. Nominations for vice president are: **David Larkin**, vice president and general manager, Broderick & Bascom Rope Co., St. Louis; **John E. Lovely**, vice president, Jones & Lamson Machine Co., Springfield, Vt., and **Thomas S. McEwan**, vice president, McClure, Hadden & Ortman Inc., St. Louis.

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Charles A. Powel, manager of headquarters engineering, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected president of the American Institute of Electrical Engineers for the year beginning August, 1944.

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Thomas F. McLaughlin has been elected president and general manager and a director of the Eastern Rolling Mill Co., Baltimore. Mr. McLaughlin formerly was vice president of Rustless Iron & Steel Corp., Baltimore, and more recently was assistant to the president, Crucible Steel Co. of America, New York. **Gordon W. Russell**, a director of the company since last February, has been elected treasurer and assistant secretary. **John M. Curley**, president, Industrial Steels Inc., Cambridge, Mass., has been elected a director.

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Dr. Eugene McCauliff has been appointed technical sales director of the Glyco Products Co. Inc., Brooklyn, N. Y.

OBITUARIES . . .

Theodore H. Marburg, 70, at one time president of Marburg Bros., New York, died June 23 at Booth Bay Harbor, Me., one day after his arrival there for a vacation. Mr. Marburg came back from retirement a year ago to resume work in the office of Marburg Bros.

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Edwin F. Borden, 47, general manager, Douglas T. Sterling Co., management engineers, Stamford, Conn., died there June 22. He was a partner of that company and of Dohner & Lippincott, a division of the Sterling company located in New York. Mr. Borden had installed or supervised installation of layout, wage incentive, job evaluation, material and production control and cost accounting systems for more than 700 plants throughout the country.

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Allen H. Nugent, 55, assistant to the vice president, American Can Co., New York, died June 24 in White Plains, N. Y. Mr. Nugent had been manager of sales for the company until his appointment last January as assistant to vice president.

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William H. Matthai, 87, retired industrialist and financier, died June 23 in Baltimore. At the age of 16 Mr. Matthai entered the employ of Matthai & Ingram, tinware manufacturers, an organization which had been founded by his father. Nineteen years later, after a business merger, he became manager of the two Baltimore plants of the National Enameling & Stamping Co. Inc., Milwaukee. He retired as vice president of the company in 1928. He was a past president of the American Hardware Manufacturers Association.

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Thomas Mellow, 85, founder of the Liberty Foundry and the Mellow Furnace Co., St. Louis, died there June 24.

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William F. McCarthy, 68, president and founder, McCarthy Foundry Co., Chicago, died there June 19.

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Seth Thomas, 68, whose great-grandfather, Seth E. Thomas, founded the Thomaston clock company which is known internationally, died June 25 in Waterbury, Conn. He was the last member of his family to be associated with the clock company, now known as Seth Thomas Clocks, an affiliate of the General Time Instruments Corp., New York. Mr. Thomas retired several years ago.

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Chester B. Welch, 63, vice president, International Harvester Export Co., Chicago, died June 24 from injuries received when a tractor he was driving on his farm near Chicago Heights, Ill., overturned on an embankment. From 1922 to 1935 Mr. Welch served with the company's Buenos Aires, Argentina, branch, and in the latter year he went to Chicago to assume the vice presidency in charge of South American business.

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John R. Olsen, 57, Chicago district sales manager, Oliver Iron & Steel Corp., Pittsburgh, died June 23 in Chicago.

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William H. Crosby, 81, Buffalo industrialist who was widely known for his benefactions and activities in civic affairs, died June 26 in that city. At the time of his death Mr. Crosby was chairman of the board of the Crosby Co., which he had founded 48 years ago. He had served as president of the company until 14 years ago. He was also board chairman of the Barcalo Mfg. Co., Buffalo.

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L. W. Briggs, for the past eight years assistant manager of the Sheet and Strip Sales division, Weirton Steel Co., Weirton, W. Va., died June 18 in Steubenville, O.

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Adolph G. Logemann, 88, founder and board chairman, Logemann Bros. Co., Milwaukee, died June 23 in that city. Mr. Logemann established the company 50 years ago and was active in the business until his death.

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Edward N. Trump, 86, for 50 years chief engineer, Solvay Process Co., New York, and designer of one of the first rotary cement furnaces, died June 21 in Syracuse, N. Y. Mr. Trump was elected vice president of Solvay Process Co. in 1913 and he relinquished those duties in 1921 to become consulting engineer to the Warner Portland Cement Co. and other concerns. He held numerous patents on chemical machinery for soda manufacturing and by-product coke ovens. In 1929 he represented the American Society of Mechanical Engineers at the World Engineering Congress in Tokyo. He was a former vice president of the American Society of Mechanical Engineers and was a member of the American Institute of Chemical Engineers.

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Julius Uihlein, 86, who founded Julius Uihlein & Co., Cincinnati, in 1890, died June 19 in Cincinnati.

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Henry H. Edwards, 52, assistant plant manager, New Departure division, General Motors Corp., Bristol, Conn., died June 20.

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Charles H. Haney, 82, who from 1925 until his retirement in 1932 was director of foreign sales for International Harvester Co., Chicago, died June 20 in Glendale, Calif. As an executive of International Harvester and the old Deering Farm Machinery Co., Mr. Haney pioneered the sale of Chicago-built farm machinery in Europe, Asia and Australia.

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A. M. Wagner, 65, who was associated with American Radiator & Standard Sanitary Corp., Chicago, for more than 35 years, died June 19 in Chicago. Mr. Wagner was manager of the company's Milwaukee office from 1911 to 1922 and from 1932 to 1939. From 1922 to 1932 he was manager of the Minneapolis office.

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John McKim Minton, 89, who retired 20 years ago as an official of the D. G. C. Trap & Valve Co., New York, died June 15 in New York.

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John A. Burnham, former craftsman in wrought iron and other metals who was head of the Burnham Crafters, Marblehead, Mass., died June 23 in Brookline, Mass.

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Arthur L. Wilson, 53, a representative of the Peninsular Steel Co., Cleveland, died June 21 in that city. Mr. Wilson began his career in the steel industry when he joined the Railroad division, Republic Steel Corp., Cleveland. Later he became affiliated with Peninsular in a sales capacity and remained with the organization as an executive until his death.

Brewster To Make Civilian Goods In Plane Plants

Decision follows cancellation of Navy contracts. Awaits WPB ruling on use of aluminum and other metals

BREWSTER Aeronautical Corp., Long Island City, N. Y., plans to convert its two plants in that city to the production of civilian goods, it was reported last week.

The company's contracts for manufacture of Corsair fighters were canceled by the Navy recently and none from the Army can be obtained. The Navy will still operate a third plant of the company at Johnsville, Pa.

The conversion program has been started and will cost the company between $1,000,000 and $1,250,000. Some of the machinery in the Long Island plants, such as stamping equipment, can be utilized for production of civilian items. Other special equipment, which can machine a part to a tolerance of one ten-thousandth of an inch will no longer be needed and will be sold. Certain equipment belonging to the Navy will be returned.

The Brewster plants have on hand $7,000,000 to $8,000,000 worth of high-specification aluminum which will be used for civilian manufacture as soon as the War Production Board clarifies its ruling on the release of aluminum and other metals for civilian production. It is reported unofficially that the company will produce kitchen utensils and flat aluminum suitcases.

The present personnel of 3000 is finishing the last of the Navy planes and is engaged in retooling. The company will start civilian production with 4000 workers, compared with peak employment in Brewster's Long Island plants of 21,500.

Armco Buys Shelt Co. and Ohio Corrugated Culvert

American Rolling Mill Co., Middletown, O., has purchased the assets of the Ohio Corrugated Culvert Co., Middletown, and the Shelt Co., Elmira, N. Y. Both companies will be operated by a wholly owned Armco subsidiary, Armco Drainage & Metal Products Inc. Ohio Corrugated Culvert Co., a pioneer manufacturer of metal culverts, operates in Ohio and West Virginia. The Shelt Co. manufactures and distributes drainage products in New York, Pennsylvania and New Jersey.

15,000,000TH SHELL FORGING: Lieut. Col. Robert C. Downey, Army Ordnance, inspects the 15,000,000th shell forging produced by the Ambridge, Pa., Spang-Chalfant division of the National Supply Co. Second from the left in the front row is A. E. Walker, chairman and president of National Supply; Josephine Fetosh, representing employes, is presenting the shell to Colonel Downey. Works Manager W. M. Frame is standing at the colonel's right

National Carbon Sets Up Divisional Sales System

National Carbon Co. Inc., New York, is installing a new sales setup under which all company products will be handled nationally from seven divisional offices, four of which are in operation and three to be added by Oct. 1.

J. F. Warnell, former manager under the "district" system, is manager and C. J. Chapman is assistant manager of the Atlanta division. C. C. Joslyn is manager of the new Dallas, Tex., division with J. L. Mullen as assistant manager.

At Kansas City, Mo., A. C. Bryan has been appointed division manager and E. L. Dibble, assistant manager. On the West Coast, R. P. Tolles is the manager of the San Francisco division while A. R. Miller and O. B. Rendahl are assistant managers.

The three division offices yet to be opened will be located at Chicago, Pittsburgh and New York.

BRIEFS . . .

Merger between **Detroit Steel Corp.**, Detroit, and **Reliance Steel Corp.**, Cleveland, has been consummated, effective July 1. Business will be continued under the name of Detroit Steel Corp. It will continue its cold-rolled strip steel mill operations at Detroit along with its warehousing business at Detroit, Cleveland, Chicago, Worcester, Mass., and Lyndhurst, N. J.

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Meehanite Research Institute of America Inc., New Rochelle, N. Y., has published a bulletin, illustrating comparative castings and welded fabrications for the same parts on diesel engines and heavy-duty press construction.

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Westinghouse Electric & Mfg. Co. reports an increase of 6 per cent in orders received during the first five months of this year, reflecting production demands for new types of weapons developed by the company.

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Crosley Corp., Cincinnati, has appointed the following new distributors: Western Auto Parts Co., Minot, N. D., with branches in Fargo, Williston, Devils Lake, Mandan and Jamestown, N. D.; Cave Supply Co., Watertown, S. D.; and Aberdeen Supply Co., Aberdeen, S. D.

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Divine Bros. Co., Utica, N. Y., manufacturer of buffing wheels, casters, industrial truck wheels, and machinery, has purchased the property of the former Sauquoit Paper Co. at 200 Seward avenue, Utica.

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Acme Steel Co., Chicago, has licensed the Thomas Steel Co., Warren, O., to produce flexible steel slat stock for venetian blinds under Acme patents.

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Summerill Tubing Co., Bridgeport, Pa., has been awarded its third Army-Navy "E" for continued high production. Columbia Steel & Shafting Co., Carnegie, Pa., has been awarded its third pennant.

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Lynchburg Foundry Co., Lynchburg, Va., is making improvements, costing nearly $200,000, to its plant in that city to provide a modern molding unit for mass production of small castings.

Postwar Reconversion Problems T

Pacific states ponder possible outlets for tripled steel ingot producing capacity and employment possibilities for three quarters of a million shipyard workers. Wartime demands have created unbalanced condition in western economy

SAN FRANCISCO

MORE than any other industry, shipbuilding has brought about the huge increases in population and employment on the Pacific Coast during the past four years and its appetite for steel and equipment has been the principal factor in expansion of western facilities for producing and working heavy metals. This mushrooming growth now has boomeranged to the point where shipbuilding and its allied activities are being increasingly recognized as the No. 1 war industry problem for major segments of the Far West.

In an analysis of this situation, the Federal Reserve Bank of San Francisco points out that when the pressure of war orders relaxes, western metals and other industries, built up to supply shipbuilding demands, will not be faced with the comparatively simple problem of reconverting output to previous channels, such as, say, the auto makers who will begin turning out peacetime cars again. Instead, there will be the vastly more difficult task of finding and developing entirely new markets and devising alternative uses for the labor and equipment which have been born of the war.

Where will outlets be found for the tripled steel ingot producing capacity? Who will employ nearly three-quarters of a million workers? How can scores of foundries, equipment and machinery manufacturers, prefabricators and subcontractors, pump and winch makers, be kept from going out of business? How can this unbalanced condition in the western economy, which has created an artificial, lopsided concentration of employment in principal Pacific Coast industrial areas, be brought back to an even keel? Solutions to those questions and hundreds like them are the goal of leading western industrialists and businessmen.

"Expansion of plants supplying the shipyards has been predicated to a large extent upon a market created by Pacific Coast shipbuilding," the Federal Reserve Bank says. "When ship construction is curtailed, they will be faced, along with the shipyards themselves, with the alternatives of finding new markets or shutting down. The nature and scale of their activities are in large measure new to the Far West; some will be able to return to their prewar activities and customers, but a much higher level of industrial demand for western metals and metal products than existed before the war, or than would have been expected in the next decade in terms of prewar rates of growth, will have to be attained if extensive shutdowns are not to occur."

Before the war, western metals industries were relatively undeveloped. The western states depended largely on outside sources for steel, machinery, farm tools and automobiles. The small western steel producing industry turned out mostly the lighter types of rolled products. Foundries, forges and machine shops, with a few exceptions, were small and localized, and automobile production was limited to assembly operations in a few coast plants. There were no facilities to produce more than a negligible amount of materials and equipment needed for wartime shipbuilding. Because eastern steel mills did not have sufficient capacity to meet the expanded war demand, together with the rail transportation bottleneck, a tremendous expansion has occurred in iron and steel producing capacity, in foundry and forging facilities and in marine engine building in the West.

Steel and Foundry Industries Expand

Magnitude of this wartime shipbuilding influence on western industry is outlined in the Reserve Bank analysis. It is credited as the fundamental reason for creation of a steel ingot production capacity of about 3,400,000 tons annually, as compared with 1,070,000 tons in 1940. Because of shipbuilding demands, some two score foundry and forging companies have spent $25 million for enlarging their plants in the period between June, 1940, and September, 1943. Before the war the relatively small foundry industry in the western area depended on the railroads and car builders for most of their business. Ship construction brought a flood of orders for all types of heavy ship castings such as stern frames, rudder stocks, propellor tubes and struts, anchors, hawsepipes and other items.

Marine engine building has shown similar growth during the war. Prior to 1940 none of the larger types were built in the west, because of lack of a local market. Diesels of smaller types, such as those used for fishing boats and tugs, were being produced in moderate and

Forepeak section of a cargo ship is hoisted into place at the yards of the California Shipbuilding Corp., above. NEA photos, except where otherwise credited

Tapping a 225-ton heat at the Geneva Steel Co. plant, top right. There are nine open hearths at the Utah works. United States Steel Corp. photo

Indicative of the volume production of Victory ships on the West Coast is the view of these nearly-completed vessels at extreme right

Below, building the "miracle" ship in the Portland, Oreg., yards of the Kaiser company. This vessel was launched ten days after the keel was laid

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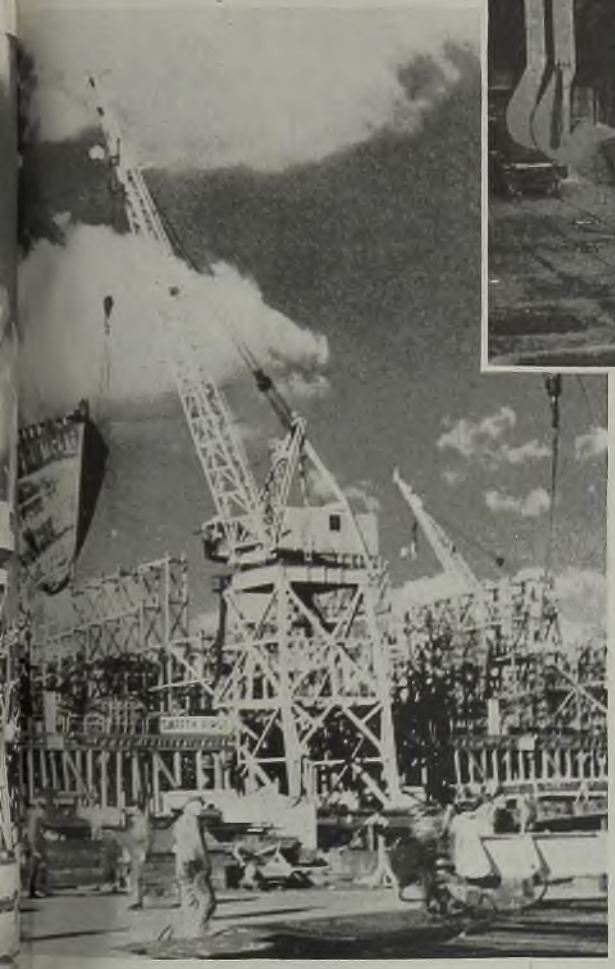
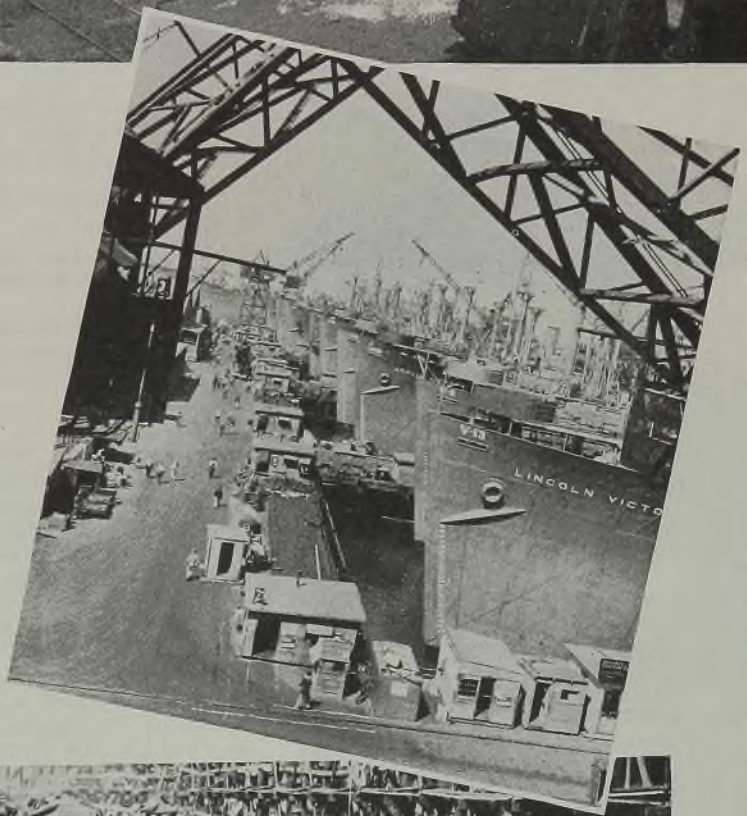
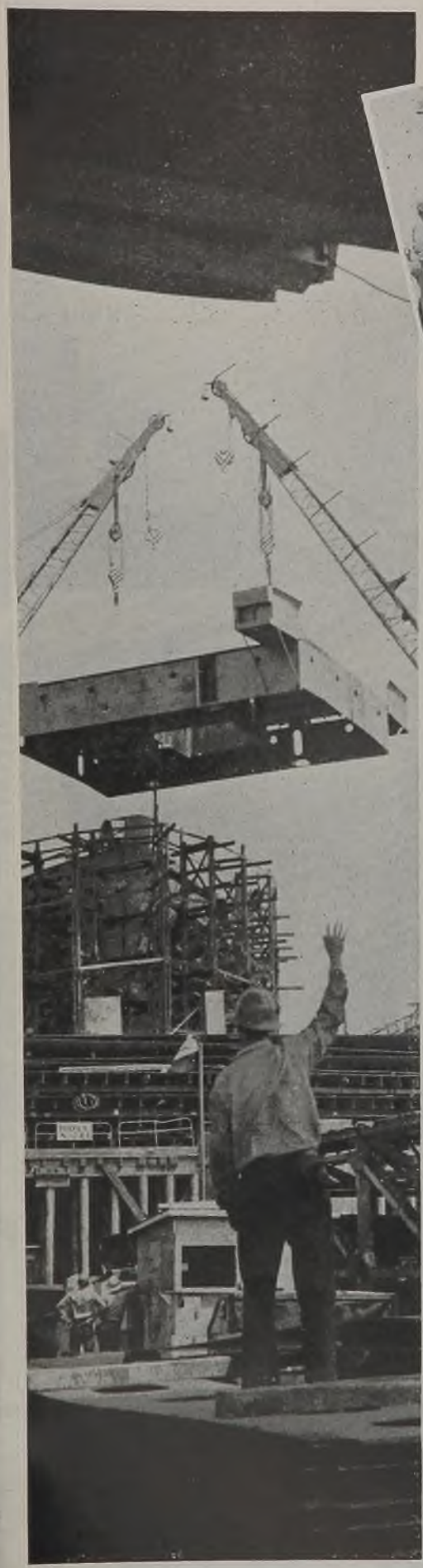
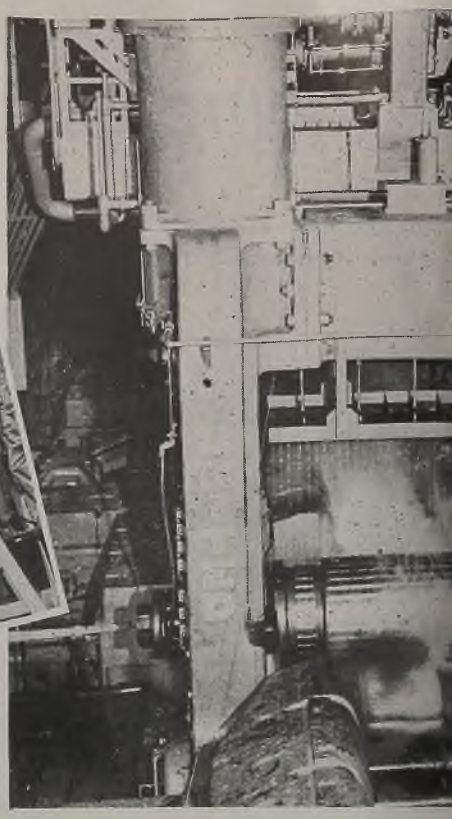
By ROBERT BOTTORFF
Editorial Correspondent, STEEL









Deck house and flying navigation bridge of a Liberty ship, left, are lifted into place at a California yard

Women welders-to-be receive pointers on ship construction, above, in a class held on the fore-peak of a Liberty ship

Slabbing mill in operation at the Geneva steel plant, right. United States Steel Corp. photo

increasing volume. With the war, production of all engines has expanded vastly. Producing large marine power plants, Hendy Mfg. Co. and Iron Fireman Mfg. Co. turned out 1000 Liberty engines for 1200 Liberty Ships launched on the West Coast. Following destruction by fire of Iron Fireman's Portland plant, Hendy is the remaining major marine propulsion builder and it is steadily entrenching itself in turbines as well as moving into the diesel field. Under the war program, large quantities of diesels have been turned out by Hendy and other plants for mine sweepers, landing craft, tugs and other small vessels. Large numbers of gasoline motors also have been produced for subchasers and patrol boats.

Altogether, approximately 200 shipbuilding firms, large and small, have been active on the Pacific Coast, and the total of their prime contracts for the war period has exceeded $7 billion. In addition, up to the beginning of this year, prime contracts for materials and equipment had been placed with 380 concerns in 45 counties of the Far West. Mare Island Navy Yard alone is said to have 190 prime contractors and more than 300 subcontractors in California, Utah, Colorado and Wyoming.

Employment in Coast shipyards now exceeds 600,000 workers, and probably well over 100,000 others are employed in such ancillary industries as steelworks and foundries, machine shops, forging and engine building plants, prefabricating yards and the like.

Of the 700,000 workers, many are likely to migrate back to other parts of the country from whence they came, and a large part of the 100,000 women now employed in shipbuilding probably will drop out of the labor force. But, the Reserve Bank points out, "the western labor pool will retain large numbers, whose war training in industrial occupations is a potential asset to the community."

Steel Demand Rises Sharply

Prior to wartime expansion, the Pacific Coast used approximately 3,000,000 tons of steel a year, of which less than one-third, all of lighter type products, was provided by nine mills in the western area. Demand for steel from the shipyards alone since beginning of the war has become as great as the entire area prewar steel consumption. It was this need that led to construction of the Fontana and Geneva plants, on which the federal government has expended $300 million.

The Fontana installation in March had reached an output rate of 31,000 tons of plates a month, while Geneva is believed to have produced about 20,000 tons in May, although actual figures have not been released. Eventual Geneva rolling capacity for plates and other items is scheduled at about 900,-

Advances War Surplus Proposal

Heintz Mfg. Co. president sees orderly liquidation of government-owned machinery through extension of tax depreciation advantages to eventual purchases of the equipment

ONE step which should be helpful in developing orderly machine tool disposal would be to have the government extend accelerated depreciation tax advantages to those industries eventually purchasing the tools, William J. Meinel, president, Heintz Mfg. Co., Philadelphia, states in a suggested plan for the liquidation of surplus government owned tools, submitted to the Pressed Steel Products Industry Advisory Committee, WPB.

Adoption of such a formula should make most of these machines—estimated at over $4 billion—attractive purchases to manufacturers anticipating a flourishing postwar era, says Mr. Meinel.

The first step we should take, he declares, is to have the various government branches prepare accurate inventories of the tools under their control. These machines should be carefully catalogued, and checks made periodically to insure their continued use on war products. If a machine is not on war work it should be immediately transferred to another plant which has need of it, or it should become the subject of consideration for government disposal. If found to be in good condition such a machine might be offered for sale "as is" at a price that makes a satisfactory deal for the government. However, if found to be damaged, worn, or in need of certain changes in order to make it an attractive purchase by some industry, whether or not engaged in war production, the necessary work to restore or convert the machine to domestic use should be performed, if at all possible, by the original manufacturer.

Amplifying his thoughts on the accelerated depreciation suggestion, Mr. Meinel said, that perhaps industry would be permitted to purchase under a depreciation plan similar to the 60-month amortization plan made available to industries which finance their war expansion programs with their own funds. A certificate of necessity could be given industrial purchasers at a time of such purchases. These certificates should be placed on a limited basis, and be made available only to manufacturing industries which buy the government tools. The use of the certificate for tax purposes should be contingent upon the actual and continued use of the machine tools in manufacturing. Certificates should be non-transferrable. Hence machine tools to be released by the government would much more likely be put into postwar use at an earlier date than if purchased by used machinery dealers for subsequent resale.

Industries already operating government owned facilities should be permitted to purchase the machine if they have a postwar productive use for the equipment. Selling prices could, in most instances, be the original cost less the proper deductions for depreciation.

Development and operation of a government program for restoring, reconditioning, converting and placing on sale to private industry those machine tools which are released from the government requirements, should not necessitate the creation of any new government agency, nor place a great burden on existing agencies, many of which are already directing the disposition of other types of materials.

000 tons annually, as against a projected 470,000 tons capacity for Fontana. Of the ultimate Geneva production, 700,000 tons would be plates, as compared with 300,000 tons forecast for Fontana.

Steel ingot producing capacity at present is estimated at 800,000 tons in northern California, against 600,000 in 1940; southern California, 1,050,000 tons against 300,000, respectively; Washington state 240,000 against 170,000, and Utah 1,280,000 against none in 1940. Oregon has 30,000 tons capacity at present.

What is true of the shipbuilding industry in relation to postwar problems, also holds good for the huge West Coast aircraft industry, with one important exception. The planemakers will be faced with loss of almost all of their wartime contracts, which have totaled about $11 billion so far in the war period, but when the war ends they will be able to revert to making planes for the airlines on a scale probably larger than prewar.

Padlock Production Lags Behind Navy Needs

Contracts for about 16 per cent of the 3,500,000 padlocks required by the Navy during the next year have not yet been placed. A representative of the Navy has urged that the industry review its production commitments and make every effort to accept contracts for the remaining 560,000 padlocks of the program. Backlog of unfilled orders averages from 9 to 10 months with labor shortages retarding production.

May Pig Iron Output Nearly Reaches All-Time High

PIG IRON production in May totaled 5,342,866 net tons, falling only 91,374 tons short of equaling the all-time record of 5,434,240 tons set in March. In April, a shorter month, output was 5,243,410 tons. For five months this year total production was 26,424,993 tons, against 25,508,035 tons in the comparable period in 1943. May production was at 94 per cent of capacity, compared with 96.2 per cent in March and 95.3 per cent in April. Average rate of production for five months this year was 95.2 per cent of capacity, compared with 97.3 per cent in the first five months of 1943, based on the capacity then available. Details are presented in the following table, in net tons:

District	Pig iron	Ferro, spiegel	Total May	Total Year to date	Per cent capacity
Eastern	942,380	17,114	959,494	4,817,437	88.4
Pittsburgh-Youngstown	2,187,172	15,814	2,202,986	10,784,624	96.8
Cleveland-Detroit	529,042	.....	529,042	2,657,576	94.8
Chicago	1,119,337	.....	1,119,337	5,620,214	97.3
Southern	374,743	9,902	384,645	1,840,763	94.1
Western	147,362	.....	147,362	704,379	73.3
Total	5,300,036	42,830	5,342,866	26,424,993	94.0

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.

Production Expected To Ease During Holiday Week

INDUSTRIAL activity recorded little change during the latest period, with bituminous coal, output, engineering construction and truck assemblies registering only minor fluctuation from the preceding week's pace. Holiday schedules indicate a slight dip in production for the coming week.

Labor shortage accentuated by the hot weather continues to adversely affect steel production at a time when new orders are exceeding output. Further decline to the 95 per cent level is indicated over coming weeks.

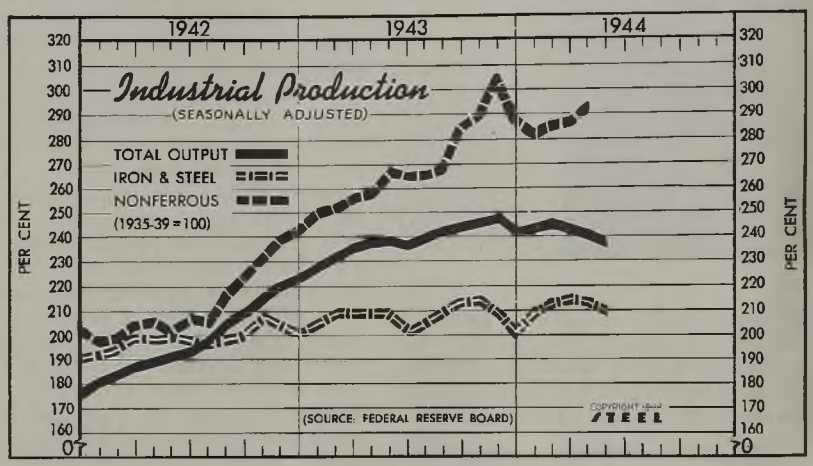
Cutbacks in military requirements have been relatively small lately. Recent near record level of war expenditures more than offset these cutbacks and foretell a still higher level of war materiel output over the coming months. Manpower shortage continues the chief obstacle in achieving the scheduled 10 per cent increase in production.

SCRAP STOCKS—Slower movement of scrap to consumers' yards combined with continued high consumption rate has resulted in the fourth consecutive monthly decline in iron and steel scrap inventories at consumers' and suppliers' plants. These stocks totaled 5,932,000 gross tons on April 30, or 2 per cent below the previous month and almost one million tons less than recorded on the like date a year ago. Purchased scrap consumption during April was also off 2 per cent on a daily average basis.

STEEL CASTINGS OUTPUT—Reflecting augmented heavy truck and other war programs, orders booked by the steel casting industry during April increased to the highest level recorded since last November. Production, however, declined to 155,778 net tons, comparing with 174,626 in the preceding month and 161,403 net tons in the comparable period a year ago.

CONSTRUCTION—May shipments of fabricated structural steel reversed the downward tendency of the preceding two months but remained only slightly more than half that recorded in the comparable 1943 month. Shipments to date this year, compiled from data representing about 75 per cent of the industry, are 56 per cent below that recorded in the comparable 1943 period.

FEDERAL RESERVE BOARD'S INDEX—Small declines in output of metal products and nondurable goods accounted for most of the 2 point decline to 237 in the Federal Reserve Board's seasonally adjusted index of industrial production for May. Steel production was maintained at a high rate during that period, and aircraft production was about at the same daily average rate as in the preceding month. Deliveries of merchant ships declined somewhat from the April rate, reflecting curtailment of Liberty ship construction; the number of Victory ships delivered rose further in May. Supplies of aluminum and magnesium continued to exceed military requirements after further curtailment of output last month.



Federal Reserve Board's Production Indexes
(1935-1939 = 100)

	Total Production		Iron, Steel		Nonferrous	
	1944	1943	1944	1943	1944	1943
January	242	227	208	204	281	250
February	244	232	212	208	285	252
March	242	235	214	210	286	256
April	239	237	213	209	292	257
May	237	238	210	208	...	266
June	...	236	...	201	...	264
July	...	239	...	203	...	264
August	...	242	...	209	...	267
September	...	243	...	213	...	284
October	...	247	...	214	...	289
November	...	247	...	209	...	304
December	...	241	...	200	...	286
Average	...	239	...	207	...	270

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	97.5	98.0	98.5	98.5
Electric Power Distributed (million kilowatt hours)	4,325	4,098	4,292	4,120
Bituminous Coal Production (daily av.—1000 tons)	2,047	2,093	2,052	2,001
Petroleum Production (daily av.—1000 bbls.)	4,585	4,568	4,514	3,955
Construction Volume (ENR—unit $1,000,000)	$28.0	$29.2	$27.9	$53.7
Automobile and Truck Output (Ward's—number units)	19,385	18,985	18,260	19,185

*Dates on request.

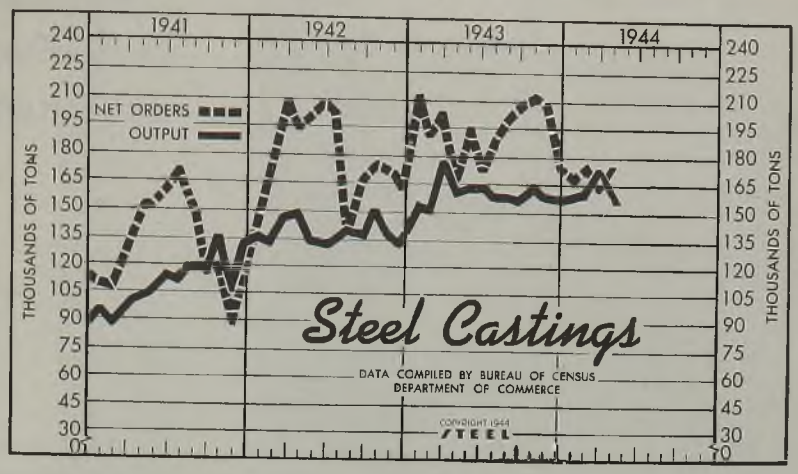
TRADE				
Freight Carloadings (unit—1000 cars)	885†	879	870	761
Business Failures (Dun & Bradstreet, number)	25	30	33	60
Money in Circulation (in millions of dollars)‡	$22,293	$22,333	$21,911	$17,154
Department Store Sales (change from like week a year ago)‡	+2%	+7%	+31%	+29%

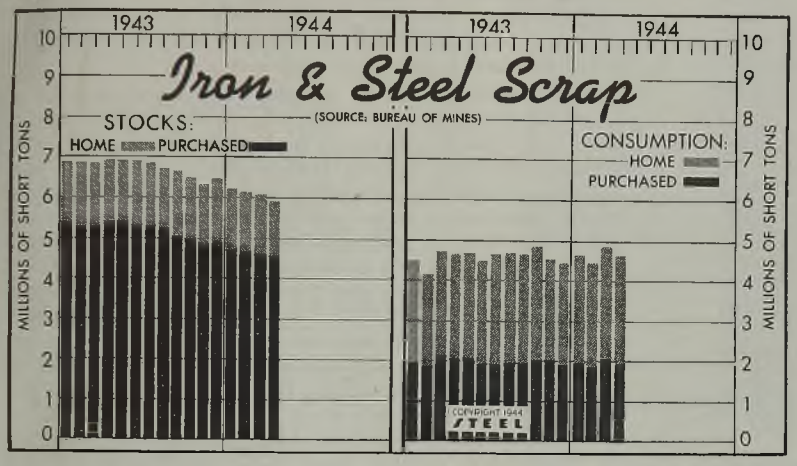
†Preliminary. ‡Federal Reserve Board.

Commercial Steel Castings

(Net tons in thousands)

	Orders		Production	
	1944	1943	1944	1943
Jan.	167.7	218.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	....	192.5	....	163.8
June	....	171.7	....	163.9
July	....	187.2	....	158.7
Aug.	....	200.8	....	158.8
Sept.	....	214.1	....	157.8
Oct.	....	211.3	....	163.9
Nov.	....	209.3	....	158.8
Dec.	....	173.6	....	158.6
Total	....	2,383.4	....	1,928.6





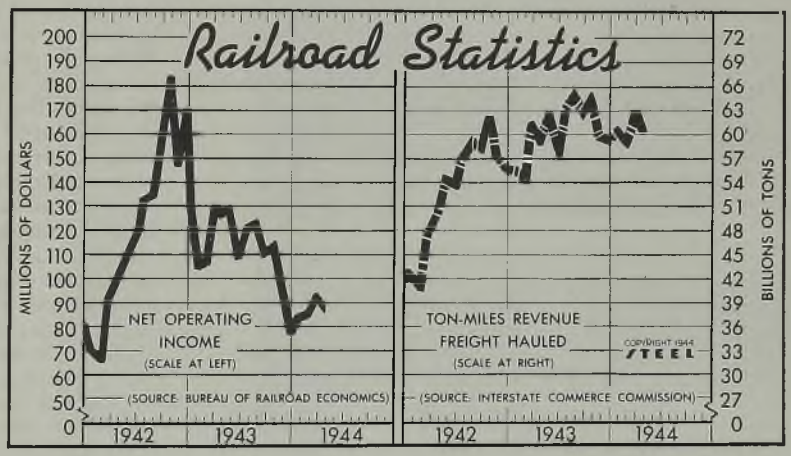
Iron and Steel Scrap
Bureau of Mines

(Gross Tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1944	1943	1944	1943
Jan.	6,214	6,877	4,616	4,492
Feb.	6,134	6,871	4,414	4,178
Mar.	6,027	6,850	4,827	4,787
Apr.	5,932	6,918	4,629	4,642
May	....	6,905	....	4,723
June	....	6,916	....	4,493
July	....	6,860	....	4,670
Aug.	....	6,778	....	4,686
Sept.	....	6,613	....	4,657
Oct.	....	6,456	....	4,830
Nov.	....	6,391	....	4,581
Dec.	....	6,448	....	4,449
Mo.Ave.	....	6,740	....	4,599

Statistics of Class I Railroads

	Net Operating Income			Ton-Miles Revenue Freight		
	1944	1943	1942	1944	1943	1942
	(millions)			(billions)		
Jan.	$82.8	$105.1	$66.8	60.5	55.1	43.0
Feb.	84.5	105.8	64.4	59.3	54.4	40.8
Mar.	92.5	129.6	90.6	63.0	61.2	48.3
Apr.	87.7	127.1	101.6	60.4	59.1	50.0
May	....	128.2	109.7	....	62.1	54.2
June	....	109.7	118.7	....	58.0	53.9
July	....	120.6	133.6	....	63.7	57.0
Aug.	....	124.6	135.9	....	65.1	58.6
Sept.	....	110.2	154.6	....	62.5	58.2
Oct.	....	113.1	184.7	....	65.0	62.2
Nov.	....	96.4	148.9	....	59.6	57.0
Dec.	....	76.9	170.9	....	59.4	55.0
Ave.	....	$113.5	$122.9	....	60.5	53.2



FINANCE

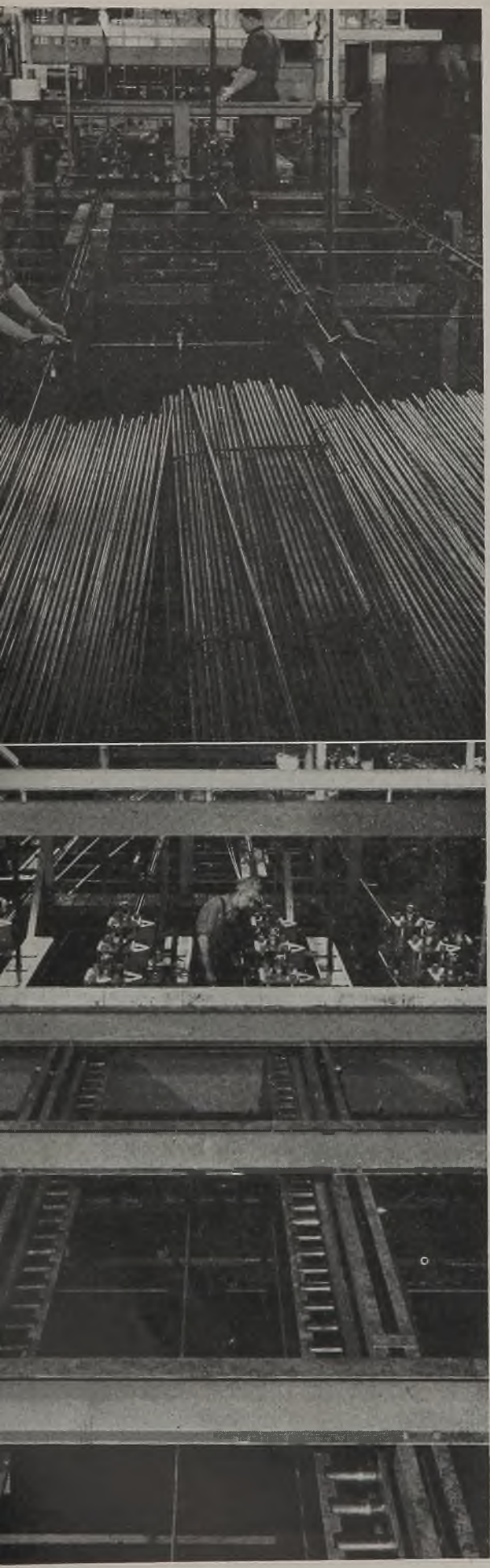
	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$11,373	$8,737	$8,290	$9,065
Federal Gross Debt (billions)	$190.5	$189.2	$187.7	$139.7
Bond Volume, NYSE (millions)	$53.4	$61.7	$59.7	$52.4
Stocks Sales, NYSE (thousands)	8,644	11,443	4,611	4,672
Loans and Investments (millions)†	$50,405	$50,032	$50,319	$46,965
United States Government Obligations Held (millions)†	$37,257	$37,027	$37,232	$34,251

†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)†	249.8	250.0	250.7	244.1
Industrial Raw Materials (Bureau of Labor index)†	113.1	114.4	113.3	114.5
Manufactured Products (Bureau of Labor index)†	101.0	101.0	101.1	100.0

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



Caterpillar Tractor Co. applies induction-heating process on commercial basis to....

CONTINUOUS

OF STEEL BARS

ONE OF the most outstanding contributions to the science of heat treating in recent years and one which may have far-reaching effects has been made through the development of a process for the application of electrical induction heating to the continuous heat treatment of steel bars.

The induction-heating process has been in use for many years but the most rapid strides in its development have been made in the past decade and its applications now may be numbered in many hundreds, ranging from melting to soldering, brazing, annealing, hardening, and heating for forging or forming. The process has found many of its uses in hardening small pieces and selected areas of large parts such as crankshaft bearing surfaces but now, for the first time, it is being applied to the hardening of bars in commercial quantities and at very appreciable savings in costs.

While the initial installation in the plant of the Caterpillar Tractor Co. at Peoria, Ill. is regarded as still being somewhat "experimental" by their engineers who participated largely in its development in co-operation with the Ohio Crankshaft Co., the fact remains that the equipment is in every-day operation processing steel for a considerable portion of the company's bar requirements.

Reduced to simplest terms, each heat-treating unit may be described as a pair of induction-heating coils for hardening and tempering, powered by standard Tocco 125 and 75-kilowatt, 9600-cycle motor-generator units, through which the bars are fed by three sets of drive rolls at speeds regulated by a speed control unit. The heat-treating units, including controls and driving mechanism and the power units were designed and built by the Ohio Crankshaft Co. Included, of course, is the necessary conveying and other auxiliary equipment. The installation comprises four identical units, arranged in parallel, all of which are powered by the two motor-generator sets.

Fig. 1 shows an overall view of the installation from the entrance side. The bars are unloaded by crane in position for feeding into any one of the four units. In this case, bars of like diameter are being treated but four different sizes may be handled if desired. The bars are fed in end-to-end on narrow, motorized conveyors engineered by the Caterpillar Tractor Co. which first carry the material through small cylindrical spray washers. This spray, a trisodium phosphate solution, is maintained at 190 degrees Fahr. and has the function of removing any extraneous surface material which might otherwise be deposited on the heating coils.

After the bars pass through the washer, they are engaged by the first set of drive rolls. It will be noted by referring to Fig. 3 that each heat-treating unit has three sets of adjustable rolls to accommodate various bar diameters, all three sets being driven by the same motor and controlled by the same variable speed control unit. This positive drive arrangement is, in fact, responsible in a major way for the success of the operation, since the bars are brought up to proper heat and quenched at the same rate which

Fig. 1 (*Left, above*)—*Two operators handle four continuous induction heat-treating lines in the plant of the Caterpillar Tractor Co. Bars are fed in end-to-end and the balance of the operation is carried out automatically*

Fig. 2 (*Left*)—*After heat-treatment, the bars emerge on the narrow roller conveyors shown in the foreground, actuate a limit switch which tilts the conveyor and drops them to the chain-type conveyor below*

By IRWIN H. SUCH
Engineering Editor, STEEL

EAT TREATMENT

means that hardness is uniform and hard spots are prevented. So uniform is the treatment, that hardness throughout the length of a 20-foot bar can be held within three points on the rockwell C scale.

The enclosed hardening coil will be observed between the first and second drive rolls in Fig. 3 and also in close-up view in Fig. 4. This coil is 17 inches long, being wound from several feet of copper tubing and having an opening large enough to permit the passage of 1¼-inch bars. A tube of asbestos composition insulates the bar from the coil. This is a safety factor, since the rigid rolls of the drive mechanism prevent the bar from touching the coil. Natural gas is passed through the coil enclosure to provide an inert atmosphere.

The bars are brought up to hardening temperature of about 1600 degrees Fahr. while traversing the 15-inch length of the coil at the rate of 1.9 feet or 22.8 inches per minute in the case of ⅞-inch bars. It is important to note that the bars are heated all the way through in this short interval. As the bars leave the coil, they pass immediately through a quench ring. Practically a solid cone of water strikes the surface of the bar under high pressure which is sufficient to produce thorough hardening.

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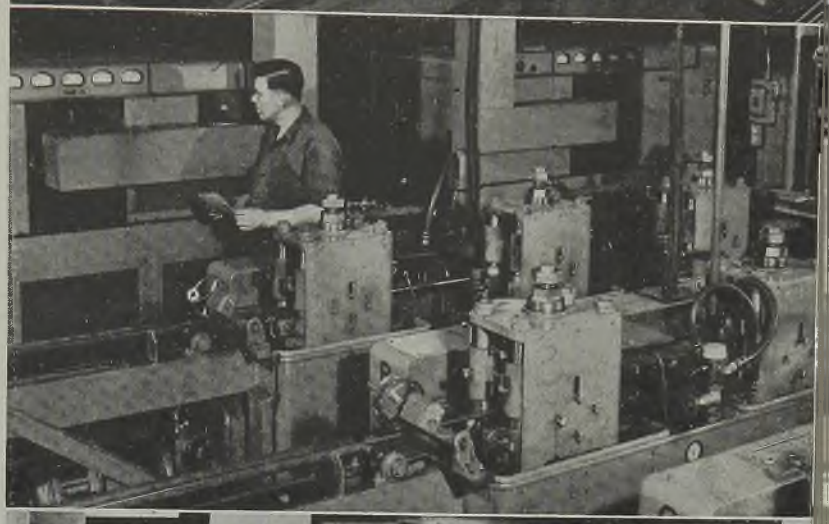


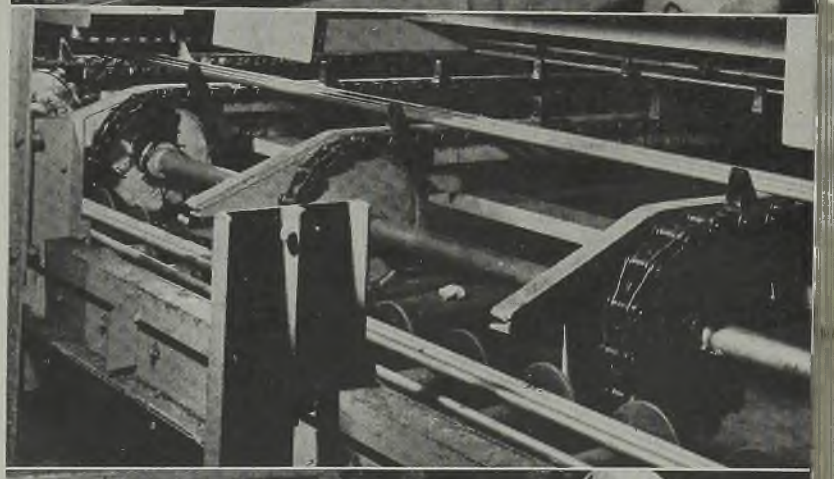


Fig. 3 (Top to bottom)—Each of the four heat-treating lines has three sets of drive rolls, controlled by a speed control unit and two induction heating coils and spray quench rings, one set for hardening and one for tempering. Each unit heat treats about 250 pounds of steel per hour with uniform physical properties, almost complete lack of scale, a minimum of distortion and at a substantial saving in costs

Fig. 4—Close-up view of two lines with the two Tocco power units shown in the background, one of which serves the four hardening coils and the other the four tempering coils. The wheel riding on the bar ahead of the first set of rolls drives a production meter

Fig. 5—Closeup of the chain-drive conveyor shows bars being dropped upon a roller conveyor which carries the bars back to the storage area at the entrance side of the installation

Fig. 6—A rockwell hardness tester is located adjacent to the conveyor carrying the bars to the storage area. Every fifth bar is checked and lengths also are cut off for further testing in the plant laboratory. Hardness ranges from rockwell C20 to 28 from the center to the surface on all sizes treated thus far

EFFICIENT DIE

. . . . permit 600-ton load in punching 29 holes to be handled on 225-ton press in landing mat production line. For blanking out aircraft engine mounting rings, 115 inches of lineal cut are made in ½-inch steel plate on 700-ton press, a job ordinarily requiring 1150 tons

KANSAS CITY is proof that all industrial centers are neither in the North nor the East. Long known as a leading live stock, grain, and agricultural center, located where the broadening Missouri river bends eastward through the richest plain in the world, this very location has endowed it with industrial advantages which often have escaped national attention.

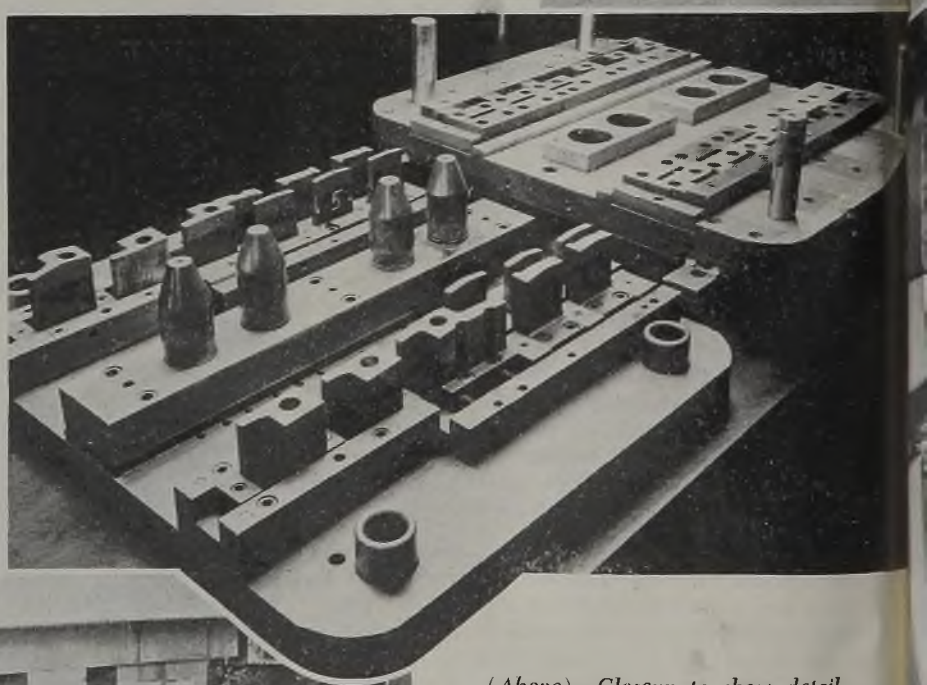
Less than 200 miles from the huge midcontinent oil fields, surrounded by great farming and mining areas, having a trading region of 14 states, there has been constant demand for all types of farm implements, oil field equipment, and mining machinery. Economies in freight costs alone are encouraging solid Kansas City industrial expansion, the better to serve this great surrounding market. Its presently expanded war production can be expected to project itself into far greater peacetime volume of metal fabrication.

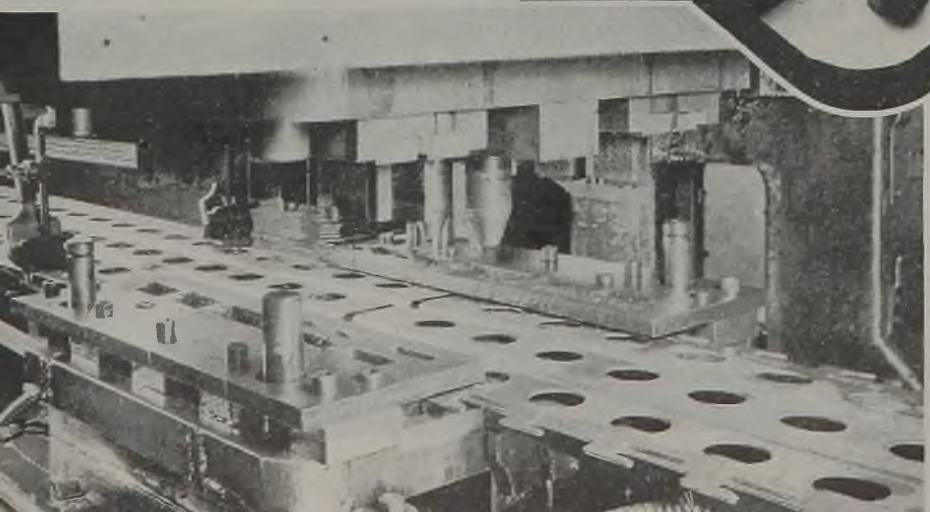
An example of the industrial alertness of this important western city is Butler Mfg. Co., sheet metal fabricators since 1902, making welded tanks, truck tanks, transport tanks, prefabricated steel buildings, grain bins, stock tanks, hog waterers and feeders, steel garages, filters, stills and units for reclaiming cleaners' solvent, and many other sheet steel products. In 1939 and 1940, Butler fabricated over 60 per cent of the 63,000 steel grain bins distributed to farms by the Department of Agriculture; actually pressed, formed, punched, and shipped 20,500 of them (topping 1 ton each) in the first 75 days after the contract was awarded.

This performance required the acquisition of an additional plant. Butler acquired and renovated an ancient crock-roofed, derelict 17-acre plant at Galesburg, Ill. During a 45-day period, over 1250 cars of freight were handled in and out of the plant.

This prewar taste of expanded production success encouraged the organization into doing "impossible" things. One is not long in contact with this organization before he senses an atmosphere of drive, co-operation, and harmony that gets things done. Ingenious Walter Smith, chief engineer, sparks the outfit in tackling big and tough jobs. Team mates that back up production programs effectively include Burns and Larkin in sales, the Melcher brothers at plant management and purchasing, the Norquist brothers at administration and engineering, Burge and Schoning as plant superintendents and others.

Third of 26 fabricators to set up fabrication of all-steel runways, Butler has produced 24,000,000 square feet in the past two years. Originating much of the engineering, it produced 200 hinged-arch steel hangars 130 feet wide, 160 feet long, 26 feet high, capable of taking all planes except the B-29, yet so readily portable that they are crated in 13 boxes





(Above)—Closeup to show detail of progressive bayonet punching dies used in operation illustrated below

(Left)—Dies here punch bayonets and locking slits. Note brushes at left which apply lubricant as work is fed from left to right through these progressive dies

)PERATIONS

5 feet square and 20 feet long, with tools and erection instructions, for shipment in two gondola cars by rail, or flown in two C-46 Commandos. These hangars have withstood 80-mile-per-hour winds, are canvas and steel roofed, can be erected in 12 hours and are easily camouflaged.

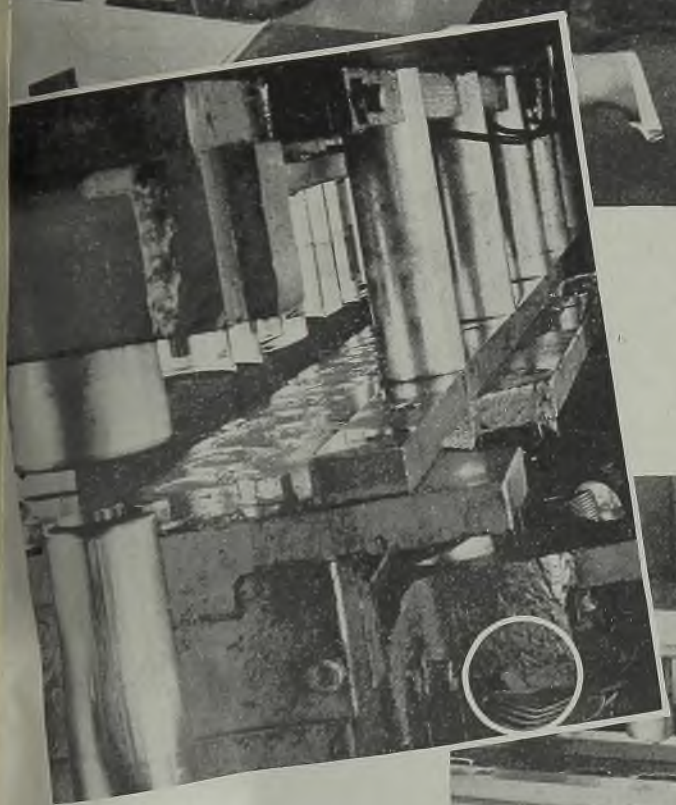
In addition, Butler has so far fabricated and packed for export 5000 prefabricated and easily erected military barracks, light weight, insulated and electrically equipped; over 1000 utility airport buildings, made in four sections complete with erection tools, sash and overhead doors, to be set up in one day's time; 200 prefabricated Dymaxion houses for Signal Corps officers' quarters; 1000 airplane refueling units of the truck-tank type with capacities from 650 to 2000 gallons; 800 semitrailer refueling units of 2000 to 3200-gallon capacities, some 3000 truck tanks of 750-gallon capacity to transport gasoline or water, each section easily removable if damaged. This is not all—but enough to back up the fact that because of exceptional equipment and "know-how" accumulated from this experience, the organization will be able to fabricate practically anything in the postwar period, and it intends to do so.

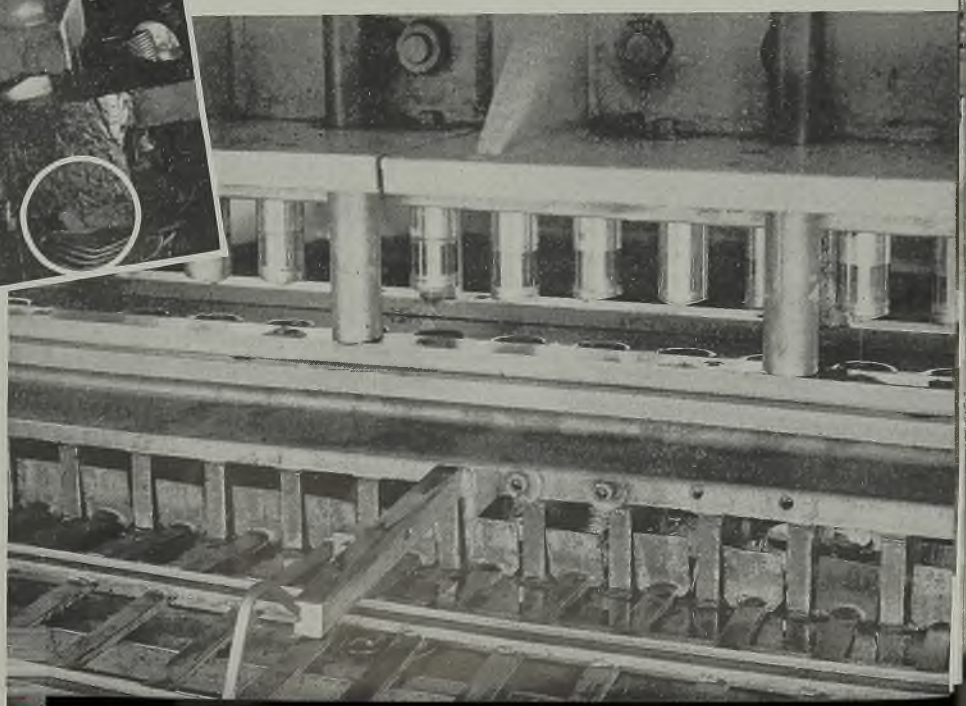
Its staff of 36 engineers is set up in five divisions: Oil Equipment, Building Equipment, Farm Equipment, Cleaners' Equipment, Tool Design and Methods Engineering. The company now has plants at Minneapolis and Galesburg, as well as at Kansas City. No more completely equipped or more flexible setup of its type has yet been observed. The

(*Please turn to Page* 104)

(Above)—Butler Mfg. Co. officials: Left to right; E. E. Norquist, president; V. C. Norquist, consulting engineer; W. L. Smith, chief engineer; W. B. Larkin, manager, Steel Building Division

(Left)—Closeup of staggered-end punches used in perforating planks for landing mats. Circle shows how V-shaped punch ends distribute work

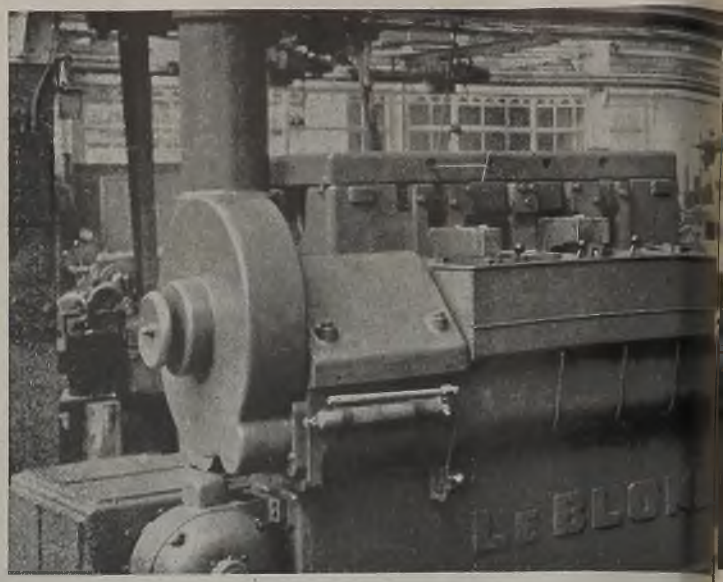




(Right)—Punched disks seen at right in above illustration are shoved out from under dies by multiple fingered "pushers" ganged below die and working between uprights that support bottom die section as shown here. Lower die section assembly is welded

Prominent Metallurgist Points Out Need for Setting Up . . . .

A List of PREFERRED STEELS



By A. L. HARTLEY
Metallurgist
R. K. LeBlond Machine Tool Co.
Cincinnati

IN STEEL for June 26, a system was presented for standardizing on a fewer number of steel compositions, sizes, finishes, shapes to enable the individual small plant (buying in less than heat lots) to obtain the advantages of steel simplification. However, it was brought out that this system was based on selecting from a single list of known steels.

With the advent of AISI (American Iron & Steel Institute) steels in 1941 and the NE (National Emergency) steels in 1942, the situation is somewhat more complicated than when we had only the list of SAE steels, all of which were fairly well known. So let's take a look at the present situation and one possible cure for it—setting up a list of a few PREFERRED STEELS.

The AISI steels are essentially the same as the SAE series. However, there are some variations in chemistry. Then in 1942, the AISI steel list was revised. In addition, the NE steels were brought out, an entirely new series of steels.

Users Divided Into Four Groups

The NE steels were a radical departure from all prevailing American standard steels. When these were introduced, manufacturers were advised they must adopt them. Some executives protested vigorously and bluntly stated their products could not be satisfactorily produced with these steels. While they were untested and untried, their analyses were based on scientific information compiled by the most competent American metallurgists. The analyses were not established because of some individual's desires to make changes but because the national emergency demanded the most stringent conservation of alloys.

NE steels have proven entirely satisfactory for most applications. While some disadvantages have been encountered, serious difficulties have been comparatively few. Some difficulties arose because specific users were not able to obtain the richer alloy series of the NE group, others may have been due to improper manufacturing procedure, etc. When the entire series becomes available and manufacturing procedure is improved, possibilities of obtaining a satisfactory NE steel will be even better than they are at the present time.

Just as would be expected from such a condition, steel users have more or less divided themselves into four major groups. One group feels that we should revert back to the old SAE series, possibly for no other reason than the fact that they are thoroughly familiar with the characteristics of some specific SAE steel.

Many Favor SAE Steels

A second group feels that the AISI series is the one that should be adopted. Many of these advocates have picked out a few specific steels which they contend are the only ones that will make their future products satisfactorily. This group strongly contends that carefully restricted chemistry is of utmost importance to them.

Another group has found NE steels to be entirely satisfactory and has become thoroughly familiar with the use of these materials. They see no reason why they should revert to any other steel and cause more confusion in their shop.

The fourth group feels that none of these steels are exactly what should be put on the market and wants still further modification and alteration.

At the present time there are approximately 330 *items listed in the SAE, AISI and the NE classifications.* Yet the 1936 SAE group only included approximately 109 steels. So we have a very serious condition confronting both steel producer and consumer in the postwar period.

Although SAE steels are officially discarded, there are many users, both large and small, who strongly favor their use. I also believe there are many producers who do not feel that the closely restricted chemistry of the AISI series is absolutely essential.

If strong action is not taken to curtail the present trend, it is not at all improbable that we will have an array of between 400 *and* 500 *grades of steel listed under various standard headings in the postwar period.* This will not include hundreds of trade-name steels which will be introduced because many manufacturers will prefer marketing trade-name materials to producing several series of steels, none of which are really an American standard.

The article, "Steel Simplification", STEEL, April 24, expressed the situation even more forcefully than above. The one statement that describes conditions as they exist with one producer is herewith quoted:

> "Over 1000 common steels are produced according to chemical content. With certain physical attributes (size, shape, etc.) as important as chemistry the working group must approach 5000."

If that statement can be made at the present we must realize the almost impossible condition which will prevail in the postwar period if consumers and producers do not almost immediately formulate a plan to curtail this rapid expansion.

Although we could go into extensive discussion as to how the numerous series of steels will complicate standardization efforts, such a discussion would be a waste of time. I believe all executives see the serious nature of the situation without any detailed explanation.

There may be some question, especially among designing engineers, as to whether there is any merit whatsoever in having such a tremendous array of steels. The answer to that is definitely "No". Even the SAE list of steels which, as previously stated, contained approximately 109 items, included many more than were actually required. This has

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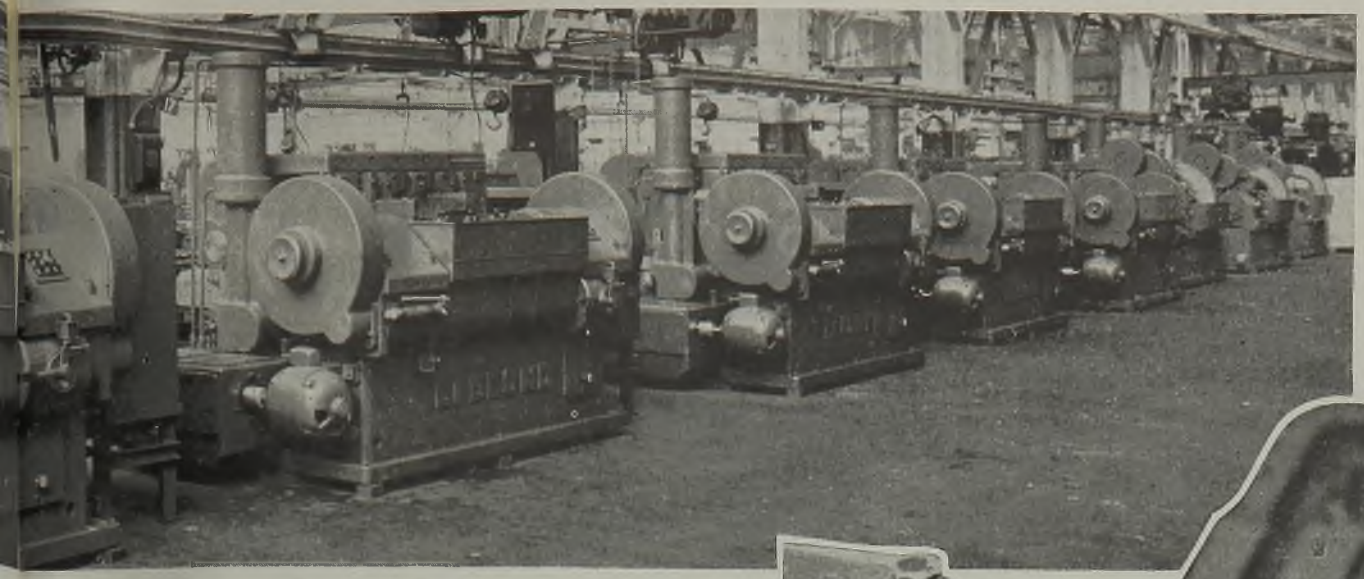
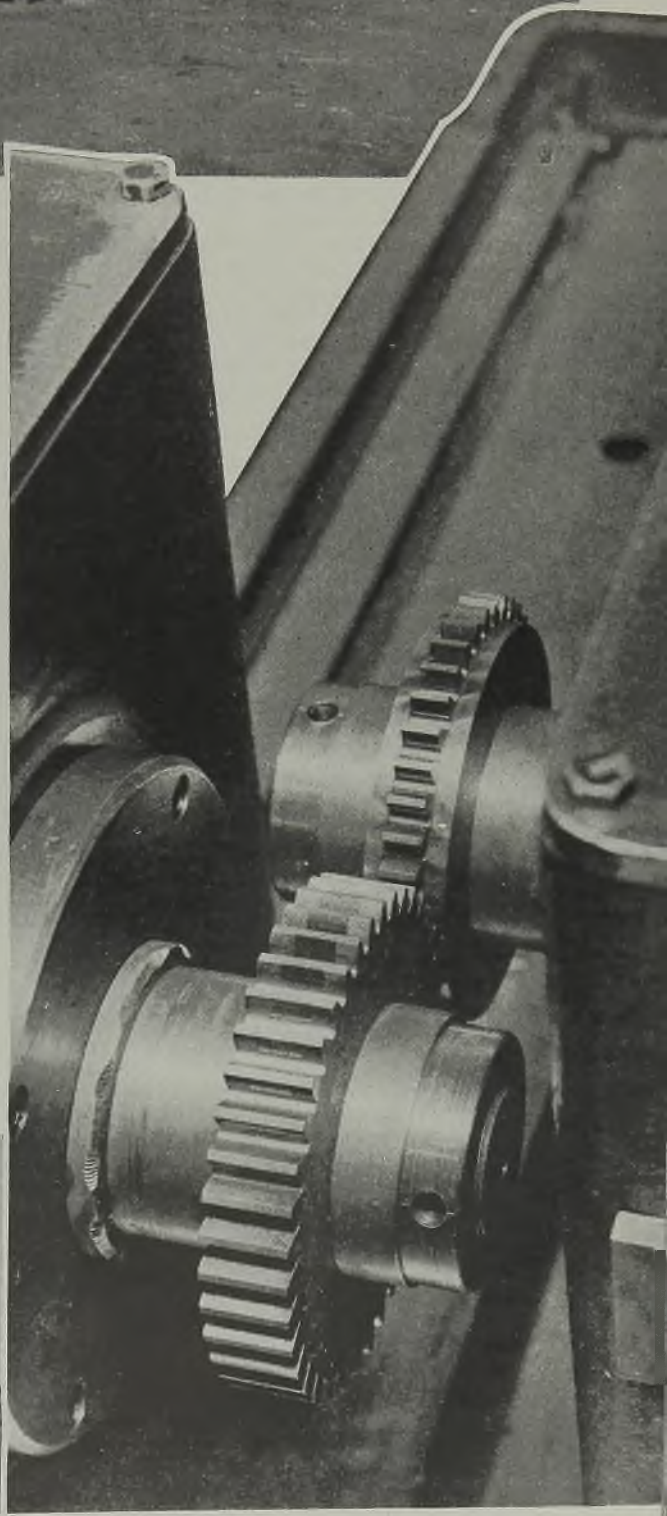
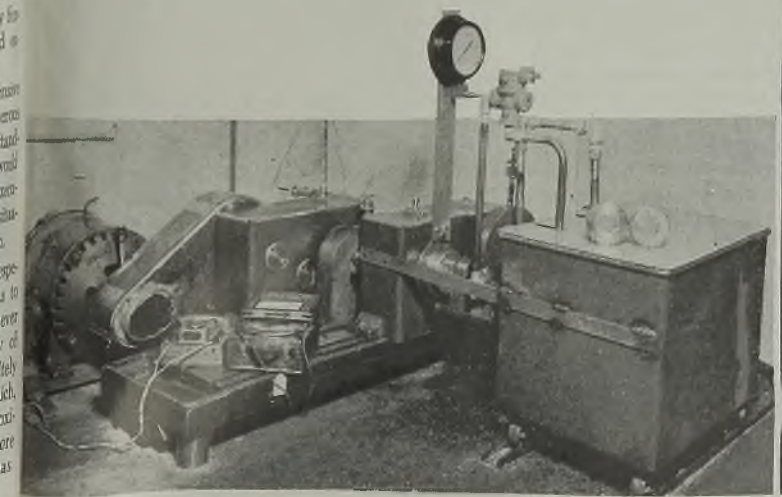


Fig. 1 (Above)—Typical example of a complete series of automatic machines fabricated from four general-purpose steels and three special-purpose types, demonstrating what can be done along the lines suggested

Fig. 2 (Right)—Closeup of driving and driven gears. Teeth on gear under test are cut to width of ¼ or ⅛-inch to reduce maximum loads needed to produce failure on test

Fig. 3 (Below)—Supplementing conventional tests with those of a more practical nature gives results that may be much more pertinent in selecting a steel. Such a practical test is that given gear steels by the machine shown here. It applies loads over a wide range; varying loads can imitate taking intermittent cut on a machine tool; setup can produce accelerated life results by loading increasingly until failure occurs





Metallurgy and Heat Flow Problems in....

HIGH-TEMPERATURE VALVES

Studies reveal how to make valves to handle hydrocarbon gas at 1400 degrees Fahr., yet keep temperature of packing materials below 750 degrees

By GEORGE GOHS
And
WM. E. HEILIG
The Wm. Powell Co.
Cincinnati

TREND TOWARD use of higher and higher temperatures in oil refinery work and various other processing plants has involved the necessity of developing valves that would operate satisfactorily at gas temperatures up to 1400 degrees Fahr., as steam and hydrocarbon gas mixtures in oil refinery practice now reach that temperature range. Mercury vapor power plants also involve extreme high-temperature operation of valves.

Metallurgical studies have shown that 25-12 stainless steel, 25 per cent chromium, 12 nickel is well suited to work at these temperatures and well up towards 2000 degrees, 29-9 stainless not being so satisfactory due to a tendency toward embrittlement in the 1175-1225 degree range.

First requirement of a steel for work at elevated temperatures is resistance to oxidation. The 25-12 composition has proved satisfactory from this standpoint as well as retaining its mechanical properties at the elevated temperatures.

Operating Temperature Limited

Experience has shown that stainless of the 11½ to 13 per cent chromium type works well up to 1000 degrees Fahr.; 16 to 19 per cent chromium is good up to about 1200 degrees, at which point it starts to oxidize. On the other hand, the practical limit for 25-12 stainless appears to be about 1600 degrees Fahr.—so it is entirely O.K. for work at 1400 degrees.

A limiting factor in valve design is the temperature at which the packing material breaks down. If reasonable length of service and reliable operation is to be obtained, packing materials must be kept at temperatures no higher than 750 degrees Fahr. when handling hot oil vapor, or not more than 900 degrees when handling steam.

This limitation on operating temperature of the packing means that it is necessary to move the stuffing box far enough away from the hot gases or vapors being handled so that radiation and conduction will keep packing box temperatures within the limits specified.

Thus it becomes necessary to evaluate the thermal conductivity of metals and alloys used as valve materials so that heat losses through conduction and subsequent radiation can be determined; not only for taking care of the packing temperatures mentioned above, but also because maximum working temperatures of gaskets and bonnet bolting materials must be controlled.

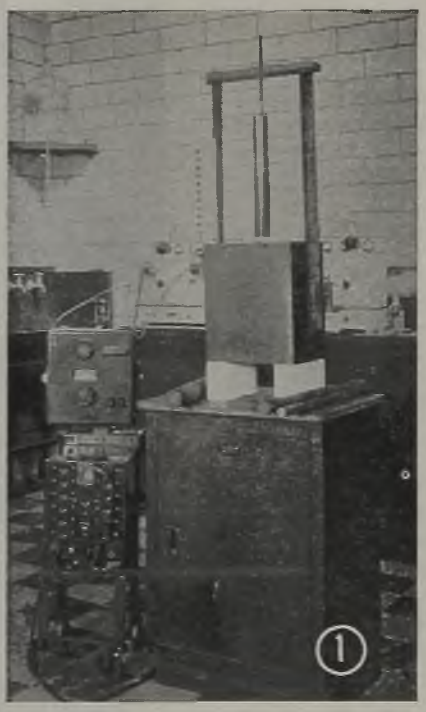


Fig. 1—*Special electric furnace setup for determining heat flow*

To determine thermal conductivity values, the laboratory setup shown in Fig. 1 was employed, consisting of a heating chamber of sufficient size to heat a 6 to 8-inch length of the specimen being tested. Electric power was supplied to a nickrome wire heating element through an autotransformer which supplied means of varying the power input. A thermocouple was mounted in the center of the bar in the furnace and furnace heat controlled automatically from this point so that a constant bar temperature of 1400 degrees Fahr. was obtained. Enough heat was supplied to take care of the heat flow through the bar, yet retaining a steady temperature of 1400 degrees at heated end of bar.

Materials tested included: 25 per cent chromium, 12 per cent nickel, Type 309; standard 18 per cent chromium, 8 per cent nickel; 11½ to 13 per cent chromium; and cold-rolled low-carbon steel.

Three different specimen sizes were used—1, 1½ and 2 inches. All specimens were 24 inches long. Sixteen holes each ⅛-inch in diameter and 3/16-inch deep were drilled at 1-inch intervals along the length of the bar for thermocouple inserts.

All specimens were permitted to soak at 1400 degrees Fahr. for a minimum of 6 hours.

Graphs Show Relationship

Temperature measurements along the length of the bars were made with thermocouple and pyrometer, and the results plotted against the distance from the source to give the charts shown here as Figs. 2, 3 and 4. Curves so plotted for the three different diameter bars are seen to be a family of hyperbolas radiating from the 1400-degree point common to all.

Conclusion that the temperature at any point along the bar

—is directly proportional to the temperature of the source

—is directly proportional to the diameter of the bar

—is inversely proportional to the distance of that point from the heat source.

This may be stated mathematically as

$$T_x = KDT_s/L$$

Where T_x is temperature at any point along the bar

T_s is temperature of bar at heat source

D is diameter of bar in inches

L is distance from heat source in inches along bar

As will be noted on the charts, Figs. 2, 3 and 4, the constant K varies with the diameter of the bar, becoming smaller as the diameter of the bar increases.

The above formula has been found satisfactory for use with temperatures of 1800 degrees Fahr. and lower, conforming to the curves close enough for all practical purposes.

In a straight bar as used here, rate of heat transfer along bar is constant regardless of bar diameter. The difference in temperatures with different size bars is due to the changed ratio between cross section area (governing heat conduction) and surface area (controlling radiation losses). Thus the same ratio of surface

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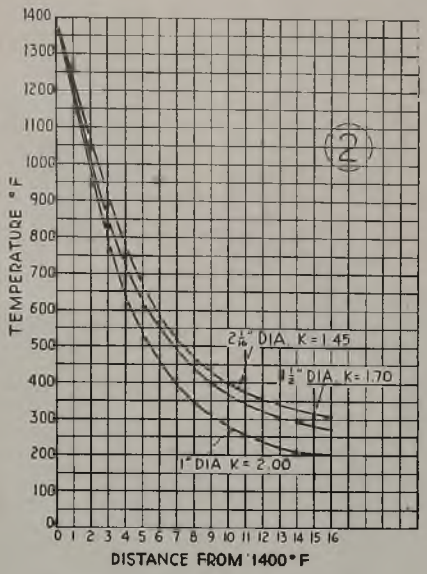


Fig. 2 — Temperature gradient characteristics of cold-rolled steel, one end heated to temperature of 1400 degrees Fahr.

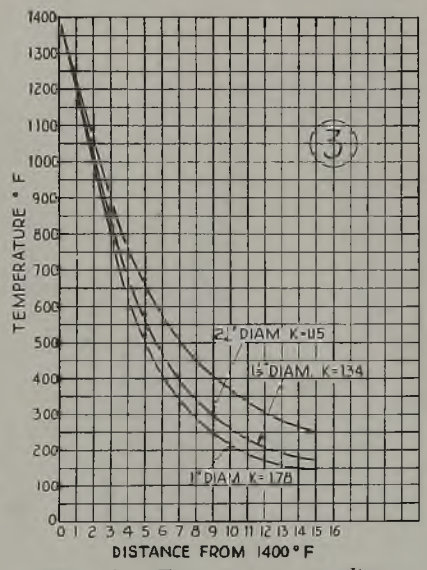
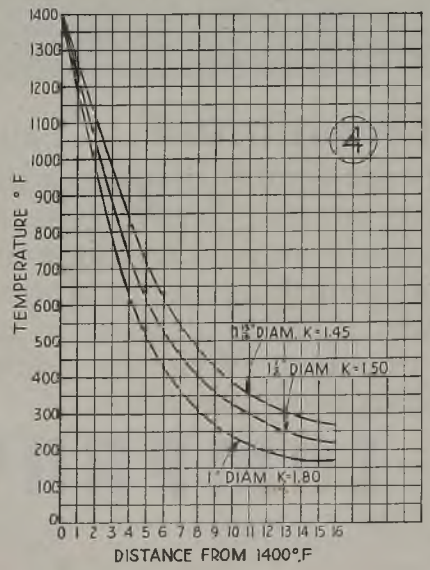


Fig. 3 — Temperature gradient characteristics of type 309 stainless steel



area to cross sectional area will give same surface temperature.

Now we are getting close to the actual application of this information to valve design.

Referring now to Fig. 6, we have bar diameters plotted against distance from heat source at which bar will be 750 degrees when one end is heated to 1400 degrees. Note that this varies from approximately 3¼ inches for a 1-inch bar to about 15 inches for a 7½-inch bar.

Shows Effect of Cooling Fins

Surface area increases according to the formula 2(3.1416)r, where "r" is radius of bar; on the other hand, cross sectional area increases according to $3.1416(r)^2$. Thus one increases in direct proportion to the radius whereas the other increases as the square of the radius.

But by utilizing the same ratio of surface area to cross sectional area of the 1-inch bar, the 15-inch bar can be made to have a temperature of 750 degrees at the same 3¼-inch distance along its length. The required ratio is obtained by flattening the 15-inch bar.

This shows the effect of using cooling fins, for adding fins increases the surface area with little increase in cross sectional area, thus bringing the ratio closer to that desired for minimum bar temperature.

For this reason, the high-temperature valve in Fig. 5 has four heat-radiating fins which are employed not only for added strength but also to produce the most favorable ratio of surface to cross sectional area. This in turn makes it possible to bring the stuffing box reasonably close to the hot gases handled, yet keeping its maximum temperature within the limits specified.

This ratio of surface area to cross sectional area is the reason why materials

(*Please turn to Page* 134)

Fig. 4 — Temperature gradient characteristics of type 416 stainless

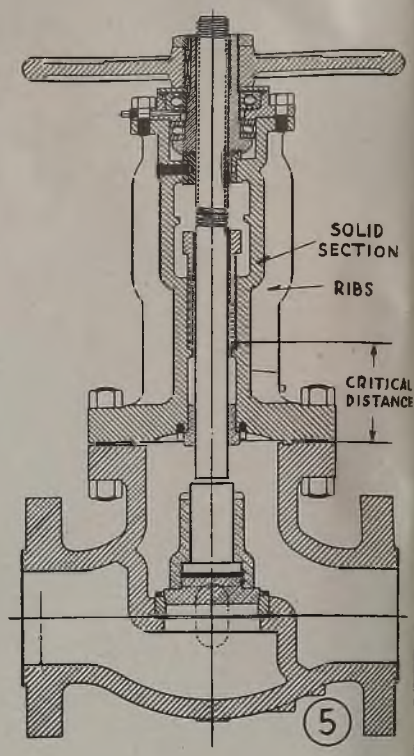


Fig. 5—Cross section through typical high-temperature valve, showing how packing seal is kept below 750 degrees Fahr. by removing it from high-heat zone

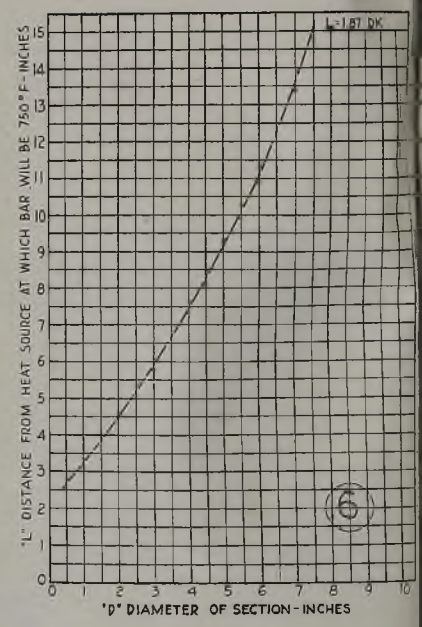


Fig. 6 — Temperature gradient characteristics of type 309 stainless. Here distance from 1400-degree heat source at which bar will have temperature of 750 degrees is plotted against diameter of section

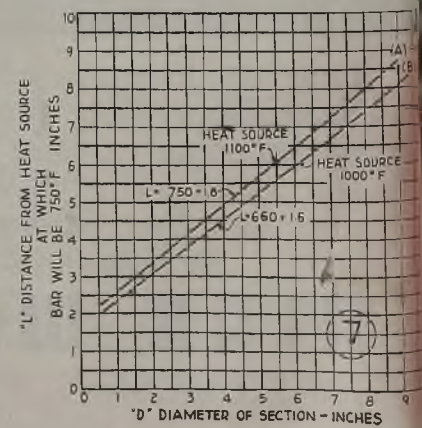
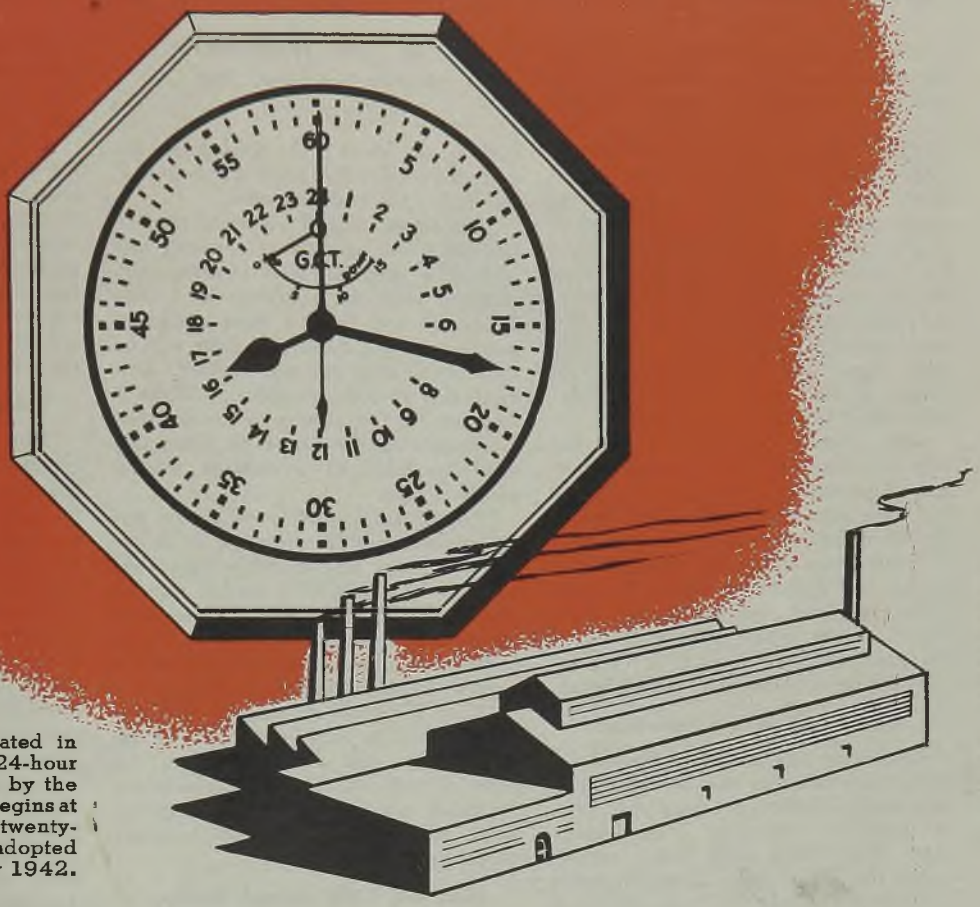


Fig. 7 — Temperature gradient characteristics of cold-rolled steel bars of different diameters, showing distances from heat sources of 1100 and 1000 degrees at which bar will have 750-degree temperature

EVER SEE A 24 HOUR CLOCK?



The 24-hour clock originated in Europe prior to 1600. The 24-hour time system was first used by the U.S. Navy in 1916. Its day begins at midnight and extends over twenty-four hours. The U.S. Army adopted this time system in July 1942.

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War-Stimulated Engineering

"Passes in Review" Before the ASME at Pittsburgh

By GUY HUBBARD
Machine Tool Editor, STEEL

UNDER wartime conditions, engineering meetings such as that held two weeks ago by the American Society of Mechanical Engineers at Pittsburgh (See STEEL, June 26, Page 60) serve a two-fold purpose. First, they give immediate, practical help to engineers on tough problems of design and production for the war effort. Second, and no less important to the war effort, they furnish renewed inspiration to this heavily overburdened group of men so that they return to "active duty" and tackle with vigor and confidence problems which looked well-nigh "impossible" when they left for the meeting.

Such valuable inspiration comes not only from technical and economic papers and discussions by recognized authorities, of whom about 100 contributed to the Pittsburgh meeting. It comes fully as much from inspection of plants and engineering projects to which the individual engineer seldom would have entree. I am thinking, for instance, of our memorable trip through a big shipyard on the Ohio river near Pittsburgh.

Shipbuiding in the Mountains

Censorship precludes the detailed description which this visit would rate in peacetime. Suffice it to say that ships of ingenious American design—good-sized ships which carry heavy cargoes across the oceans under their own power—are being fabricated from Pittsburgh steel plate (mostly by welding), are equipped and begin their journey by water to the fighting fronts, from this naval establishment which is located in the Allegheny mountains hundreds of miles from salt water.

Nowhere in Germany or in any other Axis country has anything like that been accomplished. And yet it is just one of the many "impossible" things which have been accomplished by American engineering resourcefulness and which were not contemplated by Hitler when he compiled his now badly disarranged "time table".

Inasmuch as material handling plays a major role in this "mountain shipyard" and in view of the fact that several noted members of ASME have been pioneers in this science, let us take a look at one of the papers on this subject which was presented at the Pittsburgh meeting. Randolph W. Mallick of Westinghouse presented the following ideas.

"Intensive studies of effective work areas have proved that that area within the range of normal sweep of an operator's hands is the most effective for best performance. Time lengthens the manufacturing cycle. And the longer this cycle is, the lower is the total output for a given period. The lower the output is, the higher the cost becomes.

"We know that if material can be brought to an operator at a steady rate and to a predetermined position—and removed after the operation at a constant rate and from a fixed discharge point—then the operator's effort will be used in the most effective manner. This represents an ideal condition. While it may not be the answer to every problem, much can be gained by using this ideal condition as a nucleus around which to plan.

"Just casually watch some person doing something in the course of his or her everyday work and mentally figure out just how that simple operation can be improved. We must recognize that most people are not instinctively doing things in the most effective manner. Habit has a lot to do with their methods.

"Even if improved material handling has no effect on reducing the cost of the product, we still are justified—on the basis of reduced safety hazards which inevitably result—in vigorous efforts toward adoption of improved handling programs."

Hoyt and Gillet Defend Welding

Although their paper dealt primarily with structural materials for railway use, Samuel L. Hoyt and H. W. Gillett of Battelle Memorial Institute made some recommendations of general interest.

They pointed out that in order to insure successful application of a material it is necessary to study carefully the following angles: Engineering design; the steel; its fabrication—including welding—and the final service requirements. Sad failures have occurred when the steel angle was slighted and when a properly selected steel has been improperly handled. Through careful study, on the other hand, common grades of steel can be whipped into shape to give really noteworthy results. And here is what they had to say of welding:

"There is nothing wrong with welding—if it is done properly, if the design is right, and if the steel is made properly. Recent cases of 'brittle ships', however, show that there can be plenty wrong with welded ships if their design fails to allow for stress distribution, and if the steel used is not suited to withstand the somewhat unorthodox stresses at the temperatures at which these ships have gone to pieces. These accidents could have been avoided merely by applying metallurgical principles which long have been known but which all too often are neglected."

E. C. Hartmann, G. O. Hoglund and M. A. Miller, Aluminum Co. of America, reviewed methods of making joints in aluminum alloys. "While gas and arc welding have not ordinarily been employed with the highest strength alloys", they said, "reheat treatment after welding now is being used in some cases to restore strength to the metal adjacent to the weld.

Soldering and Bonding Aluminum

"Furnace, torch and dip brazing give excellent results, but soldering is perhaps the least known method. Most of the obstacles to soldering now have been overcome and this process now is commercially practical with several of the important aluminum alloys. Resin bonding—consisting of cementing aluminum surfaces together by means of a number of organic materials which have been found to have requisite bonding properties—has great possibilities in connection with fabrication of aluminum alloy structures."

Another paper which dealt with aluminum, but from the standpoint of unit forming rather than joining, has interesting implications in connection with other metals, including steel. Kirby Thornton, also of Aluminum Co. of America, showed how stepped extrusion now is being employed to form blanks for airplane spars, thus reducing machining time and volume of chips.

These spars require a heavy head for connection, behind which they step down into a thinner structural shape. The process thus far is successful in extruding the straight structural section beyond the heavier head, but tapering still depends on machining. Several discussors, including Sam Tour, suggested that this is the "first step" toward full tapered extrusion by means of hydraulically or wedge-controlled adjustable dies.

It is typical of the healthy internal rivalry which keeps engineers always on their toes, that this proposed full-tapered extrusion might eventually change greatly or even eliminate the spar milling upon which another group of engineers now are concentrating their efforts. Whether it does or not, the fact remains that out of this spar milling effort is emerging the new technique of high speed or "hyper-milling", which at the moment is one of the hottest subjects in the field of machine tool engineering.

Not in many a long day has any more

(*Please turn to Page* 120)

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Monthly production quotas for Helldivers are met regularly at Curtiss-Wright Corp.'s Columbus plant with aid of eight different kinds of conveyors and . . . .

ENDLESS-CHAIN MONORAIL SYSTEM 2 Miles Long

By ROBERT WELLS
Columbus, O.

IN PREWAR DAYS, extensive conveyor systems like the kind which in peacetime helped turn out better automobiles more rapidly were unknown in airplane factories, for in those years an order for 50 planes was considered unusually large. With the almost overnight expansion of the aircraft industry under war's impetus, the situation changed. But many plane builders, believing that aircraft parts are too large and of too great irregularity to be handled by conveyors, hesitated to install such mechanical devices.

One of the largest of airplane factories to adapt conveyors to aircraft work with a great deal of success is the Columbus, O. plant of the Curtiss-Wright Corp. where the Navy dive bomber, the Helldiver, is manufactured.

Built shortly before Pearl Harbor, and since greatly expanded, the factory is one of the most modern plants of its kind in the world. It extends over such a large area that the problem of transporting parts was a serious one. After struggling along with a system of intraplant trucks for some months, engineers came to the conclusion that installation of an extensive conveyor system was a necessity to speed up production, which in early days of the plant's existence was somewhat disappointing.

There was hesitancy on the part of a minority of the Columbus plant's executives to recognize the desirability for conveyors. Most of these men have changed their minds and now are enthusiastic boosters for the plant's intra- and interbuilding mechanical conveyors. Notable also is the fact the Columbus plant has set an unbroken record of meeting its production quotas each month since installation of these devices.

Most impressive of the eight types of conveyors now in use is a recently installed overhead monorail endless-chain conveyor which services a manufacturing area ½-mile long by ⅛-mile wide. Conveyors in each of the two main factory buildings meet an interbuilding conveyor at a central control station (see Fig. 2) so that a part may be dispatched by conveyor to any point in the manufacturing area. Material or parts routed from one building to another are transferred at this station. Push-button mechanism, with a control for each line conveniently mounted above operator's head, can be used to start or stop conveyors at will. In case of an emergency, conveyor can be locked and cannot be started again except from this control station, thus minimizing danger of accidents if repairs must be made.

Storage space required in the final assembly buildings has been drastically reduced by use of conveyors. The mechanical carrier has taken over at least 50 per cent of the duties of the plant's

Fig. 1—Chain conveyor systems, with total length of 12,197 feet, or nearly 2 miles, connect production, inspection and assembly stations scattered throughout the huge Curtiss-Wright Columbus, O. plant. Note basket-trays filled with small parts

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Thus, they are inherently dependable and economical, and this is especially important in the war industries where they are working 24 hours a day. Here they have the additional advantage of operating from one battery while another is on charge; except for the few minutes needed to exchange batteries, they need not stop for servicing of the power unit.

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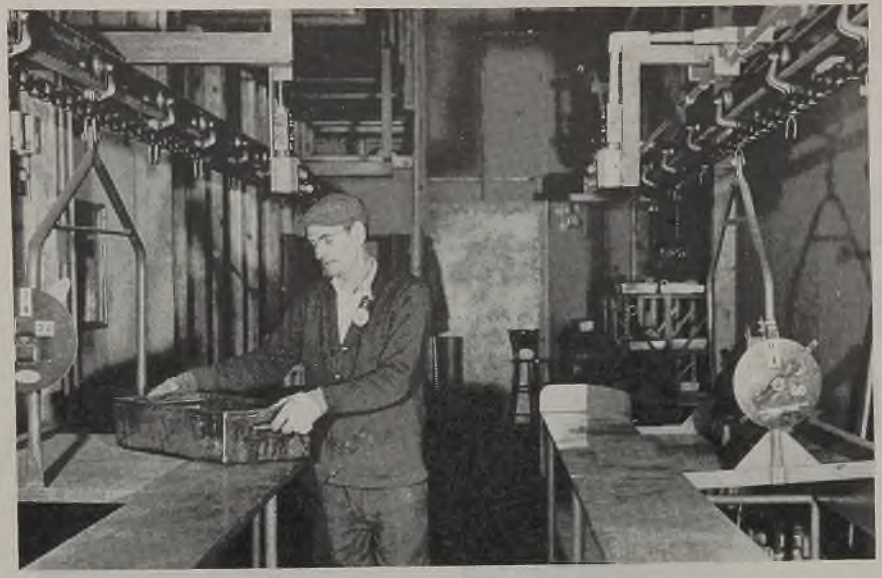


Fig. 2 (Above)—Transfer station between two adjoining main plant buildings. Destinations for parts are indicated in code on dial at front of each tray. Push-button mechanisms above operator's head are conveniently located to start and stop conveyors at will, thus minimizing danger of accidents

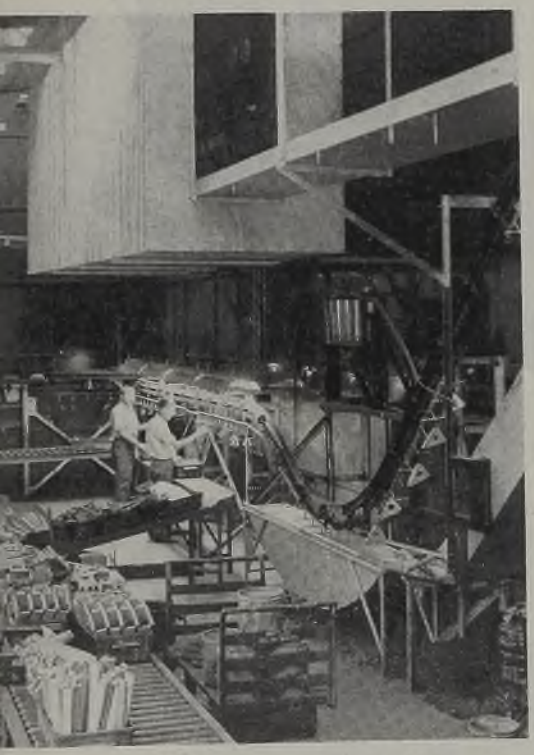
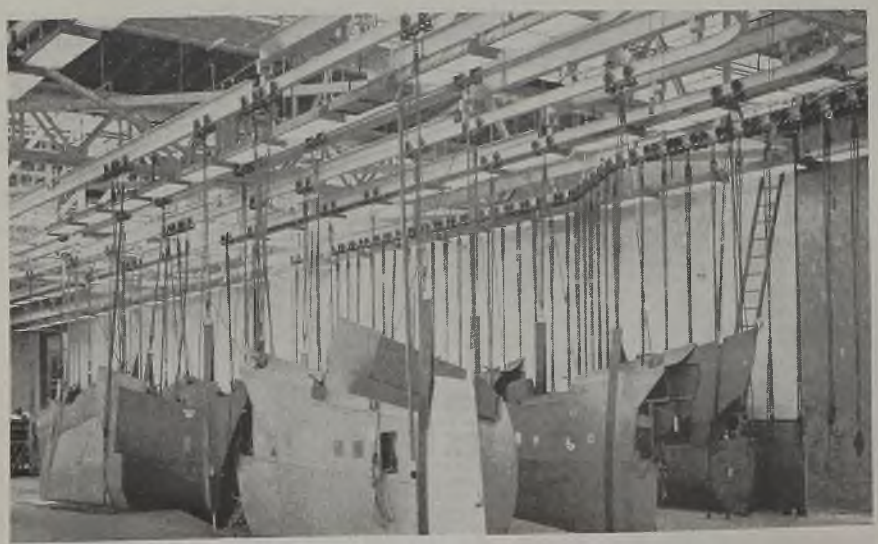


Fig. 3 (Left) — Here endless chain conveyor drops from ceiling to work level to permit parts suspended from it to be paint dipped with minimum handling. Small parts arrive from heat-treat department on roller conveyor at left, are hung on hooks, carried through first dip (right foreground), through infrared drier into second dip (not shown), are again air dried and then returned to starting point

Fig. 4 (Below)—For painting, outer wing panels are slung on trolleys in an adjoining panel department, pushed manually into paint shop on extension track and thence on to spurs where they are painted without rehandling



intrafactory trucking system, which in the early days of operation was charged with moving all supply parts. The plant vehicles now can concentrate on moving only the heavy parts.

Overhead monorail endless-chain conveyors at the plane plant stretch for a total of 12,197 feet—nearly 2 miles. Four-inch monorails are used. Carrying trays are 2 x 4 feet in size and will handle loads up to 200 pounds (see Fig. 1). They are made of steel with wooden bottoms. Dial indicators with code numbers are attached to the front of each tray (see Figs. 1 and 2) and serve as route markers in getting parts to their ultimate destination.

Although the conveyor trays have a capacity of up to 200 pounds, one of their greatest uses is in the transporting of small parts. The Helldiver has more than 45,000 different kinds of parts. Without the conveyor system, it would be far more difficult for each of these to be routed to the right station at the exact time when it is needed. Hooks are also attached to the chain and many kinds of parts can be fastened to them for transporting to any desired point in the factory.

The chain conveyor moves at the rate of 30 feet a minute, slow enough to permit operators at each loading station to make two "picks" (move parts to or from a conveyor tray) during the time a tray is being carried past the loading stand. Each station is from 10 to 12 feet long.

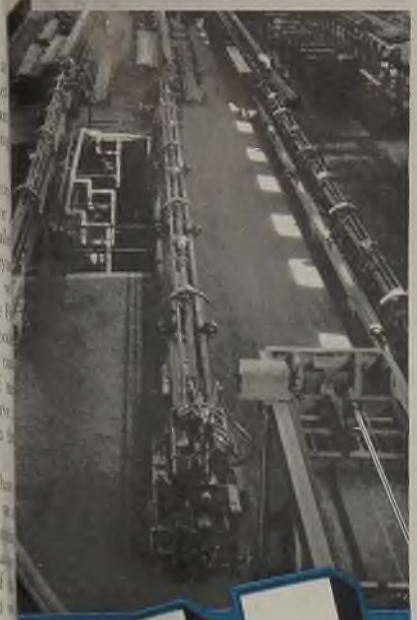
Transfer 1200 Loads Per Shift

During each 8-hour day shift alone, close to 1200 loads are transferred between the two main buildings by the conveyor system, plus the thousands of loads carried between departments within each building.

The monorail chain conveyors have also assisted greatly in salvaging small articles. For example, in preconveyor days at the plant, small plastic caps from hydraulic fittings were thrown away. Now they are collected, placed in a container on a conveyor tray, taken to a degreasing bath, inspected and returned to use. Odd-sized bolts in containers are placed on the conveyor trays and carried to sorting machines. When a part becomes separated from its paper tag or becomes "lost" in some other manner, it is returned to the plant's lost-and-found department via conveyors, thus preventing waste.

A specialized use of the overhead monorail endless-chain conveyor at the Helldiver plant is in the paint-dip department (Fig. 3). Here a 350-foot loop carries small parts through the painting process with a minimum of handling.

Parts arrive from the heat-treat department, where they have been prepared for painting, by means of one conveyor and are hung on hooks on the paint department monorail. The chain conveyor dips the parts in a paint tank, carries them past a battery of infrared lights, dips them in a second paint tank and then carries them until they are air dried. The parts are then removed



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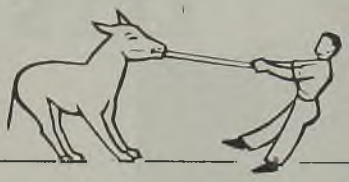

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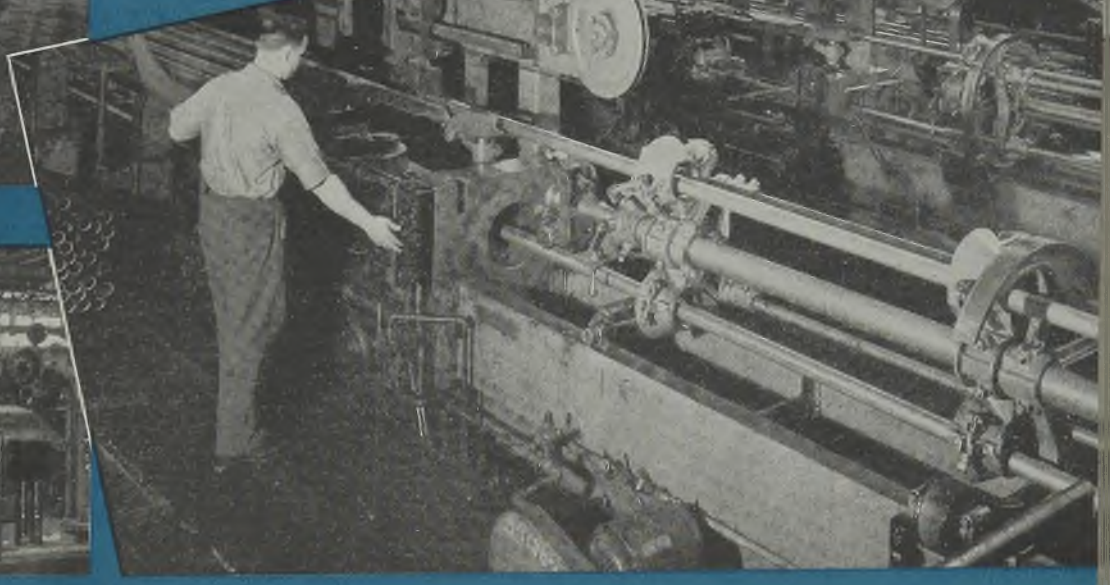

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Liberty is a mere word until it no longer exists. Then, it suddenly becomes more precious than life. Ask the subjected peoples of Europe what they think of liberty! Ask if they are not weary of working under dictatorship that tells them where they shall work, orders the number of hours, and dictates the wages to be paid. Ask them if they like living in an atmosphere of continual strife and uncertainty, where tomorrow's action depends upon today's decree!

Our country started as a democracy. Let us keep it that way! Under the influence of war and an uncertain peace, we are no longer farmers, managers, union and non-union workers, or white collar employees. We are Americans! Together, we constitute a tremendous force that can again "proclaim liberty" and restore the blessings of individual enterprise and responsibility to every man, woman and child in the Nation.

The Liberty Bell—let's ring it again!

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THE WHEELS OF INDU

manually, passed down a roller type conveyor to a station where they are placed on trays in the main factory conveyor and routed to the proper departments.

In the case of larger parts, such as the outer wing panels shown in Fig. 4, a bay of the factory used by the paint department is equipped with extension track and spurs, comparable in their relationship to main route, to the sidings used in railway systems. Here are painted all large parts of the Helldiver except fuselage and center panel. Inbound work is slung on trolleys in the adjoining panel department and pushed manually into the paint shop on the extension track and is painted without rehandling as it hangs from trolleys on the spurs. Monorail is a 6-inch I-beam about 1500 feet long. Trolleys have four steel-flanged wheels and height from floor to wheel bearing is 17 feet 9 inches. Switches are operated with a pole hook.

When outer wing panels are dry and ready for assembly, they are returned to final assembly, switched to a main-line monorail, and attached to a conveyor with four Comet hoists, each having ½-ton capacity. (See Fig. 5.) Main body of the plane moves continuously down the assembly line and the four hoists holding the panel move at a like rate of speed, permitting installation of the panel without halting the line. The same method is used to install the left wing panel.

Monorail Bridge Efficient

An interesting application of the monorail bridge is found in Fig. 7 where the parts cleaning department utilizes a traveling crane conveyor with electric powered hoist to lower parts into five tanks in sequence containing (a) aluminum cleaner, (b) hot rinsing water, (c) anodize solution, (d) hot rinsing water and (e) hot air drier. After parts have dried, suspension racks are placed on a rack support and the work is unloaded and inspected. Hoist and trolley are controlled from the floor by the sole operator, a woman. Crane rails are two 90-foot arch beams. Bridge is 4½-feet wide with a span of 12 feet, while height to wheel bearing from floor is 16 feet. The hoist, with 4-lift stabilized motion, operates with one motor and the trolley with two, one at each rail.

Most of the conveyor trays are of a fixed type, but some of those in use between the plant's heat-treat department and the "ice box," where fabricated parts are stored before use, are of a dump type which permits the parts to be handled more easily.

Among other types of conveyors in use are level and inclined roller conveyors for box containers and heavy parts handling (see Figs. 6 and 8), conveyor tables for handling sheet stock (Fig. 10), belt conveyors for parts and subassemblies (Fig. 9), and drag chain conveyors with pusher dogs for moving final assembly dollies down the production lines.

The level push-type roller conveyor is used in the Curtiss-Wright Columbus plant's heat-treating department. An inspection and conditioning section on the line out of heat treat is shown in Fig. 6 where parts from heat treating arrive by roller conveyor loop seen in foreground. Incoming parts are given magnetic inspection, are demagnetized and degreased. Parts pass along the roller conveyor and are transferred to a factory conveyor (monorail). Rollers are 1.9 inches in diameter, 23½ inches long, with 4-inch centers. Capacity is 175 pounds. Height of the conveyor is 30½ inches and loop is 60 x 24 feet.

Sturdy construction of the level roller conveyor used in this plant makes possible its use for purposes other than transportation exclusively. Fig. 8 shows a section of this type employed as a shuttle bed for a drill press working on heavy parts. Rollers slide back and forth, permitting sideways motion and allowing operator to center jig sections

Fig. 5 (Top, right)—Overhead monorail and four hoists of ½-ton capacity each move outer wing panel shown here at same rate plane body is moving, permitting installation without halting the assembly line

Fig. 6 (Right)—Parts moving out of heat-treat inspection arrive at this station by roller conveyor loop, center foreground. Here they are given magnetic inspection, are demagnetized and degreased, then transferred to a factory conveyor

Fig. 7 (Below)—This traveling train conveyor with electric powered hoist and bridge lowers parts into five tanks which comprise the cleaning cycle. The hoist, with 4-lift stabilized motion, operates with one motor and trolley with two, one at each rail

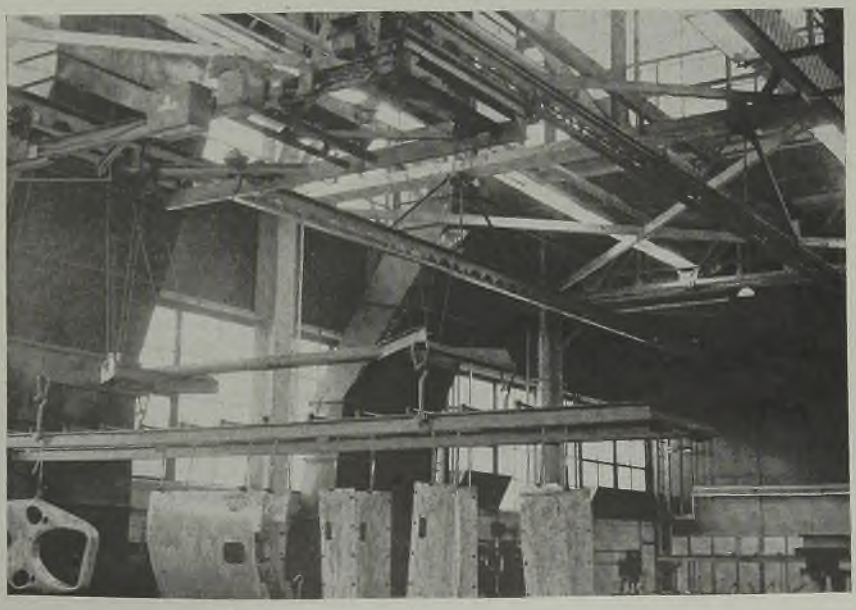

Fig. 8 (Above)—Level roller conveyor acts as shuttle bed for a drill press working on jigs. Sideways motion available allows operator to center heavy parts under the drill. Conveyor is 8 feet long and variable in height

Fig. 9 (Top)—This belt conveyor travels slowly enough that it can be used as a work-bench for deburring holes and edges of aluminum sheet skins which previously were drilled and routed. Finished pieces are removed at the end of the 70-foot long belt

Fig. 10 (Bottom)—An unusual two-level wheel conveyor table, developed in the plant, is used by the mold loft department to imprint designs of master templates on subject templates for body sheets and other sections. Operator alternately raises or lowers the decks to printing table level as needed. Table is 31¾ inches high, 50 inches wide and 169½ inches long

under the drill. Conveyor is variable in height and is 8 feet in length.

Belt conveyors also have an extremely important place in the scheme of things, many times serving in dual capacity of transportation medium and assembly or fabricating workbench. Fig. 9 demonstrates use of a belt conveyor as a workbench. Here aluminum-sheet skins, previously drilled and routed, are placed on the slowly moving conveyor and edges and holes are deburred. Finished pieces are removed at the end of the 70-foot run. Belt on which work rests is 30 inches wide and travels at a height from floor of 36 inches. Rollers are 1⅞ inches in diameter and are on 6-inch centers. The radio and electric department at this Curtiss-Wright plant employs a 24-inch moving belt for assembly work. Parts bins are mounted in permanent racks above the belt so that assemblers, who are seated at the belt's edge, need not leave their stations to replenish supplies. Belt is supported on continuous wood flooring 34¾ inches high. Length of two such installations is 150 feet, each accounting for half the distance. A ½-horsepower motor powers the conveyor.

Fig. 10 shows an unusual 2-level wheel conveyor table which was developed at the plant for the mold loft department. Master template and subject template (for fuselage or other plane sections) are placed on different decks of the table. Operator alternately raises or lowers decks to the printing table level as required. In this manner, the design of the master template can be imprinted on the subject template. Each template is supported by a preloading sheet. Power is supplied by four AM-90 Senacon motors. Table is 31¾ inches high, 50 inches wide and 169½ inches long. Wheels have a diameter of 2½ inches and are staggered.

In the final assembly line, where the Helldiver is completed, a heavy drag chain is set just above the floor level. Pusher dogs are located at intervals in the chain. These bear against steel push plates attached to the bottom of large assembly dollies which support the entire plane. The drag chain, moving slowly, carries the ship past successive stations where workmen perform their assigned tasks. At the end of the line, the plane is removed from its supporting dolly and immediately prepared for its initial flight.

This dolly is equipped with V-shaped wheels which fit on to notched rail. Except for lunch hours or emergency stops, the assembly line moves continuously, on an average of about 22½ hours out of each 24. Although the chain in the final assembly line moves 160 tons of planes and dollies, it is pulled by an electric motor rated at only 1 horsepower. This is the result of an extensive gear reduction system between motor and chain.

The 160-ton weight which must be pulled requires a chain with sufficient ruggedness to pull the load safely and at a steady speed. After extensive tests, a chain made by Jeffrey Mfg. Co., Columbus, O., was selected as the right one for this purpose.

Shot Blast Department Features Pellet Recovery

Abrasive handling and reclaiming system in the shot blast room recently installed at the Emeryville, Calif., plant of Westinghouse includes several new features.

Rust and scale are removed from transformers and marine battery cases before painting by shot blasting with steel pellets slightly larger than a pin head. These are driven at terrific speed by compressed air at 100 pounds per square inch from ⅜-inch nozzles. As the steel shot falls through the perforation in the floor, pellets are collected in large bins which in turn feed a regulated amount on endless conveyor belts.

These belts dump their loads on a vertical bucket belt which returns the shot to the mixing chamber. Air introduced at 1100 cubic feet per minute removes dust and fine particles.

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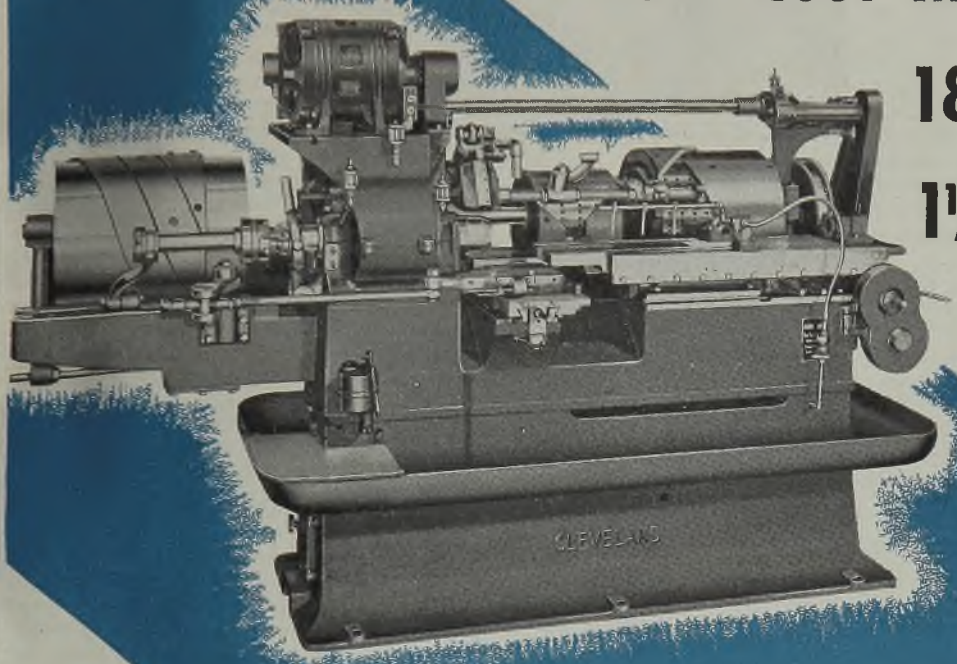

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Efficient Die Operations

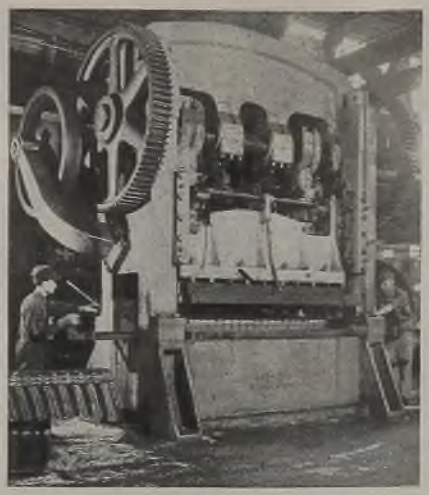
(*Continued from Page* 87)

special machine adaptations and die designs are outstanding. To provide some technical understanding of them, the fabrication of the airplane landing mat will be described and several additional special operations will be discussed—all having utility in postwar production.

The pierced plank type airplane landing mat (hereafter called the "plank") has a finished size of 15 inches wide, 9 feet 11/34 inches long, is of 10-gage mild steel, has three rows of 29 holes, each 2⅝ inches in diameter, with 30 flanged bayonet-type fasteners having lug holes intersticed at each edge. Weighing 89 pounds as received, finish weight per plank is 62 pounds. More than three 50-ton carloads of scrap are conveyor loaded for shipment each week. Each plank covers 12½ square feet and is bundled for shipment in units of 30 with 20 bundles to a carload, weighing 101,550 pounds.

Steel planks are received flat, slightly over 10 feet in length and are trimmed with a fractional overage on both ends. Since end trim shape varies, two progressive dies are required, both being mounted on the same press enabling the operators, after first trim, to pass the plank between upper and lower dies after which the plank is placed in position for second trim on the far side of the press as another is being placed for the repeated first trim; thus facilitating both operations with minimum time and labor. Much of this work is done on Chicago 180-ton and Verson 260-ton press brakes.

After end trim, the planks come to a Cincinnati press where two corrugations are made in the 18¾-inch sheet, each 2½ inches from longitudinal center. Controlled by stop gages, two successive operations (work and turn) create ¾-inch corrugations to result in an effective 15-inch width. Planks are then stacked preparatory to punching.



Tubulating or flanging pierced holes in airplane landing mat planks, using 450-ton press

The entire punching operation is interesting. The Verson 225-ton punch press, containing a series of 29 dies in-line, is skillfully designed to perforate the planks with 2¼-inch openings on longitudinal centers, there being three rows or 87 holes to be thus punched. This is accomplished with three press strokes; moving the plank from front of press to rear, the successive three steps being controlled by stop gages. Openings are spaced 5 inches on cross centers from longitudinal center of plank. (The lay of the sheet is reversed for bayonet punching later.)

This 29-hole gang die is 12 feet long, 12 inches wide, 15 inches high. If the punch stroke was straight on, the load factor would be 600 tons, far past the capacity of the press. Further, such a punch would cause terrific distortion. So a staggered design of these punches is used, stepped back ⅛-inch in depth in a pattern so that they do not all hit at once.

Entering end of punch is cut at an angle so they have about a 1/3 shearing and 2/3 punching action. The gang dies have a tool steel tip of 2½ inches fitted into a mild steel shank by means of a counterbore with an Allan safety set screw having a hexagon hollow head set in the tool tip which can be reached by an elbowed wrench and removed, changed and tightened in less than 5 minutes.

Another interesting feature is the special designed stripper of this press. There is a 250-ton stripping load involved which grows greater as the punches get dull. A beam was added to the press between its 11-foot span and topped by a larger beam. Six stripper rods were installed at 18-inch intervals to support the stripper plate across the press, there being no room except for such a plate. By this means, all bend and "give" of the stripper is eliminated. The press has an automatic oiler and an endless belt to remove the punchings which automatically drop upon it. It is interesting to know that none of this tooling has been changed in the past 26 months.

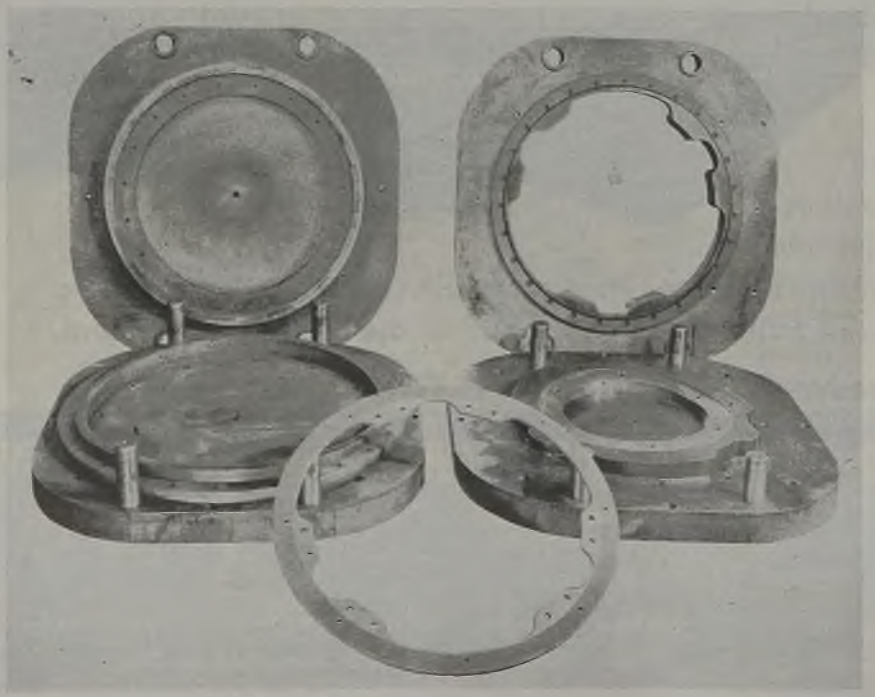
Progressive Dies for Three Operations

The perforated planks are moved to a 125-ton Verson press equipped with progressive dies to accomplish the next three operations: (1) trimming the sheet to exact width, (2) forming the bayonet hooks or lock, (3) punching the slots that receive the bayonet hooks. There are 30 slots and hooks on each plank side. The dies locate by two pairs of two "peter" pins which hit the holes with a taper and develop a tolerance of 0.005 to 0.006-inch. This cannot accumulate because location is made on progressive gang center. The punches are staggered in height and have some shear in them.

Six strokes are required to complete forming of hooks and slots, the dies being arranged in a progression of three. The tool bars for the press are high-carbon, high-chromium steel. The progression through the press is controlled by stop gages. Dies are lubricated manually. A new 250-ton Verson is being installed that will accommodate two sets of these dies, side by side.

After bayonet hooks and slots are punched, the work moves to the tubulating press where in two passes and one

(*Please turn to Page* 126)



These inside and outside dies produce the large plate shown for mounting an aircraft engine in a shipping case. Dies cut 115 *lineal inches of the ½-inch steel plate. Note die height changes around periphery, enabling shearing action to be stretched out so that* 700*-ton press can do this job ordinarily requiring* 1150 *tons*

BIG GAME HUNTING 1944 STYLE

IN PRE-WAR DAYS, bringing down one of the huge animals of the jungle single-handedly was considered quite a feat—even when it was accomplished by a skilled marksman.

But today thousands of infantrymen, paratroopers and Marines are bagging far bigger game—30-ton tanks and reinforced concrete pill boxes. They're doing it with the grenade adapter—a weapon which converts the ordinary rifle into a death-dealing artillery piece. By hurling grenades at long range and with great accuracy, it gives the foot soldier offensive and defensive power against the most formidable land armament modern warfare has devised.

WELDED STEEL TUBING plays an important role in the construction of grenade adapter equipment. It forms the part which engages the device to the rifle barrel. Fabricating it calls for extreme accuracy of manufacture as well as A-1 materials.

We are busy making grenade adapter tubing for the armed forces — giving it all the skill and experience acquired in many years of tubing manufacture. This, plus other war assignments, is at present utilizing our entire capacity. We are ready, however, to offer assistance on plans calling for the use of WELDED STEEL TUBING or Steel Forgings, and to lend a hand in their realization whenever war needs become less pressing. If you have a problem on either of these items, get in touch with us. You will be under no obligation.

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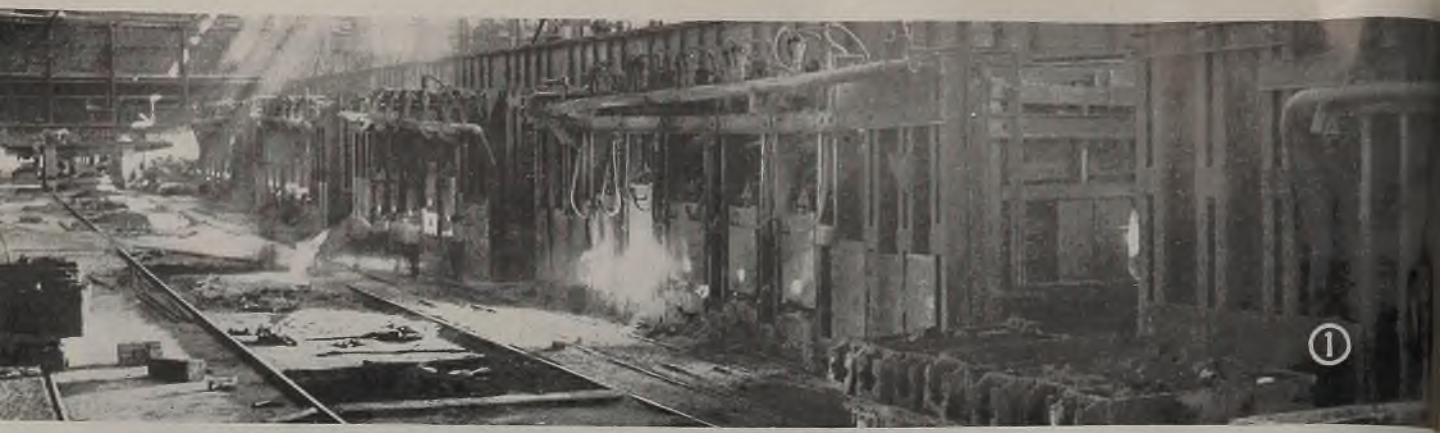


Forging Shot from Alloy Bar Stock

Kansas City plant—first in the United States to use cupola-melted scrap in the form of hot metal with cold charge in the open hearth—swings on to production of armor-piercing shot steel early in 1942. Unique procedure for producing the forgings is employed

ONCE considered the backdoor of the industrial East, Kansas City is destined to be recognized as the front door to the industrial West. This city is the home of Sheffield Steel Corp., a subsidiary of the American Rolling Mill Co. Sheffield gets its name from a way station located at its site which was the end of the run in the old horsecar days, and not from company intent to attempt to plagiarize the reputation of the Sheffield steel of British fame, as is sometimes mistakenly thought.

Kansas City at the outset of the war began the fabrication of a wide list of important war products. War's end will find it tooled for great industrial expansion. The city sets in the heart of an area that normally generates huge demand for all manner of farm, oil and mining equipment which can now be better answered by Kansas City industry with its advantages in freight rates and its effective delivery reach into 14 states. Possessing the tooling, engineering and that accumulation of skills which war production has brought, Kansas City also has the one prime essential, the source of steel at its elbow, capable of filling any fabricating requirement.

Sheffield Steel produces a great diversity of items, the total being 70 even before Pearl Harbor. The company evolved from the Kansas City Bolt & Nut Co., organized in 1887 particularly to produce a special bolt for the great railroad building expansion. Gradually it extended production until its 1909 catalog evidenced fabrication of bolts, nuts, rivets, washers, rods for building and bridge construction, patent grip thread track bolts, drift bolts, turnbuckles, forgings, merchant bars and bar iron.

After talking to a number of the officials of this company, one is impressed with the spirit of co-operation that exists through the entire organization and begins to suspect that much of the success that has been achieved by this pioneering industry has been obtained because of this factor. The individuals in the company say so themselves.

Much emphasis is placed by this group upon organization thinking, rather than upon individual thinking. The employes are not seeking individual credit for what has been accomplished. In talking with a number of executives, it was evidenced that these men were only voicing the accumulated knowledge and experience of the combined organization. One official stated:

"The steel industry was skeptical of the future of our first steel plant built shortly before 1920 and questioned the production of steel in an isolated area so far removed from the conventional raw materials. There was no pig iron, coal or coke here. About this time, however, scrap was first beginning to come on the market in large quantities from the obsolescence of automotive, railway, oil field and farm equipment. We became pioneers in the 'all scrap' process of open-hearth steel production. The open hearths at Kansas City were the first to be built west of the Mississippi River and east of the Rocky Mountains.

"In this vast area, steel in any one shape or form was not used in large quantities and to produce the volume necessary for economic production of steel, it was necessary to widely diversify and convert the basic steel into a large number of products. It was necessary to retain the old products manufactured by Kansas City Bolt & Nut Co. and to add many new products.

"For example, we are the only company in the country continuing to produce wagon box and singletree strap sections by the rolling mill method—but we have added many new specialties, including wire products, bolts, grinding media and highway guard rails.

"We have become the variety store of the steel industry.

"To maintain our earning position, which even through the depression years was satisfactory, we have restricted our shipments to those territories where the transportation cost from our mills is equal to or less than the transportation cost from competitive mills. The cost of transportation in steel items is a high ratio of the selling price. This represents important problems of economics in the steel industry. Actually, in some categories, any margin of profit that is left is made on savings in freight."

Location Is Advantageous

In terms of the surrounding area's demands, the plant has a favorable freight rate spread from the Rocky Mountains to the Mississippi and from the Gulf to the Duluth breaking point; creating a favorable market area in Kansas, Missouri, Nebraska, Iowa, Oklahoma, Arkansas, Colorado, Texas, Minnesota and South Dakota. The company maintains a small plant at Sand Springs, Okla., and has been operating a new plant at Houston, Tex., which will produce a variety of items, varying from nails to structural steel. Planned in 1936, the plant at Houston will not only serve the company's southern customers in Texas and surrounding states, but will be in a position to advantageously serve the water borne industrial markets of the world.

So, on the banks of the Blue River on Kansas City's outskirts, this company is set up to supply many expanding industries, soon to be galvanized into extensive enlargement, such as, Union

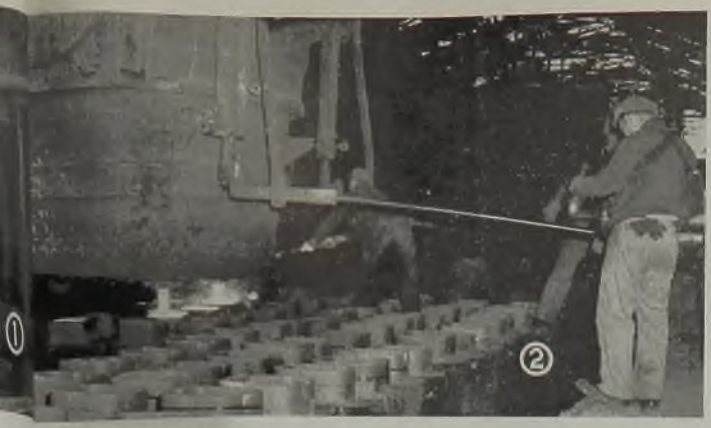


Fig. 1—Charging floor in open-hearth shop

Fig. 2—Top pouring a heat of open-hearth steel from a 2-nozzle ladle

Fig 3—Tapping a heat of open-hearth steel

Fig. 4—Bottom pouring a heat of open-hearth steel. Fountain which feeds various molds is shown at right

By G. Eldridge Stedman

Wire Rope Corp., Butler Mfg. Co., Darby Corp., Kansas City Structural Steel Co., Missouri Valley Bridge & Iron Co., and others, all of whom purchase a portion of their requirements from Sheffield Steel. It will be able to supply alloy steels in volume as needed; this facility having been greatly enlarged by its war production of forged armor piercing shot and its prior development of Moly-Cop forged grinding balls.

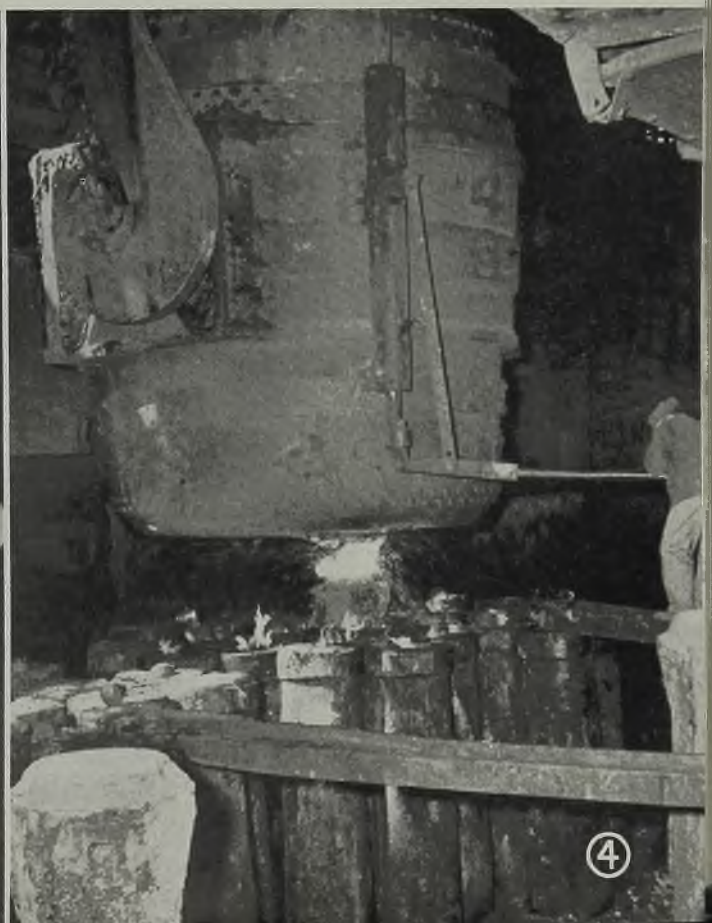
The company developed a method of combining cupolas in conjunction with open hearths to speed up the using of "all scrap" in a semiblast furnace technique. This was the first such operation in the United States. The method uses 30 per cent hot and 70 per cent cold metal charge in the open-hearth furnaces. There are five 110 gross ton open-hearth furnaces. Herein, everything is produced from ingot iron to alloy steel. From 120 to 125 ingots are cast per heat. Cold charging these open-hearth furnaces would create too much bulk interference and so a technique of 30 per cent hot metal was originated.

Two cupolas operate alternately, pouring into a 200-ton holding furnace, the pour being continuous at the rate of 20 tons per hour. Each cupola operates for 72 hours, after which time it is shut down for relining at the tuyere zone.

The cupola is charged with scrap, limestone and coke by skip hoist. From the cupola the metal pours into the holding furnace, then into a transfer ladle by which it is charged into the open-hearth furnace to meet the 70 per cent scrap which awaits it. The addition of this 30 per cent hot metal produces swift reaction and the total charge gains temperature fast. The liquefaction with coke carries 3 per cent carbon, and is desulphurized with soda ash. From the open hearth, the steel is tapped into a 125-ton ladle, from which it is teemed into ingot molds; approximately 60 per cent being bottom-poured and the balance top-poured.

To tap and top-pour 110 tons of special alloy steel into ingots requires a double pour from two nozzles. Otherwise, the pouring time would be too long. The temperature drop from tap to finish pouring creates the problem of maintaining uniformity.

In bottom pouring, a fountain reservoir serves the molds from a center hole. The metal is poured into this by a single nozzle. The flow is in six legs, radiating from the hub of the fountain, each of which guides the pour into five mold openings or 30 ingots in a group, the steel entering the molds from the bottom by this pouring method. The main idea in this, because of the small ingots, is to reduce the number of openings of stopper and nozzle for they create excessive wear. Pouring 30 ingots at a time, the nozzle remains in good condition. Im-



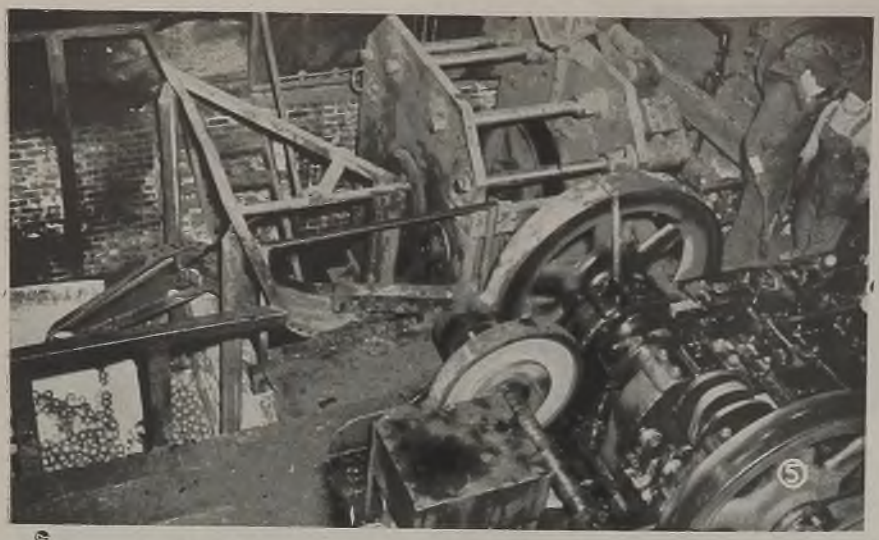


Fig. 5—Machine for grinding ball forgings

proved surface conditions result from bottom pouring as compared with top pouring; therefore, all steel not requiring hot-top practice is bottom-poured.

In top pouring, the steel is teemed from the ladle directly into the open top of the molds and two nozzles are employed, filling two molds at one time. All of the top-poured ingots are hot topped which reduces the amount of pipe and increases the amount of recovery in the manufacture of high-grade steels.

The problem of hot-topping heats, a natural difficulty in small ingot pouring, has been brought under control by the company's technicians. There is the danger in this of excessive inclusions. This problem is naturally multiplied by the larger number of smaller ingots. Molds must be throughly cleaned. Rigid laboratory analysis, low percentage of ingot rejects, and customer satisfaction indicate the excellent results accomplished.

Subjected to Rigid Tests

A metallurgical laboratory with complete chemical and physical equipment under direction of a chief metallurgist and several assistants, is maintained. On shot steel and other alloys, a wafer is taken from a billet at a point corresponding to the top of each ingot, and macroetched for observation of conditions of porosity, piping, etc. Physical tests are made on all products for tensile properties. A complete physical testing laboratory includes facilities for special tests for many products, which include complete stress-strain diagrams, impact tests, fatigue tests, and hardness tests. Extensive research facilities have been provided for all phases of annealing and general heat treatment, including salt baths, lead baths, oil, water and brine quenches. This equipment is all under automatic pyrometric program control. Photomicrographic equipment with capacity to 5000 diameters is used to make metallographic observations of grain structure and faults.

For years, the company has been marketing alloy steel grinding balls under the name "Moly-Cop." The "know-how" developed in producing and forging this alloy has been of great assistance in the manufacture of armor piercing shot.

In 1941, the Ordnance Department gave the company a contract to make one million 37-millimeter armor piercing shot forgings. The steel specified was WD-4150, which is a chrome-moly alloy and was made in the open-hearth shop. In the spring of 1942, the company also began a substantial production of semi-armor piercing shot steel for 75-millimeter and 3-inch shot. At the start, it was suggested that the company's No. 7 alloy, developed for grinding balls, should make a good armor piercing steel. This grade could be made without the use of chromium, which, at the time, was critical. Ballistic tests made on shot made from this alloy were so satisfactory that at one time Ordnance considered using this grade or a similar grade as standard specification, particularly on smaller caliber shot. There was a considerable saving in chromium and manganese in this grade, both of which were then critical. The molybdenum content of the alloy was approximately the same as WD-4150 (approximately 0.2 per cent in each case) while comparisons of the critical element were—in 4150, 0.60 to 0.90 manganese, 0.80 to 1.10 chrome —in the No. 7 alloy, 0.30 to 0.50 manganese, no chromium. However, molybdenum soon became more critical than chromium, and manganese became less critical, so that, with few exceptions, WD-4150 alloy specification was retained as the Ordnance standard.

Fig. 6—Grinding balls being conveyed through quenching medium

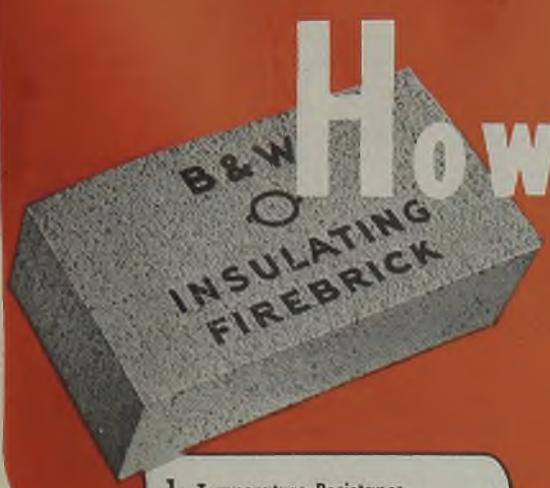
Most of the original Monoblock shot (one-piece) were machined directly from hot rolled bars. A three-piece shot was later adopted by Ordnance. Because of the more complicated shapes required in this three-piece shot, which, if machined from bar required more machining and excessive scrap, and because steel was becoming more critical, forgings were required by the machiners rather than bars. Equipment for making these forgings was installed in the latter part of 1942.

Hardness Must Be Removed

The first requirement, of course, in the production of an armor piercing shot is to have a steel that, after machining, can be heat treated to provide the proper ballistic requirements, but to be supplied in an annealed condition for ease in machining. Roughly speaking, armor piercing shot must pierce face-hardened armor of a thickness approximating the diameter of the shot and must go through the plate intact, there to explode. Steel, from which shot of these ballistic requirements are made, air hardens after rolling to a brinell of 300 to 350 and for machining purposes must be annealed.

Also the surface of the bars must be free from defects which would not be eliminated with the customary machining practice for armor piercing shot. The practice followed in rolling and conditioning the steel is, therefore, first to roll the ingots into 4 and 5-inch billets. Then the billets are given a slow cool from the mill finishing temperature. After 48 hours they are ready for surface conditioning. They are preheated to 400 degrees Fahr. and skin-scarfed with an oxy-acetylene scarfing torch. Thus a steel with a clean surface enters the reheating furnace to be reheated to 2200 degrees Fahr. It then is withdrawn and rolled into required bar size.

The bottleneck at the plant was not the capacity of its open-hearth furnaces, but its annealing capacity. Such annealing furnaces were simply not to be had so the management resorted to home-made annealing facilities. Within three months, enough annealing equipment had been improvised to remove the bottleneck and to supply 4000 tons per month of armor piercing alloy of 2 7/16 and



HOW TO EVALUATE INSULATING FIREBRICK

1. Temperature Resistance
2. Light Weight for Low Conductivity
3. Stability
4. Volume Change
5. Manufacturer's Responsibility
6. Value

2

light weight for low conductivity

The fuel and money that an otherwise suitable insulating firebrick can save—or waste—is shown by a simple and generally reliable index. It is the weight of the brick. The lower the weight, the lower will be the heat conductivity and fuel consumption. With rare exceptions this easily applied rule will measure the true life-term cost of an insulating firebrick.

The conductivity rating is a more scientific measure of thermal efficiency, but unless such ratings are obtained by the same test method, they are not comparable. It is best to compare ratings based on the authoritative ASTM-182-43T test method.

Your local B&W representative will gladly help you make this evaluation for your furnace applications. He has data on the weight and heat-conductivity of B&W Insulating Firebrick, and can also supply information on the other five ways to evaluate insulating firebrick—for greatest overall economy.

THE BABCOCK & WILCOX COMPANY

85 Liberty Street *Refractories Division* **New York 6, N. Y.**

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BABCOCK & WILCOX

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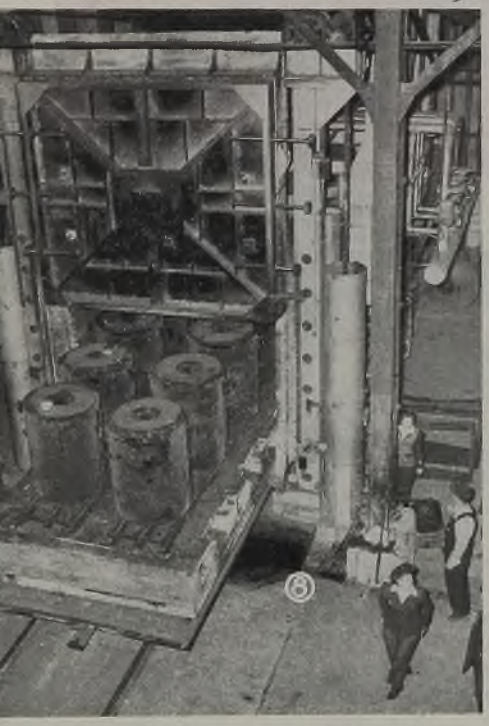


Fig. 7—Boxes in which steel bars are annealed

Fig. 8—Car-type annealing furnace for forgings

Fig. 9—Photomicrographs showing annealed structure representative of 4150 grade AP shot. Steel annealed in zonolite insulated boxes. Left to right: 100X, 1000X, 3000X and 5000X

3 1/16-inch diameter round bars.

A box anneal, using a Zonolite insulating mat to retard cooling of the bars, is employed. Work is received direct from the rolls at 1800 degrees Fahr., is held on the mill's cooling bed to about 1500 degrees Fahr. and at that temperature, is loaded into special designed annealing boxes. These are open top, all-welded steel boxes 4 feet wide, 3 feet high and 14 feet long; insulation thickness being governed by length of the legs of angles which support the boxes from inside. This insulation is vermiculite of the mica family. From the mill cooling bed, fed under rayotube control at 1475 degrees Fahr., the bars are hot sawed to box length of 12 feet. They then move down into the pusher and are shoved into the annealing boxes. The annealing boxes when loaded, are removed by crane, stacked on top of each other and submitted to slow anneal for 72 hours, after which the bars have a brinell of 207 to 229. Since the insulation causes a heavy dust when the discharged annealing boxes are dumped a machine was designed to dump from the top, trap the dust in a collector and carry it off.

This annealing technique develops an exceptionally good machining structure. It is a coarse lamellar pearlite, accomplished by the retarded cooling. The transformation point is approximately 1325 degrees Fahr. and the extended time provided for the work to go through the transformation range controls the quality of the lamellar phenomenon. This special annealing cycle is so retarded that 12 hours are consumed through the transformation range which produces the pearlite required for such excellent machinability. The coarse lamellar structure requires the machiner to use a different type of heat treatment, involving more soak than conventional. But when the heat treatment procedure is once established, he is then able to obtain excellent ballistic results.

When the bars are removed from the annealing boxes, they are descaled with an acetylene flame, and then pickled, machine straightened and subsequently cold sawed to multiple shot length.

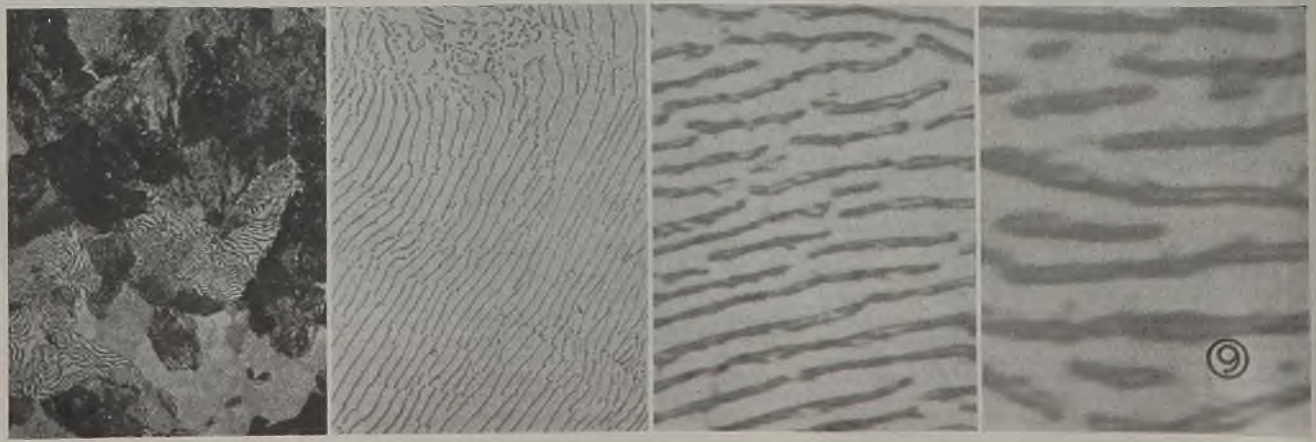
Fortunately the mill was adaptable to this method. An old type hand mill, originally installed to roll iron fagots into finished bars was converted. This was possible because it was a slower mill and, had it been larger, the adaptation would not have worked as well.

As previously stated, a portion of the requirements for shot changed from bar stock to forgings and at the present time forgings are being supplied as well as bar stock. The company's experience in forge shop work had extended over a number of years. Although it had some equipment adaptable to forging shot, a new forge shop was built in the latter part of 1942 for this purpose. Both body and cap forgings are produced.

Produces New-Type Shot

Another interesting metamorphosis of the shotmaking business has been the reforging of original Monoblock shot into the new type three-piece shot (explosive type). At the present time, the new forge shop, is occupied on part of the Ordnance Department's requirements of this reworked shot in the 57-millimeter size, supplying them to several machining facilities. In this reworked forging, extreme accuracy is required because of the slight amount of excess metal provided in the original forging. The work is heated in two gas-fired forging furnaces from which the work is discharged by hand into 2, 2½ and 3-inch forging machines. The entire forging cycle requires 15 seconds. After forging the shot is gaged for concentricity, outside diameter and length. Shot to be reworked is received in the plant in the original cartons—is unboxed, debanded and normalized, then forged.

As conventional annealing equipment



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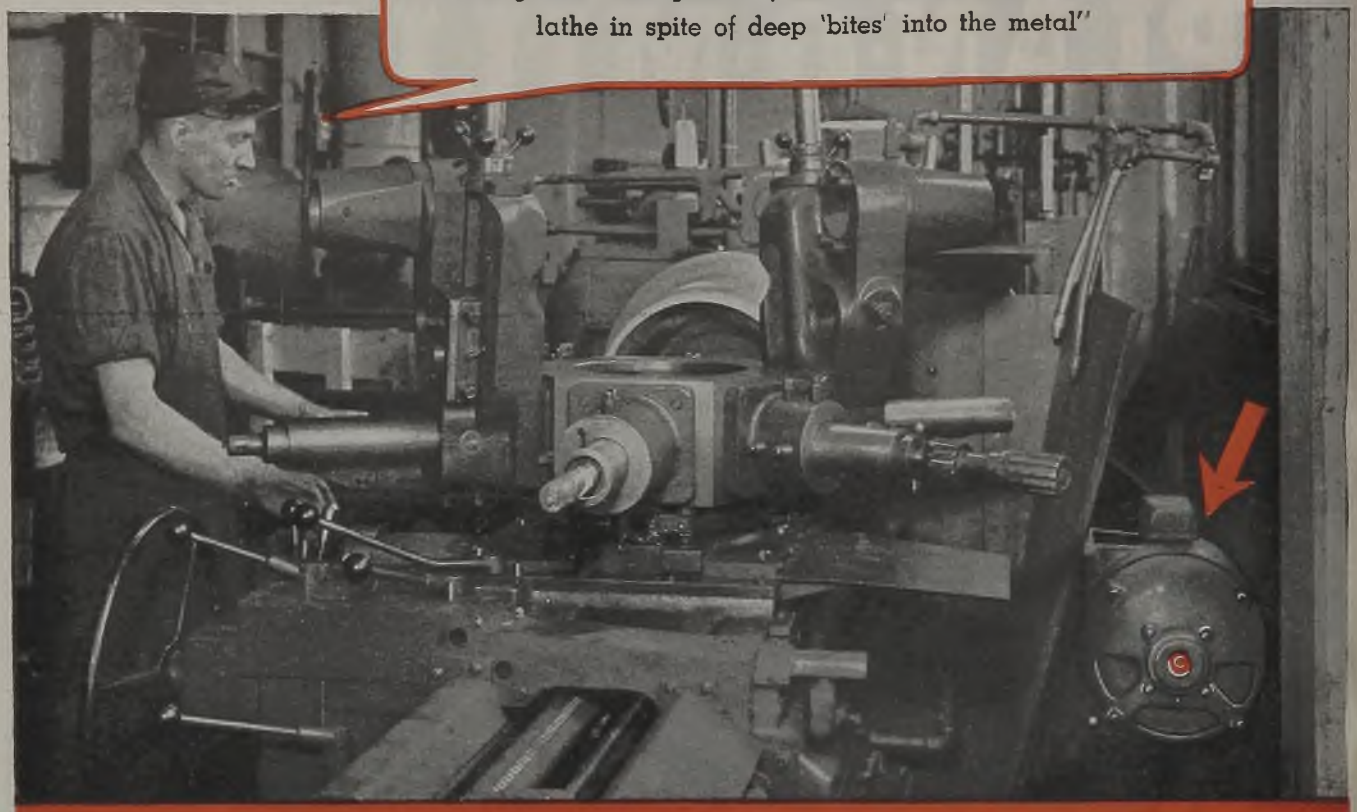
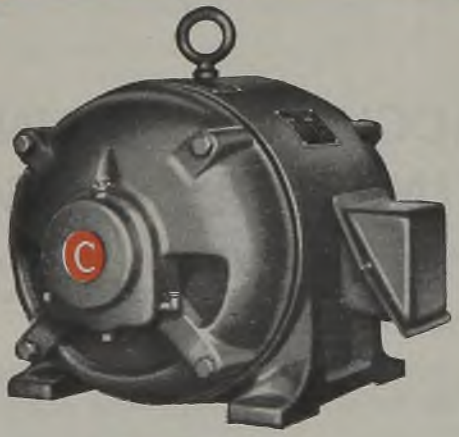
"No grunts and groans from the Century motor on this lathe in spite of deep 'bites' into the metal"



CENTURY FORM J MOTORS Provide Extra Protection Against Falling Solids and Dripping Liquids



The Century Form J Squirrel Cage motor is ideal for machine tool applications such as the lathe shown above.

The 10 horsepower Century motor on this job furnishes adequate power for the deep rough cuts and the unusual freedom from vibration also contributes greatly to precision operations, when they are performed.

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Get complete information on the advantages of Century Form J motors — and the complete Century line, from 1/6 to 600 horsepower. The wide experience of the Century field engineer may prove valuable to you. He'll be pleased to help you with your problems, whether for today's production or your postwar plans.

C Century MOTORS

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CENTURY ELECTRIC COMPANY, 1806 Pine Street, St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Fig. 10—Machine for forging 57-millimeter shot

Fig. 11—Machine for forging caps for 57-millimeter shot

became available, car-type annealing furnaces for annealing bar stock and smaller batch type furnaces for annealing forgings, were installed, so that the plant now is in a position to supply a variety of annealed structures. It still has many requests, however, for the structure obtained by the box-type emergency method, which structure is best obtained by this method, and continues to use this method of annealing for some of its customers.

The shot forging practice from bar stock is somewhat unique. The bar is cut into a slug in sufficient length to make two forgings. It is given a forging heat of 2100 degrees Fahr. and upset first on one end and then on the other into two finished forgings on 2½ and 3-inch forging machines. By this method, after the first forging is produced, it is used for a tong hold while the second forging is being produced. The two forgings are then separated by hot sawing and thrown into a container to delay the cooling rate, annealed in vat type, gas-fired furnaces of 2-ton capacity to bring out proper characteristics. The forgings then are shot blasted outside and inside, finally inspected, and are then ready for shipment to the machining companies.

Grinding media was one of the most important of the company's many diversified items prior to the war. These balls, from ½-inch up to, and including, 12-inches diameter, are used for grinding cement, ore, coal, plastics, abrasives, enamel and paint. The company produces one grinding ball 9¼ inches diameter which is used in a horizontal race of a coal pulverizing mill. Copper, lead, zinc, gold, silver and other mines use these balls in mills ranging in diameter from 5 to 10 feet. The ore is ground wet in these mills. The mill output depends upon many variables, such as type of classifier, percentage of water, mill speed, liners, size and kind of ball. Some 20 variables affect this result, all of which must be synchronized. The forged balls are fracture-free and near tool steel in quality. They present excellent possibilities in molybdenum alloy tonnage. The success of the structure used in balls suggests many possible improvements in bar and knob-type mill liners.

The plant includes many types of equipment. For example, spike machines each turn out spikes at the rate of 70 kegs of 200 pounds each eight hours. These are produced from mild steel square rods, 22 feet in length, in ½, 9/16 and ⅝-inch sizes. The machine first cuts and points in the same operation; then grips and heads each spike with the metal at 1950 degrees Fahr.

Batteries of machines cut and blank nuts and bolts of every size and description. Other machines are fed by coils of wires lengthwise and crosswise to 24 electrode positions for simultaneous spot-welding on a 9 x 12 foot frame to form reinforcing mesh. Some machines have been in the plant from the start. The management makes use of everything, revamping much of the old to more automatic function. For example, the first shot cap forgings required by the emergency were made on revamped tie plate presses.

Again, faced with the rework of the 57-millimeter Monoblock shot and being unable to find a heat treating furnace, it revamped its original ball furnace to normalize these. Arranging a lever control at the charging end, the shot are charged into the downslant of the furnace through eight V-slots along which the shot are pushed through the heat cycle to the discharge into a metal tray. Four staggered, gas-fired burners supply a progressive heat up to 1600 degrees during a 15 minute soak, the work moving by lever-assisted, gravity flow.

Recent Design of Fans Furnished in Bulletin

Studies have shown that at 110 degrees Fahr. a man's working efficiency has dropped about 90 per cent. Information on recent designs of man-cooling equipment is furnished in a new Bulletin 160-6 on "Heat Killers", published by Coppus Engineering Corp., Worcester 2, Mass.

Two types of portable heat killers are described in the bulletin. One type, the Vano, provides moderate volumes of air, at high velocities, through a long horn-shaped diffuser. It is recommended for applications where the cooling air is required at a specific, comparatively small area or where one man is working alone. Stationary guide vanes, mounted in the air stream beyond the fan, direct and concentrate the air current, eliminating eddies.

The Aeroplane type moves large volumes and is recommended for large areas or where several men are cooled by a single fan. Both types have fan casings, therefore, they exclude all stale air from being recirculated. However, by moving considerable quantities of secondary air, extra cooling is provided at no extra cost and the relatively small heat killer is claimed to give the results of larger screen-enclosed fans.

Other uses suggested include cooling off furnaces, electric motors, etc.

New Blooming Mill Put Into Operation

Operation of the 36-inch blooming mill of the Kaiser Co., Fontana, Calif. started rolling June 17. The bloomer will supply billets and blooms to the new structural mill to be ready for operation in a few weeks. The electric furnace installed at the east end of the open-hearth shop made its first heat of alloy steel June 18.

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 non-exclusive 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, metal working, 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. 22—METAL FOUNDING

LIST OF ENEMY PATENTS

DESCRIPTION	PATENT NO.
Method of producing type or type blocks	1671620
Casting mold	1575995
Stereotype plate casting machine	1887917
Casting machine for semicylindrical printing plates	1932580
Plate depositing table for casting machines	1942243
Stereotyping apparatus	1976540
Matrix holder	1614479
Core molding apparatus	1968703
Sand core forming apparatus	2025404
Core peeling device for foundries	1735890
Coremaking for cast pipes	1789643
Apparatus for the mass production of cast articles	1925890
Means for making double sided molds	1781451
Universal grate bar molding machine	1652332
Molding machine	1573009
Lowering device in molding machines	1905358
Sand thrower for foundries	1697160
Sand distributor for filling molding boxes and the like with molding sand	1865145
Centrifugal mold filling apparatus	1894877
Mold and core making	1923237
Molding by sand blowing	2107814
Casting machine	1734316
Automatic casting machine for metal bars as used in composing machines	2012189
Electric induction furnace	2133634
Chill for continuous string casting	2131307
Continuous casting apparatus	2268100
Die casting machine	1920620
Method of casting metals	2264456
Centrifugal casting machine	1567488
Metal casting machine	1581169
Apparatus for the centrifugal casting of hollow bodies	1648442
Process of centrifugally molding metals	1650987
Centrifugal tube casting apparatus	1815093
Apparatus for casting metals and metalloids	1876261
Apparatus for casting hollow bodies in chill molds rotable about vertical axes	1904831
Preparing open and closed hollow bodies by centrifugal casting	1921699
Centrifugal casting machine	2008196
Apparatus and method for making centrifugal castings	2026457
Apparatus for making centrifugal castings	2034692
Mold for centrifugal casting	2130726
Centrifugally cast pipes	2148802
Apparatus for the manufacture of molding machine and mold for the centrifugal casting of annular bodies	2159073
Apparatus for the production of goods by centrifugal casting	2208368
Apparatus for centrifugal casting of molten metal	2214133
Apparatus for the production of castings	2230514
Casting apparatus	1727518
Process and apparatus for casting metals and ceramic masses according to the centrifuging method	1823037
Muffle for use in connection with the casting of precious metals	2006148
Centrifugal casting apparatus for dental purposes	2009489
Metal casting apparatus	1673054
Device for casting metal in molds	1698441
Mold for casting metals and metal alloys	1888913
Production of metallic bodies by a combined casting and pressing process	1698010
Casting under pressure	1784600
Device for casting under pressure	1971652
Die casting and pressure molding machine	2088134
Die casting apparatus	2120333
Casting press	2206211
Casting machine	1566215
Casting machine	1573518
Die casting machine	1662750
Molding apparatus for making dentures and plates for dental purposes	1766113
Die casting machine	1638717
Method of casting with the aid of gaseous pressure mediums	1703739
Die casting machine	1793110
Casting apparatus	1694118
Casting vessel	2237723
Device for feeding the casting pots of linotype and similar machines working with soft metals	1903751
Ladle	1771114
Ladle for casting fluid metal	2098937
Ladle for low melting materials	1767975
Automatic machine for casting metal under pressure	1644054
Pressure die casting machine with device for uniformly controlling the movable parts by means of gaseous and hydraulic pressure media	1980533
Device for producing die castings from metal alloys in which the material to be pressed is forced from a pressure chamber under a high pressure into a permanent mold	2055944
Method for prevention of cracking of castings	1667642
Apparatus for casting under pressure in dentistry	1657475
Mold for aluminothermic welding of rails	1732382
Casting mold for aluminothermic welding	1760010
Casting mold for aluminothermic rail welding	1776601
Mold for aluminothermic welding	1793047
Casting mold for manufacturing zinc containers for galvanic elements batteries or the like	1856382
Apparatus for molding strut pistons	2107009
Apparatus for manufacturing compound castings	1843702
Mold for casting metal	1913358
Device for producing cast chains composed of single links	1920578
Chill mold for casting noniron metals	1774426
Chill mold	2101404
Supporting plate for chill molds	2153464
Apparatus for casting hollow bodies	2212844
Casting apparatus for first quality and refined steels	1693076
Casting runner	1890027
Apparatus for casting metal	1915022
Reversible base plate for casting steel ingots in molds	1997907
Ingot mold	2155283
Ingot mold	1884291
Casting mold	1776591
Auxiliary device for the production of hollow crowns of the teeth from cast metal	1704006
Core	1864451
Yieldable core for casting heavy hollow steel blocks	2170486
Cooling means for castings	1784346
Mold for casting metals	1615086
Water cooled mold	1895135
Apparatus for casting metal ingots	2119321
Chaplet	1775874
Stamper and hammer for foundries	1977851
Making sand cores	1802681
Method of producing casting molds	2211133
Method of manufacturing coating for permanent metal molds	1570969
Method of manufacturing mold powder ingot mold lining	2266734
Production of iron castings	1678655
Casting articles of corrosion proof steel	1684700
Method of casting copper alloys	1722124
Process for producing cast iron of any desired structure	1746467
Metal casting process	1966615
Process and contrivance for producing hollow bodies by casting	1971279
Process for manufacturing chilled hollow balls	2184257
Process for producing hollow cast blocks	2209519
Method of casting composite metals	2264457
Process for composite casting	1819722
Milling and like roll or cylinder and method of manufacturing the same	1659896
Method for uniting steel and bronze intimately with one another and improved mold for carrying out this method	1998516
Process for making engine cylinders with an inner lining	2166634
Accumulator	2176781