Time-saving equipment helps U. S. railroads handle huge volume of wartime traffic. Page 69

STEEL

The Magazine of Metalworking and Metalproducing

OCTOBER 25, 1943

Volume 113—Number 17

Published by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. E. L. Shaner, President and Treasurer; G. O. Hays, Vice President; F. G. Steinebach, Secretary.

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

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

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

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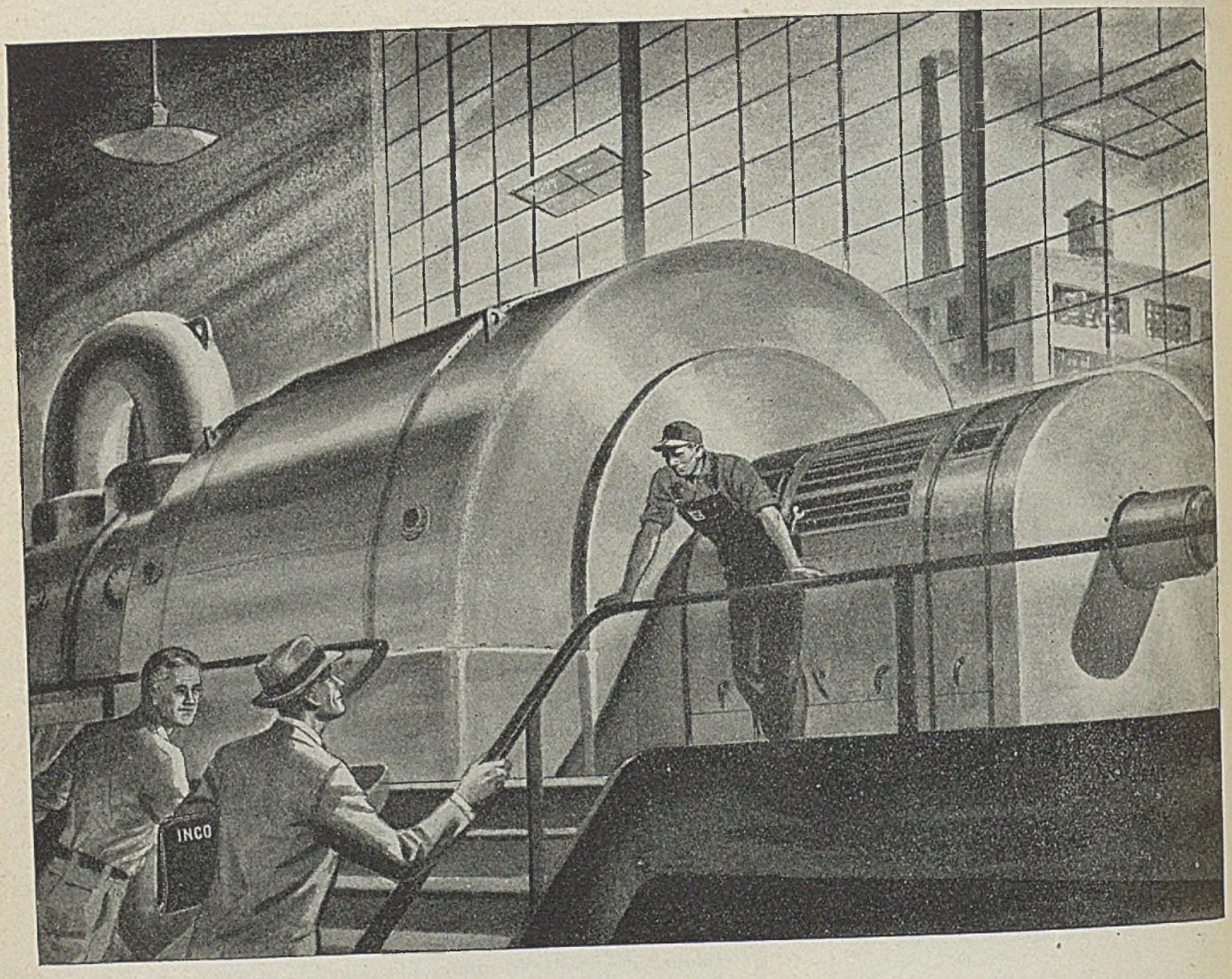

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THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

STEEL
October 25, 1943

Wartime Convention Magnet

Last week marked the peak of the fall convention season. Throughout the nation a dozen or more annual meetings of organizations identified with the metalworking industries were held and each reported an unusually large attendance.

It is not easy to explain why attendance at meetings of this kind has mounted in wartime. Certainly the man who travels to a convention today undergoes numerous hardships which did not exist in peacetime. Why is it that more people are willing to put up with the manifold inconveniences of the period in order to participate in the meetings of the organization of their profession, business or specialty?

One answer is that under the impetus of war, events are marching more briskly than ever before. The convention-goer feels that he must have more contacts to keep up with the parade of progress. His trade or technical associations, next to his favorite business or professional publication, are the best mediums for these contacts. This undoubtedly is one reason for the heavy attendance at conventions.

Another clue to the motivating attraction of conventions is found in the character of discussion. The programs of most meetings held since Pearl Harbor have been built around the theme of producing more effectively for war. Thousands of sessions have been devoted almost exclusively to production technic. The "know how" of intensive production has been disseminated widely and quickly by means of these convention war clinics.

Recently a new note of interest has crept into convention discussions. Production for war still is the predominant theme, but lately it has been difficult to discuss production for war without at the same time considering the after-war implications of the subject under discussion. This was a common characteristic of every convention scheduled last week. It has been noticeable in every meeting held during the last six months.

There are critics who declare that this disposition to think about postwar implications of wartime developments is dangerous—that it indicates complacency. We doubt whether this interpretation is correct. We believe that the men who have done so much to increase production for war feel more and more that their jobs do not end with the war but that the skill they have acquired for war must be carried over for use in peace.

This new intriguing idea of responsibility for after-war conditions may be the most potent of all present convention attractions.

A. I. S. C. LOOKS AHEAD: Effect of the war upon the steel construction industry has been extremely interesting. At first the industry was called upon to fabricate steel for war plant construction and the expansion of old plants. As the peak of this activity passed, the shops turned to other work—chiefly subassemblies for ship construction, barges, landing craft, etc.

This conversion has brought welding to the fore and it has also given the fabricating shops a wide experience in many operations not identified with bridge and building construction. A new versatility has been manifested which, taken in conjunction with the prospect of a heavy volume of postwar work, has made the steel construction industry guardedly optimistic about the future.

This more encouraging outlook was much in evidence at the twenty-first annual meeting of the American Institute of Steel Construction Inc. Clyde G. Conley, long-time president of the institute, cited figures indicating that the average annual volume of business in ten years following the war will exceed

(OVER)

the average annual volume of any previous decade.

We predict that some amazing things will be done with structural steel before the first postwar decade has passed. —p. 45

° ° °

POSTWAR TINPLATING: In view of the heavy investment in electrolytic tin plate lines and the long-term reliance upon tinning by the hot-dip process, there is much speculation as to what will happen when the wartime necessity for conserving tin has been lifted.

Apparently the answer still is uncertain. Discussion at the eighty-fourth meeting of the Electrochemical Society indicated that while many obstacles have been overcome—in canmaking as well as in electrodeposition—chemically-untreated 0.50-pound electrolytic tin plate has proved satisfactory for only a limited number of can applications. This and even heavier plate will not do for mildly acid processed foods.

A canmaker's representative predicts that after the war, canmakers will go back to the 1.50-pound coating. Whether the coating will be applied electrolytically or by hot-dipping will depend, in his opinion, "upon further research on electrolytic production lines as to the maximum weight of tin coating required to assure a service life equal to that of hot-dipped plate and also whether tin can be applied to the steel more economically by electrodeposition than by hot-dipping." —p. 66

° ° °

ACCELERATED PROGRESS: No one who attended the National Metal Congress in Chicago last week could escape the realization that war has speeded technological progress tremendously. Throughout the meetings of the American Society for Metals and the co-operating associations, there were evidences of new processes, new materials and new ideas of many kinds which, under the ordinary circumstances of peacetime, probably would not have blossomed into reality for years.

It is difficult to get a true perspective of the important elements which make for success in America's war effort, but some time in the future it will be possible to look back and to see clearly that this or that development was of prime importance.

When that time comes, it will be apparent to everybody that one of the biggest assets in our drive for victory is the ability, ingenuity and resourcefulness of the men identified with the metalworking industries. Credit is due them for our ability to do in two years what our enemies did in ten.

—pp. 39, 41, 42, 44

FEWER TEETH NEEDED? Arthur A. Schwartz, chief tool research engineer of Bell Aircraft Corp., has acquired a peeve against the indiscriminate use of multi-bladed milling cutters. He has a theory that a cutter should have enough teeth to load the machine but not enough to overload it. In many instances this will mean a cutter with from one to six blades.

A typical cutting unit conforming to Mr. Schwartz' ideas consists of four sections, each a malleable iron disc to which a single cutting tooth has been brazed. The four sections are mounted on the arbor so that the teeth are at 90 degree intervals. Thus one blade always is in the cut.

This departure from orthodox design produces a smoother finish and increases production. Many engineers and operating men who have heard Mr. Schwartz present his ideas are convinced that he has "something." It is quite possible that a new trend is in the making which may lead to significant changes in milling machine practice. —p. 76

° ° °

PROFIT LESS THAN 1%: Members of the American Machine Tool Distributors' Association attending its nineteenth annual meeting at Montebello, Quebec, focused their attention upon postwar problems. Underlying most of the discussion was the question, "How can we carry on effectively into the postwar future when, in the face of declining income, our reserves are being syphoned off almost to the bottom of the barrel by renegotiation?"

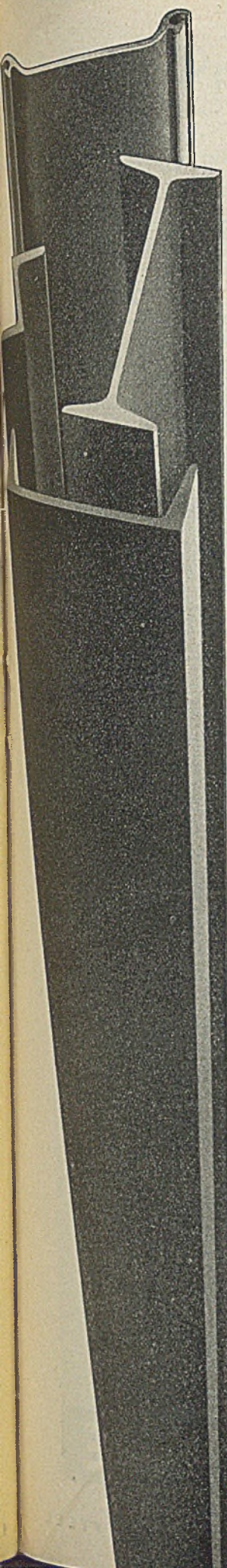
Renegotiation, as applied to many machine tool distributors, means cutting profits, after renegotiation and after taxes, to less than one per cent. Machine tool distributing houses are not large, as industrial corporations go; consequently a return at this meager rate will spell disaster unless remedies are afforded.

That some modification in the renegotiation law is imperative is being stressed more and more by industrialists in almost every line of activity. Equally important is prompt settlement by the government on terminated contracts.

—pp. 50, 54, 67

E. L. Shaner

EDITOR-IN-CHIEF



This temporary bridge on the upper Liard River will be replaced by a steel span.

Bridges to Japan

"Bridges to Japan" are being fabricated from Inland plates and shapes, and shipped, along with Inland sheet piling, to sites on the 1670-mile Alaska Highway.

Pushed through in record-breaking time, this strategic highway is now being completed for the transportation of important military supplies to our Alaskan outpost.

The original bridges and piers on the highway were built largely of timber from surrounding forests. These temporary structures are being replaced now by bridges of steel. The new permanent bridges are built not only to withstand heavy military traffic during the war but to assure safety when the highway is opened to commercial and tourist traffic later.

These "Bridges to Japan" are but one of the many ways in which Inland steel is used in helping to win the war.

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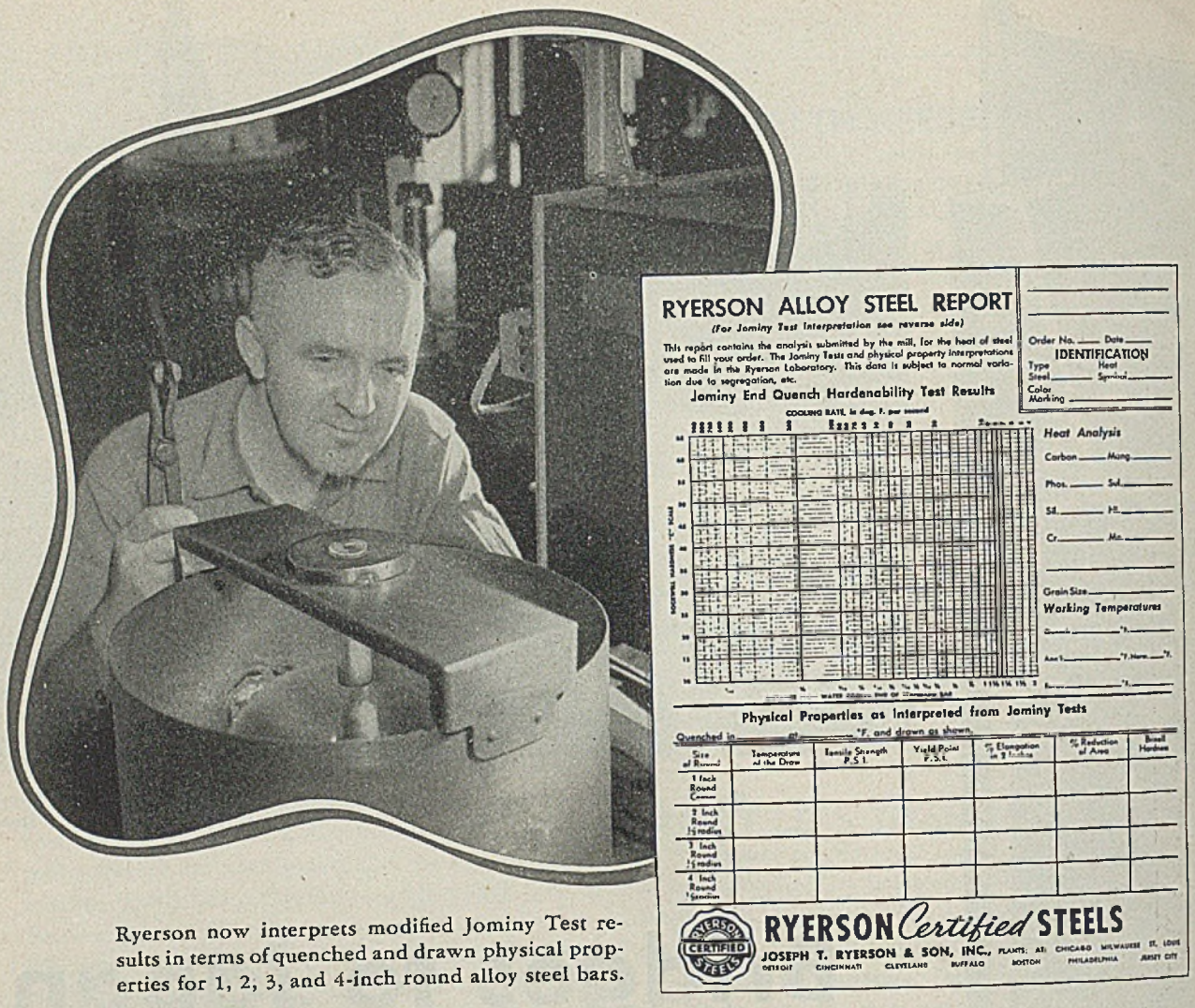

Ryerson now interprets modified Jominy Test results in terms of quenched and drawn physical properties for 1, 2, 3, and 4-inch round alloy steel bars.

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Ryerson furnishes hardenability interpretations with each alloy steel shipment

The new Ryerson Alloy Steel Report sheet is furnished with each shipment of alloy steels from stock. This report includes: a positive identification for the steel you receive . . . its chemical analysis as reported by the mill . . . the recommended working temperatures of the steel . . . a chart of its hardenability response with interpretations of the physical properties *after* heat treatment and the effect of mass on the physicals of 1, 2, 3, and 4-inch bars.

All this information makes it easier for you to specify your alloy steel requirements in terms of *what the steel will do* . . . rather than on analysis alone. It further guides you in the proper heat treatment of your steel to obtain the best results.

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RYERSON STEEL–SERVICE

War Problems Dominate Meetings

General and group sessions of participating societies patterned to meet requirements of the hour though some discussions consider postwar problems. . . War conference displays in hotel rooms substitute for customary large exposition

CHICAGO

WITH metals—their production, fabrication and treatment—constituting the backbone of the United Nations' war program and with the United States carrying the major portion of the load, the twenty-fifth annual National Metal Congress, held in Chicago, Oct. 18-22, was streamlined and patterned to meet the requirements of the hour.

Its keynote was "increased output of war products and conservation of materials."

Attendance proved that despite the fact key men can ill afford much time away from pressing industrial duties and also despite the inconveniences of travel, offsetting profit is to be derived from personal consultation with others and free exchange of experience on vital problems.

As in previous years, the Congress was sponsored by the American Society for Metals, in co-operation with the American Welding Society, holding its twenty-fourth annual convention; American Institute of Mining and Metallurgical Engineers with the fall meetings of its Institute of Metals and Iron and Steel Divisions; and the Wire Association, conducting its Wartime Emergency annual meeting.

American Society for Metals, with headquarters at the Palmer House, limited its strictly technical sessions to a total of 12 on four mornings, leaving five afternoons and four evenings free for 17 panel-type group sessions. The technical sessions featured presentation of 37 papers dealing for the most part with metals research, its results and progress. Group meetings, on the other hand, dealt principally with subjects related to the war program and to a lesser extent with postwar planning. Each group meeting presented from two to eight discussion leaders and experts capable of summarizing ground covered.

Topics Discussed

Indicating the practical and timely nature of these group meetings, topics included the following: Advanced quenching practice, boron in steel and iron, purchase of steels on performance rather than analysis, nondestructive tests, powder metals, steel with intensifiers, foundry metallurgy, steelmaking methods, postwar planning in nonferrous metals, surface hardening, control of quality, NE steels, changes in metallurgy and metals, lightweight construction, salvage, magnesium, and finishes and protection.

The meeting on purchase of steels on performance rather than analysis developed a clear consensus that such purchase is desirable, that the trend at present and for some time past has been in that direction, and that the trend probably will be accelerated from here on. It was pointed out clearly that after all the customer is purchasing use of metal rather than metal itself, therefore the end result justifies whatever is the most efficient means of buying it. One speaker made the startling disclosure that 10 per cent, or 100 tons of every 1000 tons, of alloy steel made in his company's plant must go for specimens required for the various chemical and physical tests. In normal times this is a serious waste of material, and in wartime is almost a form of production sabotage.

An additional feature of the week's program was four "Victory Sessions" held just before lunch on four days with nationally-known speakers in the fields of labor, business and the military. Among these speakers were William C. Whetro, chief, labor production division, Region 6, WPB, Chicago; Bennett Chapple, assistant to the president, American Rolling Mill Co., Middletown, O.; Brig. Gen. Herman F. Safford, chief of the production service branch, office of chief of ordnance, Washington; and Capt. G. D.

Near-capacity audiences featured virtually all sessions of the twenty-fifth National Metal Congress, indicating that metallurgical problems born of war stimulated attendance instead of restricting it. Here is shown in the Palmer House ballroom one of two simultaneous panel-type meetings of the American Society for Metals

Linke, chief of the armor, projectile and bomb section, Navy bureau of ordnance, Washington.

Mr. Chapple made a fervent plea for full return to the private enterprise system in business in postwar. As laudable as the "four freedoms" are, he declared these will be useless and industry will be enslaved unless it has freedom of action and enterprise. He suggested that in the postwar era, the American people base their economy on the full meaning of the last sentence in the Declaration of Independence.

Chief imprint of the war was observed in the exhibits. In place of the customary Metal Exposition held in a large hall, the show was designated "War Conference Display" and was accommodated in sample and display rooms occupying the entire seventh, eighth and ninth floors of the Palmer House. Approximately 215 companies were represented, and, by necessity, their products were confined to light equipment and materials, diagrams, blue prints and charts, or quarters merely providing consultation facilities. Nevertheless, the display served its usual worthwhile purpose.

At the annual business meeting of the American Society for Metals, Oct. 20, Dr. Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp., Chicago, was inducted into the office of president, to succeed Dr. Herbert J. French, assistant manager, development and research division, International Nickel Co. Inc., New York; Dr. Kent R. Van Horn, research metallurgist, Aluminum Co. of America, Cleveland, is the new vice president, and Harry D. McKinney, vice president and works manager, Driver-Harris Co., Harrison, N. J., the new treasurer. Made directors were Dr. Charles H. Herty Jr., assistant to vice president, Bethlehem Steel Co., Bethlehem, Pa., and Dr. A. L. Boegehold, head, metallurgy department, research laboratories division, General Motors Corp., Detroit.

C. H. MATHEWSON

Chairman of the Department of Metallurgy, Yale University, who presented the Campbell Memorial lecture, American Society for Metals

Dr. C. H. Mathewson, chairman of the department of metallurgy, Yale University, New Haven, Conn., presented the annual Edward de Mille Campbell Memorial lecture immediately after the business session.

Award of medals was a feature of the annual banquet on Oct. 21. Two of these are newly established. One of these, the Gold Medal of the American Society for Metals, to one recognized for outstanding metallurgical knowledge who has shown great versatility in the application of science to the metal industry, was presented to Dr. Zay Jeffries, technical director, Lamp Department, General Electric Co., Cleveland. The other, the American Society for Metals Medal for the Advancement of Research, to an executive in an industrial organization the principal activity of which is the production or fabrication of metals, was bestowed upon Roy Arthur Hunt, president, Aluminum Co. of America, Pittsburgh.

The Albert Sauveur Achievement Award was given to Dr. Charles H. Herty Jr., assistant to the vice president, Bethlehem Steel Co. Bethlehem, Pa. In May, 1926, the Bureau of Mines, Pittsburgh, organized a program of study into the physical chemistry of steelmaking, under direction of Dr. Herty. Results were of such far-reaching benefit and stimulation to the open-hearth industry as to be judged "A metallurgical achievement which has stimulated other organized work along similar lines to such an extent that a marked advance has been made in metallurgical knowledge."

Dr. Shadburn Marshall, research laboratories, Remington Arms Co., Bridgeport, Conn., received the Henry Marion Howe medal for the best paper published in the society's *Transactions*. The best paper, "The Carbon-Oxygen Equilibrium in Liquid Iron," published in September, 1942, was co-authored by Dr. Marshall and Dr. John Chipman, professor of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass. Since Dr. Chipman already had received a Howe Medal—in 1934, this year's award was made to Dr. Marshall alone.

Membership in the American Society

Receive Awards of American Society for Metals

DR. C. H. HERTY JR.

DR. ZAY JEFFRIES

DR. SHADBURN MARSHALL

ROY A. HUNT

Gold Medal of the American Society for Metals was awarded to Dr. Zay Jeffries, technical director, lamp department, General Electric Co., Nela Park, Cleveland. ASM Medal for Advancement of Research was awarded to Roy A. Hunt, president, Aluminum Co. of America, Pittsburgh. Dr. Charles H. Herty Jr., assistant to the vice president, Bethlehem Steel Co., Bethlehem, Pa., received the Albert Sauveur Achievement Award. Dr. Shadburn Marshall, research laboratory, Remington Arms Co., Bridgeport, Conn., received the Henry Marion Howe Medal for the best paper, "The Carbon-Oxygen Equilibrium in Liquid Iron," published in Transactions of September, 1942.

HARRY D. McKINNEY

Vice president and works manager, Driver-Harris Co., Harrison, N. J., who was elected treasurer, American Society for Metals

DR. MARCUS A. GROSSMANN

Director of research, Carnegie-Illinois Steel Corp., Chicago, who was elected president, American Society for Metals

DR. KENT R. VAN HORN

Research metallurgist, Aluminum Co. of America, Cleveland, who was elected first vice president, American Society for Metals

for Metals now totals 17,095, H. J. French retiring president of the society announced. He also said that the number of chapters increased during the past year by eight, now totaling 62.

The twenty-sixth National Metal Congress and War Conference Display will be held at the Public Auditorium in Cleveland, Oct. 16 to 20 next year.

Metal Treating Institute Elects Knerr President

Horace Knerr, president, Metlab Co., Philadelphia, was elected president of the Metal Treating Institute at the organization's eleventh annual meeting at the Swedish Club, Chicago, Oct. 17, in connection with the National Metal Congress. He succeeds Charles I. Wesley, president, Wesley Steel Treating Co., Milwaukee.

A. D. Bach, president, New England Metallurgical Corp., South Boston, Mass., was named vice president, and Stewart N. Clarkson, 420 Lexington avenue, New York, secretary.

New directors include N. M. Salkover, vice president and general manager, Queen City Steel Treating Co., Cincinnati; L. A. Lindberg, president, Lindberg Steel Treating Co., Chicago; Walter G. Hamilton, president, Accurate Steel Treating Co., Chicago; W. W. Farrar, president, Cook Heat Treating Corp., Los Angeles; and Charles G. Heilman, president, Commonwealth Industries Inc., Detroit.

Italian Steel Plant at Naples Wrecked by Germans

Newspaper dispatches from Italy disclose that before abandoning the Naples area the Germans destroyed the Ilva steel works and chemical plant which employed some 4000 men. The Germans are said to have spent 15 days systematically laying cordite charges and mines and today only tall stark chimneys and acres of black ruins remain.

Wiremakers Discuss Problems

Running wire through mercury at 450 degrees Fahr. promotes good torsion, delegates to convention told. . . Coating also is prominent in discussions

RUNNING wire emerging from a die through mercury at 450 degrees Fahr. promotes a good torsion, it was brought out at the technical session last Tuesday of the Wire Association at the organization's annual meeting at Hotel La Salle, Chicago, held in conjunction with the National Metal Congress.

If the temperature of the mercury is 650 degrees, the torsion is not satisfactory.

For steel articles to be painted, lead outranks any other coating material. Only minor changes are required to convert a wire galvanizing machine to a lead coating unit. The lead coating process is similar to galvanizing with the exception that the flux and bath are different. Lead alloy coating of 97.5 per cent lead and 2.5 per cent tin is ductile

Fabrication of lead-coated wire presents no problem. The lead serves as a lubricant in forming, stamping and spinning processes. Lead alloy coating has a lower rate of corrosion than zinc coatings.

The foregoing was brought out by C. A. Kellogg, chief, department of metallurgy and inspection, Continental Steel Corp., Kokomo, Ind., in his paper on "Use of Lead Base Coatings as a Substitute for Zinc."

Among the various phases brought out was that while coating low-carbon steel with pure lead is being done, the procedure is not practical. The purpose of using an alloy of lead and tin is to have some sort of a metal that will bite into the steel and form a coating.

Lead coated sheets are found to corrode only 60 per cent as fast as zinc coated sheets. Also of importance is the fact that lead alloys are satisfactory for conditions where atmospheric corrosion is involved but are not recommended for underwater or underground applications because of pin hole development.

In discussing "Hydrogen Brittleness in Spring Steel" by R. R. Tatnall, metallurgical engineer, Wickwire Spencer Steel Co., Worcester, Mass., said one wiremaker described an experiment he made. Six closely-wound oil-tempered springs were placed under tension over two posts mounted on a board. The first board was dipped into a cleaning solution, the second board was sprinkled with the cleaning solution, the third board had no cleaning. The three boards were allowed to stand overnight and were then baked for two hours at 250 to 300 degrees Fahr. Every spring on the first board broke, half on the second board broke, and all on the third board were intact. The only explanation offered was that hydrogen embrittlement may have been formed at two different degrees.

It was announced at the meeting the Wire Association's goal of 500 members has been reached; also that E. W. Gundstrom, assistant plant manager, Rome Cable Corp., Rome, N. Y., will be the general chairman of the program committee for 1944 and C. A. Litzler, chief engineer, Industrial Oven Engineering Co., Cleveland, chairman, nonferrous division.

Recognizing the growing importance of the Pacific Coast in the industrial picture the association will hold its first Pacific Coast regional meeting at Sir Francis Drake hotel, San Francisco, Oct. 29.

The Mordica Memorial Lecture for 1944 will be presented by A. M. Reeder, metallurgical engineer, Jones & Laughlin Steel Corp., Pittsburgh.

New Fundamental Data Remove Welding from Cut-and-Try Era

Significant advances in predicting welding procedure revealed at twenty-fourth annual convention of AWS. Results to be obtained under any set of conditions can be forecast within an accuracy of 5 per cent

ADVANCES resulting from studies of welding fundamentals undoubtedly represent the most important progress in welding as revealed at the twenty-fourth annual meeting of the American Welding Society with its 63 technical papers and inspection symposium presented at 20 technical sessions in Chicago last week.

Several papers indicated the great distance we have traveled down the road from welding's first groping "cut-and-try" era. Data and fundamental concepts now developed put welding on a basis where results to be obtained from any set of welding conditions can be predicted within an accuracy of 5 per cent.

Perhaps most significant of all was the system for predicting best arc welding procedure, described by Gilbert E. Doan and Robert D. Stout of Lehigh University. This method shows how to predict in advance and without resort to a welding test exactly what welding conditions will preserve a chosen ductility in any low alloy or higher carbon steel of any plate thickness and joint design when welded at any temperature (including preheat or subzero weather) and with any combination of arc current, voltage and arc travel speed.

Increases Usefulness of Welding

Importance of the system is that it overcomes necessity of long and laborious "cut-and-try" methods formerly required for setting up welding procedures. Thus it greatly simplifies the application of arc welding on low alloy and higher carbon steels. It thereby will increase usefulness of welding, since it points the way to prevent hardening and embrittlement of the heat-affected zone near the weld, difficulties that have limited the welding of these steels.

It offers an answer to the important questions: "How much preheat (if any) is needed? If atmosphere temperature drops to zero, what procedure changes must be made to avoid cracking? If plate thickness is revised, what other welding conditions must be changed and how much? What adjustments in procedure must be made if a new steel composition is used?

Using this system, a design engineer can specify a welding procedure (current, voltage, arc travel speed, preheat temperature, etc.) when he has chosen a steel for his design. Basic data required comes from two tests only—the jominy hardenability and the ductility (notched-bar bend) tests. In the future, these test results may reasonably be requested from the steel manufacturer. Already one supplier is giving jominy data.

A paper by W. F. Hess and associates at the welding laboratory, Rensselaer Polytechnic Institute, described how they measured cooling rates in heat-affected zones and developed mathematical means for predicting welding conditions. Final results closely check those obtained by Messrs. Doan and Stout with their method of prediction. Mr. Hess measured the cooling rates accurately with special equipment. Data were correlated with actual welding conditions to modify purely mathematical solutions for cooling rates, thereby making possible an extremely wide extension of the welding conditions covered. This permits duplication of any desired cooling rate at specified temperature levels within reasonable limits.

It is now possible to predict complete welding data for a new plate thickness, according to Mr. Hess. Probably more important, a method of applying cooling curve data to predict welding procedure for different steels has been found. Mathematical equations now developed permit determination of amount of time available between successive passes on multilayer welds. Data of this kind should make possible more extensive use of welding on alloy steels.

A third method of predicting welding procedure was described by Victor Paschke, Columbia University. He uses electric resistance-capacity networks to study mechanism of heat flow during the cooling period. The great number of factors influencing welding make general solutions difficult, but it is possible to chart energy transfer to the work by radiation and by heat contained in the metal melting off the electrode. Thus all conditions influencing cooling of the weld can be presented in only two charts.

These curves have been worked out on the electrical analyzer for zero degrees Cent. conditions. Effect of preheat is simple translation of the curve along the ordinate. This makes possible to at once predict or evaluate preheat effects.

After establishing these general curves, the correctness of the electric analogy method was evaluated by comparison with actual temperature measurements obtained by Mr. Hess at Rennselaer Polytechnic. The agreement can be considered excellent.

Thus, there are three entirely different means by which desired welding condi-

DAVID ARNOTT

American Bureau of Shipping, elected president of the American Welding Society

ISAAC HARTER

Vice president, Babcock & Wilcox Co., Barberton, O., elected first vice president, American Welding Society

A. C. WEIGEL

Vice president, Combustion Engineering Co. Inc., New York, elected second vice president, American Welding Society

tions and working procedure can be specified in arc welding.

But this type of investigation is not at all confined to arc welding. The first Adams lecture, presented by Dr. C. A. Adams, first president of the society, detailed some important work done in connection with the quantitative analysis of the electrical and thermal factors in resistance welding. These put heat flow on a definite basis, both as regards steady state and transient conditions. Much new data in form of curves and charts is now available. This information makes it possible to calculate and predict heat flows in resistance welding.

Such data clearly contrast the two extremes of heat flow: Insufficient input, never forming a weld; excessively rapid input, making the weld so quickly that it is almost impossible to control. And most important, the optimum welding conditions are easily determined.

In discussing quality control in aircraft spot welding, Nathan C. Clark, Lockheed Aircraft Corp., explained how statistical control can be employed to predict trouble before it occurs; how it can be used to predict quality and also to develop most economical specifications for a spot welding job.

Improved Welding Equipment

Still further advances in spot welding heavy gages of both carbon and alloy steels have come from improved equipment which forges and heat treats the weld as soon as made. One such heavy press welder described by John C. Barrett, Taylor Winfield Corp., provides any one of seven different current values during seven different time intervals with three additional intervals as "off" times. Hardenable steels can be welded and heat treated with such equipment. A dual pressure system helps prevent porosity and cracking in the weld.

Steels up to ¾-inch thick have been welded on this machine, including SAE-1020, SAE-1065 and SAE-4130. Evaluating welds by shear and drop impact tests, by metallographic analysis, by hardness surveys revealed the drop impact test as most valuable, for improper heat treating shows up most readily as low impact strength.

One of the most interesting papers describing investigation of a specific problem was that presented by C. W. Steward, Curtiss Wright Corp. Research Laboratory, and devoted to studies on spotweld joint efficiency in aluminum alloy sheet, significant because of its application to aircraft.

Results of his investigation showed: Maximum joint efficiency to be 100 per cent; average, 93 per cent. Maximum strength was 61,800 pounds per square inch; average, 59,800. Ideal spot pattern for 24S-T Alclad in 0.040-inch stock is one with spots spaced ½-inch apart in both directions. Closer spacing is likely to produce loss in strength.

Maximum efficiency is obtained with alternating-current welds. High strength spots are better than low strength ones for maximum efficiency and production economy. Wirebrushing is better than chemical cleaning. Presence of small cracks, visible only by X-ray, is not critical. For stored-energy welders, current wave shape makes little difference in joint efficiency.

On another investigation, enough information was obtained to demonstrate

RICHARD DELLA-VEDOWA

W. F. HESS

DR. DAVID S. JACOBUS

ROBERT B. STOUT

MABEL ROCKWELL

J. H. FRYE JR.

Samuel Wylie Miller Memorial Award was given to Dr. David S. Jacobus, retired consulting engineer of the Babcock & Wilcox Co., Barberton, O. Lincoln Gold Medal was awarded to Gilbert E. Doan, Robert B. Stout and John Frye Jr., all of the faculty of Lehigh University, Bethlehem, Pa., co-authors of a paper entitled "Preserving Ductility in Weldments." University prize of $100 went to W. F. Hess and D. C. Herrschaft (not shown), both of Rensselaer Polytechnic Institute, Troy, N. Y., for their paper entitled "The Spot Welding of 0.040 In. S.A.E. X-4130 Steel." Industrial prize of $100 was awarded to Mabel Macferran Rockwell and Richard Della-Vedowa, both of the Lockheed Aircraft Corp., Burbank, Calif., for their paper entitled, "The Effect of Welding Spacing on the Strength of Spot-Welded Joints."

GILBERT E. DOAN

the necessity for a weldability specification on mild steel, where close control of weld strength and uniformity is wanted, said J. M. Diebold, Yellow Truck & Coach Mfg. Co. Using a stored energy welder, he reported variation in weld strength was much greater than variation in the machine; and in at least one case, good welds were impossible to make in otherwise good steel. He predicted that steel weld strength variation will have to be studied if real weld consistency is to be obtained.

An unusual test for welded pressure vessels was described by C. O. Dohrenwend, Armour Research Foundation. A hammer test was devised; using an electric strain gage connected with a cathode-ray oscilloscope and camera, through an amplifier. This setup recorded the transient strains of the hammer blow. Duration of impact is about 0.001-second. Transient effect is independent of pressure in the vessel.

Another unique development is the electronic control of gas-cutting machines so they automatically follow lines on a paper template. Obviously, such automatic control has important possibilities as it offers improvements in quality, quantity and costs compared with hand operated machines, according to R. D. McComb, Industrial Control Division, General Electric Co.

Welded Locomotive Boiler Successful

Success of the first all-welded locomotive boiler, constructed by the American Locomotive Co. in 1937 and subjected to severe tests since then, has already resulted in arrangements to build additional boilers of this type, said E. G. Young, University of Illinois. Entire boiler is built by buttwelding together sheets of form and thickness found in conventional boiler, retaining the usual staybolt construction. Welds in shell and outside firebox are stress relieved. Locomotive is a 2-8-0 type, among the heaviest in service.

Since introduction of special bearing bronze welding metal for bearing surfaces six years ago, many successful applications have been developed. As reported by J. W. Kenefic, Air Reduction Sales Co., chief of these in locomotive applications is the building up of driving box laterals. Crown brasses are also reclaimed with weld deposited bearing bronze. Likewise driving box shoes and wedges are restored, although some roads build up corresponding face of the driving box instead.

Weld fabricated locomotive driving boxes require only 38 pounds of brass instead of 200. A similar saving of critical brass is made by replacing the cast crown with a steel filler plate overlaid with welded-on bronze. Such repairs are doing an outstanding job of keeping our railroads running in spite of critical material shortages.

Range of machine gas cutting has been extended to thicknesses of 42 inches, the process now being acceptable as a production operation up to that thick-

(*Please turn to Page* 138)

Institute of Metals Discusses Problems Facing Steelmakers

MANY steelmakers are called upon to use 14 per cent or more turnings in their open-hearth charges and because the turnings are contaminated with oil the roof life of the furnaces has been shortened.

This is one of the things happening to refractories since peak operations have been in effect at steel plants, according to A. P. Miller, assistant general superintendent, Inland Steel Co., Indiana Harbor, Ind.

Mr. Miller as chairman of the refractories session of the regional meeting and annual fall meeting of the Institute of Metals Division, and Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, Hotel Sherman, Chicago, Oct. 16-20, also brought out the following facts:

Trend in open-hearth practice is toward higher hot metal charges because of the shortage of scrap.

The steel industry is faced with employment of less experienced operators and, hence, with less control.

Fuel is not the same as formerly. Viscosity varies and the sulphur is higher, both of which are harmful to the furnaces.

More rigid metallurgical restrictions are requiring the operation of furnaces at higher temperatures.

Most important phase of open-hearth practice is the active drive

(*Please turn to Page* 136)

Present, Past and Pending

BUDA DETECTOR CAR UNIT DEMONSTRATED

CHICAGO—First public demonstration of the Buda detector car unit, a two-train car used to detect rail fissures through use of magnets instead of electrical current, was made here, recently.

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AMERICAN LOCOMOTIVE COMPLETES CONTRACT

BUFFALO—American Locomotive Co.'s Dunkirk, N. Y., plant completed its gun carriage contract last week, providing additional capacity for output of locomotive parts.

o o o

STEEL PRODUCTS MAY BE EXPORTED TO FRENCH WEST INDIES

WASHINGTON—Basic iron and steel products may be exported to the French West Indies under a so-called program license issued to the delegation of the French National Committee in the United States.

o o o

GE BUILDS WORLD'S MOST POWERFUL MOTOR

SCHENECTADY—The world's most powerful electric motor, said by General Electric Co. to be capable of hoisting a destroyer out of the water to the height of a fifteen-story building in a minute, has been completed for the new Geneva steelworks at Geneva, Utah.

o o o

MANPOWER PLAN DISCUSSED BY DETROIT GROUPS

DETROIT—Terms of an overall manpower plan to meet the particular needs of Detroit are being considered by officials of WMC and the Detroit management-labor committee, in the event that the WMC minimum nation-wide program may not meet the needs of Detroit.

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CITE NEED FOR GOVERNMENT ECONOMIES

WASHINGTON—Congressional leaders have notified the administration that the new revenue legislation this year will be difficult if not impossible to obtain without important government economies.

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SCRAP SHORTAGE SERIOUS FOR SHEFFIELD STEEL

KANSAS CITY, MO.—Sheffield Steel Corp. may be forced to close down one or more of its four open hearth furnaces unless steel scrap collections can be increased substantially soon.

o o o

TO VOTE ON ALUMINUM CO. MERGER

PITTSBURGH—Stockholders of Aluminum Co. of America will vote Nov. 12 on a plan to merge Aluminum Manufacturers Inc. into Aluminum Co. of America.

Fabricators Anticipate Heavy Business Volume in Postwar Era

Prevalent opinion at twenty-first annual convention of American Institute of Steel Construction much more optimistic for the future than at midyear. . . Problem of converting from war work will not be difficult

THAT there will be a heavy postwar volume of business available for the structural steel fabricating industry was the prevalent opinion often expressed at the twenty-first annual meeting at Rye, N. Y., of the American Institute of Steel Construction Inc., Oct. 19-21.

This contrasts the somewhat skeptical view of future tonnage held by many in the industry as late as midyear when, with backlogs petering out, fabricators were filling up shops with direct war production, mostly welded, but with after-war prospects clouded with uncertainty. A more thorough analysis of the postwar market goes far toward dissipating this attitude.

While currently shops of the industry have taken on the atmosphere of shipyard adjuncts, experience in the production of new products, including also heavy equipment and miscellaneous work, will be applied to future fabricating, probably broadening the scope of fabricators. In this welding will exert a strong influence.

In entering the field of specialties, somewhat out of their regular field, structural shops have not been required to make drastic conversions, although expansions in welding equipment are large, necessitating some changes in plant layouts and greater use of jigs. That shops will not be required to reconvert on a large scale is a favorable factor contributing to the rapidity with which the industry may mesh into peacetime schedule to meet pent-up requirements. The extent to which welding will be employed in fabrication of building steel and new work derived from a wider market, will be closely followed; that welding will be employed more is admitted. However, this brings forward its own problems—high-strength steel, range limits of carbon for safe welding, basic working stresses, progress in the art of welding, designs, uniform specifications and other factors.

Range of products emanating from structural steel fabricating shops, including actual instruments of war, is astounding to those not appreciating the versatility of the industry and its reservoir of designing and planning ability, according to Clyde G. Conley, Mount Vernon Bridge Co., Mount Vernon, O., president of AISC.

Having affirmed its reputation as a make-to-order industry in building the emergency industrial war plant on schedule, structural fabricators without delay have meshed into the intricate war program for products as urgently needed as the plants they erected for others. Experience gained in recent months and sometimes radical changes in production methods should be of material assistance in meeting postwar demands presenting new and novel problems in engineering and production, said Mr. Conley. The versatility and adaptability of the structural fabricating shops have been demonstrated.

Postwar panorama of the industry is not as drab as sometimes painted. Mr. Conley cited figures to indicate average construction volume in ten years following the war will exceed the annual volume of any previous decade. He stressed the ability of the fabricating shops to meet needs, for in 1941, peak year in the ten-year period starting in 1931, under pressure of war expansion, the industry was asked to fabricate 2,296,954 tons against an estimated capacity of better than 4,000,000 tons.

Structural steel in the postwar period will be required in large quantities for public works, utilities, railroads, institutional buildings, consumer goods, facilities and multiple housing. Also foreign nations will be in even greater need of rehabilitation of public and industrial facilities, especially those in the fighting zones, said Mr. Conley, predicting a market for the fabricating of materials for projects abroad.

Vital Role Played by Fabricators

Now cloaked by military secrecy, the study of the many contributions of the industry, when told, will reveal and include a particularly interesting chapter on the role played in making possible large scale invasion, according to Mr. Conley.

As to postwar planning, Mr. Conley declared if we should begin to visualize the problem not as an excursion into the realm of fancy, but as one demanding an immediate survey of peacetime needs, the industry should be prepared to meet needs without too great a period of delay.

As regards reconversion, the industry is fortunate and only an indication of the amount and variety of the potential construction is required to launch shops into its production.

While civilian needs have been restricted during the war there is every reason to expect these needs will be resumed in greater volume. Many fabricators have already on their books contracts for public works postponed because of necessary priority restrictions, Mr. Conley said.

CLYDE G. CONLEY

"As I believe it is the obligation of industry to think and plan now in terms of meeting both domestic and foreign demand, I believe that it is the obligation of government to recognize the compatibility between its own humanitarian aims and our desire to make the fullest use of our resources and abilities. To a certain extent leaders of democracy have articulated what they feel to be the needs of the future. Industry can meet those needs. For this reason I think it is clear that excessive taxation and other handicapping legislation which would hamper and put obstacles in the way of this development are not in accordance with this program."

Most surprised by the accomplishments of industry are our enemies and second are those economists who have been predicting the end of the private enterprise system, many of whom are on the public payroll, said Raymond Moley, assistant secretary of state in the early days of the present administration. Any postwar planning of industry must take into consideration the possibility of a wrong government policy.

Citing Germany as the victim of an outworn economic policy, Mr. Moley said the dangers of a borrowed theory involve the influence of foreign economic thinking, proponents of which have been far too influential in our estimates, much in excess of their stature. In this connection he mentioned John Maynard Keynes. He questioned managed currency attempts and forced savings, declaring Americans by their savings had refuted inflation claims as pertaining to the need of such requirements. Not a managed currency but a corollary of standard value is needed to assure contracts.

Mr. Moley criticized the Wagner act as one-sided and opposed government partnerships with any group, industry, labor or agriculture. Government should be above and detached from all groups, he asserted.

Welding, and the extent that this type of structural steel fabrication will be expanded after the war as a result of the impetus given this process of joining, dominated the technical session. Charles F. Goodrich,

chief engineer, American Bridge Co., Pittsburgh, discussed technical aspects of postwar construction from this angle and a paper on the subject was submitted by Lamotte Grover, structural engineer, Air Reduction Co. Inc., New York.

Comments indicated structural shop men do not anticipate elimination of riveted work. While current emphasis leans heavily to welding due to the nature of new products fabricated for war, design changes and other developments covering the return to normal work will not be required to swing toward welding to the extent expected or predicted by some. Opinion prevailed, however, welding would retain some of its wartime gains in structural shops.

Much fabrication by welding currently involves duplications, some operations being repeated many times, which makes for economies which will not be possible on unit work of individual design. Special and sometimes costly jigs frequently are assembled for this duplicated work which would not be economical in straight building frame construction.

Amplifying these points, Mr. Goodrich declared conversion of heavy industries to production of war machines is almost incredible, that replacement and repair of facilities will be heavy, as will that for fabricated structural steel. Despite early confusion he credits WPB with doing a reasonably good job in the long run in distributing steel to meet war requirements and necessities of everyday life.

Allocation of steel for war needs will be greatly curtailed with the end of the conflict and regardless of the length of the war the availability of structural shapes and plates for postwar construction will take place rather suddenly, in his opinion. With the withdrawal of various restrictions as rapidly as possible desirable, customers will begin to demand some of structural sections now prohibited, about half the number available before the war. Because many rolls that produce them have been converted to the production of unrestricted sections, some of these shapes and sizes probably will not be available immediately.

Noting the axiom that the fewer the specifications, the cheaper the product, he said some limitation orders restricting the number of specifications to which structural steel and other allied materials may be furnished has not been an unmixed blessing, suggesting some of it may linger after the war.

Prefabrication Registers Gains

Great strides are underway in prefabrication which will mean more small shapes after the war. Long span bridges will be built embodying lessons learned from the Tacoma Narrows bridge disaster. Plans for the replacement of this bridge are about completed, Mr. Goodrich said.

Stimulated by the war, probably far beyond any possible advancement had peace prevailed, the art of welding is improving by leaps and bounds and Mr. Goodrich said the proportion of welded structures to riveted ones will undoubtedly increase due in great measure to the experience gained in welding ships and numerous other items of equipment. The art of welding is not perfect, he said, and still needs research, experiment and testing in structural steel fabrication.

Welding of high-strength steel will require postwar attention. Elements required for high-strength structural steel, carbon, silica, manganese and others, make welding difficult and engineers, metallurgists, steelmakers and fabricators will have to solve the various problems, he said. Currently high-strength steels are so greatly restricted as to prohibit use in structural material.

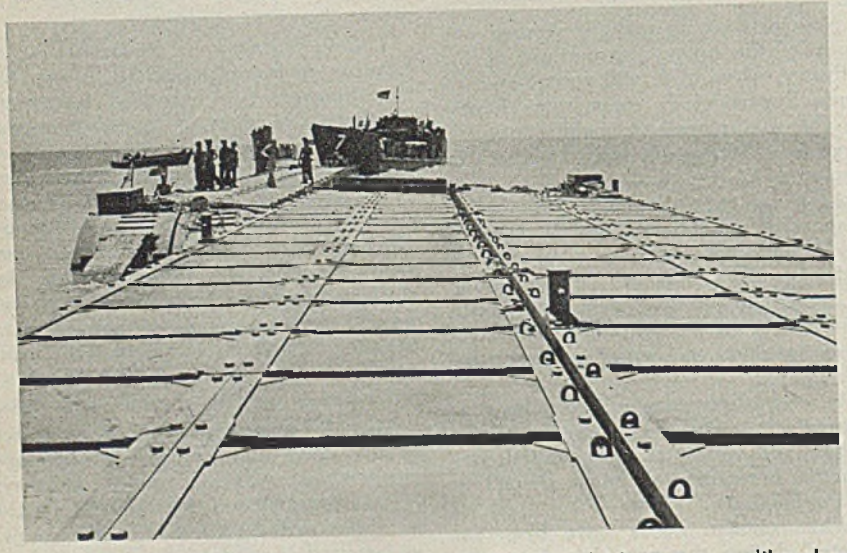
An increase or decrease of a few hundredths of one per cent of carbon in certain ranges makes all the difference in determining whether the steel is safely weldable under usual conditions. Most specifications place a maximum of .25 on carbon for strength welding without heat treatment and in conflict with this, it is difficult to roll thick material to required strength unless this percentage limit is exceeded. The ASTM committee in charge of specification A-7, ordinary structural steel, has proposed a specification, designed to meet this upper limit on carbon by reducing the required strength in proportion to increase in thickness.

This compromise, said Mr. Goodrich, at once injects two serious questions in the problem: 1. Shall we decrease working stresses with this decrease in strength of thick material? 2. Shall we have two kinds of structural steel, one for riveting and one for welding? The answer to the latter question is an emphatic "No," both from the steel industry and the fabricating industry, Mr. Goodrich declared. This is a technical problem and will become very pertinent as soon as the war is over. Fabricators who are sharing the large amount of welding during the war will, in Mr. Goodrich's opinion, be able to weld with perfect safety structural steel containing at least .30 per cent carbon, but to do so some fabricators must know and follow proper welding procedures, sequences and heat control.

Soon after the war the matter of basic working stresses for structural steel buildings will also rise. Late in the war construction period 24,000 pounds per square inch stress was imposed for all structural steel buildings, other than those of a definitely permanent nature instead of the prewar 20,000 pounds. Mr. Goodrich asked, "Shall we design our permanent steel buildings to this 20 per cent increased working stress or shall we increase it, say 10 per cent, and should we increase the basic working stress for bridges from 18,000 pounds per square inch to 20,000 pounds or leave them where they were before restriction? This problem will need considerable study by specification writing bodies."

Secondary stresses and those caused by impact, fatigue, wind, etc., which have been more or less neglected will need to be considered if unit stresses are increased. Perhaps steelmakers will be asked to produce ordinary structural steel to a greater strength as an aid in handling the problem, he suggested.

Strenuous efforts should also be made to lower the cost of ordinary structural steel and to lower fabricating costs, Mr. Goodrich declared, admitting this will not be easy.



NAVY'S WONDER SHIP: Tank landing vessels, which open up like the Trojan horse to emit warriors and armored vehicles, have a new trick. They carry their own roads. Steel pontoon gear carried on the side enables them to lay pontoon roads to shore where rocks or reefs make a close approach to shore impossible. NEA photo

Sees Depletion Of Minerals

Speaker tells statisticians accelerated consumption is rapidly exhausting reserves

THIS country is consuming minerals at such a rate we are in sight of the time when demand for certain metals cannot be met, R. C. Allen, vice president, Oglebay-Norton & Co., stated at the sixteenth annual meeting of the Cleveland chapter, American Statistical Association, last week.

The speaker resigned some time ago as deputy chief of the Iron and Steel Division, War Production Board, in which post he had been in charge of the iron ore and minerals war program.

Despite extensive prospecting by private enterprise and government agencies we can't keep up with the pace minerals are being exhausted, Mr. Allen said. Coal is the only mineral of which we have sufficient quantity.

As an example of the accelerated rate of iron ore consumption, he said we are producing more steel today than all the rest of the world, and early next year will reach 100 million net tons annually. About 130 million gross tons of iron ore will be required annually to sustain this steel production at capacity, 85 per cent of which must originate from the Lake Superior region.

At the present rate of consumption, Mr. Allen estimated known high grade ores in the Lake Superior region would be exhausted in seven years.

Overall Price Adjustment Board Headed by Dodge

War procurement agencies last week established an overall price adjustment board with Joseph M. Dodge, chairman of the War Department Price Adjustment Board, as chairman, and including Carmen G. Blough, War Production Board; Kenneth H. Rockey, Navy; M. Woodward, Maritime Commission and War Shipping Administration; Harry C. Maull Jr., Treasury, and Charles T. Fisher Jr., Reconstruction Finance Corp.

The new board will be responsible for interpreting the renegotiation act, will define exemption of minerals, and will prescribe the form of financial statements to be filed by contractors.

POSTWAR PREVIEWS

AUTOMOTIVE—Automotive Council for War Production may continue into postwar period to co-ordinate reconversion to peacetime activities. See page 57.

DISTRIBUTION—Warehousemen urged to reduce inventories, especially in slow-moving items, at meeting of National Association of Sheet Metal Distributors. See page 68.

WELDING—New fundamental data remove welding further from "cut-and-try" era, with great potentialities for postwar period. See page 42.

TIN PLATE—Reversion to heavier plating on cans for processed foods probable after war ends. See page 66.

CONSTRUCTION—Structural steel fabricators' conversion problem slight. Heavy postwar building program envisaged. See page 45.

RENEGOTIATION—Suggestions for amendments to Contracts Renegotiation act submitted to Congress by Cleveland industrialist. See page 54.

CONTRACT TERMINATION—Firm national policy urged on congressmen by businessmen in hearings before military affairs committee. See page 50.

CUTTING TOOLS—Design of cutting tools for high-speed aircraft work radically changed as a result of recent experience with single-tooth tools tipped with alloys. Multibladed cutter a "wastrel." See page 76.

WELDING JIGS—Well designed jigs and fixtures for arc welding elaborate structures are and will continue to be the key to profitable mass production, holding setup and final assembly time to a minimum. See page 80.

INSPECTION— New industrial X-ray unit with built-in materials handling system becomes an important factor in the unprecedented increase in output of light alloy castings and assemblies. See page 89.

WEIGHT CONTROL—Importance of accurate weight control methods in steel production emphasized by wider use of automatic scales and printed record. See page 92.

Strike Threatens; Coal Production Behind Schedule

Truce expires Oct. 31, with output 30,000,000 tons below year's goal

WITH this year's coal production already 30,000,000 tons behind schedule, industrial and domestic consumers faced a new fuel crisis as the truce between miners and operators neared expiration.

Unrest among the miners has been evident for several weeks. More than half of Alabama's miners staged a wildcat strike resulting in a loss of more than 50,000 tons daily and causing blast furnaces and open hearths to close. About 3500 staged a strike in 11 Indiana mines.

Secretary of Interior Ickes, speaking as coal administrator, said he could see "no change for the better" in the coal supply situation, but that on the contrary, conditions appeared to be steadily changing for the worse.

We have never recovered, Mr. Ickes said, from the loss of 25,000,000 tons of coal in the early summer strikes, which were terminated when the government seized the mines and John L. Lewis agreed to send his miners back to work until Oct. 31 provided the government continued to operate the mines. All mines now have been returned to private operators.

Coal supplies at some steelmaking centers are precarious as the crisis nears.

At Clairton coke works in the Pittsburgh area of the Carnegie-Illinois Steel Corp., largest in the world, only five days' supply of coal is on hand, with a few days' more supply on barges in transit.

Other large consumption plants in the Pittsburgh area report similar stocks. Jones & Laughlin Steel Corp. has about a week's supply of coal with a cushion of coke beyond that.

Beehive coke ovens are operating on such a slim margin that a few days of strike would practically close down all beehive operations.

48-Hour Week Extended To Additional Areas

WASHINGTON

The 48-hour week has been decreed mandatory for all areas of the country with acute labor shortages, effective Nov. 15. Thirty-one additional areas are affected by the new order issued by the War Manpower Commission.

Seventy-one areas now are classified as acute labor shortage areas and 41 already are operating under the 48-hour week.

WINDOWS of WASHINGTON

Lack All the Facts

OIL industry spokesmen point out that the five globe-trotting senators who reported to the Senate recently that Great Britain was hoarding its petroleum reserves in the Mediterranean area did not have all the facts. They point out that there are no 100-octane gasoline plants in that area at present—that the overwhelming portion of high-octane capacity is located in the United States. They point out also that special lubricants needed in large volume in the war theaters cannot be made in the Near East and must be made here. Another factor the senators overlooked was that American oil companies control a large proportion of the Near East petroleum reserves—perhaps as much as 50 per cent, so that if there is hoarding we are a party to it. Chances are considered good that we will be erecting refining plants in the Near East fairly soon.

Sales Tax Losing Out

The sales tax proposal, as reflected by the general tenor of remarks by members of the House Ways and Means Committee during the series of hearings on tax legislation, seems to be losing ground. In part this is due to the unalterable opposition of the administration, also to opposition by labor spokesmen. But fully as important as these two sources of opposition is the inescapable fact that a sales tax would work unfair hardships in many cases—a family head with no dependents, for example, would pay far less sales tax than a man with a number of children. Chairman Doughton of the committee said "it appears" that a sales tax will be voted upon both in the committee and in the House itself.

Reconversion Proposal

President Roosevelt's announcement of Oct. 15, that he plans to establish a "reconversion" unit in the Office of War Mobilization, has been endorsed by the Agriculture, Business and Labor Committees of the National Planning Association. They advocate that formulation and general administration of general policies underlying termination of war contracts, disposal of surplus war material, utilization of government-owned plants and reconversion of war plants to peacetime activities be left to a single agency, an Administrator of National Reconversion, with the advice of a National Reconversion Commission. The administrator would co-ordinate "the relevant work of other agencies, including those that may be created to handle special duties," and utilizing "the facilities of existing agencies such as the War Production Board." This recommendation is sponsored by David C. Prince, chairman, General Electric Co., chairman of the Business Committee; Clinton S. Golden, chairman, United Steelworkers of America, and members of the War Production Board and War Manpower Commission, chairman of the Labor Committee; and James G. Patton, president, National Farmers Union, and vice chairman of the Agriculture Committee.

Expect Huge Demand

The Specialties Unit, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, is preparing a booklet containing detailed information on the heating equipment industry; copies will be furnished on request. The Specialties Unit believes postwar demand for heating equipment possibly may reach as high as $530,000,000 annually. Hence manufacturers in this industry are urged to plan efficient and attractive units that will win consumer acceptance. The Specialties Unit thinks there will be a big demand for automatic heating as well as for combination air-conditioning and heating systems. It sees possibilities for ceramic and glass stoves.

EFFICIENCY

Considerable progress is being made in fuller utilization of railroad cars. One of the most notable recent advances has been made by finding freight for refrigerator cars from the West Coast which otherwise would return empty. These cars have rather small doors and false bottoms so that they can be used only for shipping products that are small and comparatively light in weight.

Perhaps the steel company that has made most headway in using such cars is Wheeling Steel Corp. In a recent meeting of the WPB Iron and Steel Transportation Committee, Edwin C. Jepson, Wheeling's general traffic manager, reported his company in the four months ended Sept. 27, had loaded 1179 refrigerator cars for shipment to the West Coast, and that it had an additional 104 such cars on order. Products shipped in them included mostly empty steel drums and galvanized wire and nails.

Complicated Problem

One of the vast and complicated problems that will arise at the end of the war is that of arranging adjustment of American property rights in foreign countries. The magnitude of this problem is suggested by a Treasury Department tabulation which shows that at least 40,000 American citizens have investments aggregating $1,100,000,000 in more than 100 foreign countries. Of the total, about $129,000,000 is in Axis countries and $78,000,000 in Axis-occupied countries.

Capable Assistant

Chester A. Bowles, OPA's new general manager, continues to give evidence that he knows how to pick capable assistants. In borrowing black-browed Col. Bryan Houston from the Army to become deputy administrator in charge of rationing, he picked out a man who, in his identification with Young & Rubicam Inc., New York advertising agency, he knew and respected as a competitor. Colonel Houston recently completed a grand job for the Army, the difficult one of setting up a contract termination policy; he largely formulated the War Department bill which, with approval of the Navy, the Maritime Commission and the War Production Board, recently was recommended to Congress. He is expected to take over his complicated OPA chore around the end of October. A friendly man, with great charm and tact, Colonel Houston may escape the unpopularity of other rationing officials.

Study Civilian Goods

The War Production Board recently has given renewed attention to the necessity of manufacturing certain essential civilian products. No material is to be diverted from direct war requirements for civilian items; the intention is to decide now on what items should be manufactured when the materials do become available. Products already earmarked for a share of the materials as they become available are boilers, furnaces and hot water equipment, clocks and watches, glass cooking utensils, medical, surgical and dental instruments, and razor blades and razors. Current outlook is that some steel may be available for such production during the first quarter.

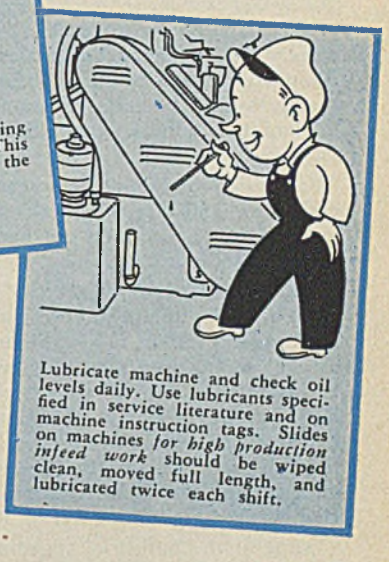
Federal Licensing

In testifying recently before the Senate Special Committee on Postwar Economic Policy and Planning, Sen. Joseph C. O'Mahoney (Dem., Wyo.) cited a number of instances that prove, he contended, the need for federal licensing and control of corporations. Among them were the then-current negotiations whereby the Aluminum Co. of America was endeavoring to acquire a financial interest in Pope & Talbot Inc., West Coast lumber firm. This firm's subsidiary, McCormick Steamship Lines, has been handling shipments to and from Alcoa West Coast plants. The senator recommended an investigation of this proposed transaction to ascertain to what an extent it would foster monopoly. The senator favors a law that would provide for federal investigation of these cases to prevent actions "counter to the public interest." It was the Rockefeller iron ore holdings, he said, that made possible the creation of the United States Steel Corp. While not all these things necessarily are bad, he said, there should be provision to prevent them when they are bad.

Balance new grinding wheels; and worn ones, too, for the wheel may lose its balance as its diameter wears down. A good time to rebalance is when the wheel mount has been removed for cleaning the slinger grooves.

Remove wheel mounts once a week, wipe the slinger grooves clean, and clean out the drain hole. (Both regulating and grinding wheels.) This will prevent water and grit from contaminating the spindle oil.

Stop machine before changing regulating wheel speeds. This will save wear and tear on the gears and chain.



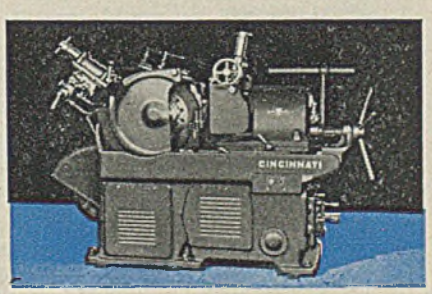
Lubricate machine and check oil levels daily. Use lubricants specified in service literature and on machine instruction tags. Slides on machines *for high production infeed work* should be wiped clean, moved full length, and lubricated twice each shift.

2% ATTENTION

PAYS 98% PRODUCTION DIVIDENDS

Time out for actual production for routine service attention may seem like an unwarranted interruption, but its just as essential as the operator's personal fitness program. The urgency rating of production must never crowd out the still small voice of attention . . . attention to details of service that keeps the machine running . . . attention that keeps the machine producing 98% or more of the normal working hours.

The CINCINNATI No. 2 Centerless Grinding Machine, for example, is a "bear" for work, but it, too, requires routine service attention to keep going. Some of the more important items are illustrated at the left. If you will consider the time required for these chores, you will find that it takes no more than about 57 minutes of a 56 hour week. In other words, two percent of the operator's time spent in routine service attention keeps the machine producing the remaining 98% of his time.



Why not give your Centerless a break. Don't begrudge it that 2% service attention, and you'll find that its always on the job ready to produce.

CINCINNATI No. 2. Centerless Grinding Machine. Complete engineering data may be obtained by writing for catalog No. G-456-1.

CINCINNATI GRINDERS INCORPORATED CINCINNATI, OHIO, U.S.A.

CENTERTYPE GRINDING MACHINES . . . CENTERLESS GRINDING MACHINES . . . CENTERLESS LAPPING MACHINES

Congressmen Hear of Delays in Settlements on Canceled Orders

National policy recommended by industrialists testifying before military affairs committees. . . Procurement agencies hesitate to close cases due to uncertainty regarding what they are authorized to do

TARDINESS by government procurement agencies in making settlements on terminated contracts was revealed in testimony by industrialists appearing before the military affairs committees of the House and Senate.

Contractors and subcontractors testified they still are waiting to receive money due on contracts canceled as far back as 16 months ago.

The trouble is not that the procurement agencies do not want to make quick settlements. It is rather because they are not certain just what they are legally authorized to do—and they are particularly touchy now that the Comptroller General has reported to Congress that the negotiated termination settlement is an infringement on his rights under the Budget and Accounting act of 1921.

Most of the industrial spokesmen who have testified so far have come to the hearings not so much to register complaints; in most instances they recited their case histories to illustrate why so much confusion and worry exists with respect to prospects that cash settlements may be delayed over a period of years unless an adequate law is formulated and enacted. Most of them made recommendations the gist of which is:

1—Congress should declare a national policy as to settlements on termination. This should provide for prompt payment to contractors and subcontractors of fair and reasonable compensation, including all costs as well as a reasonable profit.

2—Authorize the various government procurement agencies to follow the same policy in regard to contract termination now followed in price renegotiation—that is, lump all war business of a single contractor or subcontractor together and make settlement on this broad basis. The procurement agencies should be authorized to make settlements that are final. They should make these settlements on the basis of good business judgment; it is to be expected they might make mistakes here and there but on the average they can be expected to treat both the contractors and the government justly.

3—Two exceptions should be provided to allow for a review and alteration of the settlement reached between a contractor and a procurement agency. There should be local or regional tribunals, of an entirely neutral character, to which contractors might appeal in cases where they believed the procurement agencies had not treated them justly. There also should be a provision in the law that cases of settlements might be reopened where it was found subsequently that there had been fraud on the part of a contractor or collusion between a contractor and a procurement agency. While there should naturally be a penalty for fraud and collusion such a penalty should not be so severe as to frighten honest businessmen.

4—Each contractor should deal only with one procurement agency—that from which he has had most of his business. This agency, in turn, would act for all other agencies.

5—Divorce the matter of contract termination from all activities of the General Accounting Office and the Comptroller General. Unless such a provision is included, the procurement officers will hesitate to take the responsibility of making settlements in the fear that they later would be called on the carpet for making larger payments than the Comptroller General believed warranted. This also is necessary to assure contractors that they are not going to be called upon to pay back, a number of years hence, considerable sums of money at 6 per cent back interest.

6—There must be no "on-the-cuff" settlements. There should be a detailed, written record of each transaction in case a contractor wants to take his settlement to court.

7—As promptly after a termination as possible, the contractor would file a claim whereupon the procurement agency immediately would advance him anywhere between 45 and 90 per cent (the range of figures recommended by different witnesses) of the amount of the total claim, with the remainder to be paid him after the necessary audits had been made.

8—There should be a moratorium on renegotiation payments by contractors and subcontractors at the time of termination of their contracts in whole or in part.

9—There should be a provision authorizing purchase by the government of the rights of subcontractors against their prime contractors. Also, the government would be required to assume the obligations of a prime contractor to a subcontractor where the prime contractor has become insolvent.

10—The law should recognize commitments otherwise not legally enforceable because they were entered into in an informal way—often over the telephone, without any written records. Several witnesses recommended something like the Dent act that was enacted after the last war.

11—The law should carry a provision allowing the procurement agencies to make and amend contracts without regard to other statutes. They should have similar power not only to agree on and make payments, but to make and guarantee loans, and to sell or otherwise dispose of all forms of government-owned property, and to take any other action necessary to carry out the national termination policy.

12—Some overall board should have charge of setting up uniform termination standards to the end that all of the procurement agencies would follow the same procedure.

13—There should be a clear definition as to what is war business. How far down the line does it go—to the subcontractor, the sub-sub, the sub-sub-sub? How about shelf goods? Witnesses pointed out that many manufacturers of shelf goods have expanded their capacity several times because of war needs. They are entitled to some relief on their inventories and their expansions.

14—Prime contractors should be permitted to make cash settlements with subcontractors where such treatment is needed to keep the subcontractor going—such settlements being somewhat under the full amount of the claim; they would not be questioned in the final set-

SLY BEGINNING?

When Treasury Department officials recently went before the House Ways and Means Committee with recommendations for a new revenue law calling for an additional $10,500,000,000 in taxes, Congressmen Thomas A. Jenkins (Dem., O.) and A. Willis Robertson (Dem., Va.) commented on the absence this year of last year's recommendation for a $25,000 ceiling on salaries. Representative Jenkins wanted to know whether the prohibitive proposed rates on higher-bracket salaries were not "just an easy and sly way of commencing on this program that we call enforced savings."

Representative Robertson pointed out that the proposed rates would limit salaries in 1944 and 1945, due to the 12½ per cent payments due in those years on 1942 or 1943 taxes, to $23,408, regardless of what the income is.

"Next year and the following year, at the current income rates, nobody could have over $24,408.14," he said. "If he had an income of $750,000, he would owe it all to the government plus $3250; and if he had an income of $1,000,000 he would owe it all to the government plus $5750, without any increases this year."

tlement if the procurement agency found the settlement was made in good faith.

It was said again and again by various witnesses that the statute books are full of pitfalls for war contractors, that we are "losing the atmosphere that came with Pearl Harbor" because contractors are thinking about legal matters and worrying about their future solvency. Every contractor, it was said, is out on a limb. In ordinary times a contractor does not have to sell to the government and when he does so he knows what he is up against. But in time of war a manufacturer has to take contracts whether he wants them or not. Hence it is only fair that the normal rules be relaxed and be superseded with an overall law that makes sense under present conditions.

"The Army has asked us to handle the termination of subcontracts on our heavy and medium tank programs," said J. Tyson Stokes, vice president, Baldwin Locomotive Works, Philadelphia. "We absolutely refuse. For one reason we do not know what the Government Accounting Office is going to rule when it goes over the settlements. When you make a settlement based on sound business sense you are naturally going to make allowances of which the GAO would not approve. In many cases if you have to furnish positive proof of a cost you will miss out on many expenditures.

"We have thousands of subcontractors and they have thousands of suppliers in turn. How far would we go—down to the seventh subcontractor, or possibly way back to the original raw material?

"Another thing, we would have to make detailed audits in hundreds of cases because the subs and sub-subs do not have the necessary accounting personnel. There are not enough accountants in the whole country to make the necessary audits for the contractors and the government. In our case the Army does not want to handle termination; the disbursing officer is afraid of what the GAO might do to him later on.

"It is very important that the law specifically protect the disbursing officers against any future criticism. Should it be found later on that some contractor has been overpaid by the government—possibly through fraud—that should be a matter strictly between the government and the contractor. If you permit the disbursing officer to be brought in then the whole purpose of the law to get speedy and final settlements—would be nullified."

"V" Loans Difficult To Obtain

During the Murray subcommittee hearings, questions were asked by members whether loans of the "V" type would ease the situation for terminated contractors. The answer was definitely "no," that it takes too long to get "V" loans to do any good.

Walter A. Mogenson, vice president, Aviation Corp. of Ohio, said it took his company eight months last summer to get a "V" loan.

"We had a cost-plus-fixed-fee contract for high-speed airplane engines which was canceled by the Navy on May 18, 1943. We had 306 vendors and subcontractors. The Navy wanted us to handle payment of these people. We do not have the capital that would permit us to take such a risk," said Mr. Mogenson.

Webb Wilson, treasurer, Fairchild Airplane & Engine Co., Detroit, said his company tried three months to float a "V" loan and gave up because it was getting nowhere.

"The banks wanted the Navy to guarantee a higher percentage of the loan than the Navy was willing to do," said Mr. Wilson. "Anyway, no bank is going to loan money to a terminated contractor who does not know what his cash settlement would be."

Mr. Wilson, appearing in behalf of the 100-odd companies that are members of the Aeronautical Chamber of Commerce of America, submitted a long statement in which he said that a special termination law is necessary to prevent this industry from being plunged into ruin after the war.

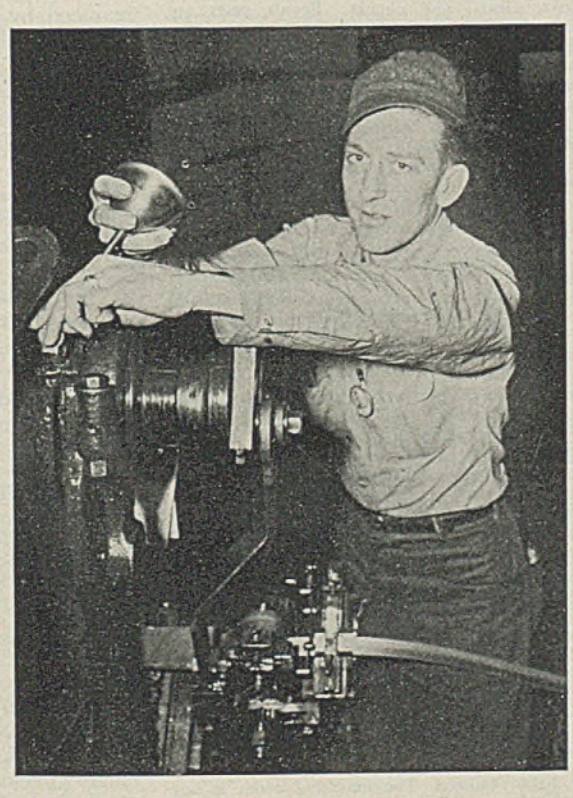
"At the end of 1942," he said, "the typical airframe manufacturer had $1.09 of current assets for each dollar it then owed. At the same date, the average for the non-aviation corporations was $2.20 of current assets for each dollar owed . . . . Financial means are available as long as we are operating on contracts. But when this work stops—when these contracts are terminated—we will find ourselves with obligations to be paid in dollars, and inventory which will then be non-salable to pay these obligations with . . . Then, Congress has not seen fit to cover us with a pay-as-you-go tax plan, so that after termination we will be faced with the necessity, in a period of probably very lean business, of paying high taxes on the previous year's huge volume of business."

A strange story was that recounted by Maxwell R. Berry, president, Electrical Products Co., Cleveland, which has been waiting more than a year for cash settlement of a terminated contract for special welding equipment for a Florida shipyard operated by the Thompson-Starritt Co. for the Maritime Commission. The order came to $21,000 and upon cancellation the Electric Products Co. submitted to the Maritime Commission a claim for $6900. This was made up by overhead costs; 11 per cent profit on the original order (11 per cent was the profit before taxes allowed by the Maritime Commission Price Adjustment Board in renegotiating this company); and a 10 per cent sales commission, which went to the company's Florida sales representative who rendered extensive engineering service to the shipyard in designing, locating and instructing plant personnel in its operation.

This claim was transferred, in turn, to the Maritime Commission office at Philadelphia, Washington, Jacksonville, New Orleans, then to the Thompson-Starritt Co. and, finally, again to the commission in Washington.

"I have found nothing but good will and a desire to be helpful," said Mr. Berry, "but the only definite proposal from the Maritime Commission was that

(*Please turn to Page* 142)



VETERAN RETURNS: Oliver Blakeney, veteran of Pearl Harbor and Guadalcanal where he was wounded and stricken with malaria which reduced his weight from 180 to 120 pounds, now operates a punch press in the Acme Steel Co. plant at Chicago. Company officials say his working at the plant has excellent effect on the morale of other workers. Says Blakeney: "I'm working for the boys still fighting"

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

ALUMINUM PRODUCTS: Following receipt of an order for aluminum products in the form of controlled materials, except ingot, which a producer cannot fill in the month requested, the producer must notify the customer as promptly as possible, and in any event, within seven days of the proposed delivery date. If the customer does not confirm the new delivery date within seven days, the producer must cancel the order. In such cases, when the new delivery date falls within a later quarter than that shown on the original order, and the order is an authorized controlled material order rather than a specially directed AM (aluminum-magnesium) order, the confirmation has no effect until the producer receives the customer's certification that he has an allotment available for the new quarter. In this event, the customer must charge the order against the allotment for the new quarter.

When a producer of aluminum product has no open capacity, either in the delivery month or the two following months, he must reject the order as promptly as possible, and in any event within seven days. He must notify his customer that he has done so.

If, after final acceptance of an order for aluminum products, a producer finds he cannot make delivery during the month in which delivery was promised, the order must be given a position on his production schedule and be filled ahead of all orders accepted for delivery in any month after the promised delivery month, unless otherwise directed by WPB or the customer. (CMP No. 1)

AUTOMOTIVE REPLACEMENT PARTS: Producers of certain automotive replacement parts must not use preference ratings assigned to their authorized production schedules covering such parts to buy replacement parts for resale as such. This WPB rule does not apply to replacement parts which will be incorporated in other replacement parts to be made by the purchasing producer but is a limitation on purchase of such parts by producers to round out a line. The ruling applies to automotive replacement parts as defined in order L-158. (CMP No. 3)

STEEL PRODUCERS: Unless specifically directed to do so, it is no longer necessary for steel producers to send the Steel Division a list of the authorized controlled material orders not shipped in the month following the month in which delivery was requested. Producers must advise their customers promptly, however, of the approximate date when delivery can be scheduled, if shipment cannot be made in the month specified. Producers must keep their customers informed also of any change in delivery dates. Revised CMP regulation No. 1 also provides that delivery of any carryover orders must be scheduled and made in preference to any orders for similar material originally scheduled for a later month. (CMP No. 1)

L ORDERS

WASHING MACHINE PARTS: Restrictions on use of copper for domestic washing machine parts have been eased. A manufacturer now may produce specific repair parts made of copper or copper-base alloy. List A of the revised order names the repair parts for which copper now may be used. Purchasers of copper repair parts must turn in a similar used part or an equal amount of copper or copper-base alloy scrap. Each manufacturer may maintain an inventory of repair parts equal to his sales in the first six months of 1943. The order also permits assembly of domestic washing machines, when specifically approved by WPB, from the limited stocks of pre-fabricated parts in inventory for the Maritime Commission and the War Shipping Administration for use on shipboard and in seamen's organizations. (L-6)

VISES: Effective date of schedule IV of limitation order L-216, which was issued originally Sept. 7 and which reduced the number of types and sizes of vises which could be manufactured from about 165 to about 40, has been postponed until Jan. 1, 1944. Proposed restrictions on production are being reviewed. (L-216)

INDEX OF ORDER REVISIONS

MARINE FITTINGS HARDWARE: Schedule III of limitation order L-236 has been issued, establishing practices affecting the sizes and types of certain items of marine fittings hardware and materials used in their manufacture. Items covered by the schedule, with specifications set forth in tables I through VII respectively, are: forged, fabricated and pipe turnbuckles; forged shackles; rope thimbles; forged rope sockets; forged hoist and grab hooks; cleats; and chocks. Repair parts are exempted from the restrictions imposed. Ten other exemptions are specified, including: items specially designed for use on or operation of lifeboats, life boat equipment, lifelines, aircraft or underwater craft; items manufactured from parts in the possession of producers on or before Oct. 14; and items manufactured to fill contracts executed before Oct. 14 with the Army, Navy, Maritime Commission or War Shipping Administration. Effective date for simplified practices is Nov. 14. (L-236)

CANNING MACHINERY: Quotas establishing the quantities of over 150 specified types of canning machinery and equipment that may be manufactured during the year beginning Oct. 1, 1943, have been announced. Prior to issuance of schedule III of order L-292, production of canning machinery was limited by the order to 50 per cent of the annual average number of units produced during 1939-41. In general, production quotas are set at about 100 per cent of the base production figure. However, on items needed for the food expansion program percentages run considerably higher, and are over 1000 per cent in some instances. Equipment for export outside of the territorial limits of the United States and Canada and for direct military use may be manufactured in excess of the quotas. The schedule provides that WPB may increase or decrease any quota or transfer any portion of it from one manufacturer to others, should need arise. (L-292)

M ORDERS

COPPER ARTICLES: Status of various copper articles under provisions of order M-9-c-4 has been changed. The amended order is not applicable to copper or copper-base alloy pipe, tubing or fittings in a building or structure, unless the installation is for plumbing, heating or cooking purposes. It is not necessary under any conditions for the Copper Division to pass on the installation of air-conditioning, refrigeration or industrial processing systems. Contractors are prohibited from using copper or brass nails, screws, nuts, bolts, rivets, washers and expansion shields for construction and repair to buildings. However, stores are permitted to dispose of their supplies of these items to anyone for the balance of 1943, but after that only on a rating of AA-5 or higher except for an additional $25 worth on lower or unrated orders. Installation of certain copper or alloy plumbing fixture fittings and trim is permitted when it is packaged with other plumbing fixture fittings and trim as a unit. (M-9-c-4)

BERYLLIUM: Definition of beryllium alloy in order M-160 has been revised to read in part as follows: "Any alloy made for resale in ingot form and containing less than 3 per cent but not less than 0.1 per cent by weight of the element beryllium, if made in whole or in part from scrap or secondary materials." Purchasers must file forms WPB-1122 and 1123. (M-160)

CLASS Z PRODUCTS: Class Z product scheduling provisions of order M-293 have been made available to essential Canadian war programs. These programs correspond to United States programs listed in table 1 of general scheduling order M-293, as a result of an amendment to the table. (M-293)

PRICE REGULATIONS

WATER PUMPS: A 20 per cent increase over previous maximum prices at all levels for the "No. 2 pitcher spout pump", used chiefly in rural areas, has been authorized. The pump is one made from cast iron with a 3-inch cylinder and adapted for a 1¼-inch suction pipe. Prices established are on an f.o.b. factory basis. (No. 246)

Childress Placed in Charge Of New WPB Subdivision

Administrative machinery for operation of area production urgency committees in critical labor areas has been announced by the War Production Board. Wade T. Childress has been appointed deputy vice chairman to handle area production urgency operations.

The pattern established by the Office of War Mobilization in September may be extended to other areas by the WPB chairman, acting through the Interagency Production Executive committee, and the chairman of the War Manpower Commission.

The administrative order specifies that no new contracts or renewals of contracts which will aggravate the existing situation will be placed in a critical area except as otherwise decided by the Production Executive committee.

Appointments-Resignations

Merrill Stubbs, chief, WPB Industrial Salvage Branch, has resigned and the position has been taken by John J. Sheehan who has been a member of the WPB Scrap Processors Board.

—o—

L. L. White, chief operating officer, Chicago & North Western railroad, Chicago, has taken a leave of absence to become director of WPB's Transportation Equipment Division, Washington. He

will succeed Andrew Stevenson, appointed executive assistant to Hiland G. Batcheller, WPB operations vice chairman.

—o—

Bradley Dewey, rubber director, announced appointment of L. D. Tompkins, Wilton, Conn., as deputy rubber director.

—o—

Miss Olive Dennis, engineer of service, Baltimore & Ohio railroad, has been loaned to the ODT to assist in determining types of railroad jobs in which women can be employed satisfactorily to meet manpower shortages.

OPA Authorizes Adjustable Pricing on Pig Iron Sales

Adjustable pricing provisions have been authorized by the Office of Price Administration for use in all sales of pig iron and in sales of iron ore produced in Minnesota, Wisconsin and Michigan. These provisions conform with the standard type being inserted in almost all OPA regulations.

Amendments to price schedule No. 10 (Pig Iron) and No. 113 (Iron Ore Produced in Minnesota, Wisconsin and Michigan), effective as of Oct. 22, provide that any person may sell pig iron, or iron ore produced in the named states, at a price which may be increased up to the maximum price in effect at the time of delivery.

They further provide that if permission is obtained from OPA, the commodities may be sold on a basis of adjustment upward in price after delivery or after agreement to deliver, should there be an increase in the maximum price of the commodity.

Purpose of the adjustable pricing provision is to facilitate sales and deliveries during periods when OPA may be considering upward adjustments in ceiling prices.

Authorization to deliver or contract to deliver on an adjustable pricing basis may be granted by OPA or any OPA official to whom power to grant authorization is delegated.

The following unrelated change in wording of the pig iron regulation also has been made by the amendment to price schedule No. 10: It more clearly states that pig iron basing point base prices may be increased by 50 cents a ton for each ¼ of 1 per cent or fraction of that quantity of silicon content in excess of base grade (1.75 to 2.25 per cent). Also, an addition of 50 cents a ton may be made to basing point base prices for each ½ of 1 per cent, or fraction thereof, of manganese content in excess of 1 per cent.

The amendments make no change in the maximum prices established for sales of iron ore and pig iron, but merely clarify certain provisions and add others to facilitate administration.

Nickel-Chromium-Molybdenum Steels Recommended for Wider Use

Steel Division's committee on conservation and operation foresees greater utilization of all kinds of alloy steel scrap if at least 60 per cent of alloy steel produced for engineering and construction purposes is of this type

USE of the nickel-chromium-molybdenum alloy steels should be increased to at least 60 per cent of the total alloy steel produced for engineering and construction purposes, it was recommended at the last meeting of the Steel Division's Industry Advisory Committee on conservation and operation.

The various so-called "triple-alloy steels" of this description are the NE 9400, NE 8600, RBEC 4700, and SAE 4300 series, as well as a number of non-standard compositions designed for special applications. Greater utilization of all kinds of alloy steel scrap and greater recovery of the alloying metals contained in steel scrap are foreseen if the proposed objectives can be achieved.

Large Recovery from Scrap

If there had not been extensive recovery of alloys from steel scrap, our supplies of these metals would have been insufficient to maintain the scheduled production of alloy steels. For a long time the distribution of alloys for the melting of tool and stainless steels has been based upon obtaining a substantial proportion of the requirements from steel scrap.

More recently, in the case of the engineering alloy steels, steps have been taken to assure full use of all the turnings being generated currently and to control the proper classification of alloy steel scrap by types.

These measures have been notably successful because of the wholehearted cooperation of both the steel users and the steel producers. In a recent month the alloy steel turnings consumed exceeded 12 per cent of the total alloy steel ingot production, leading to significant conservation of the contained alloying metals. However, the ultimate potentialities of these efforts cannot be realized unless a broader demand for the nickel-chromium-molybdenum steels is created.

The triple alloy steels have the advantage of providing flexibility in the use of alloy steel scrap without which the needs for the alloying metals would have to be satisfied to an ever greater extent from the virgin materials. Since larger quantities of scrap can be used in making up furnace charges of these steels, the stockpiling of alloy steel scrap would be relieved, with consequent increase in the amount of alloying elements recovered.

From the metallurgical standpoint, the alloy steels containing combinations of nickel, chromium, and molybdenum have always enjoyed a good reputation. At present these steels are being employed in a wide variety of applications in Army and Navy material, aircraft, heavy machinery, transportation equipment, and other important uses. In these circumstances everything possible must be done to convert the engineering and constructional alloy steels to the triple alloy compositions.

Small War Plants May Get Aid in Buying Chain Hoists

In order that jobbers' stocks may be kept in balance to aid small war plants in obtaining required chain hoists promptly, the Chain Hoist Manufacturers Industry Advisory committee has recommended that manufacturers be directed to set aside a percentage of their monthly chain hoist production by units to take care of orders rated on PD-1X (WPB-547) applications. It was suggested that about 5 to 10 per cent of chain hoist manufacturers' monthly production would be adequate to take care of distributors' applications requesting authorization to purchase chain hoists for resale.

Output of Construction Machinery Parts Must Rise

Larger production of construction machinery parts and coal mining machinery is sought by the War Production Board.

Construction Machinery Division, WPB, has issued an urgent appeal to manufacturers of construction equipment to increase their output of repair and spare parts. Present production of parts is at the rate of 50 per cent of the total dollar value of equipment produced, while peacetime output was at a 15 per cent rate. Despite this increase, not enough parts are being produced to meet present requirements and 1944 demand is expected to be even higher. Most urgently needed are parts for power shovels and cranes.

The construction machinery industry is using subcontracting to an ever greater extent. Available facilities of the machine tool industry are being used in particular.

WPB has granted higher preference ratings for the production of coal mining machinery. The Combined Production and Resources Board of the United States, United Kingdom and Canada recommended the ratings after hearing a report of its Combined Coal committee.

Corrections for Contracts Act Suggested by Cleveland Critic

J. F. Lincoln asks guarantee against "taxation without representation, recourse to courts without possible retribution from price adjustment boards, open hearings, incentives for efficient producers, regenotiation only after taxes"

RECOMMENDATIONS for revising the Contracts Renegotiation act were made to the House Ways and Means Committee recently by J. F. Lincoln, president, Lincoln Electric Co., Cleveland, and a foremost critic of the act and the procedures followed by the price adjustment boards under the act.

Three fundamental difficulties put into the law by the men administering it, Mr. Lincoln said in a letter to Chairman Robert L. Doughton, are:

1. It penalizes the efficient manufacturer and rewards the inefficient. "The only defense the efficient has against renegotiation is by decreasing his efficiency, since no producer sufficiently inefficient has been renegotiated. No law should force a contractor to be unpatriotic in order to protect his business."

2. It increases the number of men needed for war production because of this penalty, "hence we are now drafting fathers."

3. It has put into the hands of five men the power of taxation by direction without restriction of law or reference to the Congress or the courts.

Admitting a law might be needed to correct occasional abuse resulting from contracts to manufacturers with no previous experience with the products made and who therefore could not bid accurately, Mr. Lincoln suggested the following points should be included in such an act:

1. All taxpayers under the renegotiation law must have recourse to the courts without any possible retribution from the price adjustment boards.

2. All proceedings must be a matter of public record.

3. In order to eliminate the interference with management now involved, the statement obtained by the Treasury Department for the taxpayer's company should be the information used for determining any additional assessment.

4. A known lawful formula must be used. This formula should be different in the case of a manufacturer using his own money and one financed by government.

5. The formula must give more profit to the efficient producer for reducing cost. Incentive to higher efficiency must be restored. This is fundamental.

6. All commercial products whose prewar price was controlled by competition must be free from renegotiation provided they have not been increased in price beyond the actual increases in labor and material.

7. Renegotiation must be after taxes since this is the only profit left to the producer. It must leave the efficient manufacturer enough for rehabilitation of his plant and ample reserve for postwar contingencies; otherwise, postwar unemployment will result in revolution.

8. The procurement agencies must favor the efficient manufacturers by placing contracts with them so their genius will reduce the cost and increase the rate of production. Incentive here must be restored.

9. Renegotiation should be applied to as few companies as possible. Renegotiation obviously promotes inefficiency in every case where it is applied. In most cases this cure is worse than the disease.

"These changes in the present law will remove all objections. They will also reduce the present cost of war material by many times any possible recapture of profits.

"In considering this matter it is well to remember that the hope of winning this war rests on the ability of American industry. Interference and penalty can well wreck this effort," Mr. Lincoln concluded.

J. F. LINCOLN

The Navy Price Adjustment Board several weeks ago issued a finding for $3,250,000 in renegotiation proceedings on Lincoln Electric Co.'s 1942 profits.

After Mr. Lincoln refused to accept the board's decision, Under Secretary of Navy James Forrestal threatened to enforce it "by directing the withholding of payments otherwise due to you by the government and by prime contractors with the government."

Mr. Lincoln replied his company "must continue to refuse to accept this decision."

Contending that renegotiation as now administered penalizes efficiency and rewards inefficiency, Mr. Lincoln said:

"The only hope that we have for a quick ending of the war is the ability of American industry to out-produce and out-invent the Axis producers. If this is not done the human losses to win this war will be appalling. It is because of the deadening effect of renegotiation on war production that every patriotic American must resist it."

WPB and OPA Select Additional Industry Advisory Committees

Following are some of the industry advisory committees recently selected by the War Production Board and the Office of Price Administration:

Precision Tools

Government presiding officer: Franz T. Stone. Committee members: Frederick Blackall, Taft-Pierce Mfg. Co., Woonsocket, R. I.; S. H. Smith, Smith Tool & Engineering Co., Bucyrus, O.; W. J. Greene, L. S. Starrett Co., Athol, Mass.; Kenyon Y. Taylor, Millers Falls Co., Greenfield, Mass.; Paul R. Hatch, Brown & Sharpe Mfg. Co., Providence, R. I.; F. C. Tanner, Federal Products Corp., Providence, R. I.; A. Bradford Reed, Reed Small Tool Works, Worcester, Mass.; Robert G. Thompson, Lufkin Rule Co., Saginaw, Mich.

Consolidated Metal Cutting Tools

Government presiding officer: Franz T. Stone. Committee members: C. W. Bettcher, Eastern Machine Screw Corp., New Haven, Conn.; E. H. Martindale, Martindale Electric Co., Cleveland; W. E. Caldwell, Cleveland Twist Drill Co., Cleveland; D. G. Millar, Greenfield Tap & Die Corp., Greenfield, Mass.; H. R. Conners. Detroit Broach Co., Detroit; Charles M. Pond, Pratt & Whitney, W. Hartford, Conn.; W. M. Dalzen, Dalzen Tool & Mfg. Co., Detroit; J. J. Prindtville Jr., Lapointe Machine Tool Co., Hudson, Mass.; Frank W. England, Illinois Tool Works, Chicago; Ernest C. Putnam, Putnam Tool Co., Detroit; Harry Fussner, National Acme Co., Cleveland; W. G. Robbins, Carboloy Co., Detroit; W. E. Loy, Union Twist Drill Co., Athol, Mass.; J. S. Storrs, Tungsten Electric Corp., Union City, N. J.

Office Machines Manufacturers

Stanley C. Allyn, president, National Cash Register Co., Dayton, O.; W. D. Caton, vice president, Standard Register Co., Dayton, O.; John S. Coleman, executive assistant, Burroughs Adding Co., Detroit; A. B. Dick Jr., president, A. B. Dick Co., Chicago; H. P. Elliott, president, Elliott Addressing Machine Co., Cambridge, Mass.; Carl M. Friden, president, Friden Calculating Machine Co., San Leandro, Calif.; C. S. McAlister, president, American Perforator Co., Chicago; Joseph E. Rogers, Addressograph Multigraph Corp., Cleveland; Merrill B. Sands, president, Dictaphone Corp., New York City;

and A. W. Vanderhoof, Vice president, Standard Duplicating Machines Corp., Everett, Mass.

Office Machines Dealers

H. H. Saunders, New England Adding Machine Co., Boston; Walter Bret, International Office Appliance Co., New York city; W. H. Wolowitz, United Typewriter & Adding Machine Co., Washington; Paul Gross, Mailers' Service & Equipment Co., New York city; E. R. Pfahl, Adding Machine Sales & Service, Cleveland; F. K tcherside, Buckland Van Wald, Detroit; Luis de Olazarra, Shipman-Ward Mfg. Co., Chicago; J. A. Lyons, Reliable Typewriter & Adding Machine Co., Chicago; Otto E. Pruitt, Pruitt Office Machines Co., Chicago; Leo C. Horal, Denver Typewriter Co., Denver, Colo., and C. P. Carter, Frank E. Wilbur Co., San Francisco.

Axle

Government presiding officer is R. L. Vaniman. Committee members are: R. L. Bishop, Schuler Axle Co. Inc., Louisville, Ky.; H. C. Maddux, Timken-Detroit Axle Co., Detroit; L. A. Bixby, Clark Equipment Co., Buchanan, Mich.; Hugh Mixer, Eaton Mfg. Co., Cleveland; E. J. Lucas, Kingham Trailer Co. Inc., Louisville, Ky.; H. R. Silver, Standard Forge & Axle Co., Montgomery, Ala.

Butts and Hinges

Members of the committee are:
Howard N. Campbell Jr., vice president in charge of sales, McKinney Mfg. Co., Pittsburgh; Rodney W. Chamberlain, assistant general sales manager, the Stanley Works, New Britain, Conn.; Archer L. Hager, vice president, C. Hager & Sons Hinge Mfg. Co., St. Louis; Harry C. Pearce, secretary, Sharon Hardware Mfg. Co., Sharon, Penna.; Hugo M. Weyrauch, vice president, National Mfg. Co., Sterling, Ill.

Domestic Vacuum Cleaner

Government presiding officer is F. M. Mitchell. Committee members are: Henry W. Burritt, Eureka Vacuum Cleaner Co., Detroit; B. C. Neece, Landers, Frary & Clark, New Britain, Conn.; Walter Dietz, Electrolux Corp., New York; A. E. Norris, Regina Corp., Rahway, N. J.; C. G. Franz, Apex Electrical Mfg. Co., Cleveland; J. H. Nuffer, Air-Way Electric Appliance Corp., Toledo, O.; T. Russ Hill, Rexair, Inc., Detroit; R. J. Simmons, Birtman Electric Co., Chicago; H. W. Hoover, Hoover Co., North Canton, O.; Ralph Wilson, Electric Vacuum Cleaner Co. Inc., Cleveland.

Portable Pneumatic Tool

Government presiding officer is Franz Stone. Committee members are: E. V. Erickson, Wm. H. Keller Inc., Grand Haven, Mich.; Ralph W. Morrison, Aro Equipment Co., Bryan, O.; T. P. Harris, Chicago, Pneumatic Tool Co., New York; E. J. Steger, Cleveland Pneumatic Tool Co., Cleveland; Robert Johnson, Ingersoll-Rand Co., New York; E. R. Wyler, Independent Pneumatic Tool Co., New York; Joseph de V. Keefe, Dallett Co., Philadelphia.

Piston Ring Manufacturing

Government presiding officer is Norman B. Johnson. Committee members are: David A. Cowhig, Wilkening Mfg. Co., Philadelphia; T. Latimer Ford, Koppers Co., Baltimore; A. E. Johnson, Hasting Mfg. Co., Hastings, Mich.; Herbert W. Knapp, McQuay-Norris Mfg. Co., St. Louis; George C. Landon, Wausau Motor Parts Co., Wausau, Wisc.; Neil A. Moore, Sealed Power Corp., Muskegon, Mich.; H. M. Ramel, Ramsey Accessories Mfg. Corp., St. Louis; Don H. Teetor, Perfect Circle Co., Hagerstown, Ind.; Harold G. Vaughan, Muskegon Piston Ring Co., Sparta, Mich.; F. M. White, Liberty Foundries Co., Rockford, Ill.

Steel Controls

Government presiding officer is W. A. Hauck. Committee members are: William Bonte, Republic Steel Corp., Cleveland; F. R. Brugler, Bethlehem Steel Co., Bethlehem, Pa.; E. L. Resler, Jones & Laughlin Steel Corp., Pittsburgh; Neele E. Stearns, Inland Steel Co., Chicago; H. C. Stringfield, U. S. Steel Corp. of Delaware, Pittsburgh.

Probes Restrictive Labor Rules

Naval Affairs Subcommittee questions Under-Secretary Forrestal on Brewster Aircraft situation. . . Matter of employing workers efficiently held problem of Manpower Commission

WASHINGTON

WHEN Under-Secretary of the Navy James Forrestal appeared before the Drewry subcommittee of the House Naval Affairs Committee recently to answer questions about inefficiency at the plants of the Brewster Aircraft Corp. at Long Island City, N. Y., Johnsville, Pa., and Newark, N. J., numerous attempts were made by members of the subcommittee to get him to name some factor which "more than any other" was to blame for Brewster's poor showing.

The nature of the questions was such as to indicate that a number of the congressmen felt the chief blame was due to the manner in which the CIO United Auto Workers of America union used its closed shop powers in these plants. Two of the subcommittee members asked frankly how the management at Brewster could be blamed when its hands were tied by the union.

Mr. Forrestal absolutely refused to make any commitment. He said that the Brewster situation resulted from a combination of causes among which were not only a bad labor situation but also unintelligent handling of inventories and inadequate flow of materials and component parts to the production lines. He thus again lived up to the Army-Navy labor policy in this war—the armed services are super-careful in refraining from offending the feelings of labor leaders.

Cites Poorer Performances

Representative Melvin J. Maas (Rep., Minn.) declared that he had heard that the Brewster performance was not as bad as that of some other companies—that a number of others were farther down on the production list and he wanted to know why the committee was investigating an "average" performer instead of the really scandalous cases. Under-Secretary Forrestal promised to submit a list of the aircraft producers in the order of their efficiency, so that before the series is over the history of a number of other companies may be aired.

The opening hearing was rather notable for the reason that not only one or two but all the subcommittee members asked questions which indicated their impression that the Navy has not been sufficiently thorough in checking into the causes of incompetence in various war plants and in applying corrective measures. Numerous questions revealed an inclination to believe that the Navy should concern itself more with the manner in which manpower is used at these plants.

It was brought out, for example, that the labor contract at the Brewster plants has been very restrictive. It prevents discharge or disciplining of any employe without the prior consent of the union. The union fixes the company's draft deferment schedules. No employe can be transferred from one kind of work to another without his personal approval. Overtime schedules cannot be changed without advance notice to the union. Layoffs, rehiring, transfers and promotions must be made in accordance with strict plant-wide seniority, and no employe can be promoted over the objection of the union. Leadmen and sub-foremen were included under the contract and until recently the union also asserted jurisdiction over company guards who were in the Coast Guard Reserve.

Mr. Forrestal said that this matter of labor relations was one coming squarely under the authority of the War Labor Board, and he cited certain changes in the union rules at the Brewster plants that were ordered in a recent ruling of the War Labor Board. The matter of employing manpower efficiently, he said, is a problem for the War Manpower Commission. About all the Navy should or could do, he said, is to try to get efficient managerial policies set up in war plants.

Representative Patrick H. Drewry (Dem., Va.), chairman of the subcommittee, refuses to say what witnesses still are to be called; a number of Navy spokesmen were on hand for questioning after conclusion of the examination of Mr. Forrestal. It is quite certain that one who will be called and questioned extensively is Tom de Lorenzo, president of CIO-UAW Local 365, the Brewster union.

Mr. de Lorenzo recently announced his entire satisfaction with the arrangement he has made with Henry J. Kaiser, now taking active charge of the Brewster management after having been elected its president last March.

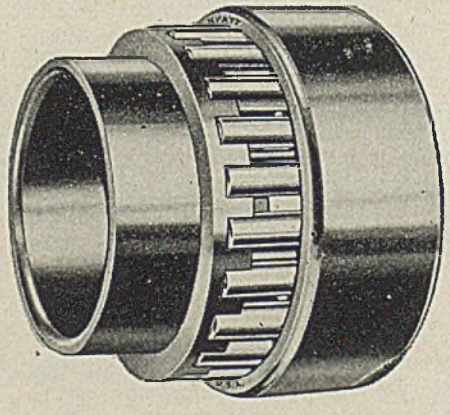
Steel Mills Set Best Record in Safety Contest

Steel mills had the lowest accident rate with an average of 5.19 per cent and foundries the highest accident rate with an average of 22.54 per cent in the Metals Section Safety Contest sponsored by the National Safety Council and covering the period from July 1, 1942, to June 30, 1943.

Average frequency rate among the 378 plants participating was 9.10 per cent. Frequency rates averaged 8 per cent higher than in the previous contest. Rates increased in all divisions except the heavy machine shops division which showed a 6 per cent decline.

—and this is the

"BIG INCH"



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By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Automotive Council for War Production possibly might continue as co-ordinating agency in postwar era to help preserve American form of economy. . . Ford sales organization recast. Bennett grows in influence

RECENT suggestion by the WPB to a Senate committee on postwar planning that, with the resumption of consumer goods manufacture, models be frozen to their 1942 status for a specified period and that such "freezing" be enforced by control of materials to manufacturers, proved to be no startling suggestion to motor car builders, practically all of whom have gone on record as planning to build 1942 models when assemblies are permitted. Even with such a policy, it will be a matter of several months before any assemblies can be completed, and introduction of entirely new models might require upward of a year.

Industry generally is in the strange position just now of resenting the various forms of bureaucratic controls over materials, prices and production which war has apparently made necessary, and at the same time of realizing that when civilian production can be resumed, such controls may have to be continued to prevent unfair competitive advantages.

There is one possible "out", which rests with the Automotive Council for War Production. In this organization now are possibly 1000 member companies, including all the motor vehicle, body, parts, tool and die and related industries which go to make up the automotive industry. They are working in the closest thing to complete harmony that has ever been witnessed, in the interests of furthering war production. Granting that the smooth resumption of peacetime production is just as critical a problem as co-ordinating war production—and conceivably it might be more so—then what is to prevent the council from altering its name to the Automotive Council for Postwar Production and drawing up the rules to guide resumption of motor car manufacture. What group is better equipped to do such a job of providing the instrumentalities of reconversion. With the greatest stake in the world—preservation of the American form of economy—what greater incentive could there be for the maintenance of the joint effort of this co-operative group at least for a limited time in the postwar period.

However, even if such an altruistic policy could be worked out, it would likely be ripped asunder without delay by some federal trade commissioner bringing suit against a "cruel combination in restraint of trade" or some equally potent political straw man.

Recasting of the Ford sales organization has been effected in recent weeks. Principal change is a fairly complete decentralization of supervision from headquarters here, with H. C. Doss, until recently holding the post of general sales manager, being transferred to Atlanta in charge of a Southern zone. Five other zones include the West Coast, headed by J. R. Davis, also a former general sales manager; Southwestern, directed by C. A. Ostrander at Dallas; Eastern, headed by W. D. Edmunds at New York; Middle Western, supervised by Arthur Hatch at Chicago, and the Dearborn branch here headed by Harry A. Mack, who also doubles in labor relations work under Harry Bennett.

Bennett Nominal Sales Manager

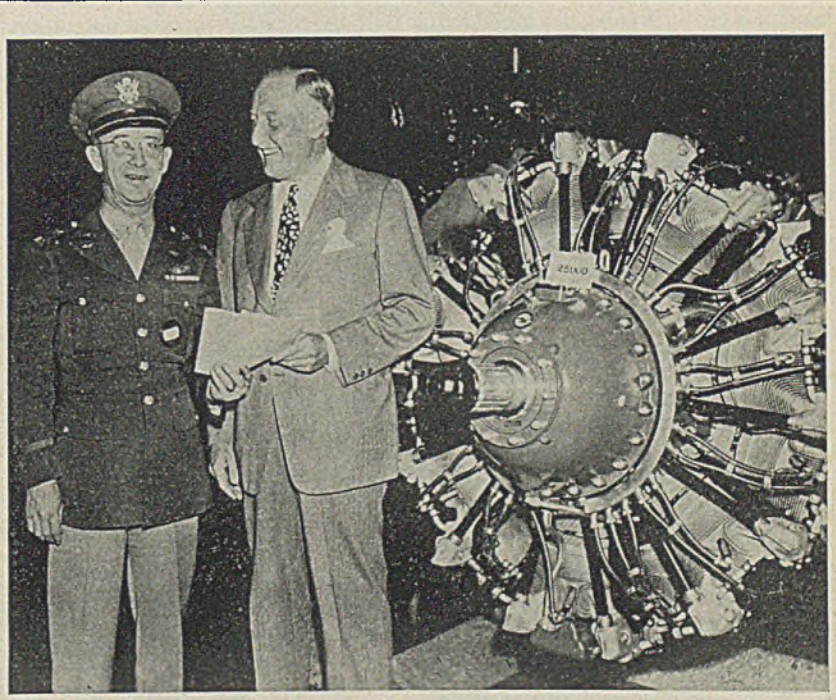
This leaves Ford at the moment without a general sales manager. Actually it would appear that Mr. Bennett is the nominal sales manager. Early last week there were reports that a new sales manager was to be named, R. I. Roberge, recently handling government contract work for Ford and before that foreign sales, being mentioned as the likely candidate. Divisional managers and their associates were in Detroit last week.

The death of Edsel Ford, it is becoming increasingly apparent, marked the end of an era at Ford. Since his passing, a number of the top names in executive ranks of the company have left and there has been a compacting of top management in the hands of the elder Mr. Ford, C. E. Sorenson and Harry Bennett. The latter's stature has grown steadily in the last few months and he now exerts a controlling influence over nearly all phases of the company's operations, with the exception of production, which is Mr. Sorenson's bailiwick.

Mr. Ford's grandson, Henry Ford II, is now being groomed for an executive position with the company, spending full days in the plants to familiarize himself with operations.

Since the resignation of A. M. Wibel, Ford purchasing activities at the Rouge plant have been under the general direction of Claude M. Nelles and Howard C. Kellogg, both old-time Ford buyers, Mr. Nelles having long been associated with steel purchases. At the same time there has been a gradual decentralization of Ford purchasing into the various units of the company, such as Willow Run, the Pratt & Whitney Engine plant, Highland Park, etc.

One of the first changes in the Ford setup following the death of Mr. Ford's son was the departure of Steve Hanagan as public relations counsel. He had established a news bureau and had brought in four or five of his men to staff it, director being John W. Thompson who formerly supervised public relations for Consolidated Aircraft in San Diego before control of this company was assumed by Aviation Corp. through its Vultee division. Thompson and Bennett hit it off well from the start, the public relations director being the guest of Bennett at the latter's ranch near Palm Springs, Calif., on at least one oc-



POWER FOR LIBERATORS: Representing 30,000,000 horsepower for 6250 Liberator bombers is this 25,000th bomber engine produced in Buick plants within the past 21 months. Above it is being officially accepted by Col. Alonzo Drake, Army Air Force procurement officer, from Harlow H. Curtice, Buick president

casion. Hence it was surprising news when Hanagan was dismissed, the only reason heard at the time being that Mr. Ford did not like his policies.

Since then, another story is being told. It runs to the effect that shortly before Hanagan's leaving, reports appeared in certain newspapers to the effect that employment recruiting personnel at the Ford Willow Run Bomber plant was "raiding" Ford dealers around the country to hire their mechanics. Ford dealers were up in the air over the matter, and Hanagan reportedly was called on the carpet for "permitting" such stories to be published, although obviously there was not much he could do about it. At any rate, this marked the end of Hanagan's association with Ford and Thompson took over control of the news bureau under Mr. Bennett's supervision.

Ford advertising, including radio and publication, currently is handled by the Maxon agency in Detroit, and direction rests in the hands of Harry M. Wismer, radio sports announcer, who is close to the Ford family. Radio feature sponsored by Ford is newscaster Earl Godwin on the blue network seven nights a week. A short time ago, Mr. Wismer conceived the idea of developing a new show featuring Paul Whiteman and his orchestra, the show going as far as auditions, according to *Variety*. Mr. Ford reportedly was not impressed, so Earl Godwin was re-engaged and still continues his newscasting for Ford.

AVCO Adds New Division

Newest addition to the manufacturing units of the Aviation Corp., as yet unannounced officially, is the Horton Mfg. division in Detroit. While no mention of the new division has been made by AVCO officials, nevertheless Horton is listed in the Detroit telephone directory as a division of Aviation Corp. and a builder of automatic electric door operators for industrial and residential installations.

The company is located in a small plant at 14656 Wyoming and has supplied a number of door-operating units for buildings at the Ford plants and for residences in and around Detroit. Essentially, the device includes an electric motor, driveshaft and auxiliary supporting equipment for raising and lowering doors. Control can be arranged in different forms, such as pushbuttons, tread switches, etc.

Most recent listing of AVCO—this trademark, incidentally, has been developed for application to all present and forthcoming Aviation Corp. products—manufacturing units shows four divisions—Republic Aircraft Products, Lycoming, Spencer Heater and Northern Aircraft Products—and one wholly owned subsidiary, the American Propeller Corp.

A second hitherto undisclosed phase of AVCO activity in the "postwar products" field is the work of A. J. Snow, former stylist and marketing consultant with a large mail-order company, who is now located in Detroit at a West Fort street address and is studying various types of consumer goods for possible postwar manufacture by AVCO plant units.

In the Sept. 13 issue of STEEL, details were presented in this department, outlining essential phases of a wage incentive plan in operation at the Ecorse, Mich., frame building plant of Murray Corp. of America. The plan was developed after several years of study by a group of "management engineers"—Stevenson, Jordan and Harrison—called into the Murray organization in 1939 by President C. W. Avery.

In the background of the past four years, association of S. J. and H. and Murray are developments which have perplexed many Detroiters and confused others who have tried to analyze just what was happening in the higher ranks of this old-line body-building plant now busy on several airframe subassembly projects.

In the first place, the director of the original S. J. and H. crew which came into Murray to start their time studies, job and salary evaluations, aptitude tests, etc., for over a year now has been operations manager of the company, displacing L. C. Hill, who had served with the company since before its incorporation in 1926. Meanwhile one of the two Widman brothers who had held high posts in the company retired from his job as sales manager, the other brother continuing as financial vice president. C. W. Avery continued as president and is vice president of the Automotive Council for War Production.

Last fall, in response to a flood of rumors that control of Murray had been purchased by outside interests—New York capital and a chain of local drugstores were mentioned—Mr. Avery gave the lie to such charges by stating that no more than 6 per cent of Murray stock was controlled by any single individual or group.

Here the matter rests officially, except for the fact that there is a considerable amount of inner seething in the greatly expanded Murray organization today, and all hands are not convinced that the S. J. and H. management engineers have done a thorough job of "scientificating" management policies and procedures. Some point to glaring weaknesses in such things as "human relations" and with employes and the training of supervisory personnel. It remains to be seen whether these deficiencies can be corrected and whether "scientific management" of the Murray category can meet the test of peacetime production in the automotive industry.

FACTS AND FIGURES

The automotive industry's war production is now nearly at the ten billion dollar a year stage. Annual production rate is now double output of civilian goods in the best peacetime year and the peak has not yet been reached.

In the first seven months this year, war production was more than in the entire year 1942. Aircraft production by the automotive industry increased 185% over the corresponding period in 1942, while tank production is up 80%, military vehicles 34% and guns 90%.

There are 1038 automobile plants from coast to coast engaged in war work, of which 316 are in Michigan, 150 in Ohio, 98 in Illinois, 92 in New York and 84 in Indiana.

The extent to which the industry subcontracts its war work is shown by the fact 56 cents out of every $1 received goes to subcontractors and vendors. A breakdown discloses these subcontractors are located in 1375 cities in 44 states. Data are from Facts and Figures, yearbook of the Automobile Manufacturers Association.

New Flying Fortress Model Now Being Produced

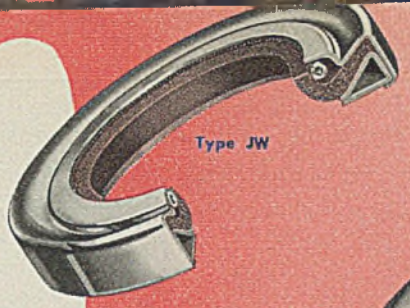
Boeing Aircraft Co. announced recently it is now producing model B-17G of the Flying Fortress—eighth in the line of Boeing B-17's. Outstanding new characteristic of the model "G" Fortress is a "chin turret" located under the nose of the ship beneath the bombardier's plastic window, it was disclosed. The craft also is said to have numerous other refinements over its immediate predecessor, the B-17F.

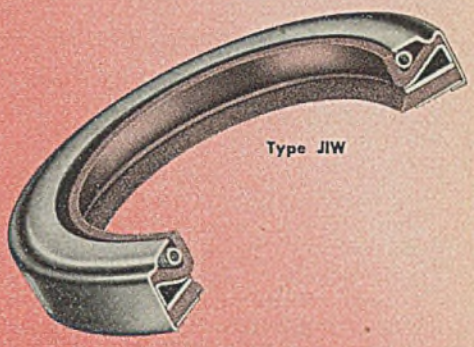
The new chin turret provides the Boeing Fortresses with added fire power from the fore portion of the ship and is designed to parry frontal attacks by enemy fighter planes, Boeing officials state. The turret is described as a power-operated unit carrying two 0.50 calibre machine guns with an effective range of approximately 1,000 yards. Former nose guns were hand operated.

Survey Reveals Women Better Producers Than Men

Women workers in war plants studied by the National Industrial Conference Board in the course of an inquiry recently completed are proving to be as good or better producers than men in a majority of cases, the board announced.

Of 146 war plants reporting to the board, about 87 or nearly 60 per cent stated that the production record of their women employes was as good if not better than those of men engaged on similar work. Another nine plants reported that while women's production was below that of men on some types of work it was equal to that of men on other jobs. In 36 plants, women on men's jobs were reported to be producing less than men.





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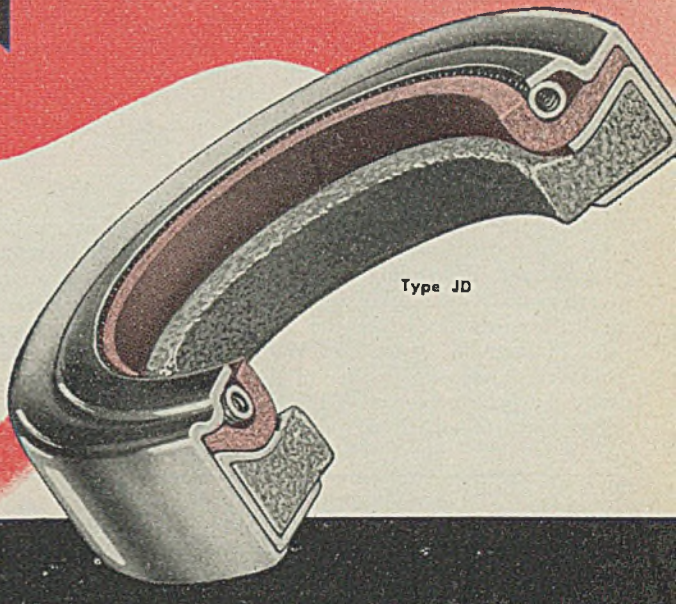

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WING TIPS

"Allotment attrition," disparity between allocations of controlled materials and total mill orders placed by consumers in a given quarter, constitutes new problem for aircraft materials control experts

AS THE Controlled Materials Plan, regulating the flow of steel, copper and aluminum raw materials to war industry, emerged from its early stages and became subject to more realistic analysis, a new phenomenon reared its head, which, for the want of a better term has been termed by the WPB, "allotment attrition"—actually the disparity between allocations of controlled materials for a claimant agency and the total mill orders placed by consumers in a given quarter against WPB allocations.

Theoretically, there should be no attrition factor, since materials requests by individual contractors are supposed to be based on carefully drawn unit bills of materials, which, after submission to the claimant agency, are screened (or checked closely) by this agency before allotments are granted. However, for a variety of reasons, attrition has built up to serious proportions, and concerted steps are now in process to remedy it.

First indication the aircraft industry was not using a substantial share of its materials allotments as determined by the Aircraft Scheduling Unit at Wright Field came in the form of figures on order placements developed by the Aluminum and Magnesium Division of WPB. Figures for the second quarter of this year were not believed to reflect the true situation since the CMP was of too recent introduction. However, third quarter figures confirmed the trend. While it is difficult to obtain overall totals on aircraft steel and copper order placements, it is reasonably certain the same condition holds true with these materials as with aluminum.

Actually, the problem is not tied so closely to the placement of orders as it is to the return of unneeded allotments in time for effective redistribution to other agencies. In the third quarter, for example, the Aircraft Resources Control Office returned materials allotments to WPB covering 58,000 tons of steel, 15,125,000 pounds of copper and 29,225,000 pounds of aluminum, but unfortunately all but an insignificant portion of these returns came too late for use by any other agency. It must be remembered that these returns are not actual materials, but rather allotments which are "tickets to buy" within mill capacity.

Fail To Achieve Schedules

What are the causes of allotment attrition? First, of course, is the widespread failure of aircraft contractors to achieve full schedules, in turn occasioned principally by shortages of manpower. Material men requesting allotments and the Aircraft Scheduling Unit in making such allotments obviously cannot foretell where schedule failure will exist or what its extent will be. Therefore, requests and allotments are based on the assumption that full schedules will be achieved. As failure occurs in the months intervening between the request for allotment and the time material is scheduled for production, surpluses are carried forward, and the need for purchase of new raw materials thus is correspondingly depreciated.

Close to schedule losses in importance as a cause of attrition is the great degree of subcontracting practiced by the aircraft industry, throughout literally thousands of widely scattered small plants in which materials control problems become difficult to master because of limited or inexperienced personnel. Thus, a small shop employing perhaps a dozen workers producing a certain airframe part cannot by its nature be expected to be too familiar with the intricacies of the CMP or of such new problems as "attrition."

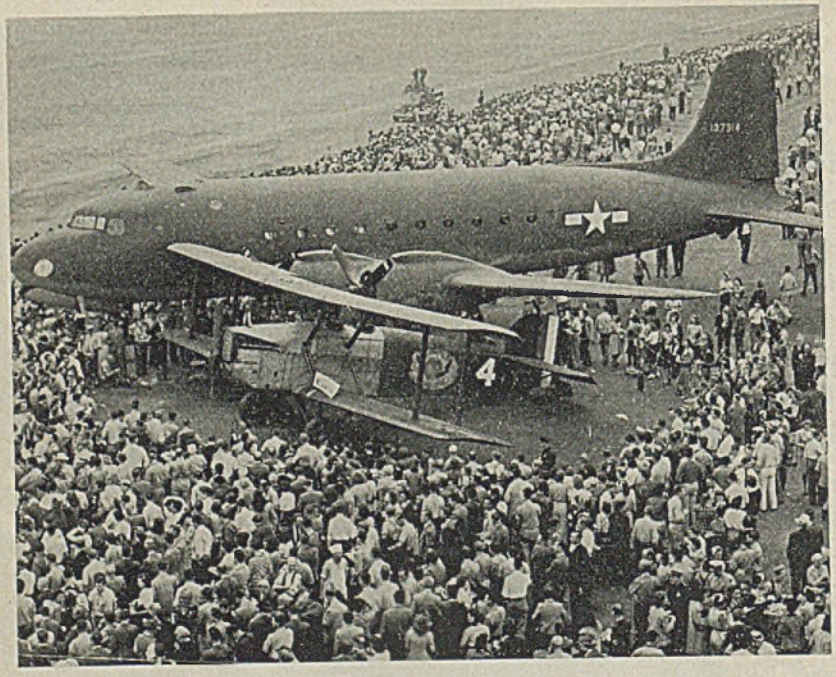
Many of these small plants do not even bother to file requests for materials allotments with their customers, or to reply to direct requests from customers for a statement of allotment use. It is at this secondary consumer level that the need for an educational effort to explain the need for minimizing attrition and for accurate materials control becomes most imperative.

A third cause of what appear to be requests for excessive allotments of materials is intimately related to a fear psychology lodged in the minds of materials control experts who have come through months of materials shortages to the point where they can believe nothing else. Where allotments have been in excess of actual purchase needs, they have been held in reserve as a safety cushion and not returned to the Aircraft Scheduling Unit. Certainly it seems reasonable to anticipate that this fear psychology will subside as contractors realize the materials picture generally is not nearly as black as it has been, and as they find requests for supplemental allotments can be serviced without delay by the ASU, as in fact they can, often within 48 hours.

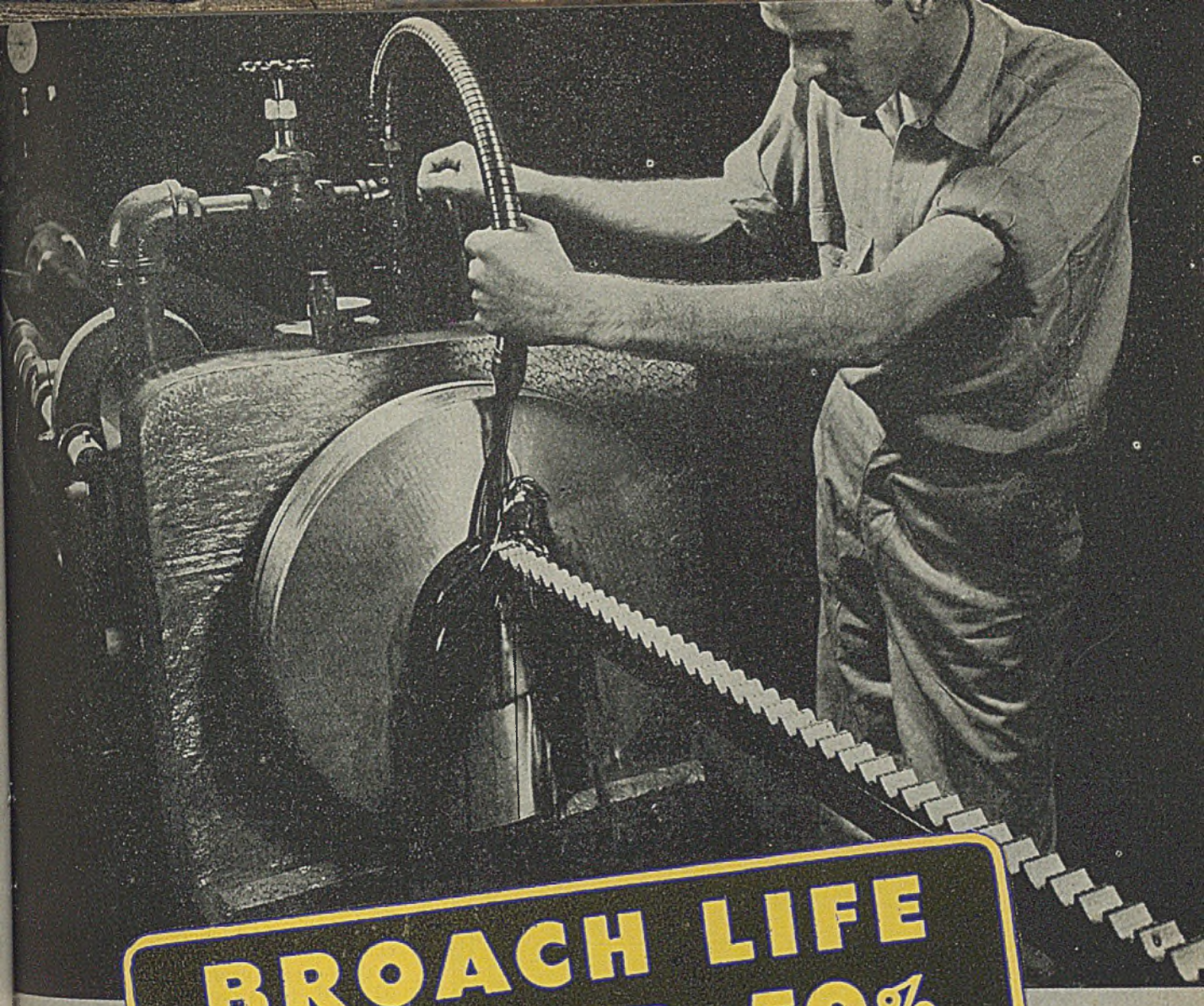
Inadequate Materials Control System

Inadequacy of materials control systems in the past has not been confined solely to smaller subcontractors, but has been a similar deficiency among some principal prime contractors. They have, perhaps excusably, concentrated solely on production, which may have meant simply a rough "safe" estimation of materials requirements rather than a careful analysis and calculation of actual needs. In recent months, ASU Army and Navy officers have been making a strenuous effort to overcome these deficiencies, both by personal contacts in the industry and through the district procurement offices of the AAF. An encouraging fact is that almost every important company in the aircraft industry is aware of what deficiencies may exist and is moving to correct them.

Contributing causes of attrition are the



PROGRESS: Advancement in airpower is shown graphically in this view of the single-engine 1924-vintage World Cruiser by the side of a new C-54 transport. In its day the older plane traveled 29,000 miles in 371 hours, while its more modern brother can do it in 140 hours. NEA photo



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necessity for substantial ASU allotments reserves and warehouse purchases. ASU has been receiving an average of some 50 supplemental requests daily as a result of engineering changes, new contracts, errors, etc., and if allotment reserves of ASU should prove at some time inadequate, the industry would immediately revert to the practice of holding individual allotment reserves. The extent of warehouse purchases is not known accurately, but they are considerably larger than at one time believed. Producers of B products on the CMP list, for example, often will hold unused allotments to cover warehouse purchases as they receive orders, a workable practice, but certainly not in the true spirit of CMP.

It would seem to be a simple matter to erase attrition by holding total allotments to the aircraft industry to the levels of actual order placement effected by the industry in past three-month periods, but this is easily demonstrated as most injurious to the industry. Allotments are requested and made far in advance of the time airplanes reach the production stage and it is impossible for material men in the plants or for the ASU to know which companies will or will not meet schedules, or the degree to which schedules may be missed. For this reason, any reduction in allotment availability below the material requirements for building the full aircraft schedule could only be handled by a straight horizontal allotment cut to all companies, and this would in turn result in short allotments to those companies meeting their schedules, or an overall production drop in the industry as a whole.

Cannot Eliminate Attrition Entirely

Officers who have been busy doing field work on this problem of attrition attest to the fact attrition can never be entirely eliminated, since it is spread over too wide a front. Some reserves admittedly must be held by industry to encompass unforeseen purchase releases, and, as pointed out previously, it is difficult to effect control measures down at the secondary consumer level of subcontractors. A corollary point is that some contractors are both prime and sub, thereby considerably complicating their materials picture.

However, attrition will be reduced materially as educational pressure is developed, and particularly as industry gains confidence in the improved materials outlook. The trend is being accelerated notably by the acute consciousness of inventories and material control developing throughout the industry as the result of greater concern over impending contract terminations.

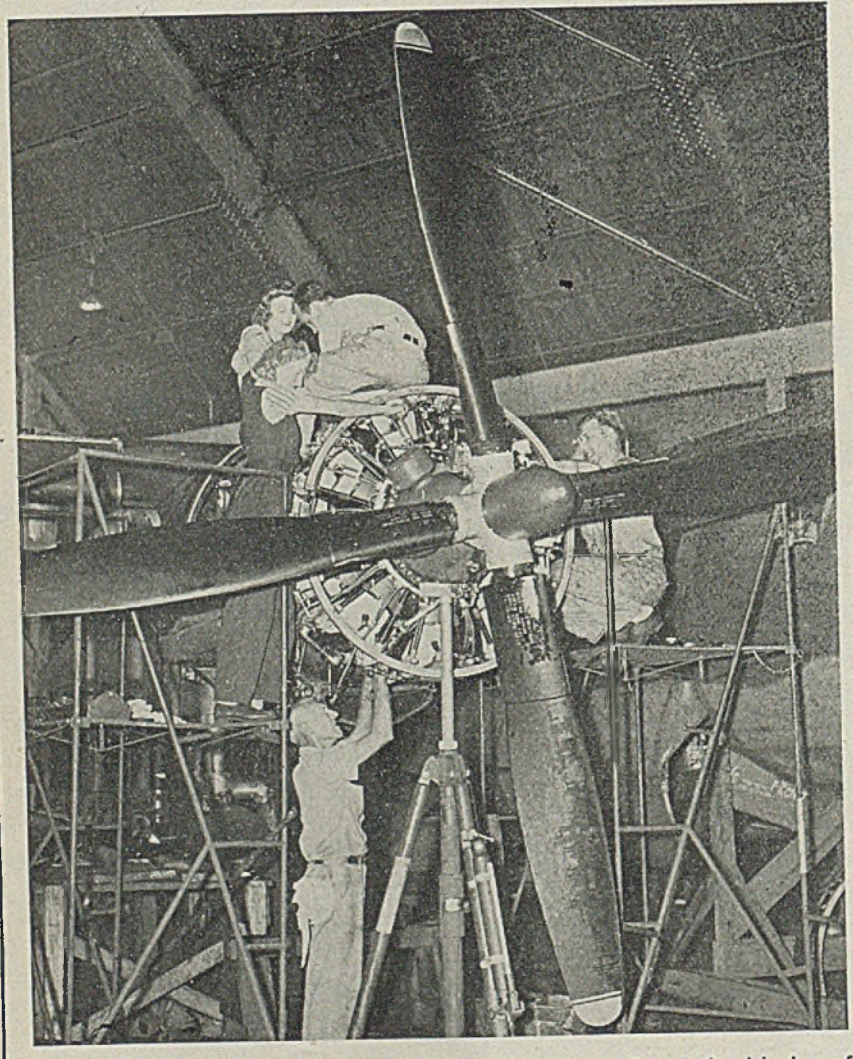
Materials inventories in the aircraft industry are heavy, for two principal reasons—cutbacks in schedules, either imposed or unavoidable; and control systems which have not taken inventories into account in purchasing raw materials. Unfortunately, the growing consciousness of the size of inventories is being reflected in reductions in new purchases, which only accentuates the attrition factor. For this one reason, fourth-quarter order placements cannot be taken as the true material requirements of the industry for that period, for they signify mainly that industry is reducing the size of its inventories, and has not necessarily been guilty of padding requests for allotments.

The answer at the moment is to persuade all units of the industry to return to the claimant agency without delay the unused portions of all allotments in time for effective redistribution to other aircraft users or to other agencies. To assist in this return of unused allotments, CMP-32 ASU forms are provided. These should be filled out and returned either to the ASU or to the customer, depending upon where the original allotment was made.

Aircraft Council Aids ASU

Co-operating with the ASU in its efforts to reduce attrition are the materials committees of the National Aircraft War Production Council, both East and West Coast branches, and the Central Aircraft Council. Meetings also have been held by Army and Navy personnel in the six Air Corps procurement districts and the various navy area officers, at which the problem has been explained in detail to all important primary and secondary consumers.

Most recent step in attacking the problem was the issuance of ASU-44 forms requiring an exact allotment accounting as of Sept. 20 to all important consumers of controlled materials in the aircraft field. These were followed by calls from district and area personnel. As the completed forms are received by the ASU in Dayton, those companies reporting unused balances in fourth-quarter allotments were contacted by wire and telephone and necessary cancellations made. A deadline of Oct. 1 was placed on these returns, since this was considered the latest possible date for effective redistribution of allotments.



HOLLOW STEEL PROPELLERS: Seamless steel tubing forms the blades of this propeller being installed on a Martin Marauder B-26 medium bomber. Manufactured by the American Propeller Corp., subsidiary of The Aviation Corp., at Toledo, O., the props require a minimum of welding

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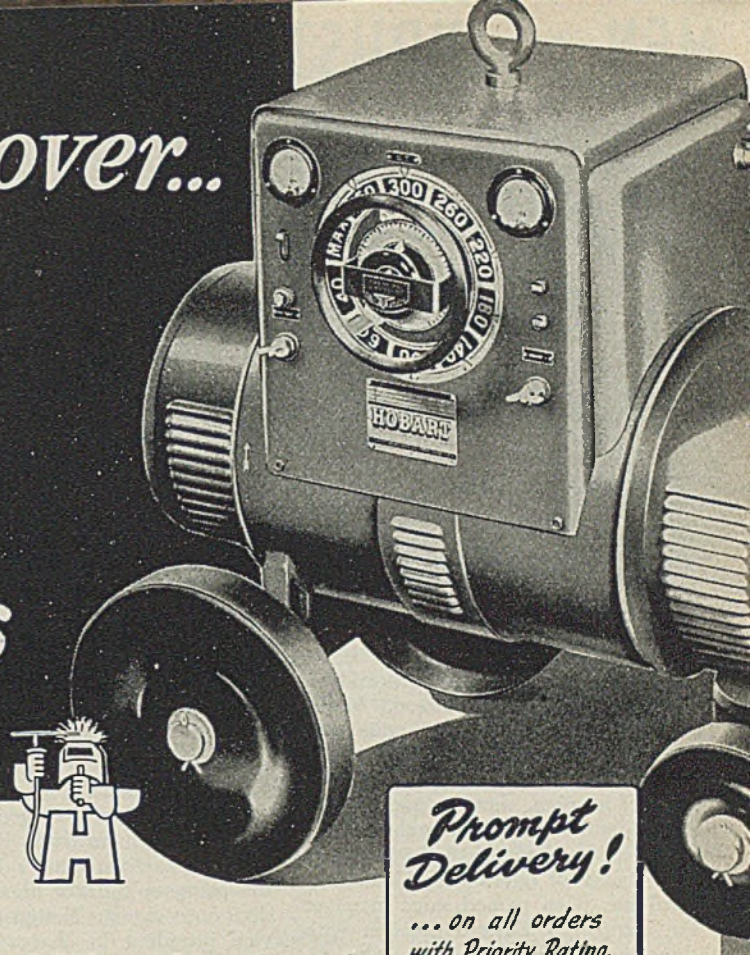

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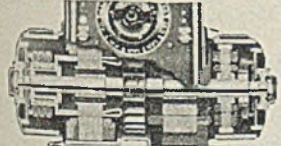

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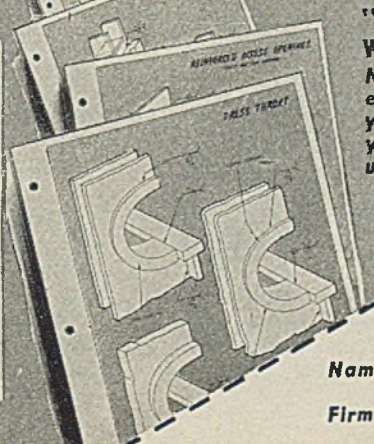

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M. N. TRAINER

E. N. CALHOUN

D. EARL McELROY

Dorothy M. J. Tracey, vice president, Tomkins-Johnson Co., Jackson, Mich., has been appointed general manager, succeeding A. R. Johnson, president.

—o—

Clyde Llewelyn, former assistant to the president, Bliss & Laughlin Inc., Harvey, Ill., has been elected vice president in charge of operations. **J. Stanley McCord** has been named sales manager of the company's Eastern division with headquarters in Buffalo, and **John O. Hoover** succeeds him as district manager, Philadelphia.

—o—

Richard P. Brown, board chairman, Brown Instrument Co., Philadelphia, and vice president, Minneapolis-Honeywell Regulator Co., Minneapolis, has been named deputy director, War Production Board, third region.

—o—

R. H. McCormick, previously advertising manager, Vascoloy-Ramet Corp., North Chicago, Ill., has been appointed advertising manager, American Hoist & Derrick Co., St. Paul.

—o—

Frank H. Harrison, former manager of manufacturing, International Harvester Co., Chicago, has been placed in charge of the Columbus, O., plant, Curtiss-Wright Corp., and has been named a vice president of the corporation. E. J. Harrington also has been made a vice president of Curtiss-Wright.

—o—

P. F. Zerkle has been appointed sales director, Michigan Tool Co., Detroit. **George Pierce** is manager of the company's new Cleveland branch, located in the Penton building, and **H. E. Roedter** is district manager of the new branch in Dayton, O., 710 Harries building.

—o—

Frederick B. Hufnagel, chairman, Crucible Steel Co. of Ameica, New York, has been elected a director of Excess Insurance Co. of America.

—o—

Wally E. George, since 1937 assistant to the management, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has joined the staff of Booz, Allen & Hamilton, Chicago, management engineers. **Edmund H. Eitel**, former manager of the Priorities Division, War Production Board, Chicago, has also joined Booz, Allen & Hamilton.

—o—

M. N. Trainer has been elected first vice president, American Brake Shoe Co., New York. Mr. Trainer is president of the company's Brake Shoe and Castings division. **A. R. Nettenstrom**, formerly vice president in charge of operations, American Forge division of American Brake Shoe, has been appointed first vice president of the Forge division.

—o—

E. N. Calhoun has been elected president, Edwin L. Wiegand Co., Pittsburgh, and **Edwin L. Wiegand**, who founded the company 28 years ago, has become chairman of the board. **A. P. Wiegand** has been elected senior vice president in charge of manufacturing.

—o—

C. B. Schmidt, general manager, De Laval Separator Co., Chicago, has been elected president of the Farm Equipment Institute to succeed **Frank Silloway**, vice president, Deere & Co., Moline, Ill. **George L. Gillette**, vice president, Minneapolis-Moline Power Implement Co., Minneapolis, is the new executive committee chairman. New members of the executive committee are **H. B. Megran**, secretary, Starline Inc., Harvard, Ill., and **W. K. Hyslop**, vice president and general manager, Massey-Harris Co., Racine, Wis.

GRANT S. DIAMOND

Who has been named president, Electro Refractories & Alloys Corp., Buffalo, as reported in STEEL, Oct. 11, p. 160.

—o—

D. Earl McElroy has been appointed special mill representative, Pacific Coast, Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld Inc., Coatesville, Pa.

—o—

Lionel M. Searle has been named manager, Simplex Radio division of Philco Corp. of Sandusky, O.

—o—

Harry Schuster, who has bought the Manufacturers' Equipment Co., Chicago, and is moving it to Milwaukee, has become president of the company. Other officers are: **B. A. Schuster**, vice president; **Nelson F. Petrie**, secretary, and **Clarence J. Meyer**, treasurer.

—o—

Harry A. Erb has joined Worthington Pump & Machinery Corp., Harrison, N. J., as service manager, Moore Steam Turbine division, Wellsville, N. Y.

—o—

S. C. Snyder has been appointed development engineer, research and technology department, Carnegie-Illinois Steel Corp., Pittsburgh. **C. W. Stoker** succeeds Mr. Snyder as development engineer, electrical sheet and strip division.

—o—

Willard M. Robinson, previously open-hearth superintendent, Phoenix Iron Co., Phoenixville, Pa., has been appointed superintendent, open-hearth department, Wickwire Spencer Steel Co., Buffalo plant, succeeding **Karl V. McCausland**.

—o—

Henry T. Bourne has been appointed general sales manager, Sargent & Co., New Haven, Conn.

—o—

Walter S. Tower, president, American Iron and Steel Institute, has been appointed chairman of the steel and iron

J. G. GRAHAM

group, New York Committee, National War Fund. David Luria, treasurer, Lewis Steel & Trading Corp., New York, will serve with Mr. Tower as chairman of the scrap metals committee.

—o—

J. G. Graham, manager of railway sales, Oliver Iron & Steel Corp., Pittsburgh, has been appointed a member of the Rails and Accessories Industry Advisory Committee, War Production Board.

—o—

R. S. Butler has been appointed assistant comptroller, general accounting, and Robert Diefendorf has been named assistant comptroller, plant accounting and statistics, H. C. Frick Coke Co., Pittsburgh. G. F. Anderson has resigned as assistant comptroller of the company.

—o—

Charles T. Jansen has joined Wilmington Chemical Corp., New York, as assistant to Vice President Edward V. Osberg.

—o—

Bernard L. Whelan has been elected general manager, Sikorsky Aircraft division, United Aircraft Corp., New York, succeeding J. Reed Miller, resigned. Lawrence L. Snow has been named manager, Airport division, United Aircraft Corp.

—o—

William F. Joyce, former secretary, Automatic Sprinkler Co. of America, Youngstown, O., has been elected vice president. J. J. Power Jr. succeeds Mr. Joyce as secretary, and J. A. Coakley Jr. has been advanced from assistant treasurer to treasurer.

—o—

Peter L. Lenz, former manager, Homewood manufacturing and repair plant, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed manager, Middle Atlantic district manufacturing and repair department, with headquarters in Philadelphia.

—o—

Robert J. McKay, chemical engineer, nickel sales department, International Nickel Co. Inc., New York, has been elected chairman of committee B-8 on electrodeposited metallic coatings, American Society for Testing Materials.

—o—

Forbes A. Ryder, formerly chief inspector, Midland Ordnance Foundation Inc., Decatur, Ill., has joined Fry, Lawson & Co., Chicago, management engineers.

—o—

Cecil L. Gibbs has been named assistant traffic manager, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

—o—

Morris Isaacson, for the past several years sales manager, R. Lavin & Sons Inc., Chicago, has been elected vice president.

—o—

E. E. Bryant has been named ceramic research director, Ferro Enamel Corp., Cleveland.

—o—

Wilbur H. Whitty has been appointed manager of the newly-opened Boston district office, Baldwin Locomotive Works, Philadelphia. Mr. Whitty, whose headquarters will be at 10 High street, will direct sales in the New England area for all divisions of the company.

—o—

Carl C. Joys Jr., formerly associated with A. O. Smith Corp., Milwaukee, in a sales capacity, has joined General American Transportation Corp., Chicago, to activate its plate and welding division.

—o—

Harrison R. Tucker has been named director, Aircraft Engineering division, Designers For Industry Inc., Cleveland.

—o—

John J. Buckely has been appointed production manager, Hub Industries Inc., Long Island City, N. Y.

—o—

M. E. Miller has been appointed traffic manager, Metals Reserve Co., Washington, to succeed T. A. Hamilton, who died Sept. 28. J. F. Morse Jr. has been named assistant traffic manager.

—o—

Robert Steel, assistant general superintendent, American Ship Building Co., Cleveland, has been appointed general superintendent in the Buffalo area, succeeding Lewis H. Reynolds, retired.

—o—

Richard S. Falk, industrial relations director, Falk Corp., Milwaukee, has joined the Marine Corps as a private.

—o—

Lowell L. Henkel, former senior industrial specialist, Technical Development Section, War Production Board, Chicago, has been appointed technical advisory consultant, Smaller War Plants Corp., Washington.

—o—

William A. Shulz has joined the Chicago sales division, Aro Equipment Corp., Bryan, O.

—o—

Louis L. Shapiro has been appointed plant manager, Glyco Products Co. Inc., Brooklyn, N. Y.

OBITUARIES . . .

Richard Ferguson, president, Ferguson Gear Co., Gastonia, N. C., died Oct. 16. Prior to forming his own organization in Gastonia, Mr. Ferguson had been general manager, Grant Lees Co., Cleveland.

—o—

George B. Warman, founder, Warman Steel Co., Huntington Park, Calif., died in Compton, Calif., Aug. 9. Mr. Warman also founded the Electric Steel Co., Huntington Park.

—o—

William R. Beatty, 66, founder and executive of the Beatty Machine & Mfg. Co., Hammond, Ind., died in that city recently.

—o—

John F. Pitz, 68, president, Pitz Foundry Inc., Brooklyn, which he established in 1910, died Oct. 17 in Kew Gardens, N. Y. Mr. Pitz was also head of the Loyal Textile Machinery Corp., and of Ames Hydrovac Corp., both of Brooklyn.

—o—

Herbert R. Walrath, 59, a director, and vice president and factory manager since 1937, Talon Inc., Meadville, Pa., died Oct. 13.

—o—

Louis S. Boismenue, 69, former purchasing agent, American Steel Foundries, East St. Louis, Ill., died there Oct. 5.

—o—

John J. Gibson, 79, who operated the Bison Bicycle Co. and founded the Kensington Electric Car Co., died in Buffalo recently.

—o—

D. A. Hinman, 77, co-founder and president, D. A. Hinman Mfg. Co., Sandwich, Ill., died there Oct. 11.

—o—

Dr. William H. Hatfield, 61, director of research and a director of Thomas Firth & John Brown Ltd., Sheffield, Eng., and a director of Firth Vickers Stainless Steels Ltd., Sheffield, died there Oct. 17.

—o—

Edward Kelly, 40, part owner, Chicago Brass Works, Chicago, died Oct. 9 in that city.

—o—

Morris Silverman, 74, founder, Paris Iron & Metal Co., Paris, Ill., died recently in that city.

—o—

A. G. McCormick, 68, president, McCormick Bros. Co., Albany, Ind., died Oct. 10.

—o—

John T. Stubbs, 42, attorney and credit manager, Harris - Seybold - Potter Co., Cleveland, died Oct. 14 in that city.

—o—

T. F. Wharton, 73, secretary-treasurer, Deere & Co., Moline, Ill., died there Oct. 13.

Return to Heavier Tin Coatings After War Wanted by Canmakers

Containers with 0.50-pound plating found unsatisfactory for preserving many mildly acid foods, although generally adequate for nonprocessed and noncorrosive items. Thin-coatings aided by enameling and chemical treatments

RETURN to 1.50-pound tin coating per base box, or 218 square feet of metal surface, for the fabrication of cans for processed foods after the war was predicted by K. W. Brighton, American Can Co., Maywood, Ill., at the 84th meeting, Electrochemical Society, New York, Oct. 13-19. Mr. Brighton reviewed developments in electrolytic tin plate from the can manufacturer's experience.

Whether postwar plate will be tin-coated by the hot-dip or electrolytic process depends on further research on electrolytic production lines as to the maximum weight of tin coating required to assure a service life equal to that of hot-dipped plate and also whether tin can be applied to the steel more economically by electro-deposition or hot-dipping.

Overcoming Many Obstables

Mr. Brighton said unenameled or chemically untreated 0.50-pound tin plate and even heavier would not do for mildly acid processed foods. By enameling interior and exterior surfaces, various chemical treatments and research on other corrosion resistances, thin-coated plate has temporarily met the emergency brought about by the loss of normal tin supplies. Development of improved soldering technique at seams with silver-lead solder has been an outstanding factor in overcoming obstacles in the use of thin-coated electrolytic tin plate for numerous containers.

Campaign to conserve tin in metal containers has been successful, up to 75 per cent of the tin content for some specific uses, but the path is not smooth for the canmaker on whose product depends a large part of the world's preserved food nor for the tin plate mill striving to meet exacting specifications for varied uses with relatively new electrolytic coating lines. "Bugs" in both the tin mill and can fabricating plant still are present.

Reviewing results with numerous foods, including tomatoes, pears, fruit juices, sausage in casing and other moderate acid processed fruits and vegetables in storage at temperatures 100 and 75 degrees Fahr. over periods of 200-250 days and less, Mr. Brighton reported wide-spread failure of cans fabricated from 0.50-pound electrolytic tin plate; 0.75-pound material showed considerable improvement and failures, corrosion, pitting and discoloration, are progressively less in ratio to heavier tin coatings.

The 0.75-pound plate is satisfactory for evaporated milk, one of the heaviest packs, but if 0.50-pound material were used, controlled distribution would be advisable. Mr. Brighton said for many purposes 1.00-pound or higher electrolytic can well be used and 0.50-pound plate will be satisfactory for numerous general line products, coffee, biscuits and other nonprocessed and noncorrosive items. Vacuum tests were employed to establish the rate of can failure in experimental packs.

Need for conservation of tin in cans early appeared in hot-dip practice, from

DR. B. D. SAKLATWALLA
Joseph W. Richards Memorial lecturer

1.50-pound to 1.35 and later 1.25, the 1940-41 packs going largely into thin-coated plate.

One entire session was devoted to strip steel plating. Development of a pioneer electrolytic line, that of the Crucible Steel Co. of America, was traced by Edward W. Hopper, Midland, Pa. Started in 1935, the first operating speed was designed for 60 feet a minute and the plating was to have a copper undercoating. This was eliminated and an iron under-coating followed. Increase in speeds and improved technique over the years were reviewed by Mr. Hopper, who declared Crucible would plate vertically in the future. An infinite number of production problems were overcome and with the curtailment in hot-dipping, the electrolytic process was ready for the test in the conservation of tin.

Bright electrolytic tin plate is now generally accepted, but Mr. Hopper indicated its use was advanced commercially ten years as a result of war conservation measures. Higher oil brightening speeds are likely and Mr. Hopper thought the better efficiency of the potash bath balanced the slightly heavier cost of chemicals required.

In a discussion of tin plating from the potassium stannate bath, Frederick A. Lowenheim, research chemist, Metal & Thermit Corp., Rahway, N. J., reviewed effects of changes in the bath composition upon the operating characteristics of this type of bath and presented new data concerning the effect of tin content on the anode efficiency.

The speaker presented data which he believed confirmed previous observations on the superiority of the potassium stannate solution over the conventional sodium bath. In confirming observations as to very thin deposits, he asserted the cathode current densities obtainable with good efficiency have been lowered somewhat, but that they still represent increases over those obtainable with the soda bath of from 100 to 500 per cent.

Principal advantages of the potash bath, he declared, will be realized in automatic installations, such as electro-tinning lines where plating conditions are susceptible to close control. In practice dragout losses and sludge losses have been so low it is believed that at even higher speeds of operation and higher bath concentrations these factors need not be considered disadvantageous.

Trend Toward Heavier Coatings

With a definite trend toward heavier coatings and the consequent necessity for slowing down the lines using the soda bath, the potash bath should be of particular interest, Mr. Lowenheim declared.

Under present conditions the principal application for tin plating is in the electrotinning of steel strip.

Laboratory tests on corrosion of tin-nickel alloy coatings on steel in canned foodstuffs, prunes, tomatoes, sauerkraut, spinach and peas, by H. R. Copson and W. A. Wesley, International Nickel Co., Bayonne, N. J., were reviewed by Mr. Copson. Nickel was first applied, then tin and the metal heat-treated at a point just below the melting range of tin. After 220 days coatings were generally intact with some pits and weight losses with prunes and sauerkraut. Results indicate that in four of the five foods used, tin-nickel coatings are possible as a substitute for heavier tin coatings, contributing to conservation of that metal.

Ernest H. Lyons Jr., Meaker Co., Chicago, speaking on "The Electrogalvanizing of Strip Steel", predicted a more extensive application of zinc to steel by that method in the future.

Electrical equipment in electrolytic lines was discussed by Glenn E. Stoltz, Westinghouse Electric & Mfg. Co., and continuous plating of fine steel wire with nickel was the subject of James H. Connolly and Richard Rimbach, Hanover Wire Cloth Co., Hanover, Pa., in the eighth and closing paper at the strip steel plating session.

Low-alloy, high-strength corrosion re-

sistant steels may be the steel industry's answer to the challenge of aluminum, magnesium and plastics, Dr. B. B. Saklatwalla, Pittsburgh, consulting metallurgist, declared, in the annual Joseph W. Richards memorial lecture.

"The transportation industries were enabled by the use of such steel to adopt light-weight construction," he said, "thereby eliminating deadweight and increasing payload and revenue. Such economic gains achieved by these steels presage an enviable future for them in the competitive reconstruction period we are about to enter."

He pointed out that the total tonnage of all alloy steels has increased from 2,000,000 tons in 1920 to 11,000,000 tons in 1942 and estimated that production would be 16,000,000 tons in 1945.

Dr. Saklatwalla grouped the steelmaking elements and alloys into four classes according to their ability to reduce the oxides of other metals, and found that five elements in one group (aluminum, titanium, vanadium, silicon and boron) are all constituents of the special addition agents or "intensifiers" that are now being added to steels to replace much larger amounts of nickel, chromium and similar strategic alloys without loss of engineering quality.

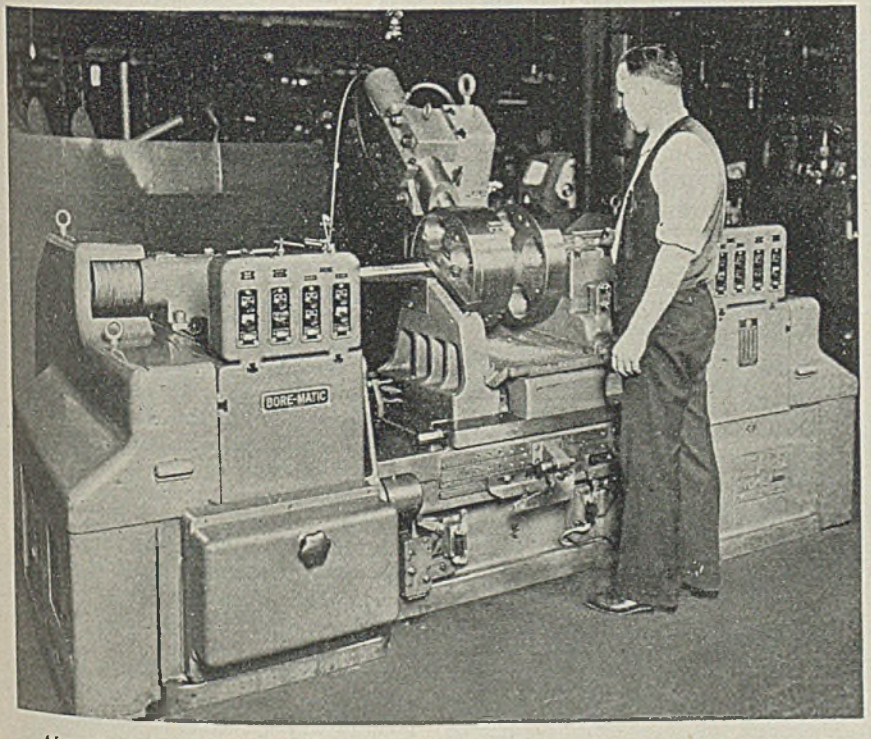
What was described as a relatively simple but highly successful direct reduction method of obtaining tungsten from ore was discussed by Colin K. Fink and Chuk Ching Ma, Columbia University."

Dwindling Volume, Renegotiation Cut Profits, Syphon Off Reserves

Dealers in Quebec convention ponder postwar future. Consider problems of disposing of surplus machines when hostilities end. Praised for efforts in tooling America for war production job

PICTURESQUE Seigniory Club, once the estate of the French-Canadian leader Louis Joseph Papineau, was the setting for the nineteenth annual meeting of American Machine Tool Distributors' Association. It is a sign of the times that a large number (close to 100) made their way to Montebello, Quebec, and that once there, they—like the machine tool builders only a few days before in Chicago—spent their time in the most serious kind of consideration of problems common to both groups, which problems will affect profoundly the postwar industrial welfare of America.

From the moment that Dan Harrington, Harrington-Wilson-Brown Co., retiring president, opened the first meeting on Oct. 14, until the sessions were brought to a close Oct. 15, by Albert Stedfast, Stedfast & Roulston Inc., newly elected president, the underlying theme was: "How can we carry on effectively into the postwar future when, in the face of declining income, our reserves are being syphoned off almost to the bottom of the barrel by renegotiation."



After this war, machine tool builders will depend on quick, ingenious tool and production engineering thinking by those who represent them "out on the firing line." This ability is officially recognized by the Ordnance Department as a major factor in development of its production program. It is exemplified within the industry itself by such "bottleneck-smashing" installations as this double-end Heald machine, tooled for precision spacing, boring and facing —on a production basis—of spindle carriers for National Acme automatics

This group of important engineering and marketing experts, whose fortunes of course are closely tied in with the machine tool builders, are not spending their time at the "wailing wall". Neither are they gazing idly into crystal balls. They are facing tough facts squarely in the hope that they may be able to change them for the better, and if not, that they will be able to survive and serve industrial America in spite of those tough facts.

In other words, under the capable leadership of economic advisers such as A. G. Bryant, Bryant Machinery & Engineering Co., and N. P. Lloyd, Lloyd Machine Tools Inc., programs are being drafted and advocated which already have won respectful attention in high government circles. It is too early yet to report what these plans are, or to predict to what extent they may eventually be adopted. Suffice it to say at this time that if they are adopted—even in part—America will be in far better condition to cope with the inevitable and fierce world competition in industrial products than it will if existing hazards to the future of the machine tool industry are allowed to continue unchecked as they are now.

Simmers Facts Down

The hard facts about renegotiation as it is being applied to substantial machine tool distributing organizations seems to simmer down about to this:—After taxes and after renegotiation, the average net profit on this much discussed "profitable wartime business" actually amounts to something between 0.6 and 0.7 per cent. When the uncertainties and meager volume of the machine tool industry in normal times are taken into account, no further comment is necessary to those who believe that hope for the future lies in the ability of private enterprise to finance itself and keep the wheels of industry turning so that there will be good jobs for all who should be working.

In presenting official greetings from Thomas Arnold, Machine Tool Controller, Dominion of Canada, C. S. Bradeen, president, Canadian Machine Tool Dealers' Association, made a significant statement. "Canada," he said, "standing as it does at the crossroads of British and American industrial traditions, may be the laboratory in which the problem of disposal of wartime machine tools may be worked out." The implication was that the Canadian government already is developing some logical plan to meet

(*Please turn to Page* 144)

Postwar Distribution Expected To Be Affected by War Experience

Changes in marketing anticipated by speaker at meeting of National Association of Sheet Metal Distributors. . . Says material shortages are opening markets for substitutes which will provide serious competition in the future

WHILE necessary during the war to follow strictly the rulings and dictates of Washington, it is likewise important for distributors to start planning seriously for developments after the war.

This was emphasized by Eugene Foley, Bayonne Steel Products Co., Newark, N. J., and president, National Association of Sheet Metal Distributors at the joint meeting of that organization with the National Wholesale Hardware Association at the Commodore hotel, New York, Oct. 18-20.

The meeting was the thirty-third semiannual gathering of the Sheet Metal Distributors and the forty-ninth annual convention of the Hardware association.

The program dealt with various phases of distribution and included timely discussions on renegotiation of contracts, postwar disposition of surplus material and manpower.

Discussing the postwar outlook, Mr. Foley believed distribution will show decided changes.

The present material shortage in many lines is opening markets for various substitutes which will provide serious competition later on, he said. There will be mass building projects and prefabricated buildings, all of which will make it necessary for distributors to gradually adjust their business.

It is also necessary to consider postwar distribution of surplus government goods, which, if released at distressed prices will demoralize certain markets, he maintained. Now is the time, the speaker declared, for distributors to start putting their houses in order. He warned them not to be "high pressured into purchasing undesirable or excessively priced merchandise just because it is offered during the present shortage and be left holding the bag when the scene changes and improved or cheaper merchandise is available."

He urged jobbers to reduce their inventories. "Get rid of every item of slow moving stock and be ready to stock up later on, thereby absorbing the products that will be turned out by the manufacturers who will convert back to civilian goods in the postwar period and which will help provide employment for our returning boys."

Warehouse distribution of steel products and warehouse hardware has been as satisfactory as anyone could expect, Arthur D. Whiteside, vice chairman in charge of civilian requirements, War Production Board, told the distributors. However, he believed it would be wise for them to examine their policies and make sure that it is as equitable and fair as possibly can be conceived. During the coming winter and the next year as a whole there will be a further tightening in supply, he predicted, and added that unless all possible flaws in distribution are eliminated legislation will be passed aimed at correction. Already, he indicated, some such legislation is under consideration.

This winter, Whiteside asserted, is going to be the test on the home front. Even though there are indications of some easing in steel, aluminum, copper and certain other metals, this may be offset in large measure by the shortage of manpower. The situation with respect to so-called soft goods such as textiles, leather, wood, is going to be even worse. Here there will not only be acute shortage in manpower—there is already shortage of some 80,000 in the lumber districts—but there will be increasing demands from abroad for this type of goods. When Hitler goes down, perhaps some time next summer, he said, there will be some 400,000,000 persons in Europe who will have to be provided for by this country in their essential needs for at least some time. This is going to make for a terrific drain on supplies, which otherwise would be consumed here.

He also spoke of the difficulty Washington is having in attracting top industrial men to carry on the work of the War Production Board and other important wartime agencies. Belief that the end of the war was not too far off is largely responsible for this difficulty, Whiteside declared. Not only is there the trouble of attracting high ranking executives to Washington, but of keeping those already there. These men believe that with the end of hostilities not too far off, at least insofar as Europe is concerned, they should be at home, with their respective enterprises, helping to shape up peacetime policies.

This, Whiteside believes, is a mistake. He thought it was even more important than ever that the various industries have their top ranking men in Washington over coming months, so that they may have a hand not only in assisting the war effort but in shaping up policies for the readjustment period to follow the war.

Renegotiation Act Called Faulty

Suspension of the renegotiation act was strongly urged by Hon. Samuel B. Pettengill, South Bend, Ind., former congressman. A faulty piece of legislation at best, in his opinion, it has been made further undesirable by conditions that have changed since the renegotiation act was first passed more than a year and a half ago. At present manufacturers are far better able to appraise their costs than when the bill was first enacted and there are now fewer new inventories which have to be taken into account in connection with the war effort. Moreover, taxes have been advanced rapidly. He believed that much was to be gained and little lost by suspending the law entirely.

In some important quarters, in certain navy circles, for instance, recommendations are being made not only to keep the law but to amend it so as to extend its scope. On the other hand, he believed that Senator George and certain others influential in Congress are in favor of wiping the act off the books and thought that the Ways and Means Committee in January would consider seriously its repeal, with such limitations as should be imposed to be created through new taxation processes.

Pettengill regarded the renegotiation act as a highly un-American statute

(*Please turn to Page 140*)

FREE ENTERPRISE

Free competitive enterprise system as the common sense plan for postwar opportunity was suggested by Wilfred Sykes, president, Inland Steel Co., Chicago, speaking last week at the meeting in New York of the National Association of Sheet Metal Distributors, as offering the following:

1—Steady employment of men, materials and money; 2—Pay for owners, management and labor based on performance, and performance only; 3—Not only more of the accustomed goods, but better goods and goods we never had before, due to technological advances; 4—Fair prices which will move these goods into a rising standard of living, through competition; 5—An opportunity for the American public to profit from the part of their pay which citizens are able to save, either by direct investment for dividends, or by entrusting it to a savings bank or insurance company which invests it for them and returns them interest.

He asserted: "The question is, when the war is over will we again have an opportunity to exercise our own initiative, free from government controls? I think we will have to fight to get this freedom returned to us."

Will Carriers Avert Transport Crisis?

Construction of 15,983 additional freight cars and program for greater use of present rail facilities show government's concern over critical situation. . . Technological advances help roads achieve remarkable traffic record

LATEST indication that the administration will do everything possible to avert a transportation crisis is seen in formation of the War Transportation Efficiency committee, organized at Washington last week by major shipper and carrier groups. This step closely follows the Senate Interstate Commerce Committee's demand for full investigation of means for relieving shortage of rail equipment, and allotment of critical materials for construction of 15,983 additional freight cars.

Chairman of the new committee is Joseph B. Eastman, director of the Office of Defense Transportation, and its main objective is a 10 per cent increase in utilization of present railroad facilities. Working through existing car efficiency groups, the national committee will concentrate on a practical program to speed up the loading, unloading, and cleaning of cars, reduce switching time, and expedite freight movements generally.

Director Eastman, addressing the shippers' and carriers' representatives at the organization meeting, prophesied the next six months would prove the most critical transportation period of the war, and urged swift action to attain the committee's goal. For the first time since the start of the war, said Mr. Eastman, U. S. railroads are heading into a winter with virtually no margin of unused capacity, yet they will be expected to carry increasing amounts of petroleum, coal, ore, and export traffic.

Can American railroads increase volume of freight and passenger war traffic enough to fill the armed forces' growing demands? This question has been asked with increasing frequency of late.

Dr. Sidney L. Miller, assistant to the ODT deputy director, early this month told the Midwest Shippers Advisory Board: "We must not forget the equipment needs of our railroads. The railroads are seriously in need of more cars and locomotives, and they cannot continue carrying the tremendous load that has been placed upon them for any length of time without additional equipment."

L. M. Betts, manager, car service division, Association of American Railroads, told this group that the lines will meet their fall transportation demands only with difficulty. Railroads, he said, are rapidly approaching the practical limitations of their facilities even when used to utmost capacity.

When the United States declared war after Pearl Harbor, the railroads had about 10,000 fewer locomotives and nearly 500,000 fewer freight cars than when entering World War I. Germany confidently expected America's railroad system to collapse under wartime pressure.

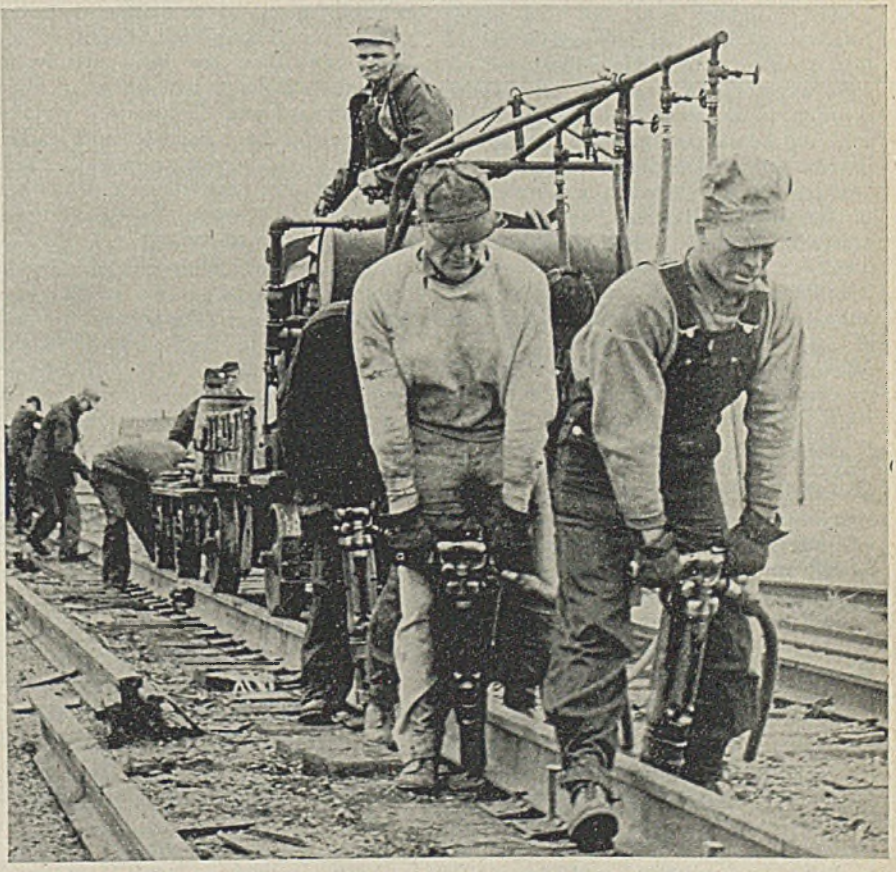
Instead, the railroads in 1942 staged a demonstration of increased efficiency under overwhelming odds which is best indicated by the indexes in the accompanying table. Revenue traffic nearly doubled; car miles increased more than half again. Revenue traffic per employe climbed 50 per cent; per man hour it increased about 40 per cent. Car miles per employe and per man hour both showed tangible improvement. Added to all these favorable factors, unit labor cost of revenue traffic dropped nearly one-fifth.

In 1918 the roads carried 405,000,000,000 ton miles of freight and 43,000,000,000 passenger miles. In 1942 they handled 638,000,000,000 freight ton miles and 54,000,000,000 miles of passenger traffic. Estimates for 1943, based on the year's first seven months of railroad operation, indicate a total of 725,000,000,000 ton miles of freight traffic and 80,000,000,000 passenger miles.

Technological improvements — some initiated a score of years ago—are largely responsible for this achievement. Percentage of chemically preserved replacement ties has sharply increased, with a correspondingly sharp reduction in number of ties replaced per mile of road during the past ten years.

Specialized labor-saving machines have been developed over the past 15 years. A mechanical outfit of spike pullers and drivers, power nutters, tie adzers, and rail-laying cranes it is said to displace 80 men during a 160-day working period on tie and rail renewal; a scarifier and ballast leveler does the work of 90 men. It is estimated the railroads have spent well over $110,000,000 on earth-moving machinery, rail drills, tie tampers, weed burners, and other work-saving equipment, nearly a third of this sum having been expended in the six years 1937-42.

Improvements in rail quality have reduced the amount of maintenance labor



Track workers drive spikes with modern pneumatic hammers in quick time and with minimum effort. Largely because of technological improvements for which American railroads have spent millions of dollars in recent years, the roads are able to carry a huge and increasing burden of war traffic

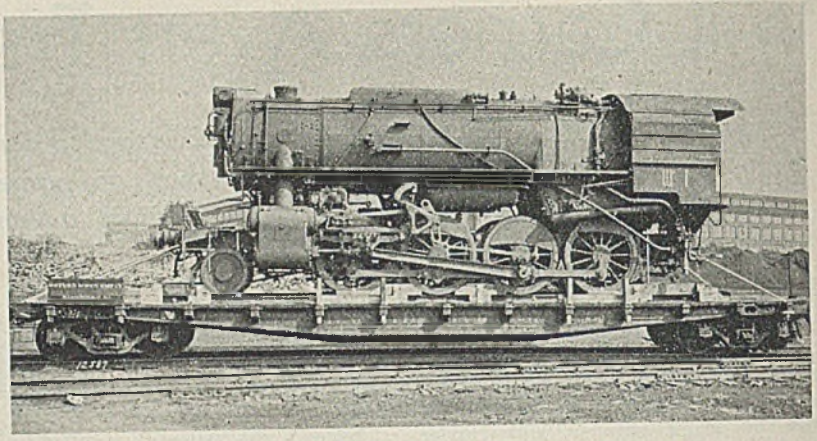
required. From 1935 through 1942 average weight of main-track rail on class I line-haul railways rose from 92.72 to 95.95 pounds per yard. A report presented at a railway association meeting states that, for heavy-traffic lines, savings by use of 112 and 131-pound rail in place of 100-pound or lighter rail may reach 40 per cent of the total track-labor expense. Increasing tonnages of control-cooled and brunorized rail have nearly eliminated dangerous transverse fissures, and methods of rail-end hardening have improved.

Railroads have greatly increased the capacity of congested sections of track by installing modernized signal systems. The War Production Board, recognizing the value of such work in keeping war shipments rolling at good speed, has made materials available. Last year 1942 automatic block signals were installed, compared with 879 in 1939; and 1293 power switch machines and semi-automatic signals for centralized traffic control were placed, against 160 in 1939.

Motive-power improvements have made possible longer trains and higher speeds, and reduction of maintenance requirements. From 1916 through 1941 the average tractive force of steam locomotives increased from 32,840 to 51,217 pounds. Mechanical lubrication, use of alloy steels to cut weight, better systems of steam distribution to maintain pressure at high speed, greater tender capacities and track water pans to avoid stops—all have made for improved efficiency. Lighter steel rods and better counterbalancing has lessened strain of high speeds by reducing unbalanced reciprocating weight. Greater use of roller bearings in locomotive and tender journals, rod bearings, and valve mechanism has cut servicing and repair time.

Diesel motive power is another factor in increasing efficiency and reducing maintenance costs. More than half the diesel locomotives now in use have been installed since 1939, and diesel-electric units now constitute about 3 per cent of all locomotives in service. Diesel locomotives have provided minimum maintenance labor, long runs with few stops, high tractive force in starting and in lower speeds, multi-unit flexibility, absence of heavy reciprocating parts, dynamic braking (speed-retarding by resistance of traction motors operated as generators, to avoid excessive wear on wheels and brake shoes), and ease in shutting off power when standing idle.

As a result of these technological improvements installed throughout a period of some 20 years, today's average freight train is nearly 120 per cent greater, in load carried and speed, than it was in 1918. Today's locomotives travel 56 per cent farther in a day and pull loads half again as heavy as those of World War I.



POWER FOR RUSSIA: Named the "Stalingrad" as a tribute to the Russians' heroic defense of that city, this locomotive, first of a substantial number to be built for the Soviet Union by Baldwin Locomotive Works, Philadelphia, is ready for shipment to dockside

Revitalize Training Program

Railways have resorted to every conceivable means of increasing their employes' productivity and recruiting new help. Overtime has been greatly increased; age limits have been extended, both upward and downward; physical requirements have been lowered, and retirements have been discouraged. Training programs, not needed when experienced men were available for any job, have been revitalized.

Railroads' maximum use of capacity has helped produce some startling statistics. In round figures, the railroads had available in 1942 about 1,800,000 freight cars, as against 2,400,000 in 1918. Last year's cars, however, averaged 25 per cent greater capacity than World War I freight cars, so that in terms of those cars the 1912 supply was the equivalent of 2,250,000 freight cars. Furthermore, the modern freight car is loaded 10 per cent nearer to capacity than the cars of 1918—which increases the figure to 2,475,000 freight cars.

Finally, today's average freight car moves around 50 per cent faster, completing three round trips for every two made by its 1918 predecessor. Increasing 2,475,000 by 50 per cent discloses that last year, for all practical purposes, the railroads had available 3,712,500 freight cars of 1918 efficiency, or more than double the total of 1,800,000 actually on hand in the latter year.

Numerous factors in the transportation picture suggest that the railroads will successfully handle the nation's huge traffic demands during the crucial six months ahead. Their shortages of rolling stock and operating equipment are steadily being reduced. Program of the War Transportation Efficiency committee should yield maximum use of the railroads' existing facilities. Office of Defense Transportation, keenly alert to the danger of a transport crisis, will work closely with the lines in correcting weaknesses which might lead in that direction. These indicators give confidence that a crisis can be avoided.

The big imponderable is the labor situation. The railroad workers' wage-increase question has not been settled. A strike could cancel all the favorable factors and precipitate stoppage of war goods delivery.

EFFICIENCY OF CLASS I AMERICAN RAILROADS, 1939-42

(1939 = 100)

Year	Revenue Traffic, Freight and Passenger	Car Miles, Freight and Passenger	Revenue Traffic per Employe	Revenue Traffic per Man Hour	Car Miles per Employe	Car Miles per Man Hour	Unit Labor Cost, Revenue Traffic
1939.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1940.....	111.1	108.2	106.5	105.2	103.7	102.5	95.4
1941.....	141.0	127.2	121.0	115.5	109.2	104.2	90.8
1942.....	196.5	153.0	150.3	139.6	117.1	108.7	82.8

Indexes based on Interstate Commerce Commission's published reports.

Tysland-Hole Furnace Of Norwegian Design

On page 56 in the August 30 issue of STEEL, the Tysland-Hole furnace was referred to as a Swedish development. This was in error as the furnace is entirely of Norwegian design, having been developed in co-operation by the Det Norske Aktieselskab for Elektrokemisk Industri Inc., the Royal Norwegian government and Christiania Spigerverk. The first mentioned, after the invasion of Norway, established an office at 101 Park avenue, New York city, from which the company's business is being maintained.

Sets Up Casting Inspection Group

New A.F.A. committee to stress methods for improving quality from buyer's viewpoint

DUE to growing demand for more critical inspection and more rigid specifications for war production castings, a new Committee on Inspection of Castings has been set up by the American Foundrymen's Association.

The committee will stress means and methods for improving quality of castings mainly from the purchaser's point of view. Heretofore, attention has been directed largely to meeting physical requirements through such tests as tensile, tension, hardness and other mechanical properties as measured by testing machines.

Results of the committee's work will first be presented to the industry at the 1944 War Production Foundry Congress, to be sponsored by the association at Buffalo, next April 25-28.

Members of the committee, for which no chairman has as yet been appointed, include: M. D. Johnson, Caterpillar Tractor Co., Peoria, Ill.; E. Platt, Sperry Gyroscope Co. Inc., Brooklyn; F. Poettgen, American Steel Foundries, Cast Armor plant, East Chicago, Ind.; C. K. David, Continental Roll & Steel Foundry Co., East Chicago, Ind.; Harold Warner, Allis-Chalmers Mfg. Co., Milwaukee; H. C. Stone, Belle City Malleable Iron Co., Racine, Wis.; E. G. Leverenz, American Steel Foundries, Indiana Harbor works, East Chicago, Ind.

Diamond Alkali Takes Over Five Chemical Distributors

Five heavy chemical distributors will become a part of the Diamond Alkali Sales Corp., Pittsburgh, on Oct. 1 in order to more closely correlate the company's field service, sales and warehousing.

Consumers Chemical Co., 12 South Twelfth street, Philadelphia, Tri-State Chemical Co. Inc., 668 South Main street, Memphis, Tenn., Sunshine Soda Co. Inc., Penton building, Cleveland, Central West Chemical Co., Redick Tower building, Omaha, Neb., and Buckeye Soda Products Co., 38 Main street, Cincinnati, O., have come under the management of the Diamond Alkali Sales Corp.

Book Commemorates 50 Years in Business

Commemorating a half century in business, Elwell-Parker Electric Co., Cleveland, has published a book, *Lengthened Shadows*, reviewing the company's development since 1893.

Although the Cleveland organization has been in existence for 50 years, the story reaches back to the birth in 1843 of Thomas Parker, one of the founders of the electrical industry in Great Britain. The old firm of Elwell-Parker Ltd. made motors and dynamos in Wolverhampton, Eng., and in 1893 licensed a separate company to build them in America.

For some time the entire American output went to the Brown Hoisting Machinery Co., Cleveland, for use on ore-handling equipment. In 1906, Elwell-Parker built motors for the first baggage-handler for the Pennsylvania railroad.

BRIEFS . . .

Broden Construction Co., Cleveland, subsidiary of the Wean Engineering Co. Inc., Warren, O., has arranged with John A. Holmquist, Aliquippa, Pa., to manufacture and sell the Holmquist line of machinery for the production of barbed wire, wire fencing, wire netting, wire mesh, wire bale ties, and reels.

—o—

Kaiser Co. Inc., Fontana, Calif., was visited on Sept. 23 by members of the Southern California chapter of the American Foundrymen's Association.

—o—

Chicago Association of Commerce announces $16,500,000 was scheduled for investment in industrial plants in the Chicago area during September.

—o—

Ault & Wilborg Corp., New York city, subsidiary of Interchemical Corp., became the Ault & Wiborg Division of Interchemical Corp., effective Sept. 1.

—o—

Designers For Industry Inc., Cleveland, has published for free distribution an illustrated brochure titled "12 Questions and Answers on D. F. I. Planned Products Service."

—o—

Ransome Machinery Co., Dunellen, N. J., has issued a new four page color bulletin No. 201 presenting a line of the company's equipment.

—o—

Yarnall-Waring Co., Philadelphia, is offering a new bulletin on the application and operating advantages of their remote water level indicator.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces that nine of its plants have received renewals of their Army-Navy "E" awards. Plants honored are located at East Pittsburgh, Trafford, Derry, Nuttall, Sharon, South Philadelphia, and Philadelphia, Pa., and at Newark, N. J. Electric elevator plant at Jersey City, N. J., marked its fourth renewal of its production award.

—o—

The Penton Publishing Co., Cleveland, publisher of *Steel, The Foundry, Machine Design*, announces transfer of its Detroit offices from 1010 Stephenson building to 502 Stephenson building.

—o—

Monroe Steel Castings Co., Monroe, Mich., recently was awarded a star for its Army-Navy "E" pennant.

They Say:

"I should like to urge that we seek to conserve our national patrimony; that we cease planning how to give away the United States; that we weigh more carefully than we seem inclined to do the current programs which are concerned more with how to divide up what we have than they are with how to increase production; that we consider whether some of our programs to save people from want and fear do not overlook the fact that fear and dread of want are two of the greatest stimulators of human activity."—**Walter E. Spahr,** professor of economics, New York University.

* * *

"The way to keep people happy and the best way to maintain our economic welfare is to provide jobs—good jobs. Now when we look about us and survey the peoples of the earth today, when we survey the panorama of history, we see that the best way to have jobs—good jobs—is to live under an orderly system of freedom—freedom of initiative—and freedom of enterprise and opportunity for all the people."—**C. Donald Dallas,** president, Revere Copper & Brass Inc.

* * *

"The danger of uncontrolled inflation is not an immediate one. The real danger, and one which is hanging over like a black cloud, is the fear of inflation after the war."—**J. Cheever Cowdin,** chairman, National Association of Manufacturer's committee on government finance.

* * *

"Too many businessmen today accept government control to get rid of their immediate problems, but that is sacrificing principle and adopting temporary expedients." Sen. **A. W. Hawkes,** (R., N. J.)

Industry Pressed To Attain Higher Schedules

ALTHOUGH handicapped by serious manpower shortages and a southern coal strike which may spread quickly, industry recorded various substantial gains for the latest weekly period. Distribution of electric power established a new high nearly 18 per cent above distribution for the same week of 1942. Crude petroleum output showed a daily average increase of over 20,000 barrels. Construction volume increased 93 per cent, due principally to refinery and pipeline contracts. Daily average of bituminous coal declined moderately.

FEDERAL RESERVE BOARD INDEX—Broad revision of the Board's industrial production index was found necessary to provide a more sensitive and accurate barometer of production. On the new basis now in effect, the last three months' figures are: July, 239; August, 241; September, 243. The change, says the Board, principally reflects sharp revision in output figures for chemical, transportation equipment, and machinery industries, with important changes also in figures on nonferrous metals, rubber goods, and petroleum products.

While the new index basis is primarily a mechanical matter, it focuses attention again on the fact that America's factory and mine output has doubled since beginning of the defense program in June of 1940, and has risen 130 per cent since outbreak of the European war in 1939.

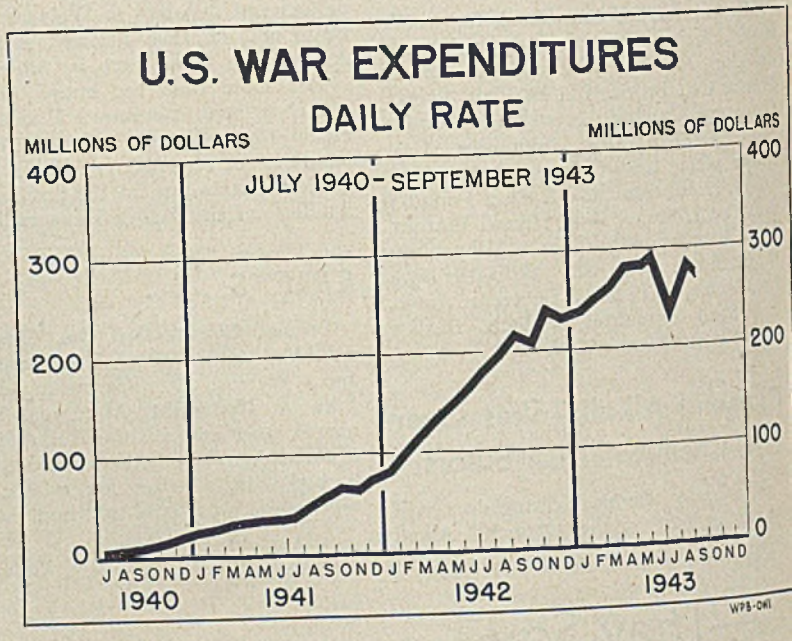
MANPOWER—Though shortages of labor remain generally critical, first returns on operation of the centralized hiring plan in Pacific Coast cities show that it is stepping up airplane production. Indications suggest the program will be adapted for use in over 70 critical labor areas. Detroit is testing a different plan, with automobile companies and unions co-operating in a mutual effort to solve their plants' help problem and thus avoid loss of war contracts.

Many leaders, including such men as Bernard Baruch, maintain the nation is far from a productive ceiling, provided adequate steps be taken to place hundreds of thousands of non-warworkers, both men and women, on production lines. Chances for a national service act do not look bright, however.

WAR EXPENDITURES—In September the government spent $7,212,000,000 for war purposes, or 4 per cent less than for August, when the total was $7,529,000,000. Average daily rate of expenditures for September (counting banking days only) was $277,400,000; for August, $289,600,000; for July, $249,900,000. Total expenditures for the three-month period amounted to $21,487,000,000. From July, 1940 through September of this year the government has spent $131,000,000,000 for war purposes.

RAILROAD EMPLOYMENT — Interstate Commerce Commission's records disclose that for the first half of 1943 the average of railroad employment was 1,028,000, higher than the average for any year since 1930. Average number of hours worked per week was 52.1—highest average for any year since 1918. President Pelley of the Association of American Railroads recently estimated that revenue ton miles would rise 6 per cent this year.

WAGES AND LIVING COSTS—In 25 manufacturing industries wage earners' "real" weekly earnings, based on goods and services they would purchase, hit a record high in August, advancing an average of 0.5 per cent, according to National Industrial Conference Board figures.



FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	100.5	99.5	99.5	99.0
Electric Power Distributed (million kilowatt hours)	4,382	4,359	4,229	3,717
Bituminous Coal Production (daily av.—1000 tons)	2,003	2,017	2,015	1,943
Petroleum Production (daily av.—1000 bbls.)	4,412	4,390	4,353	3,902
Construction Volume (ENR—unit $1,000,000)	$72.8	$37.7	$36.6	$157.5
Automobile and Truck Output (Ward's—number units)	19,585	20,635	18,860	20,225

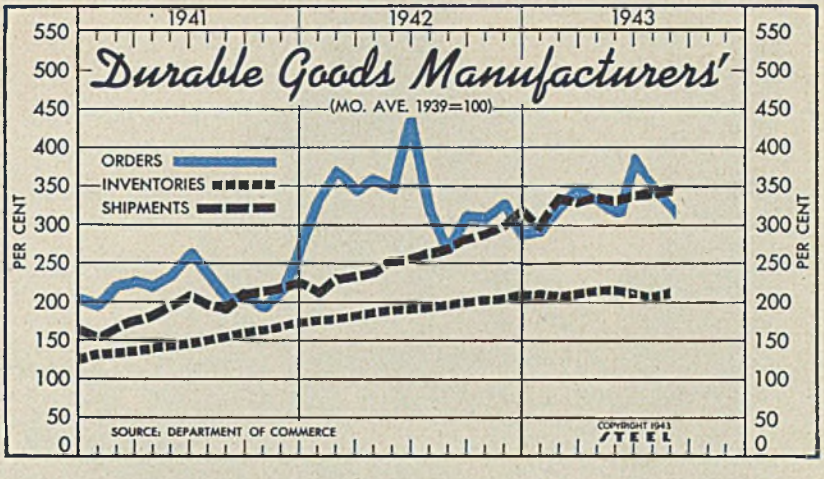
*Dates on request.

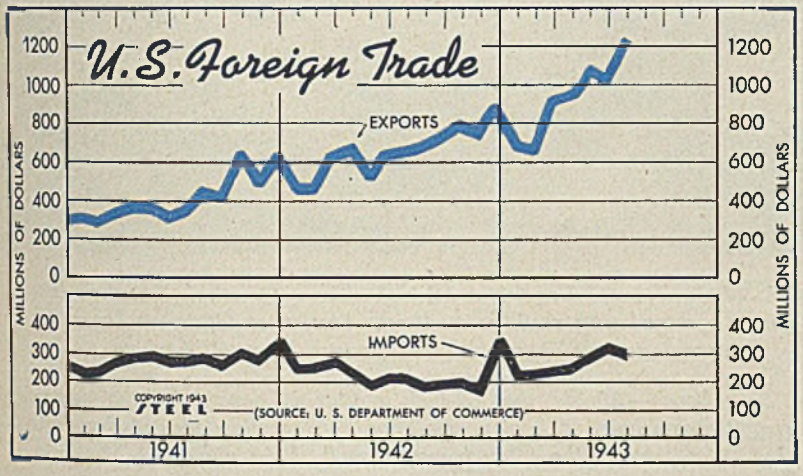
TRADE				
Freight Carloadings (unit—1000 cars)	906†	906	901	909
Business Failures (Dun & Bradstreet, number)	40	42	24	132
Money in Circulation (in millions of dollars)‡	$18,978	$18,883	$18,740	$13,932
Department Store Sales (change from like week a year ago)‡	−5%	+2%	+1%	+2%

†Preliminary. ‡Federal Reserve Board.

Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1943	1942	1943	1942	1943	1942
Jan.	293.5	333.9	298	214	211.3	179.2
Feb.	326.6	373.4	337	232	209.6	180.8
Mar.	349.2	344.4	330	235	210.7	183.4
Apr.	329.8	362.1	338	239	213.5	186.6
May	313.0	348.4	338	254	213.5	190.2
June	392.7	439.5	343	256	211.8	193.2
July	338.7	321.8	346	264	211.4	195.8
Aug.	325.0	269.4	348	270	213.3	198.0
Sept.	.....	314.5	...	283	.....	200.9
Oct.	.....	312.1	...	289	.....	204.1
Nov.	.....	334.7	...	300	.....	207.7
Dec.	.....	291.1	...	320	.....	210.1
Ave.	.....	337.1	...	268	.....	194.2





Foreign Trade
Bureau of Foreign and Domestic Commerce

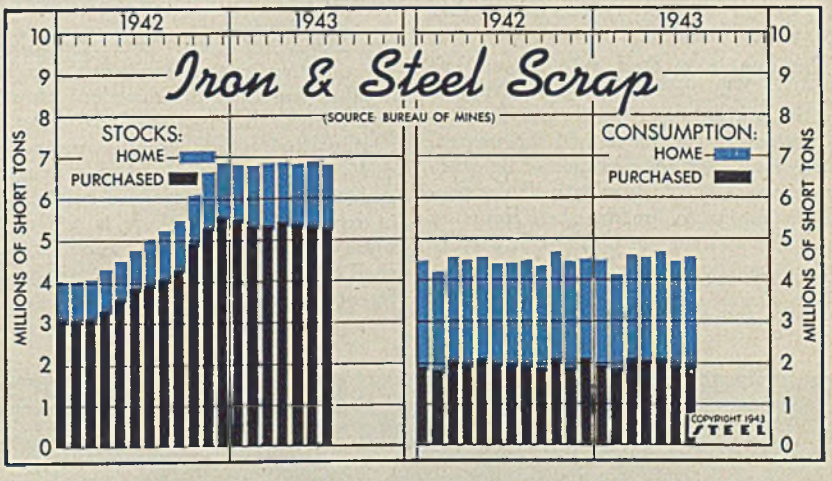
(Unit Value—$1,000,000)

	Exports			Imports		
	1943	1942	1941	1943	1942	1941
Jan.	751	479	325	228	253	229
Feb.	732	478	303	234	253	234
Mar.	984	611	357	248	272	268
Apr.	963	695	385	257	234	287
May	1,069	525	385	281	191	297
June	1,004	618	330	302	215	279
July	1,251	627	359	300	214	278
Aug.	...	694	455	...	184	282
Sept.	...	718	417	...	196	263
Oct.	...	776	666	...	199	304
Nov.	...	750	492	...	174	280
Dec.	...	853	651	...	356	344
Total	....	7826	5126	....	2743	3345

Iron and Steel Scrap
Bureau of Mines

(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,877	4,100	4,492	4,425
Feb.	6,871	4,073	4,178	4,204
Mar.	6,850	4,101	4,787	4,661
Apr.	6,918	4,324	4,642	4,603
May	6,905	4,602	4,723	4,665
June	6,916	4,859	4,493	4,464
July	6,860	5,087	4,570	4,470
Aug.	.....	5,279	.....	4,478
Sept.	.....	5,545	.....	4,424
Oct.	.....	6,260	.....	4,770
Nov.	.....	6,742	.....	4,401
Dec.	.....	6,930	.....	4,497
Total	.....	61,902	.....	54,062



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$6,813	$8,913	$6,552	$6,299
Federal Gross Debt (billions)	$165.3	$164.3	$148.3	$91.6
Bond Volume, NYSE (millions)	$36.2	$40.7	$29.2	$49.3
Stocks Sales, NYSE (thousands)	2,368	3,342	3,292	2,864
Loans and Investments (millions)†	$51,278	$50,998	$46,739	$35,975
United States Government Obligations Held (millions)†	$36,215	$36,210	$34,100	$22,179

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.2	247.8	247.5	232.8
Industrial Raw Materials (Bureau of Labor index)‡	112.1	112.5	112.3	102.6
Manufactured Products (Bureau of Labor index)‡	100.2	100.2	100.0	99.7

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

MORTAR

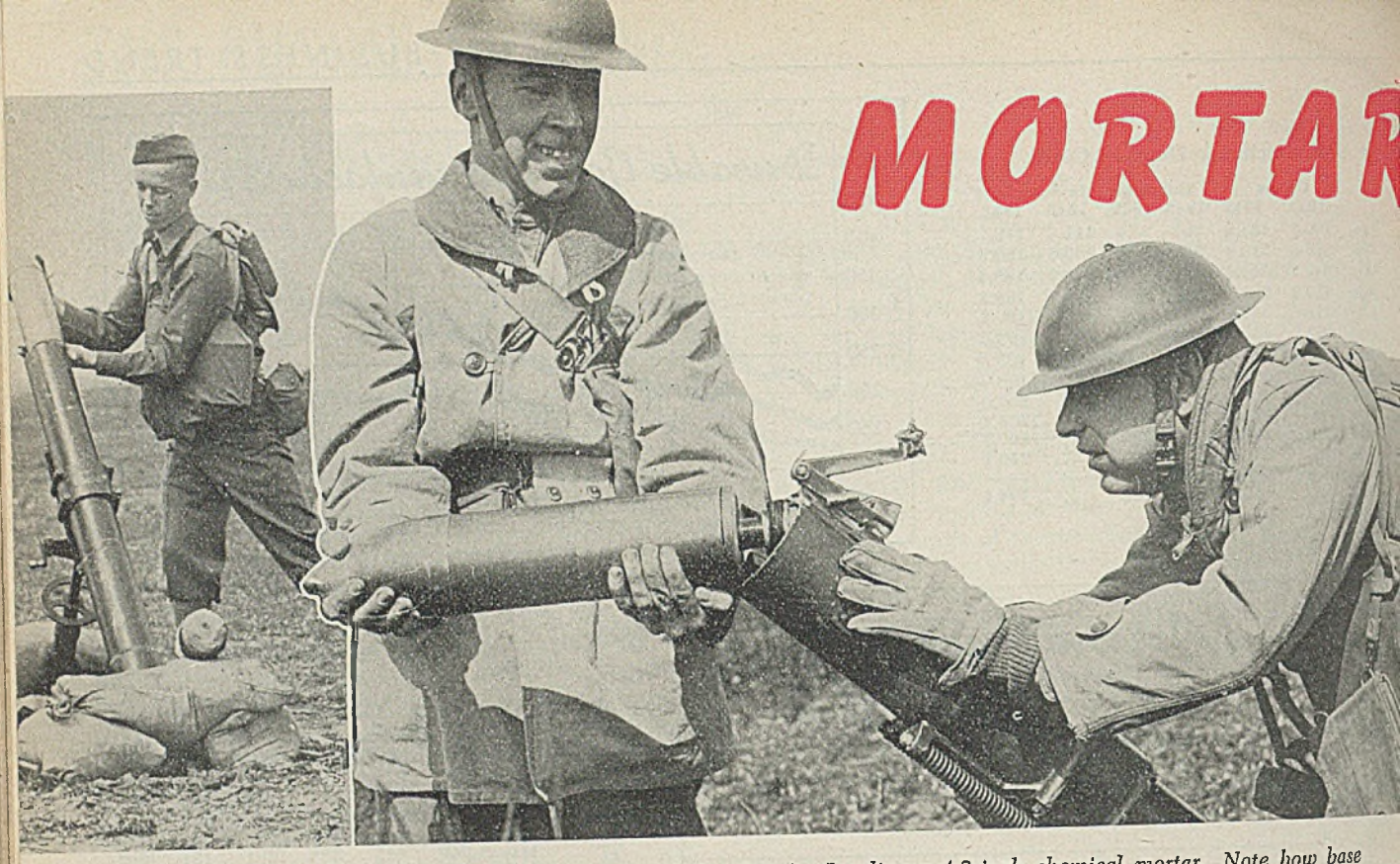


Fig. 1. (Left, above)—Loading a 4.2-inch chemical mortar. Note how base of gun is anchored with earth or sandbags. Portion of tilting mechanism for changing angle of fire also can be seen here. NEA photo

Fig. 2 (Above)—Aiming the 4.2-inch mortar is done with the detachable sight shown here. This view also affords an excellent idea of shape and size of the 4.2-inch mortar shell. NEA photo

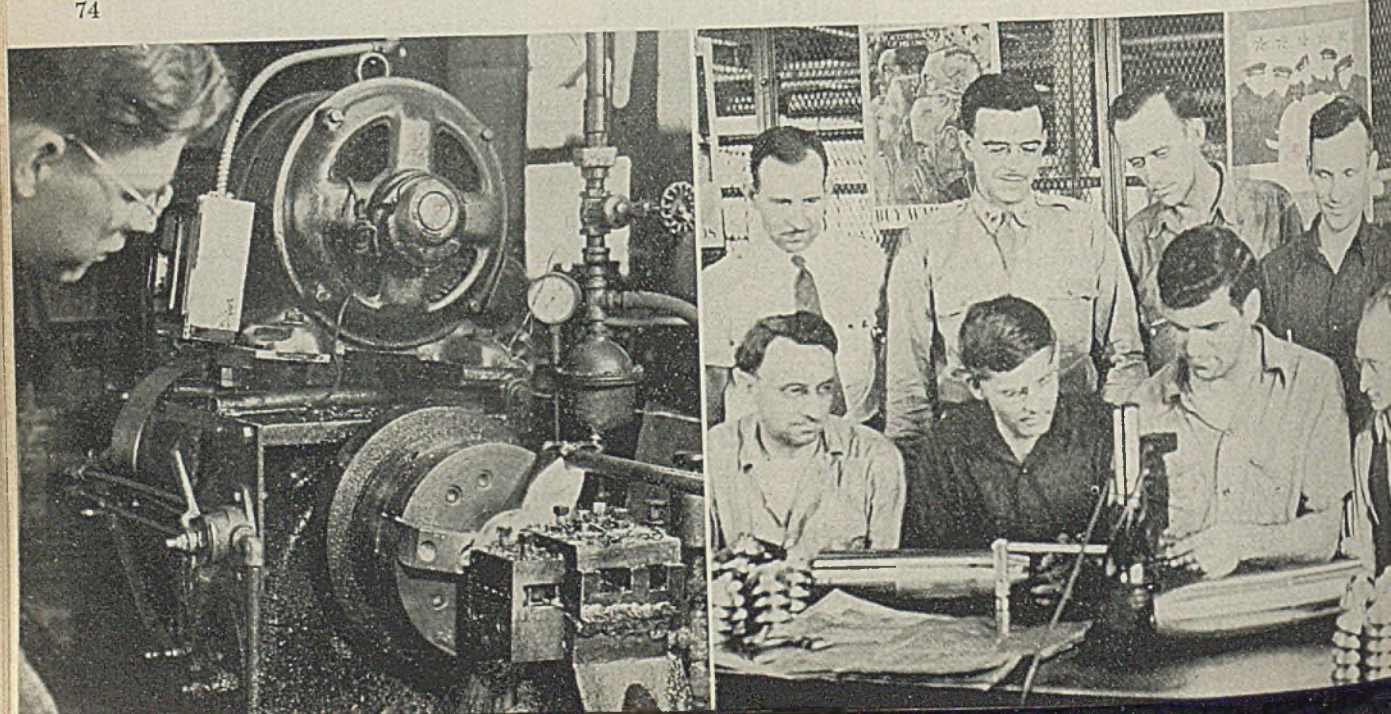
DISTINGUISHING feature of the mortar is that it is the only gun with the breech end permanently closed. Whereas other guns are loaded through the breech end, which then is closed for firing, the mortar is loaded through the muzzle end. Thus mortar shell differ in construction and operation from other types of ammunition.

The mortar is fired automatically as follows: The mortar shell is dropped into the muzzle end. As the shell strikes the bottom or breech end of the mortar, a striker pin sets off a primer or detonating charge which in turn sets off the propulsion charge to fire the shell from the gun. The mortar can be fired as rapidly as shell can be dropped into the muzzle.

The mortar is rifled for accuracy of fire like other guns. But immediately the question arises, "How can you load a rifled gun from the muzzle? How do you prevent the rotating band from engaging the rifling grooves on sliding down the barrel, yet assure proper engagement with the grooves as the shell is expelled?" Right there is one of the most interesting things about mortar shell, for they employ an entirely different and unique construction.

Refer to cross section, Fig. 3. Let's first examine the structure and then see how the parts function. To the front or top of the shell body is screwed the fuze mechanism. Inside the shell body is a mixing vane formed with a central opening in which the burster tube is positioned.

To the rear or base end of the shell body is screwed a cartridge container. This piece also positions the brass rotat-



SHELL

Significance of this story is that it reveals ingenious methods and equipment which enabled Lempco to get into production so quickly and produce shell at such a rapid rate that instead of manufacturing only 5 per cent of the shell called for by a contract (which was split between eight plants), they actually were able to turn out 38 per cent of this contract with their limited facilities. This feat won the Army-Navy "E" for Lempco

By GILBERT E. SEARS
General Superintendent
Lempco Products Inc.
Bedford, O.

ing plate up against the shell base and the steel pressure plate close behind it. Cartridge container, as its name implies, surrounds the primer cartridge. On extreme rear of cartridge container is the striker nut, holding the primer cartridge in place. The upper nut holds the powder rings in place.

Shell operates in this manner: When inserted in muzzle of the mortar, brass rotating plate and other parts are small enough in diameter to clear rifling grooves, allowing shell to drop to bottom of mortar. As it hits the bottom or breech end of the mortar, it bumps against a projecting pin which actuates the striker pin in the striker nut. This sets off the primer cartridge, which in turn fires the powder rings through holes in the cartridge container.

Powder rings then furnish the explosion which results in expulsion of the shell from the mortar. As the burning gases expand, their first action is to force the steel pressure plate up against the brass rotating plate. Due to the wedge shaped form of the steel pressure plate, this force expands the rim of the brass rotating plate, forcing it to engage the rifling grooves inside the gun barrel. These then impart the desired spin to the shell as it is fired from the mortar because the brass rotating plate is keyed to the shell base as is indicated in diagram Fig. 3.

This same spin "arms" the fuze and starts its timer working. After the period of time set on the fuze has elapsed, the powder in the burster tube is ignited and the shell body fragments from the explosion, at the same time dispersing the chemicals in the shell. If the shell

(*Please turn to Page* 96)

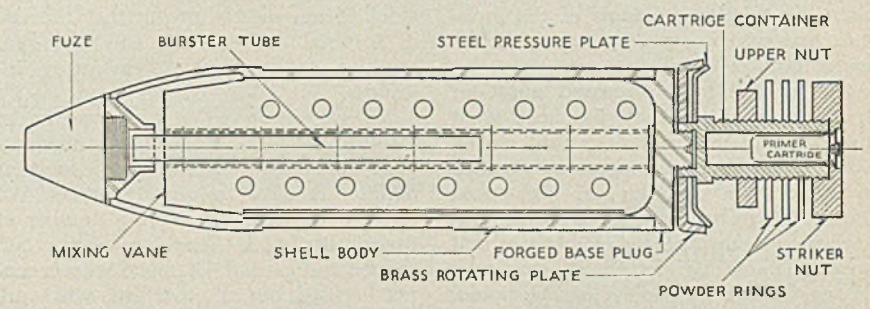
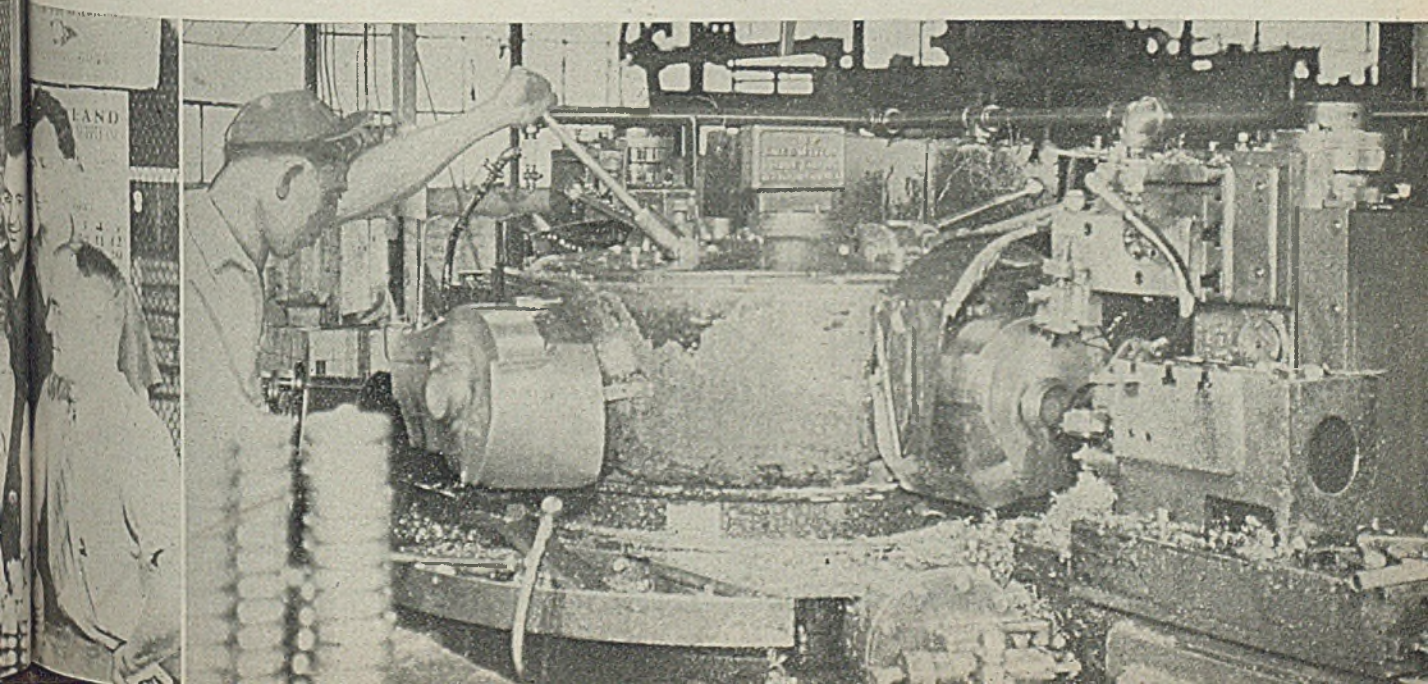


Fig. 3. (*Right, above*)—*Cross section of 4.2-inch mortar shell with mixing vane for use when shell is to be filled with chemicals. Note especially the arrangement of brass rotating plate, steel pressure plate which forces it into rifling grooves on firing, cartridge container for primer cartridge, powder rings that constitute the propellant charge*

Fig. 4. (*Left, below, opposite page*)—*Single-operation machine uses three cutters mounted in heavy fixture to rough machine the base plug. Plant photos by Birdsall*

Fig. 5. (*Right, below, opposite page*) — *These men shown watching a demonstration of an electric gage are responsible for production of mortar shell at Lempco. They are left to right seated: Chas. Hamacek, foreman in charge of threading, packing and shipping; Herman Renkel, setup man on finish turn Stamet machines; Frank Hlad, foreman in charge of rough machining; John J. Blazek, general foreman; John Y. Blazek, vice president and general manager; left to right standing: Gilbert E. Sears, general superintendent; Capt. Milton Muhlfelder, in charge of CWS inspection; Ray Roberts, grinder foreman; Steve Monyak, setup man on spot welders, nosing press and brazing equipment; John Schajatovic, chief plant inspector; Joe Sejd, foreman of finish machining*

Fig. 6. (*Right, below*)—*Special Goss & De Leeuw, for automatic finish machining base plug (operation 2, Table I), carries work on spindles that stop at three working stations, one unload-reload station*



High-Speed Milling

Properly loading milling cutters produces amazing results. Single-tip cutters handle unusual amount of stock

By ARTHUR A. SCHWARTZ
Chief Tool Research Engineer
Bell Aircraft Corp.
Buffalo

IN THESE DAYS of rapid changes in the use of cutting tools, it is essential that all of us keep up with the rapid pace. All of us, too, should pass on as much information as possible so that others may benefit by our trials and successes. Here at Bell Aircraft in the research engineering department, we have faced many exacting problems. This article will explain the solutions to some of the problems that we have run up against in the use of cutting tools.

One of the most discussed questions in machine cutting tools has been what materials are best suited for high-speed work. It has been the common practice to use either carbides or high-speed steels. There has been some use of nonferrous cast metals, but I believe that up until now we have not employed the cast alloys as widely as we should, neither have we given them the consideration they deserve.

We ran up against that problem here at Bell Aircraft when a proposal was made to change over from the use of high-speed steels. Normally, we would follow the usual pattern and go over to the carbides. But as the result of successful experimentation, we are now using one of the alloys, Tantung, to a great extent.

For example, we tried both high-speed steel and various kinds of carbides in our high-speed spar cap milling machines. We did not eliminate erratic results until we changed to Tantung. That does not mean that I am "plugging" for Tantung alone; I am merely saying that the use of material such as this can and does produce excellent results in many instances.

My suggestion is that every user make a full investigation of the nonferrous cutting materials now available, such as Stellite, Rexalloy and many others. We have found that they have a number of useful attributes. They are easily cut, shaped and ground. Diamond wheels cannot be used, but all other grits will work well. Green silicate wheels have proved to be the best for us, and we get good results from all open or porous structure wheels.

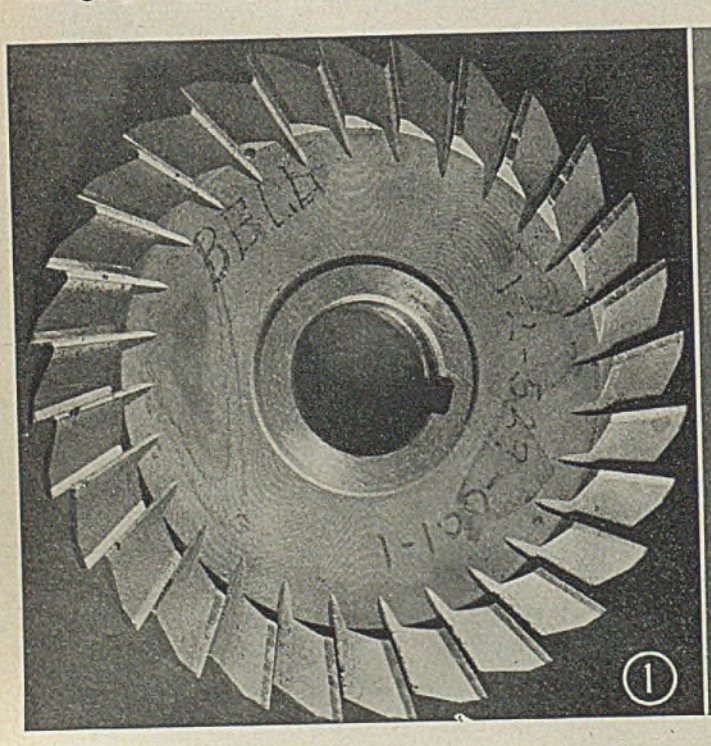
Another important attribute is their very high heat resistance, greater in fact than that of any high-speed steel. The result is you can braze this material to steel shanks or cast shanks without drawing its temper. The majority of these metals have a melting point around 3000 degrees Fahr. and a softening temperature near that value.

All of these cast alloys have a rather dense, small-grained structure, and I believe you could even make razor blades out of them, something you can't do with either high-speed steel or carbides. Another factor coming out of their close grained structure is their low coefficient of friction. This makes them "slippery" and, consequently, cratering is almost absent.

This is not meant, however, to belittle the use of either the carbides or high-speed steel. They both have definite uses and jobs which only they can perform.

This brings me to one of my pet peeves; the use of multi-bladed cutters so common today. You can stand beside any milling machine and hear what is happening. A cutter may have 28 blades, but only three or four of the blades are doing the work. The rest just "squeak" by. In doing so, they make a glassed surface for the active blades to bite through, and also consume useless power. This description may be somewhat exaggerated, but it brings home the point.

As one example here at Bell Aircraft, we did not have enough power available to operate the usual two-bladed cutter on the cap strip mill. After experimentation, we found that we could use a one-blade cutter. It is in four sections, and each of them has a single blade in it. Cutter can be seen at left in Fig. 3. These cutter blades are set 90 degrees



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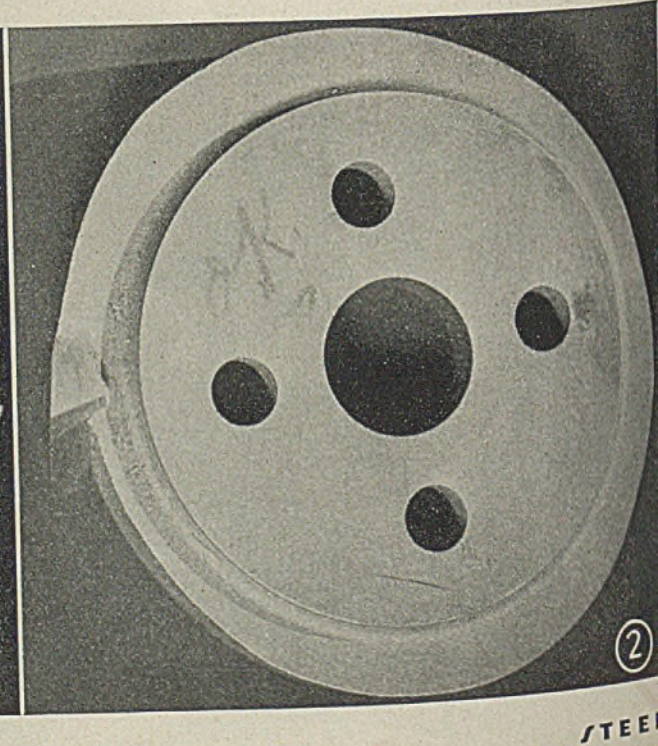
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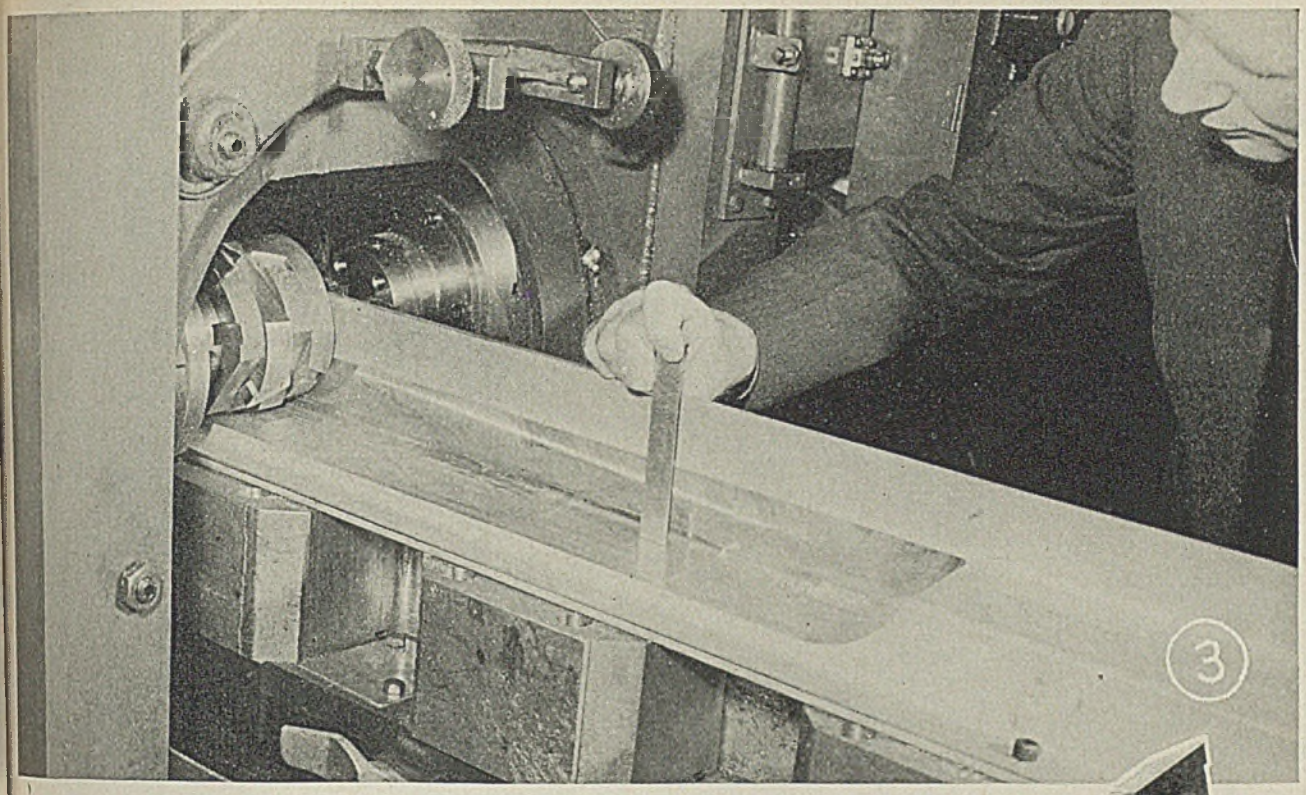
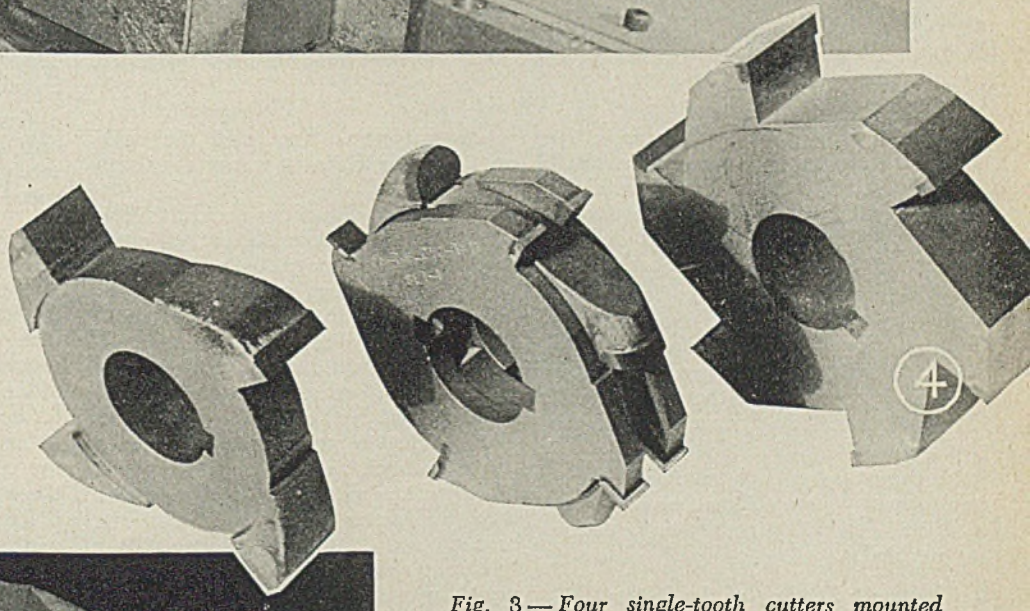


Fig. 1 — *Conventional 28-tooth cutter made as a single piece of high-speed steel*

Fig. 2 — *Single-tooth cutter made along lines suggested by Mr. Schwartz, using tooth brazed into body of malleable cast iron, cast steel, machine steel or boiler plate*



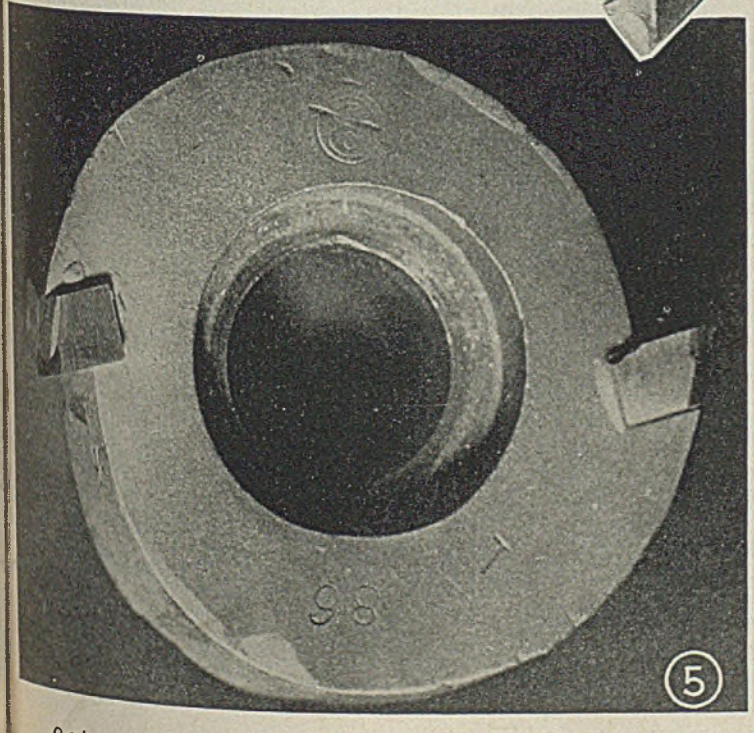


Fig. 3 — Four single-tooth cutters mounted side-by-side with cutters set 90 degrees apart mill this aluminum spar at exceptionally high speeds, throwing a basketful of chips every few moments. Note depth of cut

Fig. 4—These multiple-blade cutters have cutting material brazed to body of cutter. Note center unit is made of three cutters, each with four blades or teeth

Fig. 5—Two-tooth cutter made similar to one in Fig. 2. Number of teeth should be such as to load milling machine to maximum but not overload it as explained in the text

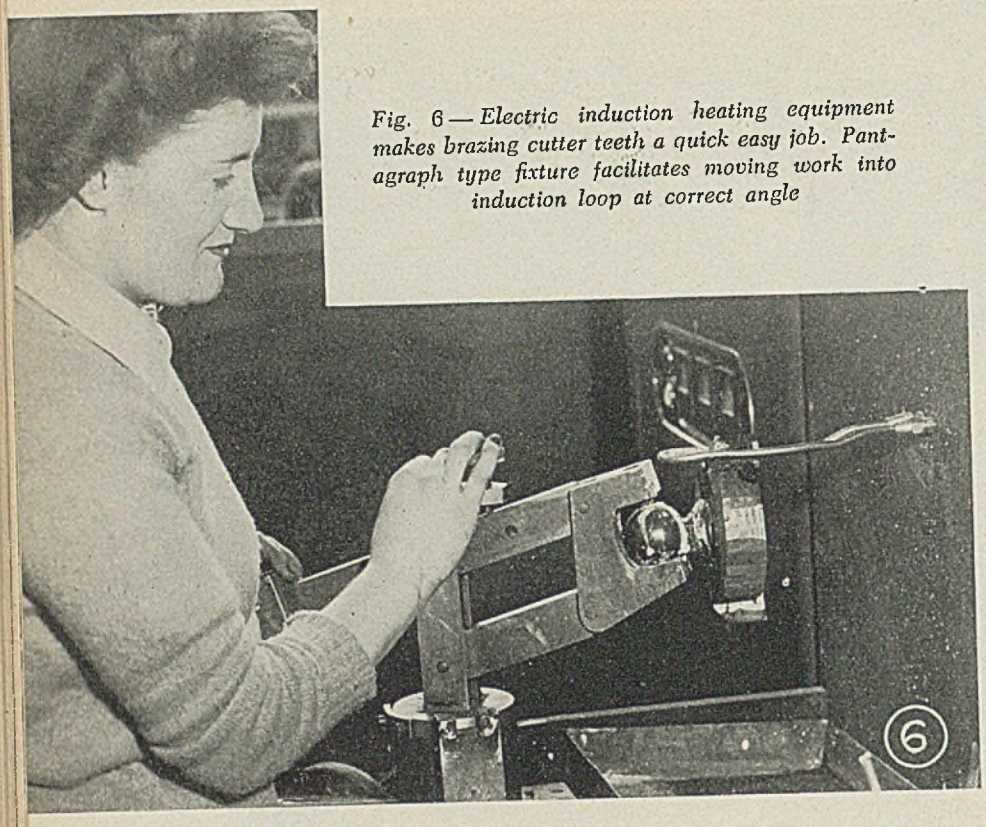


Fig. 6 — Electric induction heating equipment makes brazing cutter teeth a quick easy job. Pantagraph type fixture facilitates moving work into induction loop at correct angle

apart so that one blade is always in the cut. The shear angle was also increased to 30 degrees instead of the normal 10 degrees. It requires 80 horsepower to drive it, has a front rake of 12 degrees at the center of the blade, clearance of 5 degrees.

Bodies of these cutters are malleable castings; the blades, Tantung. Our idea is to make a cutter body of malleable casting, or if you prefer there is cast iron, Meehanite, cast steel, machine steel or boiler plate.

Then put just enough teeth on this cutter to load your machine, but not overload it. This will generally be from one to six blades.

Proper Loading of the Cutter

This matter of properly loading the cutter for most efficient operation (or turned the other way, designing your cutter for proper operation without overloading your driving motor) is something that is not generally given the consideration it deserves.

It is generally recognized that milling cutters seldom run perfectly true and about the minimum chip thickness made by a mill is about 0.002-inch and possibly 0.001-inch. But to obtain a chip of that thickness, the forward feed per tooth must be 0.010-inch or more, depending upon the depth of cut to be taken from the piece.

Now if there are 28 teeth on the cutter as is the case in Fig. 3, the total feed required to assure proper individual tooth action will be 28 times 0.010-inch or 0.280-inch per revolution of the mill. Suppose the mill is run at 80 revolutions per minute. Total feed into the work then becomes 22 inches per minute—a speed that would soon stall the usual driving motor if the cut was of any depth at all.

Yet it is not difficult to avoid this situation. Simply remove six out of every seven teeth; in other words, use a 4-blade milling cutter. Then required feed likewise is reduced to one-seventh or about 2¼ inches per minute. The usual milling machine will now have plenty of power to run such a cutter, and it will be found that feed can be stepped up to about 4 inches per minute. This feed allows each of the four teeth to take a healthy bite and produces a smoother finish and faster production, "believe it or not."

The above example illustrates what is meant when saying, "Put just enough teeth on the cutter to load your machine, but not overload it."

The significance of this idea properly followed through is astounding. Fewer blades on cutters actually can be used to produce more work, for each one will be in use, not just "coasting."

Then again production with the usual 28-blade cutter can be raised greatly just by increasing the rate of feed and putting on a bigger motor to take care of the increased load. Of course, the machine must be able to transmit and apply this additional power to the cutting points, must have sufficient strength and rigidity to absorb the increased vibration.

It is a fact that most milling cutters now in use present this two-horned dilemma—either use insufficient feed to work the cutter as it should be worked, or be faced with insufficient power to drive it. A good 90 per cent of milling cutters now in use involve this unhappy choice in their operations.

But the solution is so simple that one wonders why it is not more widely recognized. Make your own milling cutters with the correct number of blades for loading your machines to maximum. Make the cutter bodies from malleable cast iron, plain cast iron, Meehanite, cast steel, machine steel or boiler plate. Then mount cutter blades in these bodies by brazing or welding.

Brazing or welding is important, for any inserted tooth cutter may suffer from vibration, particularly individual blade vibration. High frequency and even supersonic (frequencies above range of audibility) vibrations can easily be developed in high speed milling work. Such vibrations produce deadly results in carbides and other extremely hard and brittle materials such as those which are used in cutter blades.

Brazing or welding the blades securely to the cutter body will help minimize vibrations. Likewise, using a cutter body with good solid backings to support the cutter load helps reduce vibration. See how cutter body is shaped to furnish circumferential support to the blades in illustrations Figs. 2, 4 and 5.

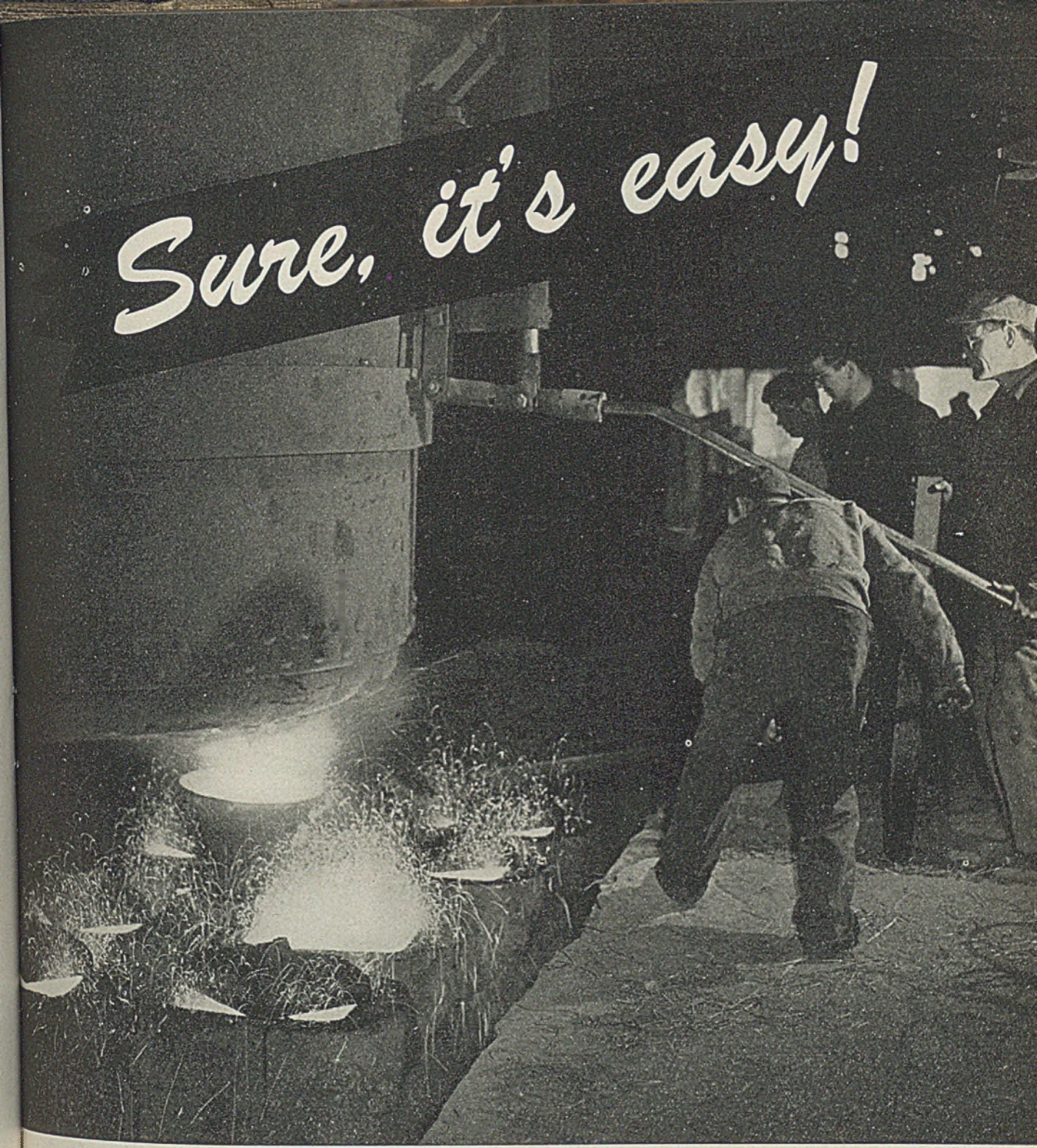
Speaking of brazing, here at Bell Aircraft we use an electric induction unit and braze a blade in place in about 2 minutes. That is the time for the complete job, the actual brazing takes only a few seconds. After brazing, the tool crib can grind the cutter using the same machines and methods employed on high-speed steel cutters.

Pantograph Fixture for Brazing

The equipment used for brazing is an electric induction heating setup. A single-turn coil or loop is bent to conform roughly to the outline of the cutter blade at the base. When positioned in the cutter body and properly fluxed, a braze can be made that is sufficiently strong to hold the cutter blade securely in place. Note the simple jig or fixture utilized in Fig. 6 for such work. The ball joint at end carries a short shaft on which the cutter body is mounted. A setscrew locks the ball in position, and a pantograph arrangement with a weight for balancing allows the operator to manipulate the work to bring the cutter blade within the induction hardening loop. An adjustable stop seen just under the operator's right hand in Fig. 6 permits accurately fixing the work position in the induction loop. Such equipment is readily adaptable to handling a wide variety of cutters.

All of these problems are of importance to the manufacturer of airplanes, and we who turn out the Army P-39 Airacobra must meet them in order to keep up with constantly increasing demands for our fighting forces. Tool engineers have a very vital duty to perform in that parts cannot be made without properly designed tools.

We are continuing our experiments here at Bell Aircraft to improve still further the use of various tools and methods for high-speed machining. Out of these experiments are coming accomplishments that have a direct bearing on the successful prosecution of the war.



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Jigs and Fixtures

. . . . for arc welded mass production

By WALTER J. BROOKING
Director of Testing and Research
R. G. LeTourneau Inc.
Peoria, Ill.

IN THE ROUTINE production of almost any unit or product by the arc welded method, the use of well designed jigs and fixtures usually pays dividends. Each individual job, however, requires careful study in the light of certain fundamental considerations before decisions can be made as to the best type of jig or fixture for the job. This fundamental study should carefully and thoroughly analyze the job from several points of view.

Probably the first and most important is the number of units to be made, since the degree of complexity of the jig or fixture depends entirely upon the total savings which a jig would make possible on that particular job. If only a few are to be made, the fixture usually must be simpler than if a large number of units, involving a proportionately larger amount of work, are to be made.

The form of each assembly to be welded must be studied to determine if it can be broken down into substructures or subassemblies which can be welded more conveniently, and then assembled as a completed large structure (such as shown in Fig. 1). The assembly also should be studied to see whether most of the welds on the separate structures are to be found in one plane for this might allow rotation around a single axis. These two points largely determine the type of fixture which should be made for a structure.

A third consideration is the total amount of welding on each structure or assembly. A study should be made to define the number of inches of welding and the different sizes of welds, so that a consideration may be made as to the number of directions in which the fixture should rotate for the positioning of the weld, in order to decide upon the type of fixture practical for the part.

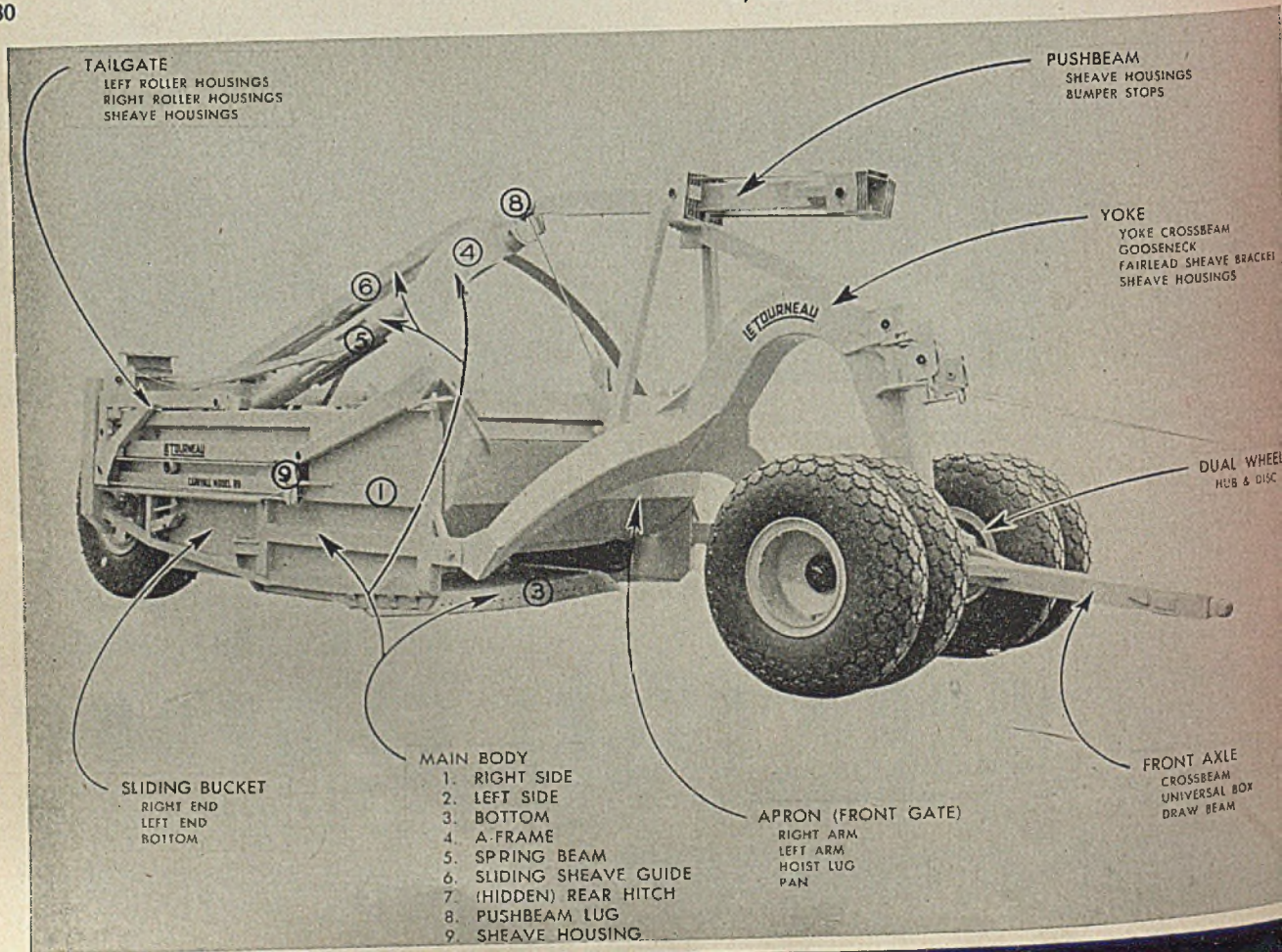
A fourth consideration involves study of the number of individual parts, since that determines the amount of setup time, and also, to a considerable degree, the number of welds in the structure and their length.

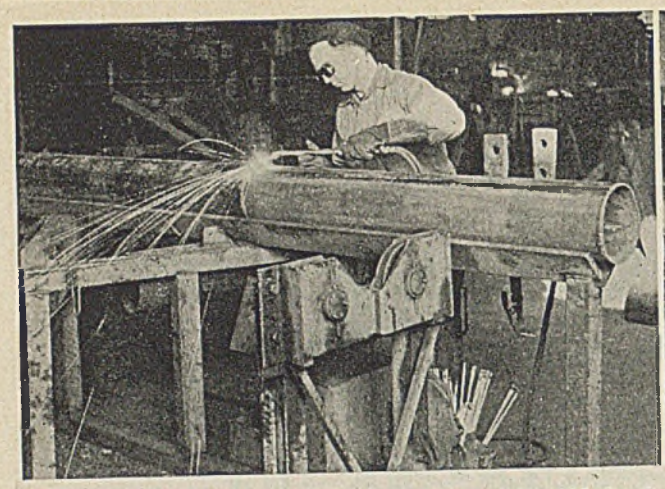
These studies should be made very completely, and in most cases should involve the use of a stop watch in order to definitely describe the amount of time which is required for the setting up of the assembly and the amount of welding which is to be done. If a large number of parts are involved, a careful study should be made of the amount of time required to set the parts together prior to welding, (estimated on the basis of time studies if possible) and considerable thought should be given to the type of fixtures which might be used for setting up or for positioning the welds of that structure.

The design of a fixture effects two separate processes. If the proper fixture is made, both are usually facilitated. These are, *first*, the setting up process—the placing of the component parts of the structure together in their proper relationship, and tack welding them together so they will maintain those relationships during the welding process; and *second*, the arc welding of the structure into a solidly fused and completed unit.

Bearing in mind these two functions

Fig. 1—Earthmover, 30-cubic-yard capacity, has 11 major structures with 60 substructures or subassemblies as indicated. Fabrication involves use of 71 of the three classes of fixtures





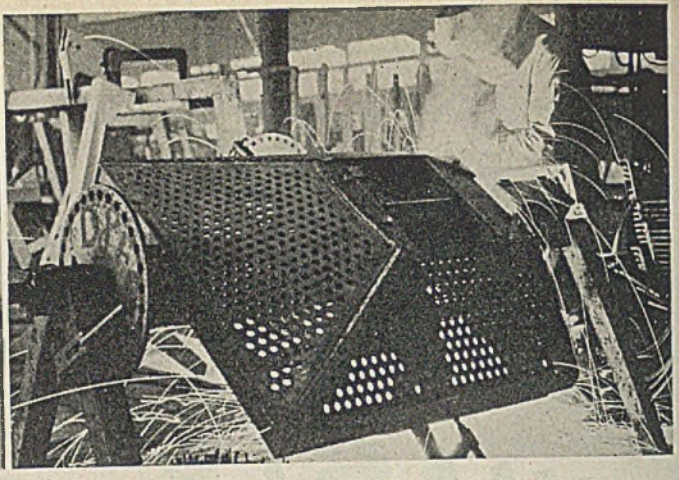


Fig. 2 (Left, above)—This subassembly is tack welded in large rolled L-section, then moved over on rollers where work is revolved easily for finish welding

Fig. 3 (Right, above)—Simple C-clamps and short capscrews require minimum time to remove completed assembly from fixture

which fixtures may serve, jigs and fixtures which are used in mass production of arc-welded structures may then be classified as follows:

Setting-up fixtures.

Weld positioning fixtures.

Combination setup and welding positioners.

Because fixtures must be built individually for the specific job, there are certain other things which should be considered as fundamentals in jig or fixture building.

First among these is that the fixture should be as simple as possible to do the job properly. This simplicity means using the least material necessary for the job, the least possible labor and fewest special accessories. This is obvious because a welding jig or fixture is an accessory to the final object which is to produce salable products. Fig. 2 shows a fundamentally simple welding fixture. Jigs and fixtures are a part of the capital investment which should be kept as small as possible so in the event a change of model or discontinuation of model is necessary, there is a minimum loss involved in jigs and fixtures that no longer can be used.

One of the most important phases of arc-welded construction is the ease with which models may be changed or redesigned for more profitable construction; and the simpler and less expensive the jigs or fixtures, the less expense and therefore the greater profit there is involved in the possibilities for changing models.

Setup Jigs and Fixtures for positioning parts of a structure while they are tack welded together have, as their main objectives, the reduction of labor and while speeding the accurate positioning of individual parts, and subsequently holding them in their proper relationship while they are tack welded, or otherwise fastened together to form the structure ready for finish welding.

Considering these fundamental objectives of a setup fixture, a careful study of the unit to be set up, together with each of its parts, should be made so that the setup fixture may form a frame work with stops and holding devices which most simply accomplish the following:

Allow the positive positioning of all the parts without measuring and in proper relationship.

Allow the clamping or fastening of the parts in position with the least labor and "gadgets".

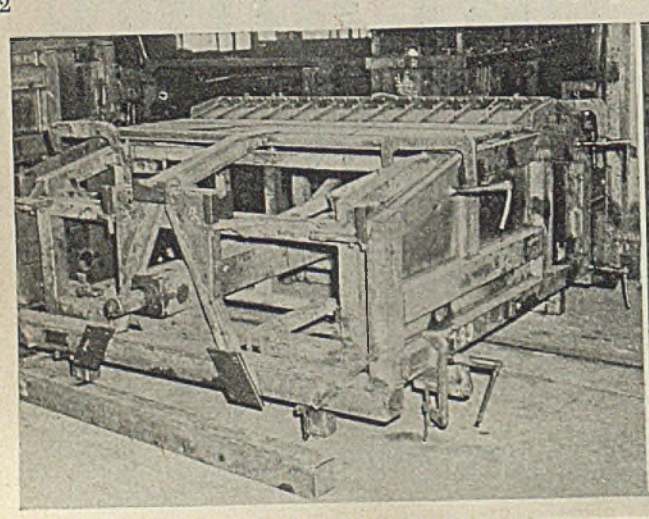
Provide obstruction-free access to the points which should be tacked to hold the parts rigidly and positively together during finish welding. It is desirable to have sufficient freedom from obstruction to allow hammering of tacks because, frequently, if parts may be hammered as they are tacked, they will fit up better.

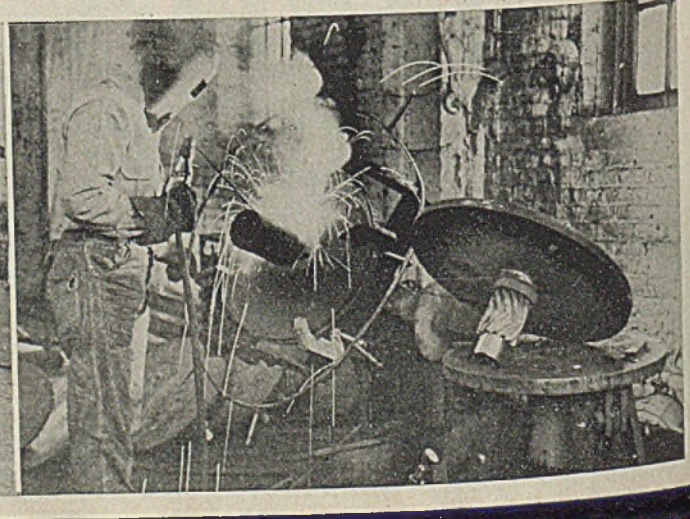
The fixture should have special plugs or stops for premachined or complex parts in order to positively locate certain holes or other machined surfaces with relationship to other parts. An example of such a fixture is a fixture for tack welding closely cut, complex parts of a large gear case where a series of machined plugs, clamps and stops are used so that the parts are held positively in the proper position while they are tackwelded. Accurate and positive positioning of such parts is an essential function of most setup fixtures, as it is known certain premachined surfaces almost always mark some fixed functional part of a machine with reference to some other part of the machine, and therefore must fit into some final assembly accurately.

The setup jig must be made so that the tack welded part is easily removed. The labor of removing parts from fixtures is a very important part of the cost of a structure; and unless the parts are easily removed, a good portion of the

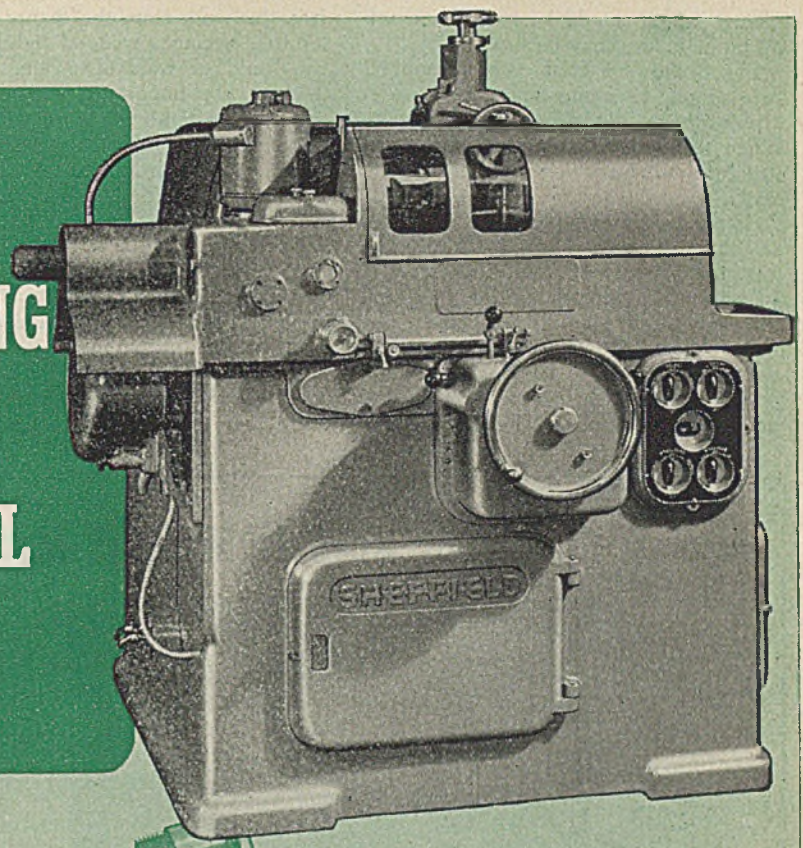
Fig. 4 (Left, below)—Large complex structure still is readily removed from fixture because position of clamps, tapered plugs and wedges is such as to facilitate easy release from fixture after welding

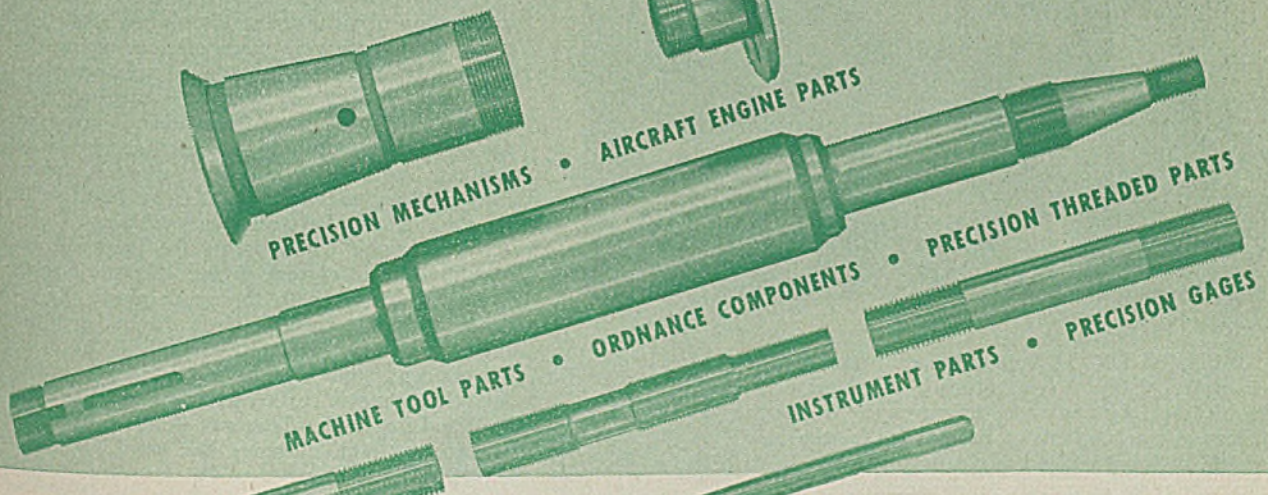
Fig. 5 (Right, below)—Parts such as this completely machined and heat-treated pinion gear must be protected from weld spatter during tackwelding and finish welding. Here setup fixture on which finished assembly sets provides enclosure for gear. Finish welding is done with tubular guard over gear as shown





NEW THREAD-GRINDING ECONOMY ON COMMERCIAL PRODUCTION





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Substantial savings in operating time over conventional machines make it more economical to grind threads with a Sheffield Thread Grinder. Also because of these savings, it is now feasible to grind threads formerly produced by other methods.

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MACHINE TOOLS—GAGES—MEASURING INSTRUMENTS—CONTRACT SERVICES

savings which should be made by a setup jig or fixture may be lost.

Fig. 3 shows a fixture which employs two simple C-clamps and a few short capscrews to hold premachined parts. When released, these allow the finished structure to come out of the fixture easily.

Even such a complex fabrication as the main body structure of the large earthmoving scraper may be placed in a large, rigid setup fixture, Fig. 4, and still may easily be removed from the jig by proper use of tapered pins, wedges and clamps. The tapered pins and wedges tend to make removal of the welded unit easier for they completely free the work from the fixture in which it often becomes wedged tightly due to the "pull" of weld distortion.

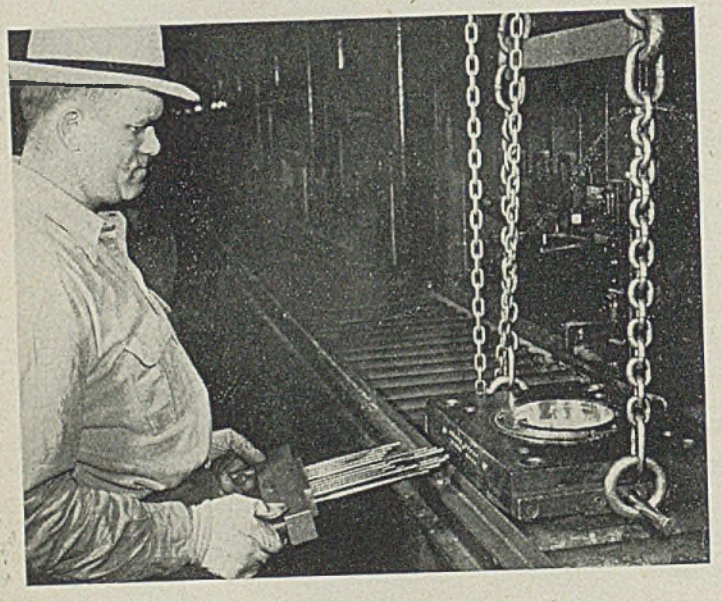
One very important feature of both setup and finish welding fixtures for structures with premachined parts is the provision of guards or shields to protect the machined surfaces from weld spatter drops.

Such protection is not difficult to provide as is shown in Fig. 5. Here a completely machined and heat-treated pinion gear is being welded to a drive plate. The finished assembly at the right is resting on the setup fixture which is used to position the pinion gear to the plate. Note that the pinion fits into a closed, cylindrical container with an endclamp which may be used to adjust the pinion upward. The drive plate is placed flat on the top of the setup table and adjusted so a bored hole in the drive plate fits over the end of the pinion. The pinion thus is completely covered, preventing the weld spatter from marring its surface during tack welding.

A simple tubular shield with a closed end is slipped over the pinion to protect its surface during the final welding operation. Such protection must be given all parts with machined surfaces to insure their proper function when the machine is assembled and in operation.

(*Continued Next Week*)

Aircraft Distributor Head Is Maze of Metal Parts



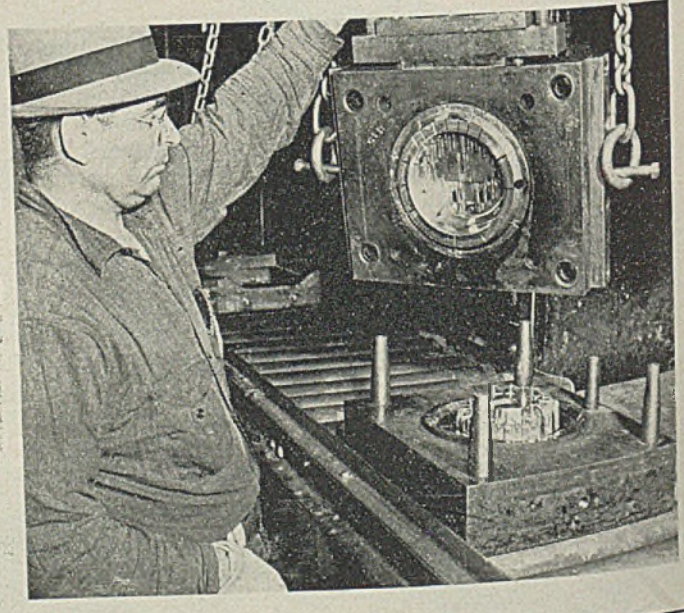
HIGH-ALTITUDE operation of planes of the American Air Force is being made surer and measurably safer by consistent improvement in design of motor parts. This is exemplified in the new plastic distributor head which Ford Motor Co. is producing by thousands to replace rubber heads previously in service. Because it possesses greater dielectric strength, provides more arc resistance and is highly resistant to moisture, the head satisfies a primary requirement—dependability.

The complicating factor in developing the head was the necessity of keeping it interchangeable with the older type and yet incorporating new ideas. Some idea of the elaborate construction involved is gained by comparing this part, which requires 26 metal inserts, with that of an ordinary 8-cylinder automobile engine's distributor head, which requires only nine.

In making the part, Ford uses a plastic of melamine resin and asbestos known as Melmac. It sets at high temperature but does not melt under heat. The material is preheated and poured into a cylinder which rests on a heated mold. Then a 500-ton press forces a plunger into the cylinder, turning the plastic to putty consistency and diffusing it throughout the cavity and around metal electrodes previously inserted in the mold. After curing and cooling, the part is machined.

In Fig. 1 a workman is shown ready to insert the 18 core pins in the side of the mold which forms the outside surface of the distributor head. Holes formed by these core pins give access to ignition wires that carry high voltage to the cylinders. Fig. 2 shows the two halves of the mold about to be mated. Cold forged metal inserts, or electrodes, may be seen in place in the lower half of the mold, while core pins are visible in the upper half. These cold forged inserts, of Monel metal, were designed by Ford engineers as a guarantee against failure of metal electrodes functioning in an installed distributor head. Formerly the inserts were made of three pieces soldered together. Pressure in the molding process sometimes broke or severely weakened these soldered joints. As an additional precaution against possible failure, the completed head is carefully tested by checking electrical resistance between each electrode, using 12,000 volts.

Ford engineers have also designed a new finger, or rotor, which whirls inside the head and distributes electric current to the 18 contact points connected by wires to the spark plugs. By increasing the distance between electrodes in the finger, the new design's strength is increased 300 per cent. Similarly, by separating to a greater degree the metal parts carrying current in both head and finger, the danger of erratic spark travel common at high altitudes has been minimized.



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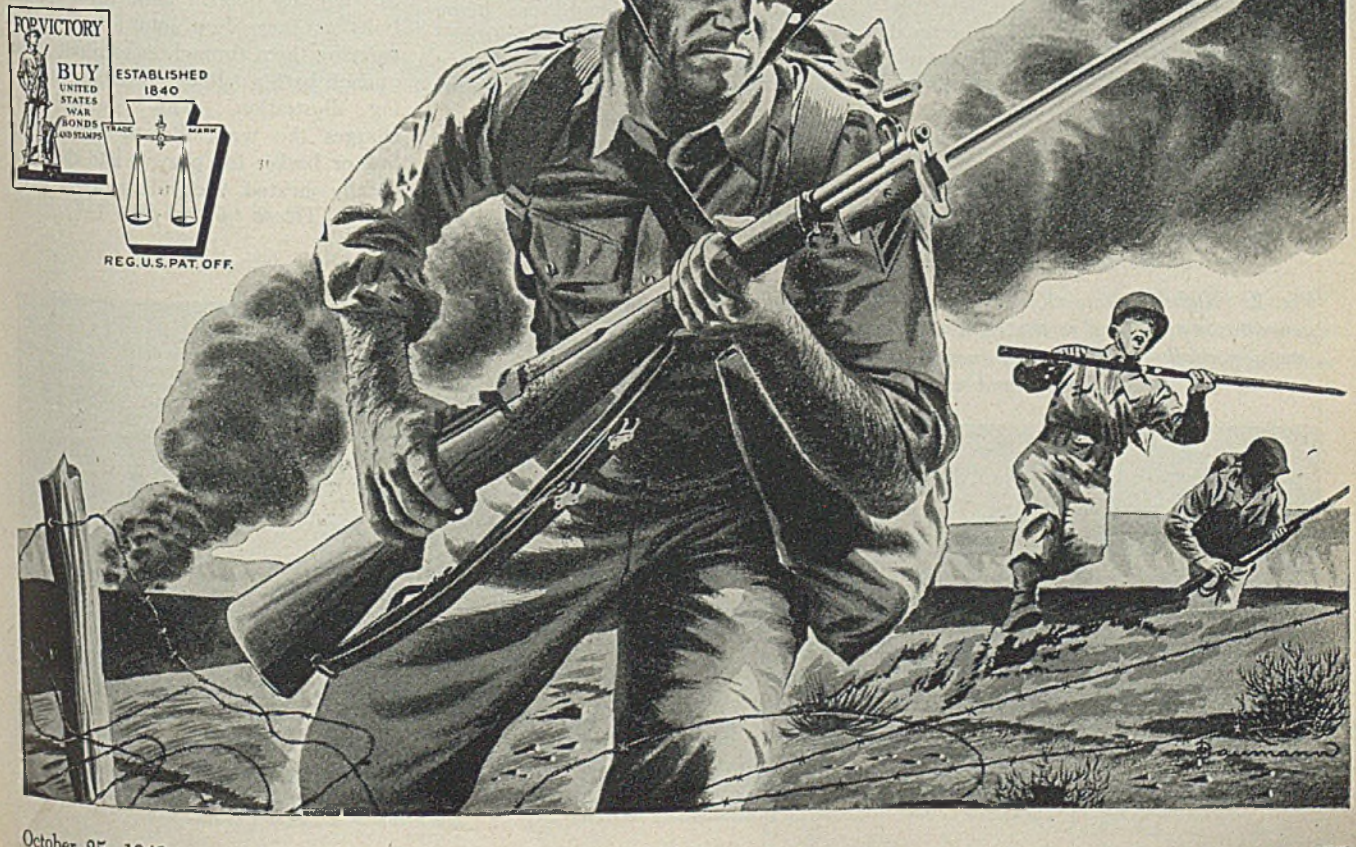
TECHNICAL ASSISTANCE from Disston engineers and metallurgists is available for the asking, without obligation. Simply write to Henry Disston & Sons, Inc., 1026 Tacony, Philadelphia 35, Pa., U. S. A.



HEAT TREATING OUTPUT DOUBLED

. . . . by installation of continuous furnace. Unit assures optimum combination of strength and toughness in headed and threaded fasteners, eliminates former 3 to 7-day excursion of work to outside plant for heat treating, reduces supervision and checking because of greater uniformity of work

By HARM WHITE

WAR DEMANDS for increased mechanized might mean heavier and larger tanks, trucks and other motorized equipment that in turn require tougher and stronger bolts. Thus Triplex Screw Co., Cleveland, like other bolt and screw manufacturers, found itself faced not only with the necessity of increasing its production enormously but also of developing methods for producing a better product.

Examination of its production facilities disclosed that the largest possibility for improvement in the product would come from increasing its toughness. In turn that involved better hardening, indicating that perhaps the heat treating would be the best place to inaugurate an improvement in facilities.

Another important factor entering into the picture also pointed in the same direction. Current practice was to manufacture the threaded fastenings up to the point where heat treatment was required. Then it was necessary to interrupt the cycle of plant operations from 3 to 7 days while the work was packed up and sent out for heat treating in an outside shop. This outside work also required considerable supervision from Triplex, an additional burden. In addition, a certain amount of testing and checking was necessary for control purposes and to make sure the product met physical requirements.

Study of these considerations led to the decision to install a continuous furnace especially designed to handle the heat treatment most effectively. The increase in output that this unit has made possible is most satisfactory for it has enabled Triplex to more than double its daily output of the heat-treated fasteners. Early in May, well over 1000 tons of threaded fasteners had been processed through this furnace.

Built specially by Electric Furnace Co., Salem, O., for this work, the furnace is electrically heated by power supplied to heavy cast nickel-chromium alloy grids suspended from the top of the heating chamber as well as on insulators mounted on transverse beams which support the upper flight of the conveyor. This arrangement provides the most effective radiation both above and below the material as it slowly moves through the furnace on the upper flight of the conveyor belt.

Heating elements are arranged in two circuits or zones, each zone being separately and automatically controlled by pyrometer equipment. Temperature is held near 1600 degrees Fahr. Furnace draws 150 kilowatts with all heating elements working.

The conveyor is of the continuous chain belt type, all of it being in the furnace chamber proper with the exception of a short extension of about 15 inches at the charging end for loading the work upon the conveyor. Discharge end of the conveyor is inside the furnace chamber, the work being dropped off the end of the conveyor into the quench tank continuously and automatically. Thus work is not exposed to the atmosphere from the time it is heated until quenched. Too, having all the belt conveyor inside the work chamber minimizes amount of heat used in reheating the belt.

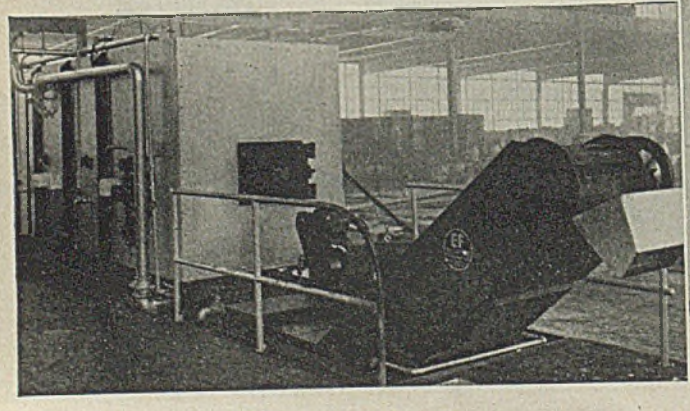
Work chamber of furnace consists of a fabricated steel shell lined with insulating material and refractories to form a tunnel in which the conveyor is mounted. Furnace conveyor, drive sprockets and supports for the chain belt are constructed of heat-resisting alloy. Hearth proper is formed by upper flight of the chain belt and is supported on transverse beams mounted under the upper flight of the conveyor.

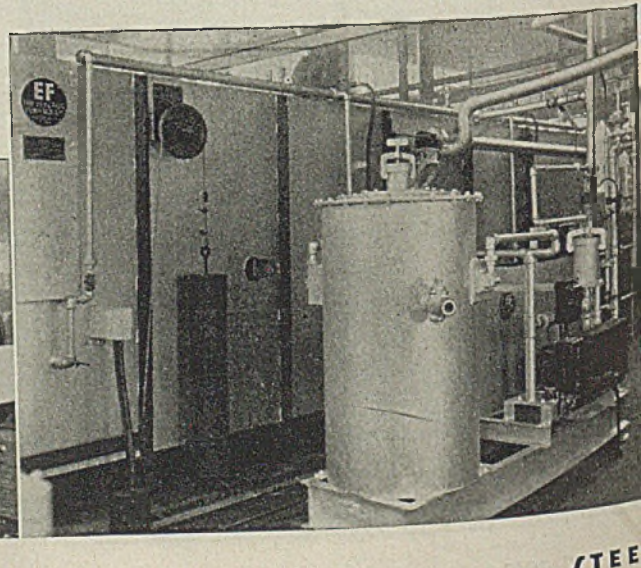
Furnace is over 22 feet long, 6 feet wide and 10 feet high. One end of the quench tank is under the discharge point of the furnace conveyor so work can be discharged directly into the quench. The quench tank is below floor level and is 18 feet long, 4.5 feet wide. Another endless belt conveyor runs through the quench tank, receiving the bolts as they drop into the tank and carrying them through and up out of the quench bath as shown in an accompanying illustration. This conveyor discharges the work directly into a tote box or basket for placing into the electrically heated recirculating-type draw

(*Please turn to page* 117)

Fig. 1. (Left, below)—Discharge end of the continuous heat treating and quenching unit. Work falls from furnace chamber into end of quench tank without being exposed to air. Conveyor here lifts work from quench tank and discharges it into tote box or truck

Fig. 2. (Right)—Protective atmosphere is produced in the generator shown here to the right of the furnace. Natural gas is partially combusted to furnish the oxygen free gas for the working chamber of the furnace

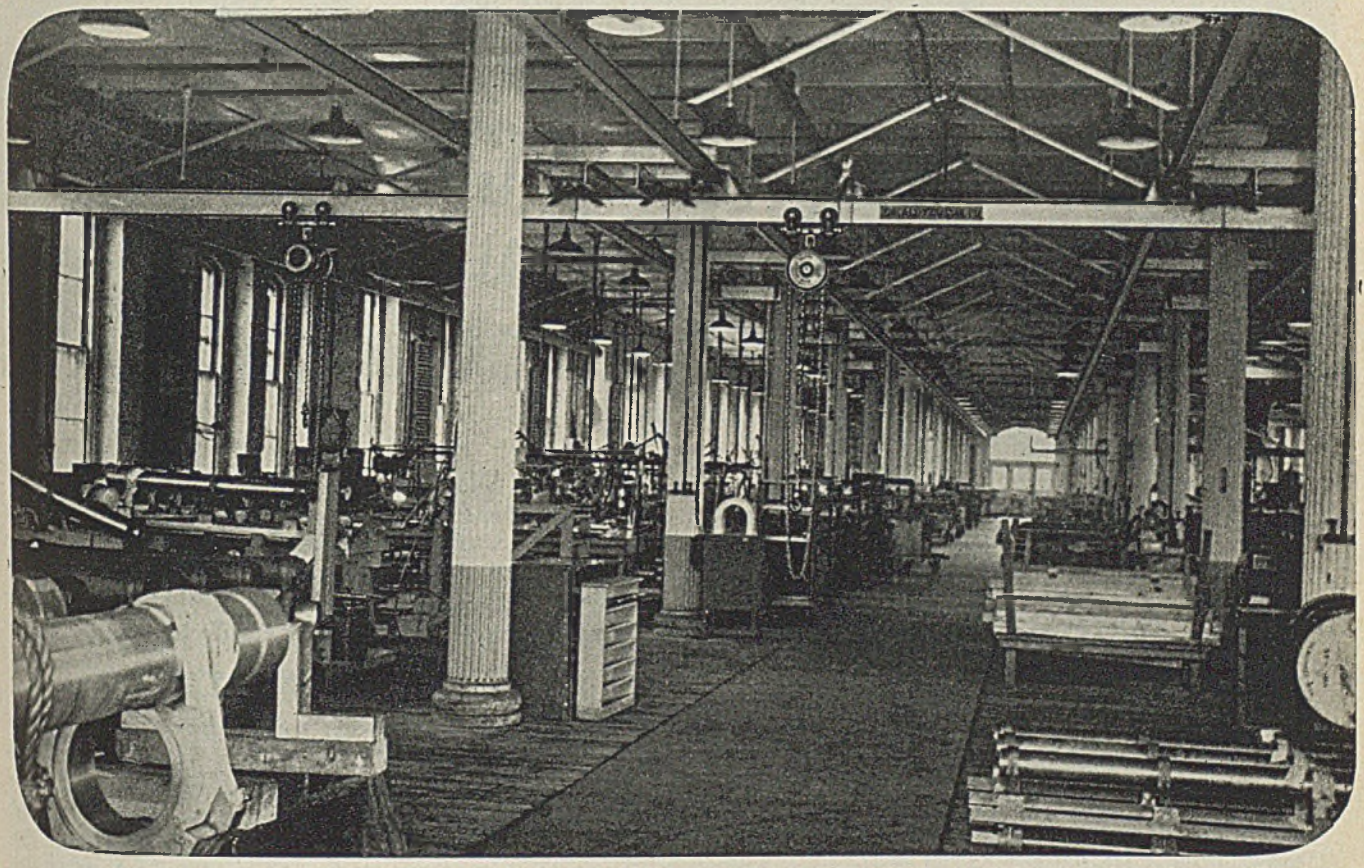




On Duty

IN THE WAR PLANTS OF AMERICA

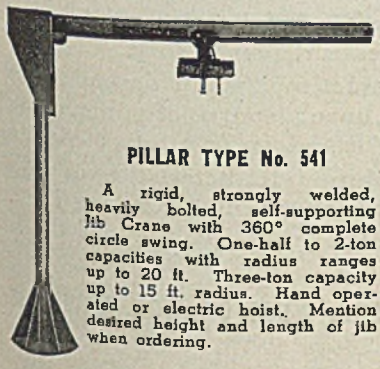
CHICAGO TRAMRAIL MONORAIL CRANES



Actual View of Chicago Tramrail Monorail Cranes Covering 3 Bays in War Plant.

★ Above illustration shows a typical application of light duty Chicago Tramrail transfer cranes covering a building three bays in width, enabling the operator to transfer the hoist and load from one crane to another.

This makes for extreme flexibility, permitting movement of material from *any* point to another in the entire area. Note that crane runways extend the full length of building in each of three bays, with various transfer points which allow shifting of hoists from one crane to another.



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Punch and Die "Idea" Jumps Output

BY SUGGESTING and developing a punch and die to pierce elongated holes in cast copper branch terminal connectors, Joseph Mizak, a toolmaker at General Electric's Bridgeport Works, helped speed production of important combat equipment and earned an award of $1200 through the company's suggestion system.

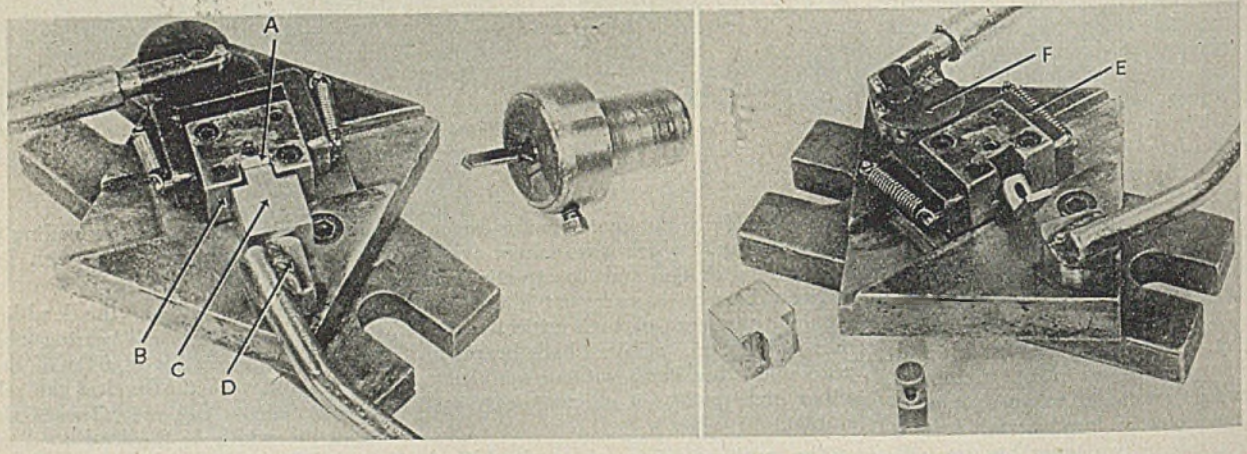
The job previously called for drilling a 3/16-inch hole in the connector and then elongating it to 5/16-inch with an end miller. This left burrs, almost an inch long in some cases, which involved another operation—filing.

Mizak's chief purpose in developing his punch-and-die method was to minimize the burrs, which it did. But his method also proved to be a faster and simpler means of doing the work. Use of the piercing method for the job is particularly interesting because the diameter of the hole is smaller than the thickness of the material, ½-inch, and was possible only because the material was soft cast copper.

The work is set in a die locked by a pusher block and a cam-lock arrangement, see accompanying illustrations. Shown here are the fixture for punching the elongated hole in the connector A, set in the die B, and locked by the pusher block C, and cam D. After being punched, the connector is knocked out of the fixture by the ejector at E, actuated by cam F. Thus, the operator pierces the hole in one stroke, indexes the cam lock to release the pusher block and removes the work by indexing another cam lever which actuates a U-shaped spring-return ejector.

Success of this method led Mizak to develop a second fixture for another job of the same type. This is a broaching punch and die for slotting a cast copper busbar, previously a milling operation which left burrs and also necessitating filing.

In principle and operation, this fixture is similar to the one described. Work is set and locked in the same manner, and removed by a spring-return ejector. The slot 5/16-inch wide, is punched through an 11/16-inch diameter. A 5-toothed broach is used because of the short stroke of the presses available for the job. On larger stroke presses the broach could be designed with more teeth for a lighter cut. The 5-toothed broach, however, does a clean job, leaving no burrs.



Kennametal Offers Tools Ground for Instant Use

Tools already ground for immediate use in precision boring machines are being offered by Kennametal Inc., 200 Lloyd avenue, Latrobe, Pa. Heretofore, a series of solid round blanks only were supplied.

The new tools designated 27SR have a side cutting edge angle of 30 degrees and an end cutting edge angle of 38 degrees, are primarily for use in a 30-degree boring bar; the 29SR type having corresponding angles of 45 and 53 degrees, are for use primarily in a 45-degree boring bar.

Five sizes are being offered in each style, 3/32, ⅛, 5/32, 3/16 and ¼-inch.

Electrode Change Cuts Welding Time by 2½ Hours

A production welding savings of 2½ hours per unit or 26 per cent was made recently by Baker Mfg. Co., Springfield, Ill., manufacturer of bulldozer frames, in switching to larger electrodes.

In a report to Lincoln Electric Co., Cleveland, the concern revealed that by increasing electrode size from 3/16 to ¼-inch, it reduced welding time from 9½ hours to 7 hours. In a further interpretation, the company stated the savings meant that one welder alone could increase welding output by approximately 2 complete bulldozer assemblies per week.

The change to larger size electrodes also effected a saving in labor costs of $1.64 per unit, or over 22 per cent, due to factors such as boosting deposit from 1.32 pounds per hour with 3/16-inch size to 2.5 pounds per hour with ¼-inch size. Effect of electrode size on rate of electrode consumption and deposition, also on welding costs including labor, overhead, power and electrode, is shown in the accompanying table.

As an example of savings made by increasing electrode size, note that by using ¼-inch size instead of a 3/16-inch size electrode, cost per pound deposited is reduced 42 per cent.

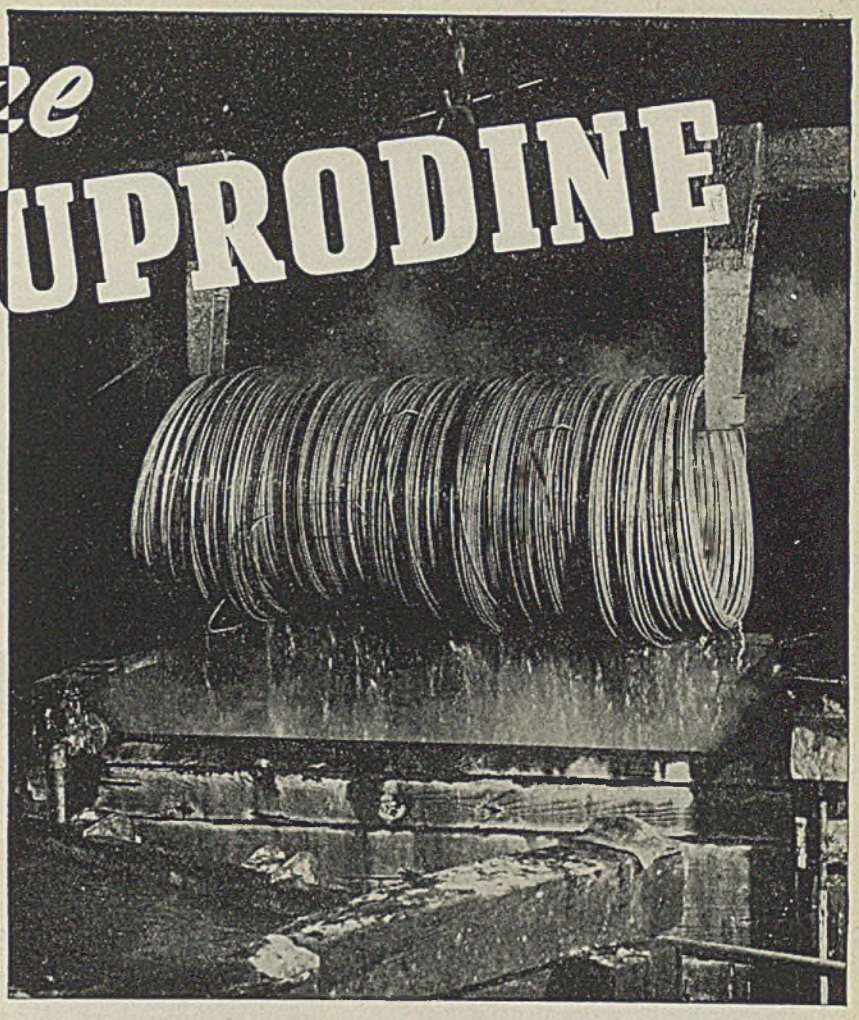
EFFECT OF CHANGING ELECTRODE SIZE

Electrode size	⅛	5/32	3/16	¼	5/16	3/8
Amperes	110	130	150	250	325	425
Arc volts	24	25	26	30	34	38
K.W. at arc	2.64	3.25	3.9	7.5	11.1	16.1
Deposit, lbs. per hr. (50% operating factor)	0.87	1.1	1.32	2.5	3.57	5.4
Efficiency of set (%)	47	50	51	55	59	59
Interruptions per lb. consumed	18	12	8	5	3	2

COST PER POUND DEPOSITED

Labor	$1.150	$0.909	$0.758	$0.400	$0.280	$0.185
Overhead	1.150	.909	.758	.400	.280	.185
Power	.064	.059	.058	.055	.053	.051
Electrode	.120	.105	.098	.098	.098	.098
Cost of interruption (including overhead)	.050	.033	.022	.014	.008	.005
	$2.534	$2.015	$1.694	$0.967	$0.719	$0.524

Cuprodize with CUPRODINE



for:

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  Increased Production
- **LONGER DIE LIFE**
- **LESS METAL PICKUP**
- **LESS SCRATCHING AND BREAKAGE**

Cuprodine increases production by making possible more drafts than could be made with acid copper.

Cuprodine is easy on dies—its use increases die life five to tenfold. Rejects from pickup, scratches and breakage are reduced to a minimum.

These are some of the advantages of Cuprodine, a powdered chemical, with which tight, adherent copper coatings are deposited on clean steel without the use of current.

The general use of Cuprodine in the drawing of steel shell cases as well as in wire mills attests to its advantage.

With proper processing Cuprodized surfaces may be used for decorative purposes.

Cuprodized surfaces may be made more rust resistant if treated with Cuprotek.

RODINE: Save Steel with Rodine Controlled Acid Bath. Rodine saves steel by inhibiting the attack of pickling acid on steel without retarding the removal of scale or rust. Rodine cleans more steel in less time. Rodine eliminates the danger of over pickling.

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UNIQUE CHARACTERISTICS OF THE EDISON ALKALINE BATTERY

★ It is durable mechanically. High strength steel construction is used in the container, grids, pole pieces, etc. The electrolyte is a preservative of steel. It requires no renewal of separators throughout its long life.

★ It is foolproof electrically. It may be short-circuited, over-charged, over-discharged, or even accidentally charged in the reverse direction without injury.

★ It can be charged rapidly. It may be charged at full normal rate throughout the entire length of charge and is not subject to finish rate limitations. It requires no equalizing.

★ It withstands temperature extremes. It is not damaged by freezing. Free air spaces on all sides of all cells provide ventilation for rapid cooling under high temperature conditions.

★ It is free from ordinary battery troubles. It is not subject to sulphation, shedding of active material, buckling of plates, jar breakage or other common causes of battery failure.

★ It is simple to maintain. Merely charge adequately, add pure water, keep clean and dry.

★ Its tray assembly and cell connections are extremely simple.

★ Its life is so long that its annual depreciation cost is lower than that of any other type of storage battery.

A recent call for battery operating information from a war plant mystified our engineers, for we had no record of Edison batteries in this plant. When our Service Engineer called, he found the plant using a truck powered by a battery made in 1923.

RETIRED IN 1937

This battery turned out to be one which had been reported scrapped in 1937. Actually, the truck and battery had been put in dead storage because the plant had been operating on a reduced schedule. The war had revived the need for the truck. The battery, found still serviceable, was a windfall.

WINDFALL VALUES

Today many industrial truck users are finding windfall values in their wise purchases of Edison Alkaline Batteries.

They bought long life because it meant low cost, but long life also means dependability.

And so now, in wartime, when dependability is all-important, they have a source of power not subject to interruption by sudden or unexpected failure.

Some of the unique characteristics of Edison Alkaline Batteries which account for long life and dependability are cited in the column at the left.

EDISON STORAGE BATTERY DIVISION, THOMAS A. EDISON, INCORPORATED, WEST ORANGE, NEW JERSEY

Edison

ALKALINE BATTERIES

HIGH-PRODUCTION X-RAY

. . . . made possible by built-in materials handling system

By W. D. CRELLEY
General Electric X-Ray Corp.
Chicago

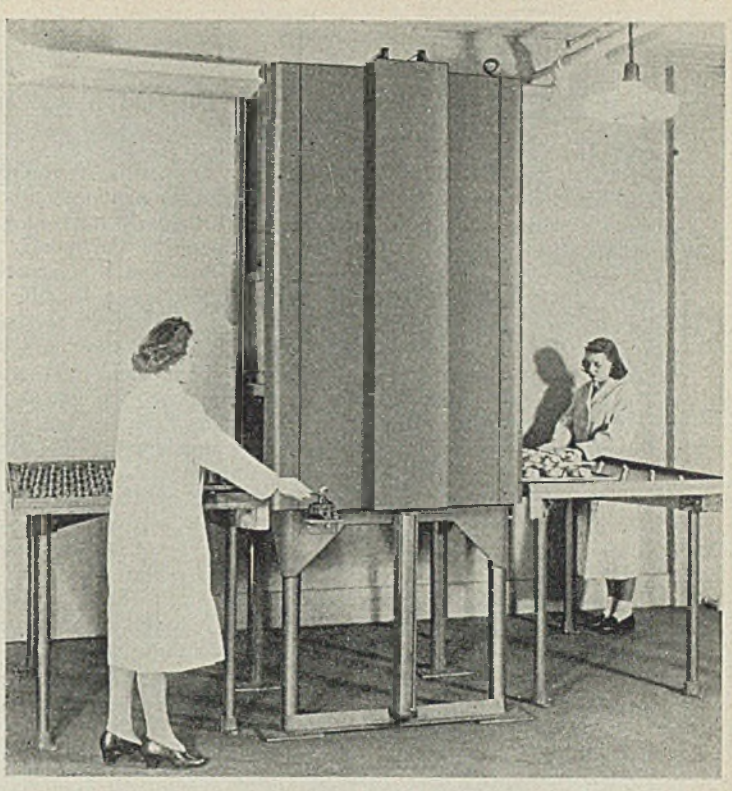


Fig. 1—Air valve being moved by operator at left actuates pneumatic-cylinder drives that open and close doors of X-ray cabinet quickly

ONE of the biggest factors in the unprecedented increase in output of materials throughout the country is the part being played by industrial X-ray equipment operating at voltages ranging from 60,000 up to and including 1,000,000 volts. A large number of such units have been delivered or are in the process of production for a wide variety of industries, providing them with an inspection tool that is compact and safe, and enabling them to insure quality and to materially increase production of heavy objects.

One type of X-ray equipment, developed by the General Electric X-Ray Corp. of Chicago, and particularly valuable in speeding war plant production, is now semi-automatic, manually operated, lead-protected production housing and available in two types for use with equipment operating at voltages ranging from 140,000 to 250,000 volts.

Designed expressly to provide a rapid, accurate method for inspecting large production lots of light-alloy castings and assemblies, this new housing is relatively simple in its construction, and it replaces the fully automatic motor-driven production unit which is no longer available. The design and construction of the new housing is such that it uses an absolute minimum of such critical materials as electric motors, ball bearings, gears and other items without sacrificing either high quality or efficient, easy operation.

The unit consists of a lead-lined steel cabinet which houses the X-ray unit. Lead-lined doors are incorporated on opposite sides of the cabinet. The doors are counterbalanced by suitable conterweights which, in turn, are connected to an air cylinder that permits operation of the doors by a hand valve at the loading position. The doors are fitted with limit switches.

On either side of the lead-lined cabinet there are two ball bearing tables, each of which consists of 94 ball bearings set flush with the level of the roller conveyor in the cabinet. These tables extend the width of the lead-lined cabinet and are connected on the rear side of the cabinet with a return conveyor of the ball bearing roller type.

The unit is furnished with three lead-covered trays which should be sufficient to handle a normal amount of production work. These trays are 22 x 34 inches and will accommodate two 14 x 17-inch film holders.

The ball bearing tables, shown in the accompanying illustrations permit the direction-of-work movement to be from left to right or from right to left, depending upon the preference of the operators who are handling the trays.

The loading operator loads one or two negative holders on one of the three lead-covered trays. She then positions the parts to be inspected on the holders

(*Please turn to Page* 116)

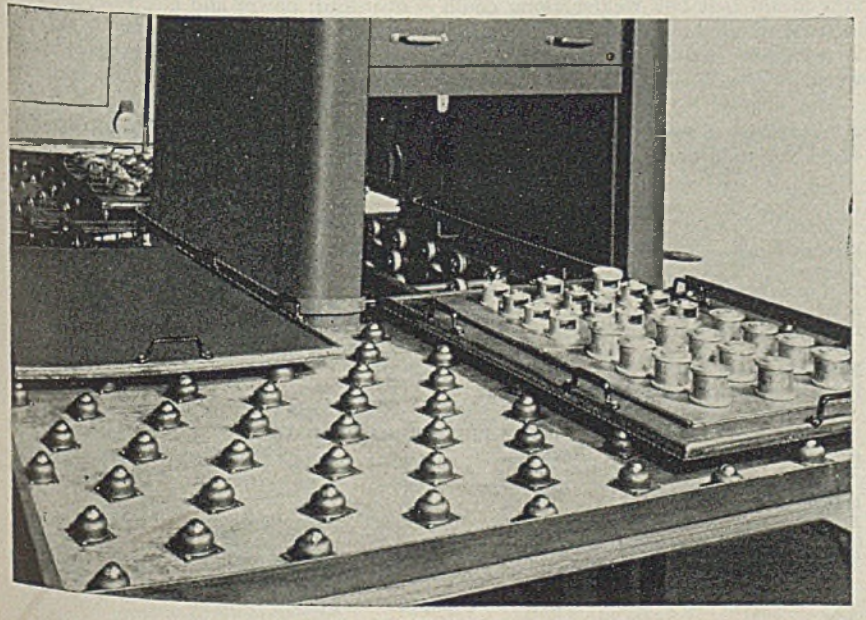
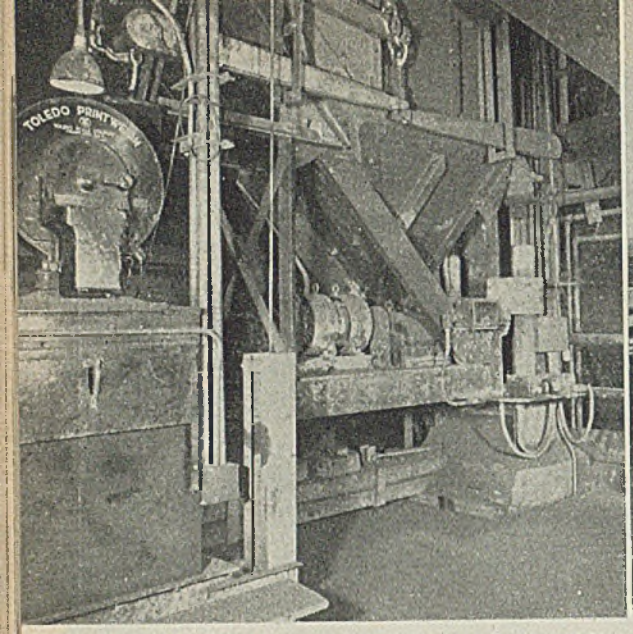
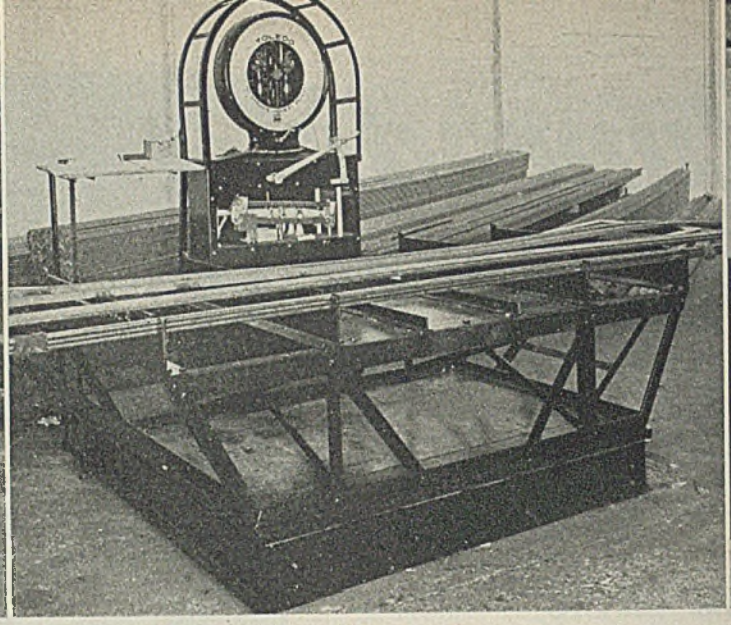


Fig. 2—Closeup of ball bearing tables which facilitate movement of the trays which carry the negative holder and work to be examined as shown at right. Note table extends around machine to left, here, furnishing a quick means of returning the trays back to the loading side of the machine





MODERN WEIGHT CONTROL In Steel Mills

Wide use of scales at blast furnaces, open-hearth shops and rolling mills seldom is realized until individual examples are cited. Throughout this treatise various types of scales, details of construction, methods of operation and advantages are presented to emphasize their importance in steel plant operation

PRODUCTION figures in the steel industry are in terms of tonnage from the ore to the finished product. Yet oddly enough, the scales that originate these vitally important weight figures seldom are mentioned. Perhaps the small investment for even the best weighing equipment compared to the investment in the plant generally, may tend to keep them from receiving the attention they deserve. Yet, remove the scales from a modern steel mill and production, both in terms of quantity and quality, would soon stop.

Weighing, no matter what the capacity of the scales involved, falls into four basic groups in steel mills: (1) the weighing of incoming materials either from an outside source, or another division of an integrated operation, (2) the weighing of charges and of intermediate products such as ingots, billets, bars, etc. (3) interdepartment weighing, (4) weighing of finished products both at the mill and at various points throughout the distribution channels.

In number of weighing points the third group ranks high, as weight records provide a practical method of checking semifinished products into and out of a department and providing the necessary records of production, and of material control.

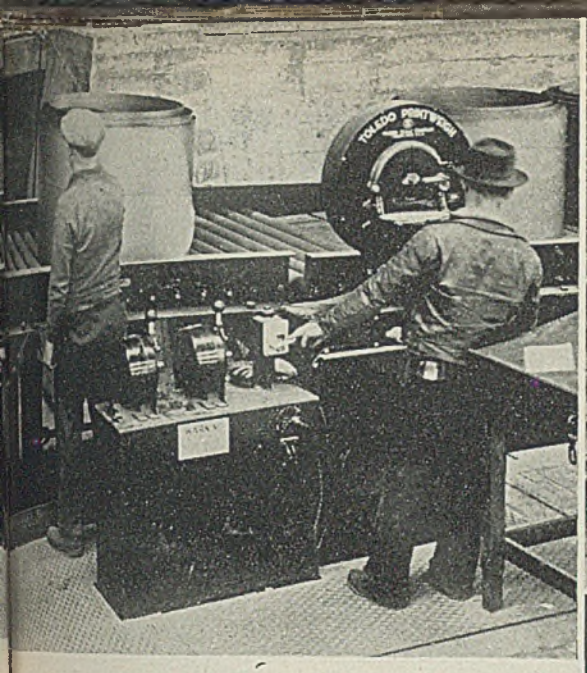
In general, the pronounced trend in the steel industry toward the use of the most modern and efficient weighing equipment has moved in reverse to the actual production flow. This is logical enough, of course. Pound for pound, errors in weighing bars, strips, sheets at the finishing mill or in the warehouse would be more costly than the same errors in weighing a carload of pig. So modern dial scales have long been accepted in the applications involving the finished product. But today, improved weight control has steadily moved back through the operations, meeting the growing demand for greater accuracy, speed, and dependability throughout the entire process.

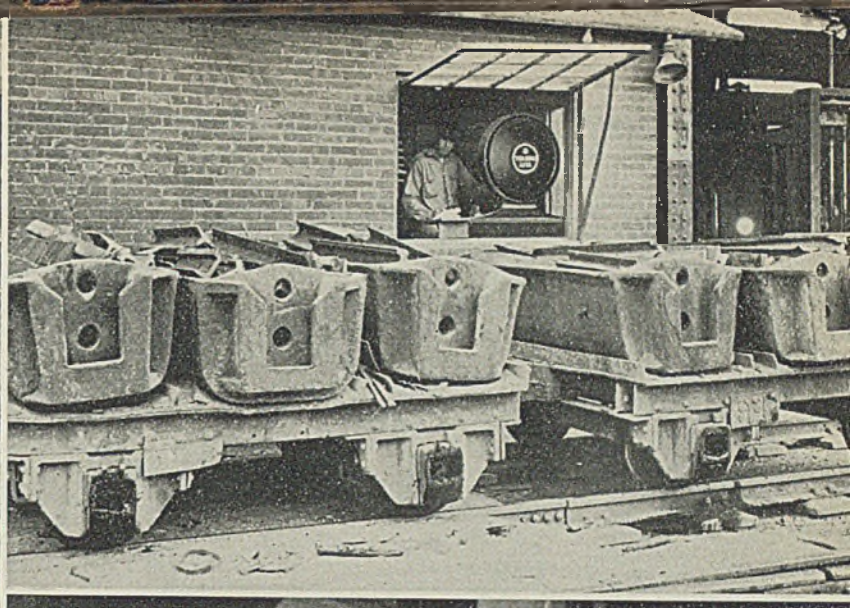
For example, for weighing molten iron, the "hot metal" scale, although of high capacity, is recognized as requiring both accuracy and speed. The weight figures originated here directly affect the amount of ore, alloying ingredients, scrap, etc. that will be added to the charge going into the open hearth . . . directly affecting both costs and quality.

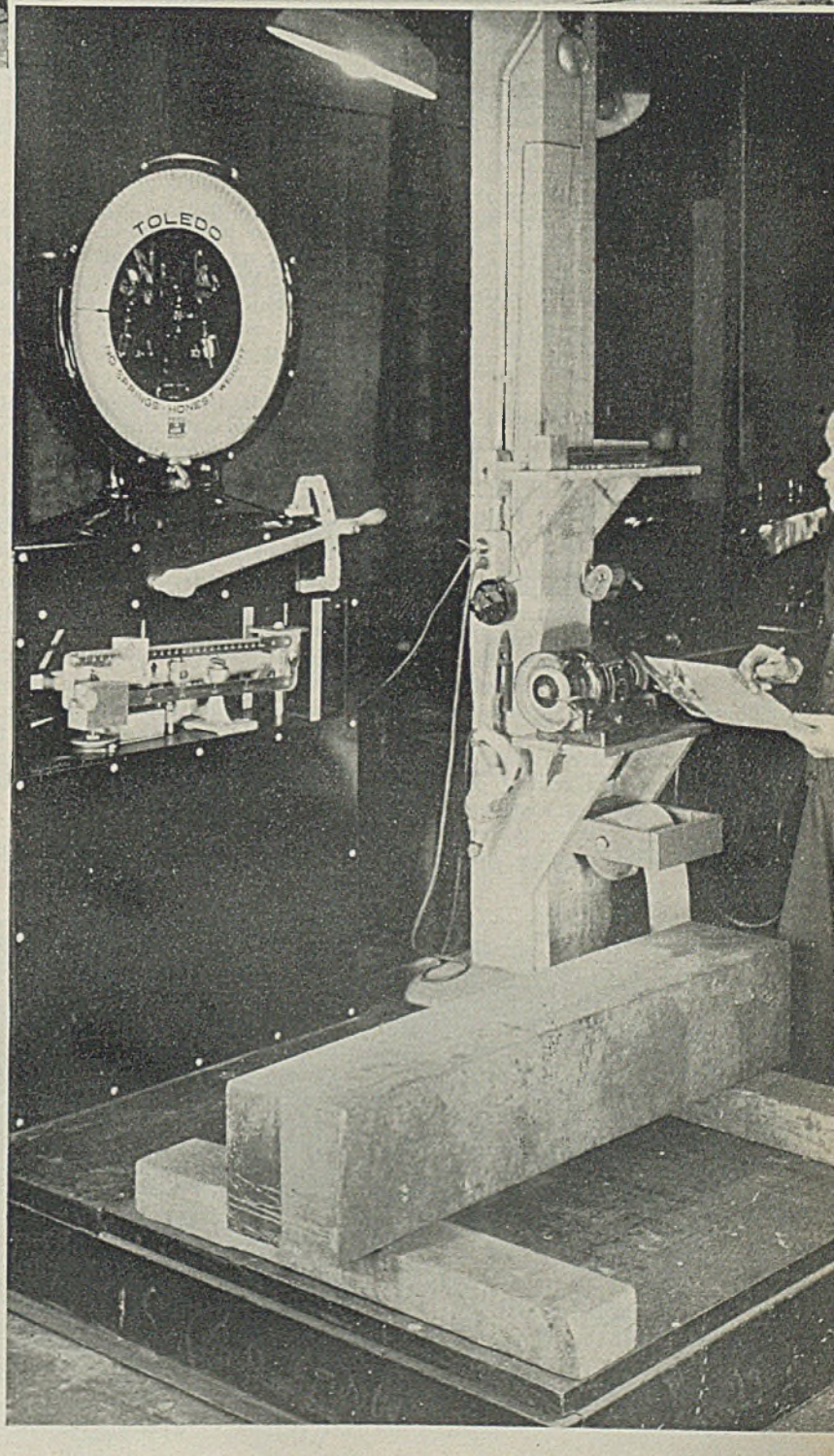
The superiority of the double-pendulum dial scale as compared to a scale with beam indication, for most steel mill weighing operations, is generally accepted today. In the first place the operator reads the weight on a dial scale to a single mark or graduation. A beam scale, on the other hand, is normally balanced only to the point where it floats up and down within the range of trig-loop often leaving the actual weight a matter of estimating. Secondly, with a dial scale, there is a great gain in speed. This is, of course, due to the fact that the weight is read directly on a dial, rather than through the more complicated process of adding mentally the readings of several poises and loose weights.

The emphasis today on the importance of the scale readings, or the weight indication, is considerably in contrast with the earlier thought on weighing, when most of the attention was focussed on levers, pivots and bearings. Naturally the lever system of the scale is of vital importance. And there has been a great deal of recent progress here—particularly in the development of self-gaging interchangeable pivots; also the greatly improved suspension bearings to absorb platform oscillation. But modern steel plant weighing starts with the assumption that the best types of levers, suspension bearings, pivots, etc. available today are capable of doing their job. The great field for further improvement lies in the reading, recording, automatic controls, speed . . . and in the general elimination of human mistakes that in the past have tended to undermine the best efforts at setting up cost and quality control systems.

Two of these developments in particular have wide applications throughout steel operations and deserve detailed dis-







Extreme left, opposite page—Automatic coke weighing installation built with hopper scale levers, weight printer (continuous strip record) and photoelectric cutoff

Center, opposite page — Special rack on this floor scale facilitates weighing rods and merchant mill shapes

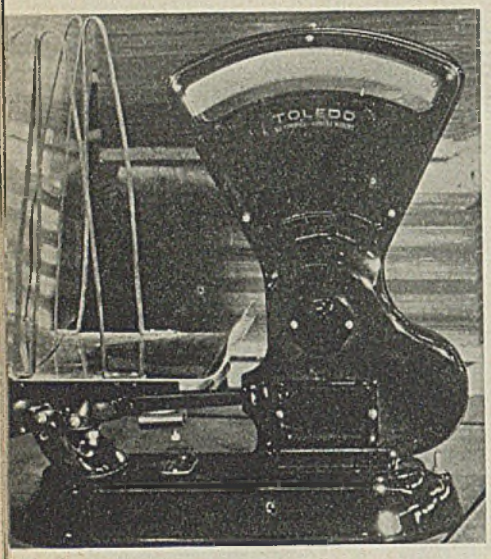
Directly above — Weight printing scale that provides printed record of weight of coils passing over conveyor

Right Above—Industrial track scale for weighing buggies of open-hearth scrap

Right—Weighing high-speed tool steel billet. Unit weights (controlled by lever at right of dial) afford readings from ½-pound to 2500 pounds

cussion. First of these is the weight-printing scale which is a further refinement of the double pendulum dial scale. This may be a track scale, a charging scale, conveyor scale or anything down to a small bench scale. The important thing is that it keeps an infallible record of each weighing such as no human being is capable of doing. These scales can be built to produce a large variety of printed records. They can be in strip form, retained within the scale, or they can be produced on tickets, on large sheets or in combination of strip and tickets. Duplicate copies are also possible, so within reason anything needed for accounting, production, receiving or shipping purposes can today be provided in a form automatically printed by the scale.

Many costly errors may occur when human beings read a scale. Those who have had to deal with weight records personally will appreciate how much of an improvement printed weights really are. First, the man at the scale can read the numbers on the dial *incorrectly*, just as we all do at times. Or he can read the weight correctly but twist or transpose the figures so that 673 comes out 637, or he may write down the



Fan scale with special rack for check-weighing tin plate

weight in *illegible* hand writing so that the figures are anyone's guess five minutes later. An important thing to remember is that there is only *one* chance to get these weight figures right. That is during the few seconds that the item is on the scale platform. Once it has gone, there is not one chance in a thousand of ever getting it back for reweighing. Weighing must be done right the *first* time, or it stays wrong forever.

The modern weight-printing scale operates in as little as 2/5 of a second. There is no time lost in gaining the advantages of a completely machine-made weight record that eliminates the human element.

The reason this type of scale has not been used longer is that it is relatively new. It required a solution to the problem of introducing a weight-printing mechanism into the scale, that would not at the same time interfere with weighing accuracy through added friction.

Second of the developments has been the application of electrical controls to charging scales. These installations vary from single units covering one critical ingredient to installations involving a half dozen or more scales, all electrically interlocked for completely automatic control.

The basis of an installation of this kind is the automatic dial scale usually of the hopper type. The cutoff of the material is made either by a mercury switch actuated by the movement of the dial mechanism, or through a photoelectrical cutoff actuated by the interception of a beam of light by the scale indicator. In either case the impulse is amplified so that the hopper gate, vibrator feeder or other mechanism is operated automatically.

The advantage of automatic cutoff is obvious. It leaves nothing to guesswork on the part of the operator. Nor can he carelessly feed in too much or too little.

By interlocking a group of scales through a central control panel, amazing control can be achieved. For example, an installation in an alloy steel plant is set up to control eight ingredients. Not only is the amount of each ingredient precisely controlled, but the proper sequence of the ingredients is automatically maintained. Nor is it possible for an operator to leave out an ingredient. Once the starting button is pressed, the automatic weighing equipment carries through the complete operation. It will then automatically repeat, if desired. With equipment of this kind *both* quantity and quality are lifted beyond any chance for human mistakes.

Interesting examples of the application of electrical controls to scales which weigh a single ingredient are found in automatic coke weighing operations.

A typical installation consists of two scales with hoppers with a capacity of 2000 cubic feet. The scale dial has an indicating capacity of 10,000 pounds.

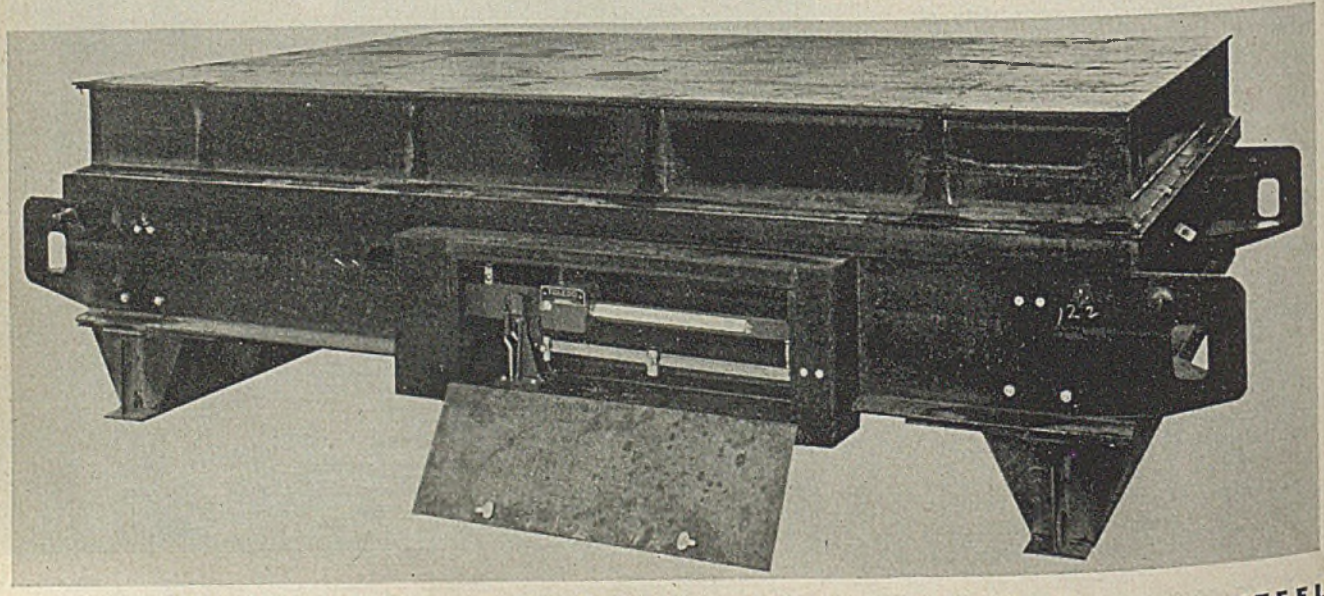
Mounted on the indicator shaft in addition to the regular indicator is a second adjustable indicator on the back of the scale which can be set to any desired weight of material. The movement of this indicator is such that when a load is added to the scale, the indicator retrogresses toward zero and when the right amount is in the weigh hopper, the indicator will register zero. A section of this indicator consists of an interceptor which cuts off the light from the source to the photoelectric cell when this indicator reaches zero. At the same time, the indicator on the front side of the scale has moved from its zero position and indicates the weight which has been placed in the hopper.

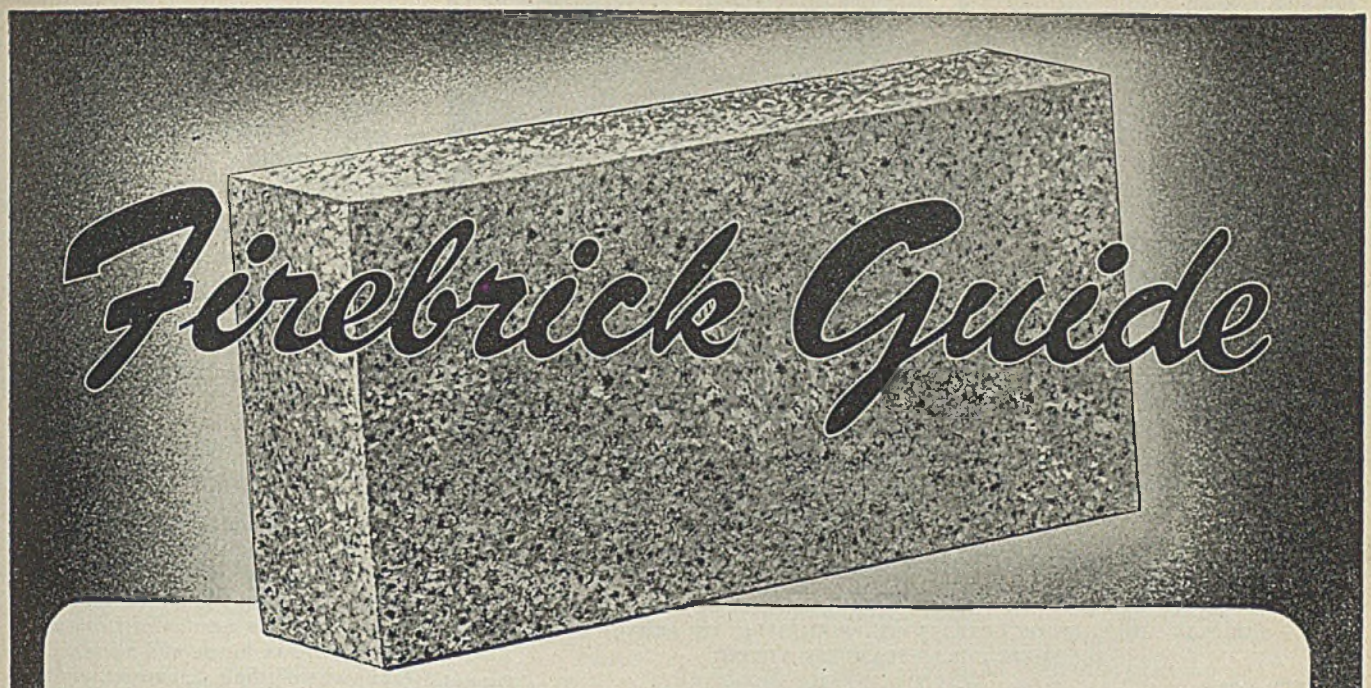
The weigh hopper is equipped with motor-operated discharge gates. The hopper is fed by a motor-driven main feeder which also removes the "breeze" in the coke. This motor is equipped with a magnetic brake. There are two of these automatic coke weighing devices, situated one on either side of the skip car pit. The other materials which enter into the feeding of the blast furnace are collected in the usual gathering car equipped with the scabs.

The automatic coke charging devices are so interlocked that when a skip car reaches the loading position in its pit, a charge of material is placed within it and it travels to the top of the furnace automatically. When it returns to the loading pit, a second load of material is placed in it and likewise a third load. When the skip car reaches the loading pit for the fourth load, the dump gate is opened automatically by its motor and the skip car receives a charge of coke. As soon as the operator sends the skip car up, the motor automatically shuts the dump gate and the feeding operation automatically starts. The material is fed into the weigh hopper at such a rate that before the skip car can make its trip to the top and return, the load will have been placed into the

(*Please turn to Page* 119)

Self-contained heavy duty scale, 35 tons capacity, for weighing armor plate. Unit can be moved about by crane





SERVICE	BRAND	TEMP. Use Limit	MORTAR USED	
			HIGH BOND	AIR SEAL AND CUSHION JOINT
EXTREME SERVICE Heavy Loads	**B&W 80** Firebrick	3000 F.	**B&W** Air Set Mortar	**B&W** High-Temperature Mortar
MODERATE TO SEVERE SERVICE where fireclay brick fail quickly, due to temperature, load or both	**B&W** Junior Firebrick	2850 F.	**B&W** Air Set Mortar	**B&W** High-Temperature Mortar
INSULATING EFFECT	**B&W** K–20	2000 F.	**B&W** Smoothset Mortar	**B&W** K20 Clay
	K–23	2300 F.	Smoothset Mortar	IFB Mortar
	K–26	2600 F.	Smoothset Mortar	IFB Mortar
	K–28	2800 F.	Smoothset Mortar	IFB Mortar
	K–30 Insulating Firebrick	2900 F.	Air Set Mortar	IFB Mortar

R-168

The Company's engineers will be glad to supplement this elementary guide with recommendations on special applications or for unusual requirements of B&W Refractories.

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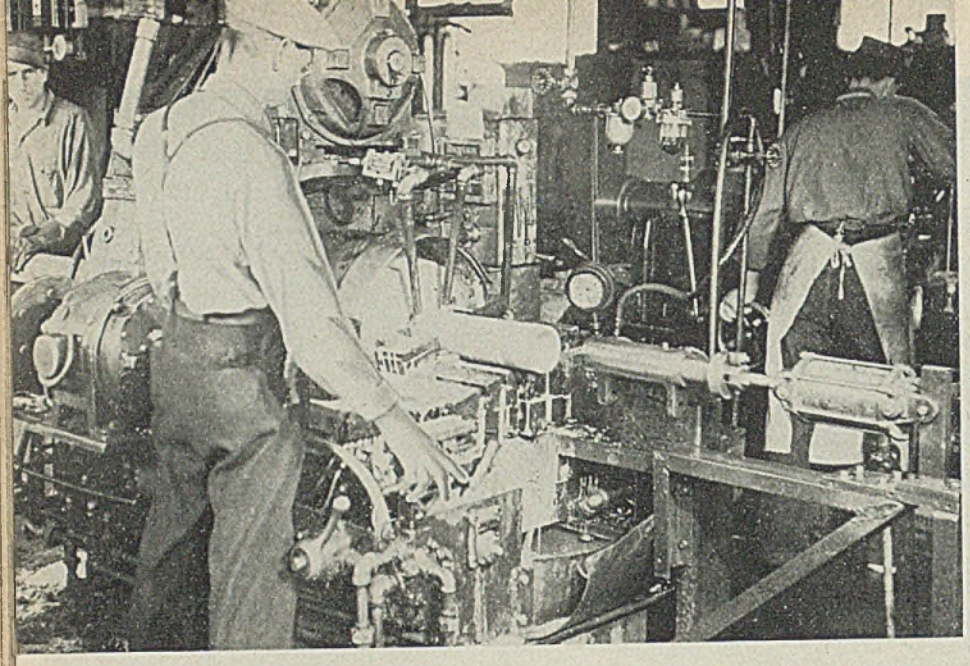


Fig. 7 — Hydraulic cut-off machine. Operator extreme left feeds tubing through machine against retractable stop operated by pneumatic cylinder shown at extreme right. This is operation 5, Table I

TABLE I—SEQUENCE OF OPERATIONS, PRODUCTION OF 4.2-INCH MORTAR SHELL FROM SEAMLESS TUBING

Operation No.	Work Done	Machine Used	Pictured in Fig. No.
	BASE PLUG OR END CAP—(X1335 Steel)—		
1	Turn outside diameter, face end and turn lug	Remodeled Lempco Lathe	5
2	Face and turn joint contact surfaces, chamfer shoulder	Goss & DeLeeuw automatic	6
3	Hot clean in strong Oakite bath, rinse in clear water, setup similar to Fig. 22.		
4	Burr, to complete preparation for brazing into shell casing, done by hand.		
	SHELL BODY—(X1335 Steel)—		
5	Cut 12-foot stock into 14.875-inch lengths	Taylor-Wilson hydraulic	7
6	Trim last piece to 14.875-inch length	Peerless 14 x 14-inch saw	..
7	Face to boring length of 14.810 inches	Reed engine lathe	8
8	Bore two different diameters simultaneously	8-spindle Ingersoll cylinder-block automatic	9, 10
9	Inspect bore diameters and counterbore depth	Go-no-go gages	11
10	Ream for base plug and chamfer reamed bore	Converted Lempco lathe	..
11	Burr reamed end for base plug, by hand filing.	.....	..
12	Clean base end for brazing, using Tromax fluid.	.....	..
13	Flux joint. Handy & Harmon on inside surfaces, Scaifflux on outside	.....	..
14	Assemble and braze by induction heating	Tocco Jr. heater	12, 13
15	Center drill base end of shell	Engine lathe, Lempco head	..
16	Turn for concentricity	Stamet automatic lathe	14
17	Inspection for eccentricity by Lempco	Special gaging setup	15
18	CWS inspection for eccentricity, bore diameters, counterbore depth	.....	..
19	Rough face base	Bradford engine lathe	16
20	Check base thickness	Special gage setup	A
21	Chamfer open end of shell	Lipe Rollway	..
22	Press mixing vane inside shell	Lempco air press	17
23	Spot weld first eight points on vane	Federal welders	18, 19
24	Spot weld second eight points on vane	Federal welders	18, 19
25	Apply torque test to check welds	Lempco rig	20
26	Close nose to contour desired	Bliss No. 305 press	21
27	Check nose eccentricity	Gage setup like Fig. 15	..
28	Bore, face and chamfer nose end for fuze adapter	Springfield engine lathe	22
29	Wash in strong Oakite bath, rinse	.....	22
30	Clean nose and fuze adapter for brazing	.....	23
31	Flux joint surfaces, Scaifflux applied by hand brush	.....	23
32	Assemble and braze fuze adapter	Tocco Jr.	23
33	Check for air-tightness of brazed joints	Lempco special setup	..
34	Face and chamfer fuze adapter	Bradford engine lathe	..
35	Finish turn OD's and nose contour	Stamet automatic lathe	..
36	Bore fuze adapter	Lipe lathe	..
37	Finish face base, turn base lug	17-in. LeBlond lathe	24
38	Check base thickness	Special gage setup	A
39	Rough grind outside diameter	No. 2 Cincinnati centerless	25
40	Finish grind outside diameter	No. 3 Cincinnati centerless	..
41	Broach to make key on base	No. 10-54 Cincinnati broach	26
42	Thread lug on shell base	Landis thread cutter	..
43	Thread adapter for fuze	Hall planetary	..
44	Inspect shell cavity for chips	Extension flashlight	..
45	Clean and dry shell	.....	..
46	CWS	.....	..
47	Turned over to CWS for final inspection, assembly with other components, oiling and shipment to loading plant.		

Note: Above tabulation shows only principal operations. Individual checks after every machining operation are not listed.

Mortar Shell

(*Continued from Page 75*)

is of the high-explosive type, the shell body will be filled with high explosive instead of chemicals. Fuzes may also be of the type that set off the shell on impact, or a combination action may be employed to set off the shell on impact if the time delay action does not function first.

Primary advantage of the mortar is that it fires a fairly heavy shell yet involves only transporting an extremely light and compact gun mechanism. Thus we find mortars mentioned frequently in descriptions of jungle and mountain warfare where their comparatively light weight and compact construction make them most valuable. Guns and ammunition can be carried manually or on mule or horseback. Units also are mounted on small track-laying tractors for maximum maneuverability in laying down smoke screens and the like.

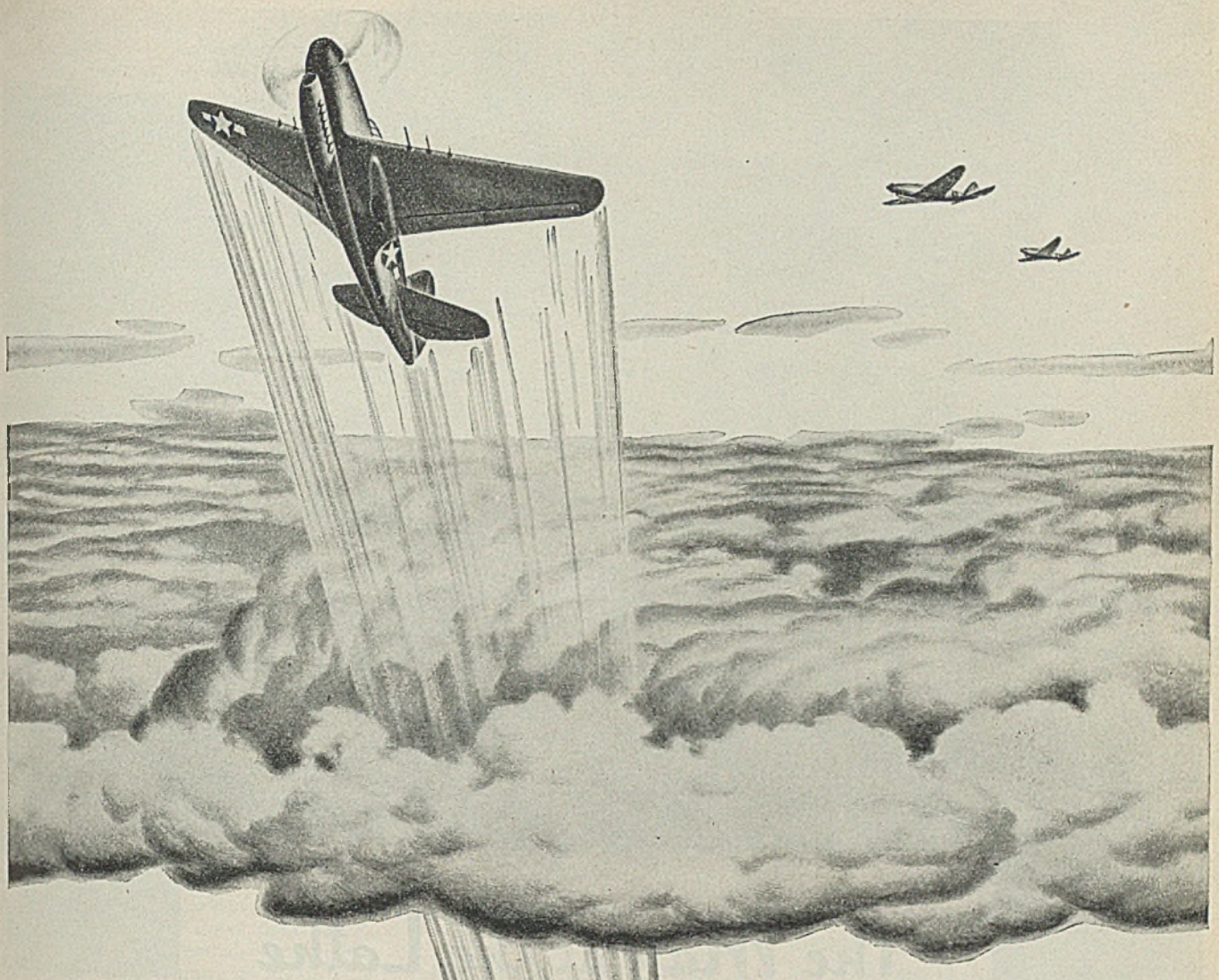
Too their high trajectory makes them suitable for lobbing shell over hills, mounds and fortifications. Such places would be difficult to hit with a flat trajectory gun such as a "75", or the newer 105 and 155-millimeter guns. Jungle warfare also finds the high trajectory of value, for it permits dropping a shell in among trees and jungle growths which might be difficult to penetrate by direct fire.

Packs a Terrific Punch

The comparatively high cubical content of the 4.2-inch mortar shell as pictured and described here means that when loaded with high explosive, it packs a terrific punch. It also is an extremely versatile design for it can easily be packed with chemicals for laying down a smoke screen at a distance. A maximum range of 2400 yards is available.

In use, the rear end of the mortar rests directly upon the ground, a flat plate being used to distribute the load. Remaining support is furnished by a one or two-legged arrangement connected near the center of the barrel and furnished with an adjusting means to provide the angle of fire desired. Mortar is aimed by a detachable sight which can be clipped to top of barrel as seen in Fig. 2. This illustration also affords an idea of the size of the 4.2-inch mortar shell. Sand bags or earth can be packed around base of mortar to steady it as shown in Fig. 1, which also reveals part of the mechanism for elevating the barrel.

Many of these shell are machined from forgings. But due to the extremely heavy load on the country's forging facilities, it was necessary to develop an alternate method of producing these



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Modern war planes can climb a mile a minute. In very few minutes a fast climber can be up in the sub-stratosphere. But . . .

Temperature takes a nose dive as the plane soars higher. At 20,000 feet the temperature is well below zero. Apparently at about 35,000 it becomes fixed . . . *at 70 degrees below zero* in the temperate zone. Over the equator, stratosphere temperature drops as low as 100 degrees below zero.

Both pilot and plane encounter troubles in the bitter-cold, rarefied air of the sub-stratosphere. Moisture freezes, oil congeals, engines gasp and die unless aided by turbo-superchargers.

Nevertheless, planes and pilots are learning to fight at higher and higher levels—thanks to research conducted on the ground in test chambers which reproduce the conditions of the stratosphere. Accurately controlled *air conditioning and refrigeration*...plus controlled pressure...make these tests possible.

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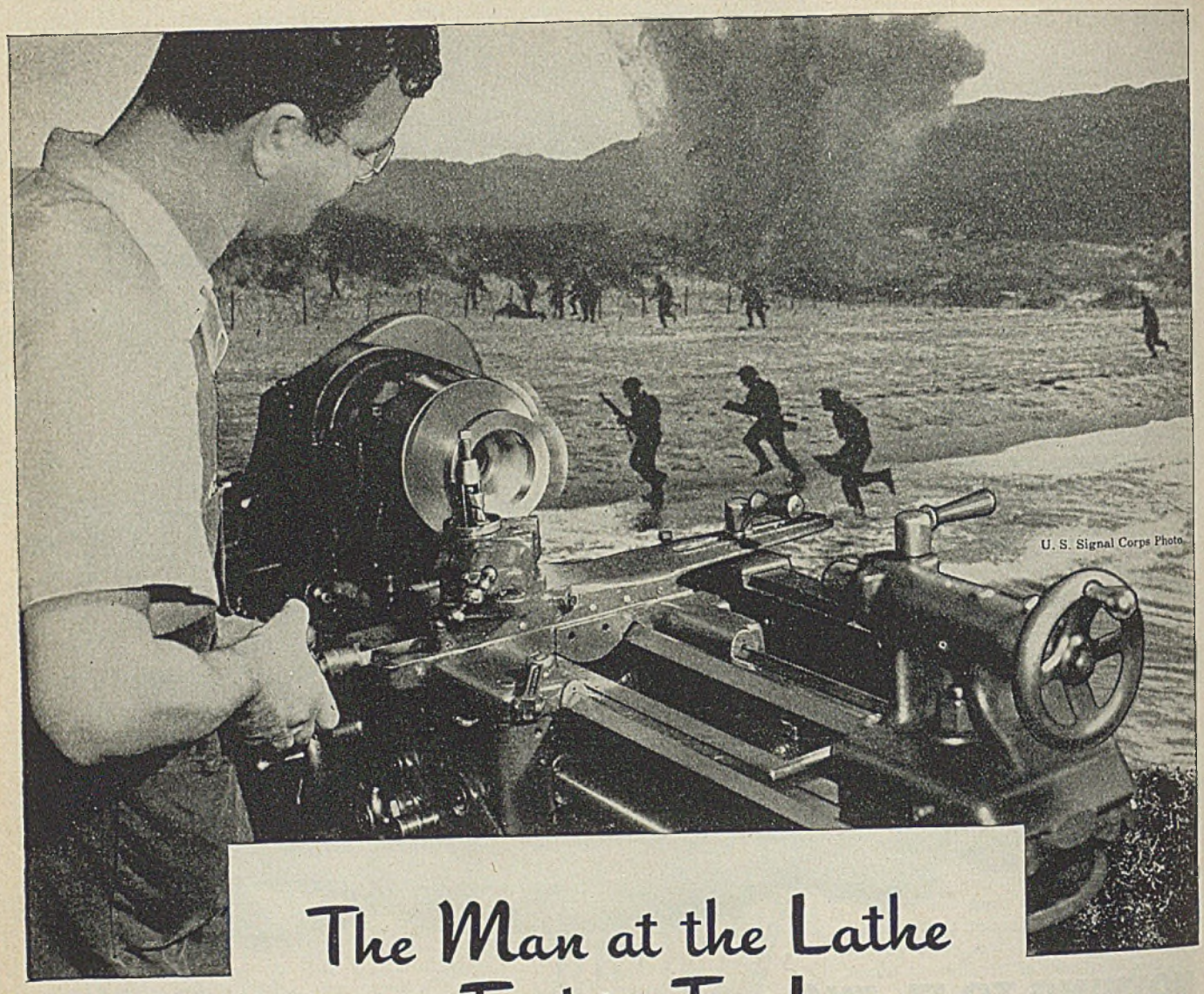

The Man at the Lathe Fights Too!

...and every turn of the spindle, as he guides his work through many precision operations, helps bring Victory one step closer.

Hours spent at a lathe may lack the dangerous excitement of combat—but the valorous men on the battle fronts breathe a prayer of thankfulness for guns, shells, planes, tanks—for all the superb equipment which is helping them swing the tide against the Axis.

So the man at the lathe is a soldier, too, as he bends his shoulders to the task of pouring out weapons in an ever-increasing stream. He faces his task grimly...proudly...proclaiming by the gleam in his eye and the jut of his jaw that he will not be outdone in service to his country, and knowing that America's production is a decisive factor in the war.

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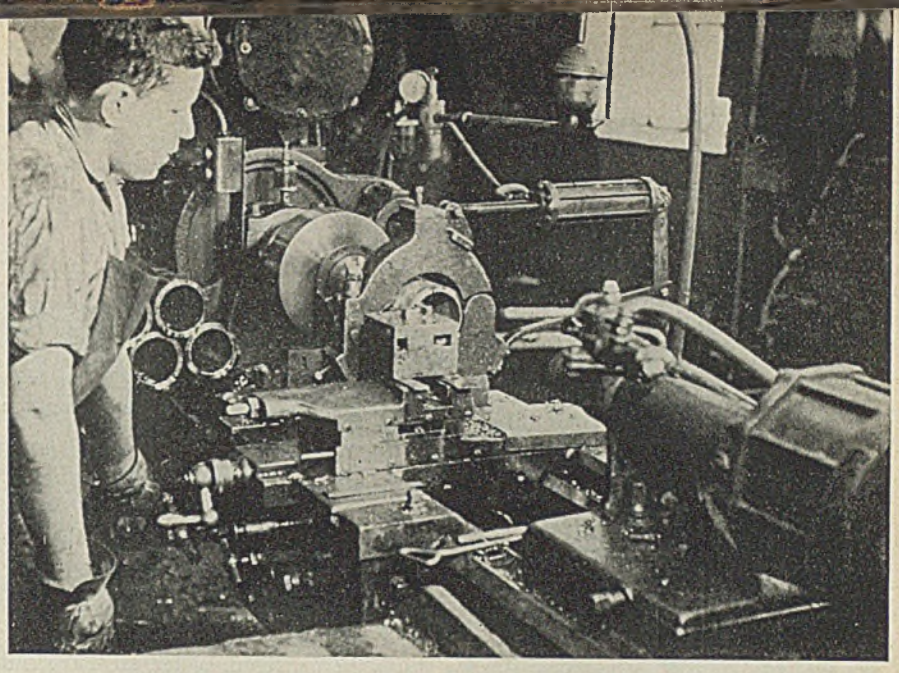


Fig. 8—Facing one end of tube (operation 7, Table I) to hold correct length, preparing tube for brazing in the base plug

from seamless steel tubing with one end closed by means of a brazed in plug. Many difficulties were involved in making a successful shell along these lines, but these were overcome and one of the very first production lines of this type was put in operation at the Bedford, O., plant of Lempco Products Inc. late in 1941. Since then, this line has served as a model for several others now in production. Not only were the difficulties in brazing the base plug overcome satisfactorily but rejects from machining errors were reduced to an extremely low point considering the close tolerances allowed on this type of shell.

First contract was received by Lempco in 1941. This later was doubled and redoubled with production reaching a peak early this year when output was at a rate practically ten times as great as the original schedule. In setting up these facilities, some additional equipment was added of necessity. Used machine tools were purchased, retooled and rebuilt for this shell line. In addition many special handling jigs and fixtures were designed and built. Entire job was engineered by Lempco engineers working with the author.

One important advantage that accrued from successful production of shell from seamless tubing was the considerable saving in material. Forged shell bodies weigh from 44 to 48 pounds in the rough which is machined down to about 11.5 pounds in the finished shell. Use of tubing eliminates most of this waste.

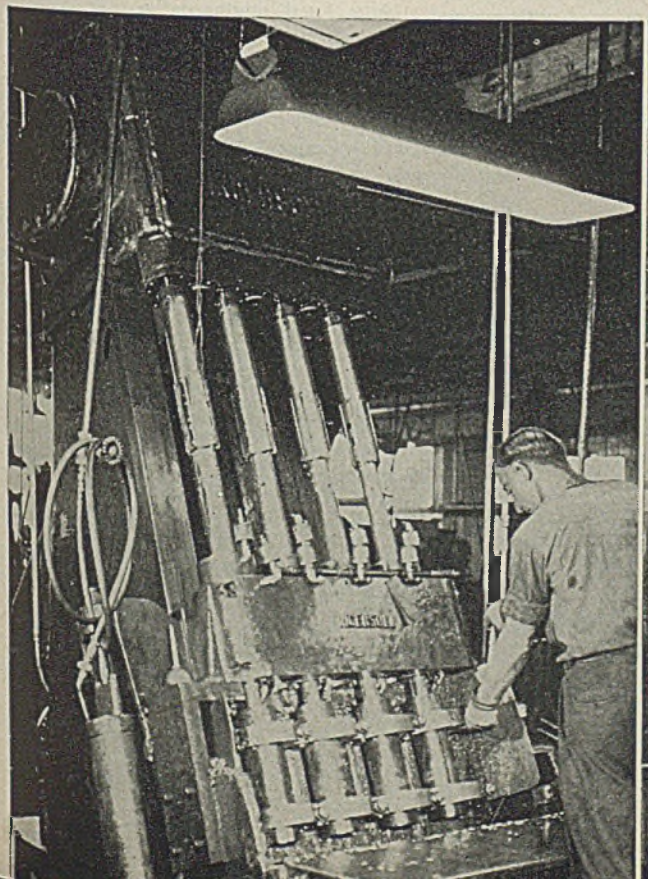
Before getting into the shell production program, Lempco made machine tools and automotive parts, including such items as hydraulic and electrical presses, brake drum truing lathes, crankshaft grinders, cylinder boring machines, axle forgings, gear forgings, drive shafts and the like.

Of the 14 or more component parts for the 4.2-inch mortar shell shown in Fig. 3, Lempco makes the base plug and the casing or shell body. However, all the other parts are shipped in to this plant from subcontractors so the complete shell can be assembled here ready for shipment to the loading plant.

The machining line at Lempco features a number of unusual machine tools, details of which will be given as we follow through the sequence of operations. One feature of this production line is that engine lathes and all single-operation machines have had their change gears removed so they can be operated only at the speed and feed determined

Fig. 9. (Left, below)—Loading tube sections into revamped cylinder-block boring machine

Fig. 10. (Right, below)—Here cutter bars have entered the work completely. Compare with Fig. 9. Both show operation 8, Table I



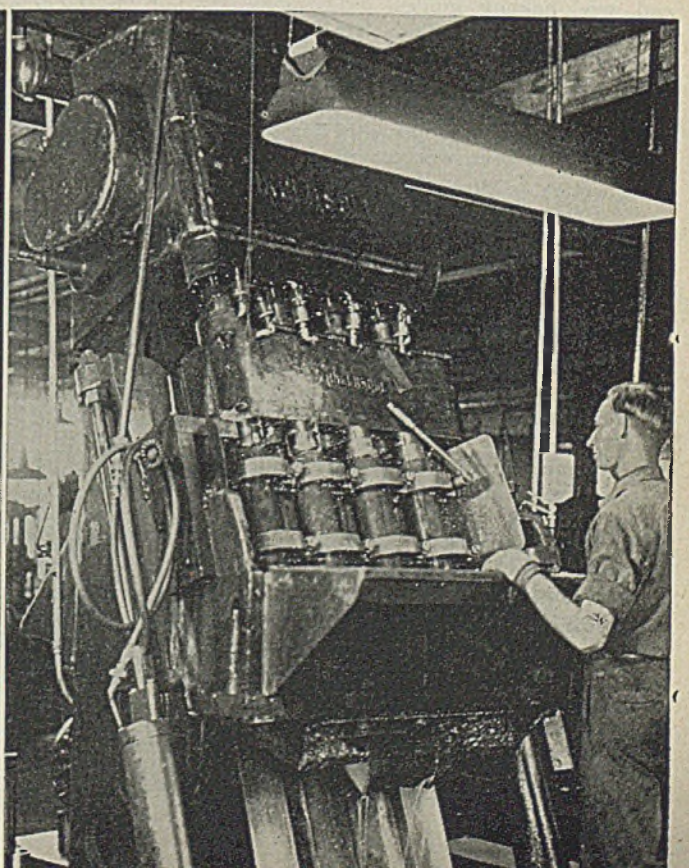


Fig. 11—Inspecting bore diameters and counterbore depth, operation 9, Table I

best by tool engineers. This eliminates possibility of the operator "fudging" feeds or speeds.

Carbide cutters are used throughout. Most cutting is done at 300 surface feet per minute. Finish and concentricity cuts are made with a feed of 0.035-inch per revolution. Bore feeds range from 0.020 to 0.030-inch per revolution of cutter. Turning feeds run about 0.035-inch per revolution with final facing feeds of about 0.015-inch per revolution. Exact values for each job as set up at the time this story was prepared will be found in the detailed description that follows.

Handling Aids Prevent Fatigue

Pneumatic cylinders are widely employed to operate work-loading devices and work-holding guides and clamps. Mechanical handling aids are widely used to facilitate loading and unloading operations and to allow girls to handle much of this work without excessive fatigue. A number of special testing setups also have been worked out.

Inspection is done both by Lempco and by representatives of CWS (Chemical Warfare Service). Every machine operation is gaged, using gages made in the plant, most of which are of the go-no-go type. Only principal checking operations are included in the sequence of operations listed in Table I. There are six main production inspection stations at which every shell is examined. These inspections include checks for (1) bore diameter; (2) concentricity; (3) adapter facing or depth from inner to outer face; (4) outside diameter after finish turn; (5) check for base thickness, length of shell, length and diameter of lug; (6) finish grind.

In addition, a number of inspections take place on a percentage basis to cover operations not so likely to get out of control. Such checks are made occasionally to determine if broaches are doing their job properly in broaching the key on the base, to see if centerless grinders are producing required finish (check is 100 per cent on diameters) and on other operations of like nature.

Sequence of manufacturing operations will be found in Table I, along with name of machine on which the work is done and illustration number when the operation is shown here.

For this story, we will start with the base or end cap, shown in Fig. 3. This part is machined from a forging. Two remodeled single - operation Lempco lathes feed an automatic. Fig. 4 shows one of the single-operation machines using three cutters mounted in a heavy fixture to rough machine the base. It turns the outside diameter, faces the end and turns the lug.

Remainder of the machining work on the base consists of rough and finish turning the diameter and face where the base fits against the shell case, and chamfering corners on the shoulder so formed. This work is done on the Goss & De Leeuw automatic pictured in Fig. 6. Said to be the only one of its kind ever made, this machine carries the work on four heads mounted on an indexing central drive mechanism. As the heads index from one to other of the four stations, cutting tools are advanced to the work being rotated in the spindles.

There are always three pieces of work at the three operating stations, while work at the fourth station is being unloaded and loaded. No particular station is designated as the loading station, as machining can start at any one of the four stations. This automatic machine is hydraulically and pneumatically operated. It also is equipped with manual controls for setting up. Vascalloy EE and EM tools are used.

Next, the base plug is washed in a strong solution of Oakite at 210 degrees Fahr., burred and then is ready for brazing into the shell casing.

First operation in production of the casing is to cut tubing to length. See Table I for complete sequence of operations.

Material used in producing this shell is X-1335 seamless steel tubing with 3⅝-inch inside diameter by 4 5/16-inch outside diameter supplied in lengths of 12 feet.

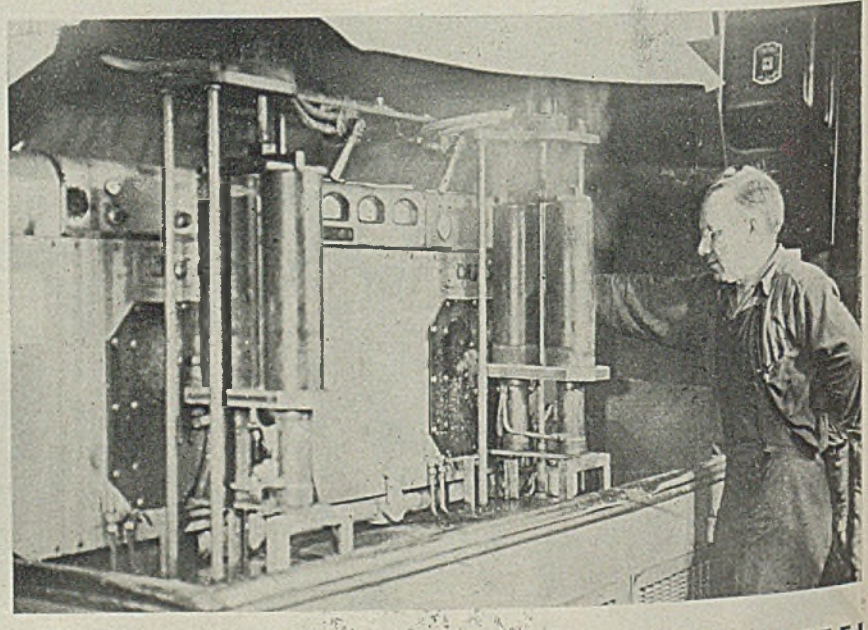
The first operation is performed on a Taylor-Wilson hydraulic cut-off machine, Fig. 7. The 12-foot length is cut up into nine sections, eight of which are 14.875 inches long—the correct length for facing. The ninth piece is approximately 3 inches too long. These pieces are cut to proper length later on a Peerless heavy duty 14 x 14-inch saw. Use of cut-off machine eliminates one lathe operation, as work sawed must be faced twice (same end).

Capacity 100 Pieces Per Hour

Spindle speed on the Taylor-Wilson is 140 revolutions per minute, surface speed is 158 feet per minute. Two cutters are used, working opposite each other as shown in Fig. 7. Feed is 0.002 to 0.005-inch per revolution depending on stock hardness. Braemow 5/16-inch double-bevel cut-off tools are used. Fig. 7 shows how stock is fed through machine. Note air cylinder for retracting the "stop" at extreme right. Machine capacity is 100 to 105 pieces per hour. With Peerless saw, the total capacity is 115 to 120 per hour.

Casing section now goes to a heavy duty Reed engine lathe, Fig. 8, to be

Fig. 12—Tocco Jr. electric induction heating setup for brazing base plug into one end of shell to form shell base. Each fixture holds two shell. While one fixture is in operation, other is being unloaded and reloaded. No water quench is used, this is a silver brazing only, operation 14, Table I



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ADDRESS_____

faced to boring length of 14.810 inches plus 0.020-inch, minus zero. This job (operation 7, sequence Table I) serves a double purpose. In addition to holding the correct length, the faced end must be perfectly flat and smooth to provide a proper seat for brazing the base plug to the casing.

This cut is made at 350 surface feet per minute with feed of 0.0125-inch per revolution. Firth-Sterling grade T-16 or Vascalloy Ramet EM material is used in the cutters.

As shown in Fig. 8, this machine is equipped with a stock-receiving fixture and an air-operated steady rest, thus enabling its operator to machine the work without stopping the spindle. This feature increased production 20 per cent.

After facing, operation 7, Table I, the tube goes to the boring machines—two heavy-duty 8-spindle inclined Ingersoll cylinder-block boring machines, Figs. 9 and 10. These provide a steady flow of accurately bored shell to the line. Application of these machines to this job is rather unique and presented a rather tough engineering problem. Spindles number 2, 4, 6 and 8 were removed from each machine. Spindles 1, 3, 5 and 7 were equipped with special bars. A large backing plate 3 inches thick was bolted to the back of the carriage. On this plate were mounted four V-block fixtures with hinged caps. Each shell is held securely in place by four serrated hardened removable jaws.

Each Cutter Bar Has Two Tools

The hinged cap on each fixture is shiftable sidewise to compensate automatically for variations in the outside diameter of the rough tubing. Each of the four cutter bars (upper center, Fig. 9) has two tools, one for each of the two bore diameters, for the shell is bored to 3.725-inches plus 0.010-inch minus zero diameter for about 11 inches of its length and to 3.945-inch plus 0.010-inch minus zero diameter for the remaining 3 19/32-inches.

These tools are set 1/32-inch ahead of the center line of the bar. Under most conditions this would not work as chatter would be present which in turn would chip and break the cemented carbide tools. Nevertheless, it works out very well in this particular setup.

Spindle speed is 160 revolutions per minute. Cutting speed is 165 surface feet per minute with a 0.020 to 0.030-inch feed, depending on material and tool condition. Kennametal KH, Firth-Sterling T-16 or Vascalloy Ramet EM tools are used with very good results. Some 80 to 90 pieces per grind is average life of a tool. This boring is operation 8, Table I.

The cut on the 3.725-inch diameter is approximately 0.070-inch, the tools being ground with a 15-degree side angle, 12-degree front angle, 6-degree clearance, 5-degree rake and 4/64-inch radius. Cut on the 3.945-inch diameter is 0.120-inch, and these tools are straight on the leading side with 6-degree clearance, 12-degree front angle. Front clearance of carbide tip is 6 degrees with a 12-degree clearance ground on shank, 5-degree top rake. Chip breakers used are 20 degrees to leading edge, 0.015 to 0.020-inch deep, 5/64-inch wide at widest part.

The two different bore diameters presented a real problem in tooling up these machines for they are primarily single-purpose machines for single-diameter straight-through boring. When boring this shell, the counterbore tool, which removes approximately 0.050-inch more stock on side than bore tool, does not start cutting until bore tool is 11.29 inches into shell. This additional cut required raising the hydraulic pressure 75 per cent. It was found that it was almost impossible to obtain that much

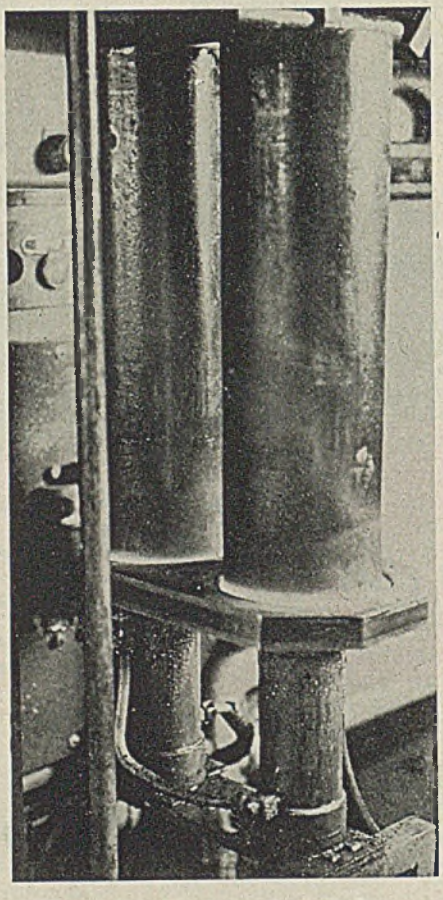

Fig. 13 — Closeup of shell base braze in operation. Note dual fixture. Clamps on top connected to air cylinder force plug in place when silver alloy ring melts in the joint

pressure at the exact time needed and maintain it through the entire cut.

After trying to raise the pressure with boosters and the like, we went at the problem from a different angle. By designing a cam-operated regulating valve, it was found possible to set the pressure high enough to carry both tools through the entire cut at a uniform rate of feed, and still by-pass enough oil to bring the bore feed to just about anything desired, the entire setup being controlled automatically.

The valve is mounted on the right hydraulic cylinder outlet and is connected to the main inlet line. A cam mounted on the carriage is arranged to contact a roller on the valve. The cam can be set to operate the valve at any point desired to allow excess pressure to be dissipated by permitting oil to flow back into the outlet line. Thus any feed is obtainable at any tool position.

Moreover, we found that the 6-inch main drive belt would not transmit enough power to the spindles, so the pulley was removed and the crown was turned off. A cast iron band 13 inches in diameter was shrunk into the pulley. Using a Houghton Vim-tread belt, we now have ample power under all conditions.

The boring bars are piloted at both top and bottom of the cut. Upper bushings are 4 1/16 inches in diameter by 12 inches long. Wear strips on bars are chromium plated. Lower bushings are of standard Ingersoll design. The bar at bottom, 2 inches in diameter, is also chromium plated. Life of upper bronze bushings is approximately 1000 hours. Bars show no wear after 3000 hours. Lower bearing setup is good for approximately 2000 hours. Clearance of all bearings is 0.003-inch.

Boring Inspection 100 Per Cent

At this point our inspection department goes to work, operation 9, Table I. Boring inspection is 100 per cent. All loose bores (excess diameter) are scrapped or set aside to be pushed through a resizing die and rebored. Undersize bores are sent to a special Greenlee turret lathe converted into a single-purpose boring machine. Counterbore depths are also inspected at this point. Rejections on this check are very infrequent.

Daily records are kept of all scrap and rejections which are totaled weekly and monthly. All operators receive a copy of the inspection report. This tends to keep them on their toes, as a few scrapped each day doesn't mean much to them but the weekly and monthly total can become quite impressive if they become careless. Pin gages are used on the 3.725-inch bore. Go and no-go plug gages are used on the 3.945-inch counterbore diameter. Counterbore depth is checked, Fig. 11, on a step-ground plug limit gage to 11.219 inches, plus or minus 0.015-inch. The bores are checked for roundness using an Ames dial cylinder gage, 0.003-inch total indicator reading is maximum. Girls handle this inspection and do a very good job. Gages are checked daily by the chief inspector.

Following the bore inspection the shell goes to a converted Lempco lathe to be reamed for the base plug, operation 10, Table I. The shell is slipped over a compensating expanding arbor and reamed to 3.736 inches, plus 0.002-inch or minus zero and 11/16-inch deep. An 8-flute adjustable high-speed reamer is used, mounted on cross slide in tool holder with 1/64-inch float. Speed is 80 surface feet per minute. A girl operates it. The shell is also chamfered 1/64 x 45 degrees on reamed bore at this point.

The shell then moves to a bench for

filing, cleaning and fluxing for base braze —operation 11, 12 and 13 respectively, Table I. The reamed end of shell is filed flat, and free from all burrs. Shell and base are first cleaned in strong Oakite bath at 210 degrees Fahr. and then cleaned with Tromax cleaning fluid at the joining surfaces. Carbon tetrachloride is also used to clean joint surfaces, perfectly clean surfaces being absolutely essential. The base cap is fitted with 3 11/16-inch diameter ring of silver alloy material for making the brazed joint. Silver alloy wire is 3/32-inch thick. Ring is pushed into corner of shoulder on base which then is assembled into casing with a hand push fit.

Handy & Harmon brazing flux is used on inside of tube and outside of base plug on surfaces to be brazed. A small amount of Scaifflux is also applied to outside diameter of tube at brazing point to kill any foreign matter that might enter into the joint.

The assembly now moves to a Tocco Jr., a 50-kilowatt 2-station electric induction brazing unit, Fig. 12. Each station handles two shell at a time. The shell are placed base down in special water-cooled inductor blocks. Pressure is applied to top of shell by means of a 4-way toggle equalizer, Fig. 13, actuated by a 1½-inch diameter by 2-inch stroke, double-cushioned air cylinder, using 25 pounds air pressure. Cylinder exerts about 14 pounds pressure on each shell base.

Before the silver alloy ring melts, it prevents contact of the base plug face against end of the casing. Thus pressure must be applied during melting to assure that the base plug is pushed snugly against the casing as the silver alloy ring melts. Brazing time is 56 seconds, cooling time 35 to 40 seconds, for the two shell—a rate of one every 28 seconds.

Both stations cannot be operated simultaneously, one must kick off before the other can be turned on. Two girls and one man handle the filing, cleaning, fluxing and brazing operations. Rejections are less than one-fourth of 1 per cent. Current is applied for about 56 seconds to make the braze at a temperature of 1400 degrees Fahr.

The shell is next centered on an engine lathe equipped with an air-actuated compensating-expanding arbor. This is listed as operation 15, Table I. Centering head is of Lempco design, equipped with an air-actuated retracting device. Using a combination center drill at 825 revolutions per minute and with shell rotating 405 revolutions per minute, machine capacity is 145 pieces per hour. It was found that both shell and drill must be revolving to maintain perfect concentricity in relation to the inside diameter of the shell.

Life of center drill is 2000 to 3000 pieces. Total runout must not exceed 0.003-inch on inside diameter of shell. Inspection is 10 per cent. Girls also operate this machine.

(*Concluded Next Week*)

AMS Materials List Revised

NINE new specifications and 16 revisions have been added to the original list of AMS (Aeronautical Material Specifications) steels and nonferrous alloys published in STEEL, Aug. 9, 1943, p. 92. Effective date for the new specifications and revisions, as approved by the Society of Automotive Engineers Inc., was Oct. 1. Those who wish to bring their present set of AMS standards up to date should communicate with the society at 29 West Thirty-ninth street, New York.

Listings marked with an "A" or "B" following the number are revisions. All changes appear in the following table:

AMS NO.		SPECIFICATIONS
AMS-4001	Sheet	99% Aluminum (2S-O)
AMS-4082B	Tubing	Magnesium, Silicon, Copper, Chromium (61S-T)
AMS-4145B	Forgings	Copper, Silicon, Magnesium, Nickel (32S-T)
AMS-4151	Extrusion	Copper, Magnesium, Manganese (17S-T)
AMS-4152B	Extrusion	Copper, Magnesium, Manganese (24S-T)
AMS-4234	Castings	4% Copper (Secondary) Solution Precipitation
AMS-4280A	Castings	(Perm. Mold) 5% Silicon, Copper, Magnesium—Solution and Overaged
AMS-4282A	Castings	(Perm. Mold) 4% Copper, 2% Silicon—Solution Precipitation
AMS-4291	Castings, Die	7% Silicon, 3.5% Copper
AMS-4422B	Castings, Sand	6% Aluminum, 3% Zinc—Solution
AMS-4631	Rods and Bars	Aluminum Bronze, 7% Al, 2% Si—Annealed
AMS-4855	Castings	Bronze, 84% Copper, 5% Lead, 5% Tin, 5% Zinc
AMS-5032	Wire	.18-.23 Carbon—Annealed—Uncoated
AMS-5050A	Tubing, Seamless	Annealed—.15 Max. Carbon
AMS-5112B	Music Wire	Best Quality
AMS-5115A	Wire, Spring	.65-.75 Carbon—Heat Treated
AMS-6280A	Bars and Forgings	.55 Ni, .5 Cr, .2 Mo,—.27-.33 Carbon
AMS-6355A	Sheet	Annealed—.55 Ni, .5 Cr, .2 Mo,—.27-.33 Carbon
AMS-6357A	Sheet	Annealed—.55 Ni, .5 Cr, .25 Mo,—.33-.38 Carbon
AMS-6358	Plate	Sheet and Strip—.55 Ni, .5 Cr, .25 Mo,—.38-.43 Carbon
AMS-6440A	Bars and Forgings	1.35 Chromium—.95-1.10 Carbon
AMS-6530A	Tubing, Seamless	Normalized—.55 Ni, .5 Cr, .2 Mo,—.27-.33 Carbon
AMS-6535A	Tubing, Seamless	Normalized—.55 Ni, .5 Cr, .25 Mo,—.33-.38 Carbon
AMS-6550A	Tubing, Welded	Normalized—.55 Ni, .5 Cr, .2 Mo,—.27-.33 Carbon
AMS-7213	Cotter Pins	—.37-.44 Carbon, Zinc Plated—Annealed

Metals Structure Text And Reference Volume

Structure of Metals, by Charles S. Barrett; cloth, 567 pages, 5¾ x 8¾ inches; published by McGraw-Hill Book Co. Inc., New York, for $6.

Crystallographic methods, principles and data of the structure of metals are covered in this volume, which is intended to serve as a text and a reference book. The portions intended for classroom use have been written for courses in crystallography, particularly courses offered students of metallurgy. It is primarily intended for graduate courses but a number of chapters are at a level appropriate for undergraduate courses in applied X-rays, crystallography and physical metallurgy.

First four chapters explain fundamentals of crystal lattices and projections and general principles of the diffractions of X-rays from crystals. Chapters V to VII cover technique of X-ray diffraction and operating details of methods in common use. Other chapters cover applications of X-ray diffraction in physical metallurgy and one is devoted to electron diffraction and its metallurgical uses.

The last half of the volume is devoted to results of research and contains extensive reviews of fields of current interest. In assembling these summaries an effort has been made to include adequate references to the literature, to cover thoroughly subjects that have not been reviewed in readily available publications and to maintain a critical but unbiased attitude toward data and conclusions that are reviewed.

Time-Saving Compressor Calculator Offered Free

Designed to save time in computing compressor requirements or in estimating the performance of present compressor units, a compressor calculator prepared by Cooper-Bessemer Corp., Mount Vernon, O., is now being offered gratis to all responsible engineering and operating executives as long as the limited supply lasts.

The calculator, of heavy stock, is pocket size measuring only 3½ x 8½ inches. Operating on the order of a slide rule, it can be used for estimating quickly the volumetric efficiency, brake horsepower and total piston displacement of any make of compressor.

Seven related scales give not only the aforementioned results, but key values, correction factors and required cylinder diameters against number of cylinders.

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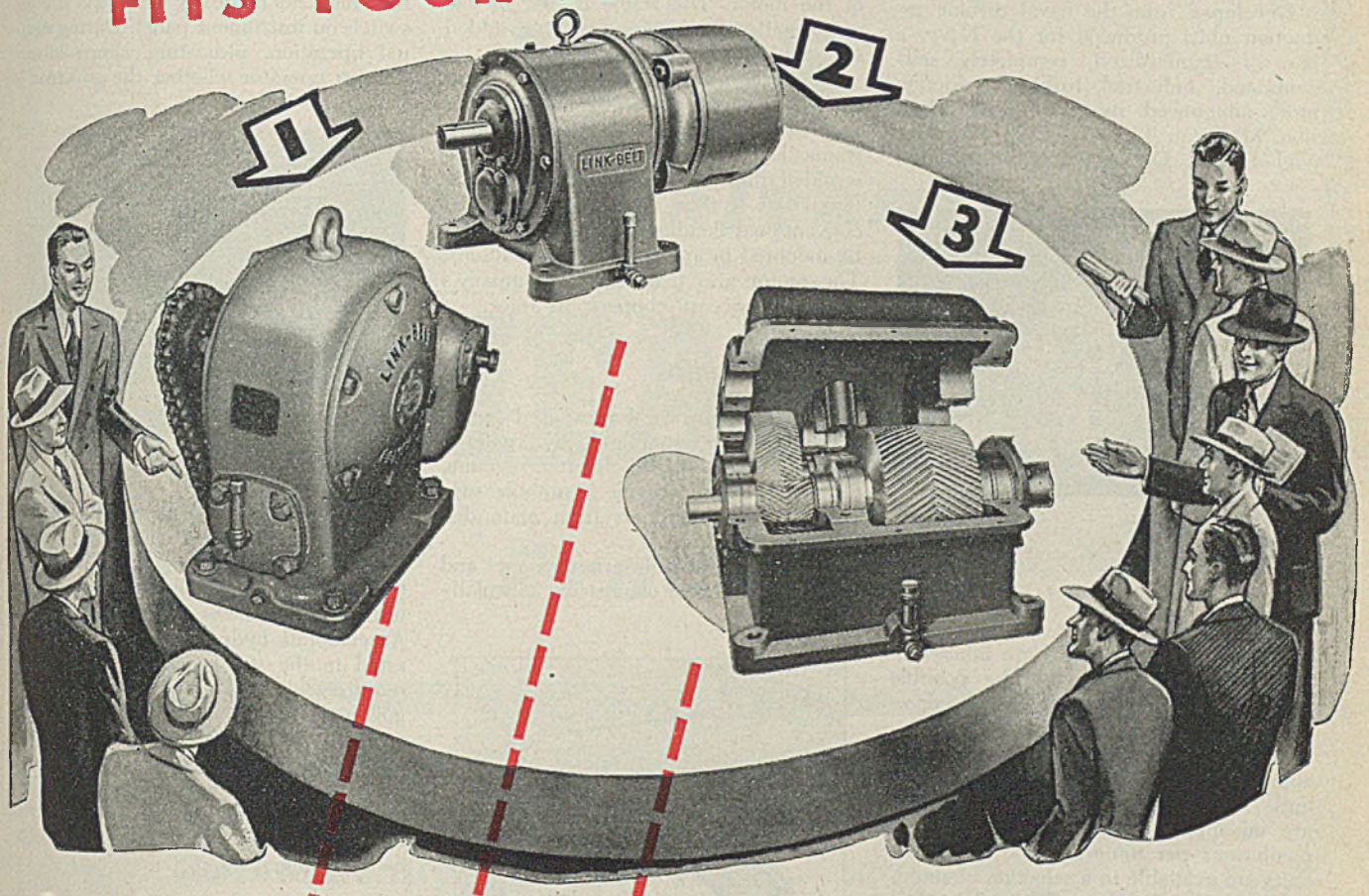

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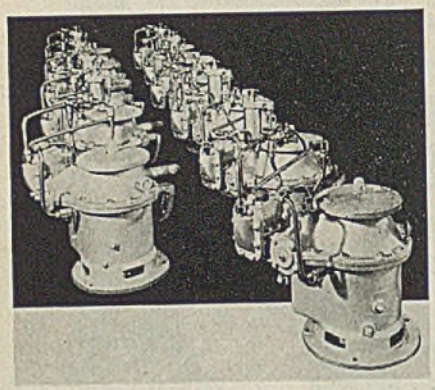
INDUSTRIAL EQUIPMENT

Turbine Reduction Units

Developed from the naval turbine reduction units produced for the Navy, a line of standardized, completely self-contained, industrial turbine reduction units announced by Cone-Drive Division, Michigan Tool Co., 7171 East McNichols road, Detroit 12, is built around



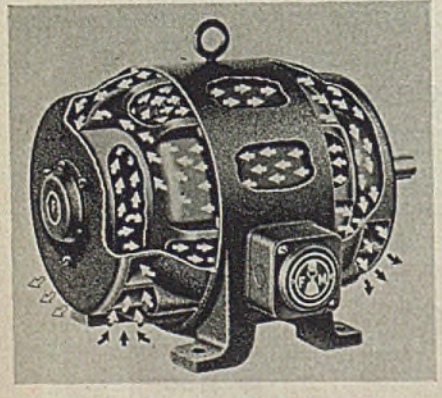
the use of area-contact, double enveloping gearing. The units are inherently more compact than would be possible with other forms of right angle drive gearing of equal load capacity.

The new units are being made available in 26½ and 37-horsepower base ratings. Both types are designed to operate on input speeds of 5000 to 6000 revolutions per minute. The two basic units are available in a selection of standard ratios ranging from 3½ to 8:1.

Units are completely equipped with built-in oil pump and oil cooler, oil filter and pressure relief valve, pressure gage, thermometer and oil level gage. The lubrication system is of the force feed type.

Squirrel-Cage Motor

Fully protected against flying chips, falling particles, dripping liquids and other industrial motor hazards, a new type all-purpose continuous-duty polyphase squirrel-cage-induction motor de-



veloped recently by Fairbanks, Morse & Co., 600 South Michigan avenue, Chicago, is suitable for general use.

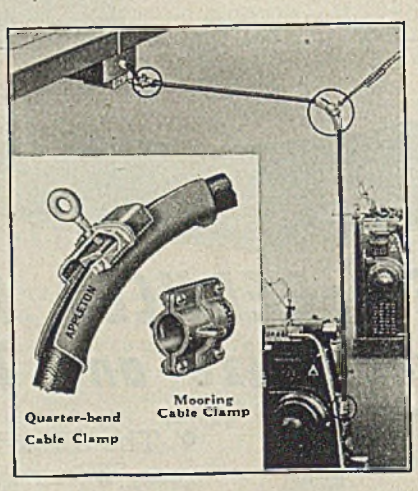
Ball bearings of the new unit are sealed in cartridge-type housings. Cross-flow ventilation is obtained through protected inlets and exhausts at each end of the motor. The frame is cast in one piece with rib sections to give added strength without adding weight.

Where space is limited, the conduit can be brought up between the motor feet to the tapped hole in the motor frame and the conduit box cover assembled flush with the frame. The external box is then discarded. When the conventional conduit box is used it can be mounted in any one of four positions. The motor also features the company's centrifugally cast copperspun rotor.

Cable Clamps

New cable clamps for exposed industrial wiring are now offered by Appleton Electric Co., 1701 Wellington avenue, Chicago. These provide a suitable support for branch feeders from main distribution systems.

The flexibility of arrangement and mounting of the clamps is especially



desirable for mass machinery installations in modern war plants. The quarter-bend cable clamp introduced provides the proper bending radius without injury to the cable, while the mooring clamp is used to anchor cable at supply and output ends without undue strain on the cable line. The sweep of the quarter-bend clamp is of sufficient length to make proper bend in cable sizes for which clamps are designed.

Governor Test Stand

Twenty-five different tests may be made on Hamilton and Curtiss propeller governors with the new governor test stand developed by Airplane Mfg. & Supply Corp., 6853 Lankershim boulevard, North Hollywood, Calif. It enables various capacity and recovery checks, pressure and relief tests and all types of adjustment allowances to be made under automatic or manual control.

The governor being tested actually controls the speed of the driving unit of the test stand—a 5-horsepower motor with a range of 900 to 3600 revolutions per minute. Speeds may be set by remote pushbutton. Automatic or manual selection may be made by a 6-way selector switch on instrument panel. During manual operation, indicating lamps inform the test operator whether the governor is

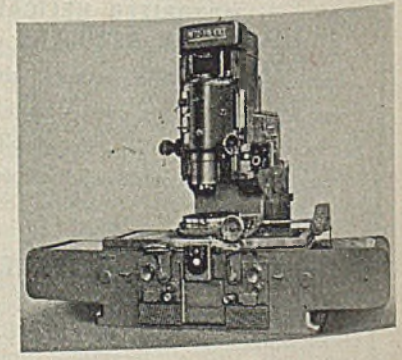
over or under speed. The test stand duplicates flight conditions by heating the oil (SAE-50) to 160 degrees Fahr. Telltale lamps indicate the temperature for testing at all times when in operation. An elaborate hydraulic system is incorporated in the stand, particularly to meet requirements of Hamilton hydromatic governors.

Test of leakage and capacity are measured by flow meters. Capacity tests are registered in gallons per minute by an indicating dial on the panel, while flow and leakage are totalized in quarts on an integrating meter.

Vertical Miller

Power downfeed for either drilling or boring with the new No. 4 vertical miller introduced by Reed-Prentice Corp., Worcester, Mass., is controlled by an electronic speed and torque regulator. The regulator controls a 1½-horsepower direct-current motor providing smooth, continuous, infinitely variable feed power to the vertical head of the machine. Both the electronic unit and controller operate on 50 or 60-cycle single-phase line in the range between 200 and 600 volts.

Desired feed is held automatically



within a fraction of a revolution per minute. Overload protection is supplied for the feed drive, in event of stalling or jamming. The feed rate is selected by a control, calibrated to provide feeds from ½ to 15 inches per minute. A

(All claims are those of the manufacturer of the equipment being described.)

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change in feed rate may be effected during the operating without stopping power or withdrawing tool. A lever is used to stop the head movement. It also controls both the up and down travel of the head. Rapid traverse of the unit at maximum feed rate of approximately 40 inches per minute is obtained by pushing the "rapid" button on the control panel. Release of this button automatically returns the head travel to the previously selected feed.

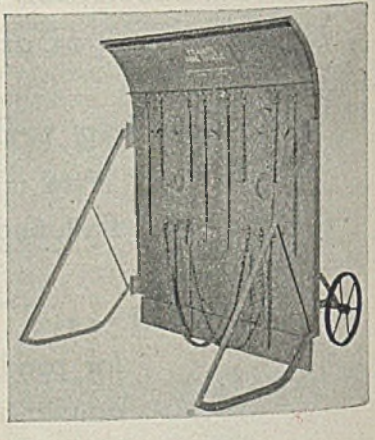
A new type sheet metal cover is used to prevent dirt and chips falling in the ways of the table. When the table travels to one end or the other of the bed, the way cover slides in a special track provided at each end. Table is cast of Meehanite, 7½ inches thick. It has five T-slots and a coolant pocket at each end.

The rotary table of the miller has its own power feed mechanism providing a feed range from 2½ to 20 inches on the table periphery through three sets of change gears. Adjustable dogs are provided for automatic feed stop in either direction while positive clamps hold the table in any position. Quick rotation of the table for setting is accomplished through internal gearing in the hand wheel.

Fire-Fighting Shield

Temperatures as high as 1200 degrees Fahr. can be deflected with a new fire-fighting shield developed by American-LaFrance-Foamite Corp., Elmira, N. Y., for use in fighting blazes out in the open.

The shield is of reinforced steel. Between its front and back plates, it is



packed with an insulating mineral wool blanket, 1-inch thick. To view the blaze and to direct fire-fighting fluid, the shield is equipped with three observation ports and four nozzle ports fitted with pivoted cover doors controlled from the rear of the shield. Anchoring chains are provided for securing playpipes in place. At the base of the shield are three hinged skirts, which give way readily upon meeting any ground unevenness.

The wheel carriage of the shield is bolted to the shield body, so that the parts may be packed to permit minimum transportation space. Rear supports of the shield provide stability and are hinged

New uses for zinc and cadmium plated articles made possible by . . .

IRIDITE

How to use IRIDITE

Plated parts are dipped into *Iridite* Solution from 10 to 60 seconds, and then are immediately rinsed in hot water.

As soon as the dipped part has been dried free of water, it can be handled without danger of injury, and shipped.

Only equipment needed is an acid-proof container for the *Iridite* Solution* and one for the hot water rinse.

The *Iridite* Process can be applied to plated parts of any type or size, excepting containers for edible products.

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● This new, super-thin, easy-to-apply, low-cost coating increases resistance to corrosion to a marked degree. It offers every parts manufacturer the opportunity of increasing the field of usefulness of zinc and cadmium as protective coatings. *Iridite* makes it possible to use these metals for plated parts, under conditions of exposure which would ordinarily never be considered.

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In addition, after it has been applied, the flexibility of *Iridite* permits parts to be bent, twisted, or formed, without chipping, flaking or affecting the protective qualities of the *Iridite* coating.

If you manufacture parts that are exposed to weather or to corrosion (except containers for food), you should send, immediately, for full details on the *Iridite* process. Better still, send us a plated part for *Iridite* coating, and test it any way you like.

Rheem Research Products
INCORPORATED

Subsidiary of Rheem Manufacturing Co.,
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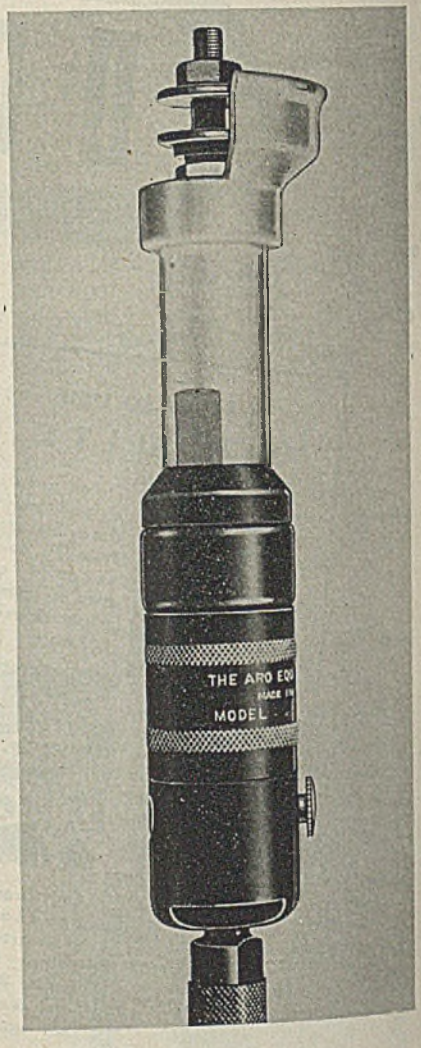
to fold against the shield body. A full-length handle bar extends the full width of the shield at the top. Two short handles, normally hanging down, may be used to maneuver the shield at the scene of the fire.

Pneumatic Grinder

Designed for use in cleaning castings and applications where tools receive rough handling, the two new portable pneumatic grinders announced by Aro Equipment Corp., Bryan, O., also can



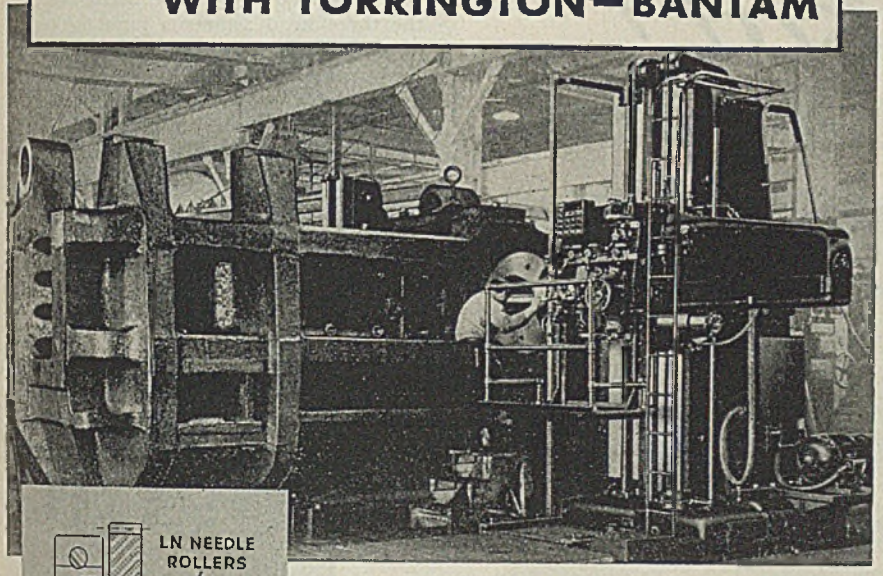
be used with rotary file burrs on aluminum and magnesium.

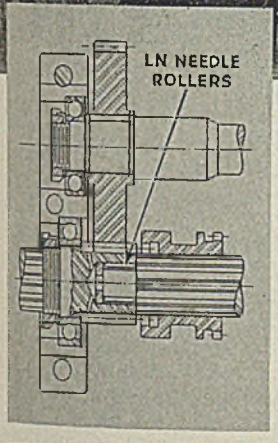
The grinders use 2-inch wheels, weigh approximately 4 pounds, and have a speed range, through an adjustable speed control, of 15,000 to 18,000 revolutions per minute. Model 221 features a button throttle control while model 321 has a lever throttle.

Collet Chuck

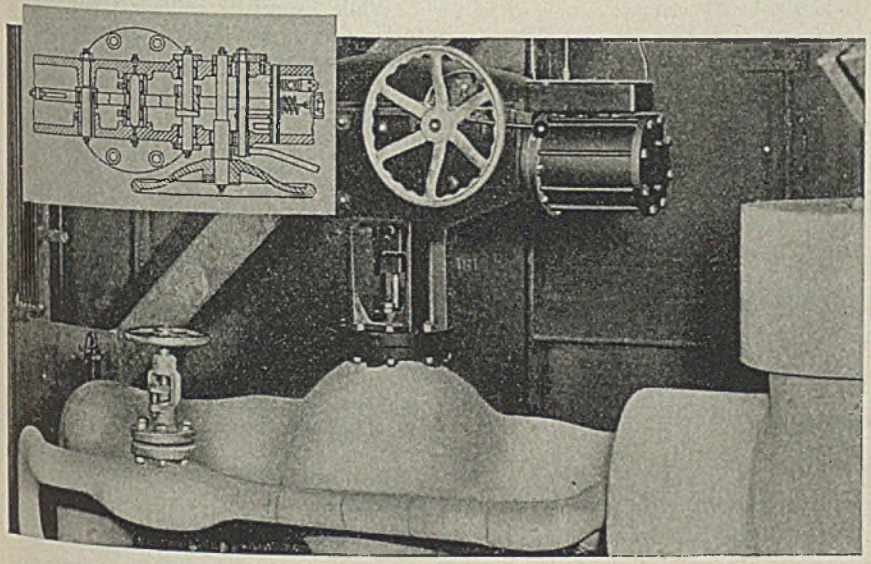
Literally a chuck of universal use, the 3-inch chuck developed recently by Gilbert-Baker-Midlam Co., 38 North Jefferson street, Dayton 2, O., will chuck countless second-operation work from ½ to 2¾-inch diameter with the speed and accuracy of a draw-in chuck. It operates with the usual draw-in collet at-

IN THE NEWS
WITH TORRINGTON—BANTAM

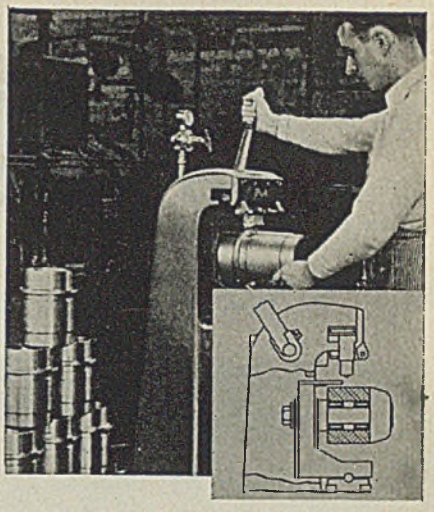




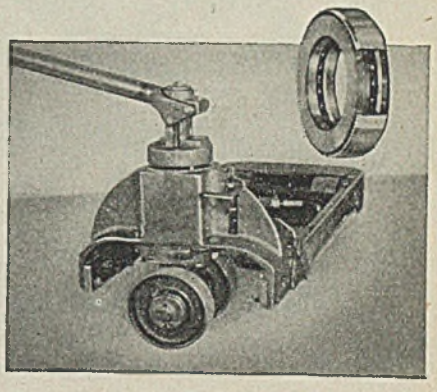
MACHINING GIANT CASTINGS to precision limits is simplified by this 6-inch spindle, floor-type horizontal boring, drilling and milling machine manufactured by The Ohio Machine Tool Company. 44 Type LN Needle Rollers, which are used as the pilot bearing of the transmission, as shown in the accompanying cross-section, contribute materially to the smooth, stable and precise performance of these finely engineered milling machines. Needle Bearings in all types and sizes from one-quarter inch to over seven inches in diameter for virtually all needs are available from Torrington. Our engineers will be glad to help in the selection of the type to meet your requirements.



WATER FLOWING AT HALF-TON PRESSURES through an 8-inch pipe is controlled by this three element feed water control valve made by the Bailey Meter Company. The valve is part of the control system of a modern high pressure boiler which serves a 60,000 kwh turbine in an electric generating plant. As shown in the accompanying cross-section, Type NCS Needle Bearings assure dependability and ease of operation for which this valve is noted. Further information on Needle Bearings is available on request.



MARKING ROUND OR FLAT SURFACES, precision graduating and serial numbering are the accomplishments of this versatile Pneumatic General Purpose Marking Machine built by the Noble and Westbrook Manufacturing Company. The worker shown here is marking part numbers on finished aircraft engine cylinder barrels, while the cross-section shows the mandrel support which holds the work. A compact, high capacity Type NCS Needle Bearing carries the mandrel to provide ease of rotation.

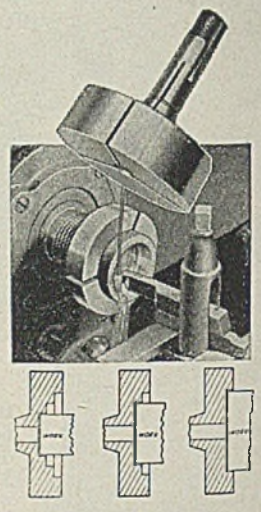


MATERIALS HANDLING with manual equipment is aided by such modern items as this liftruck manufactured by the Revolvator Company. Unusual maneuverability is made possible by the free 360° swing of pump and pulling handle, which is designed for anti-friction operation through use of a Torrington Ball Thrust Bearing in combination with a Type DC Needle Bearing.

IF YOUR NEED IS FOR LARGE BEARINGS, Torrington-Bantam's experience in the design, application and manufacture of outsize bearings is of special value. Or if you have a bearing problem which appears to call for special treatment, the experience of Torrington engineers in the design and application of every major type of anti-friction bearing suggests that you can profitably TURN TO TORRINGTON for expert counsel.

tachments on a lathe, having a threaded shank to be engaged by the draw-bar and with a tapered shoulder to fit the closing sleeve in the lathe spindle.

With the chuck locked in the lathe, a recess is bored in the head the size of the work to be held. The bored arcs of the three head segments form the jaws of the chuck, gripping the work when the draw-bar pulls the tapered shoulder against the closing sleeve. Since the work recess is bored on the same setup as succeeding operations in production, all work is thereafter chucked concentric



without indicating each piece. Because the chuck head is unhardened, it may be bored to fit work any size from ½ to 2¾ inches, and at least four 3/16-inch steps can be bored in a 1-inch chuck head.

While especially suitable for 10-inch Atlas and Logan lathes, the chuck can be made to fit the collet attachments of practically any lathe and also is applicable to most milling machines using draw-in collets.

Portable Welding Gun

An air-operated portable gun which seam welds parts too big to take to the machine is announced by Progressive Welder Co., 3050 East Outer drive, Detroit 12. It is designed for welding steel up to two thicknesses of 20-gage, including stainless. The gun, in suspended position, can be swiveled about so the operator can weld in almost any direction.

Features of the seam welder include a head operated by an air motor using 42 cubic feet of air per minute under load. The motor is rated at 2 horsepower when run at a constant speed. Speed is between 48 and 52 inches per minute, using standard rolls—or wheels. The motor is operated by air passing into the gun handle. A control button at the right of the gun operates a solenoid switch to let air into the gun cylinder. Latter is 4½ inches in diameter—large enough to provide a maximum pressure of 1400 pounds with 90 pounds of line pressure, permitting seam-welding of stainless.

The air flowing into the cylinder forces the upper and lower wheels together;