STEEL

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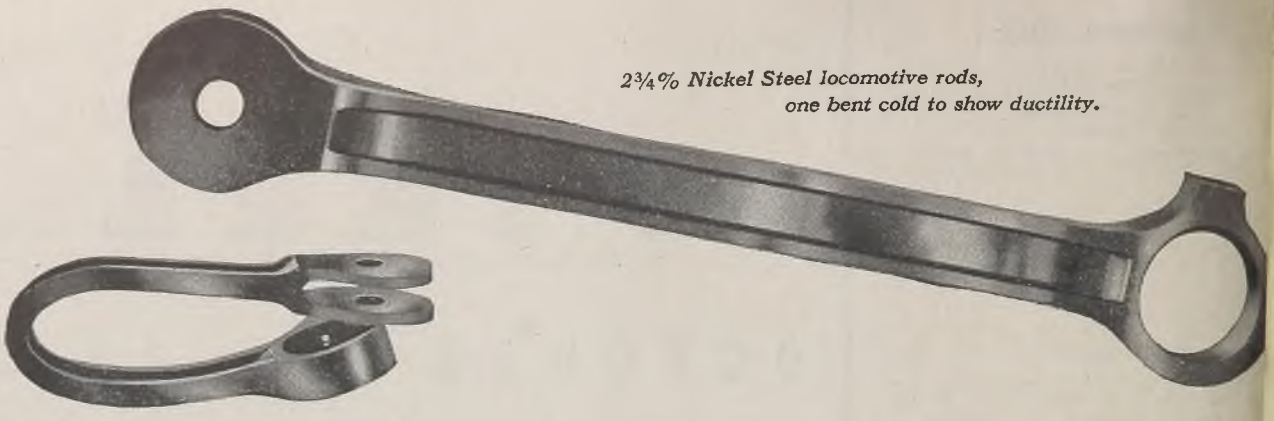
NEWS

TECHNICAL

FEATURES

MARKETS



2¾% Nickel Steel locomotive rods, one bent cold to show ductility.

QUENCHED AND TEMPERED

NICKEL STEEL

FORGINGS COMBINE

EXCEPTIONAL DUCTILITY WITH HIGH TENSILE STRENGTH

Composition and Typical Properties of Normalized Quenched and Tempered 2¾% Nickel Steel Rods

Description or Size	Melt Yield Pt. No. #s per Sq. In.	Tensile Strength #s per Sq. In.	Elong. % in 2 In.	Reduction in Area %	ANALYSIS					
					Car.	Mang.	Phos.	Sul.	Sil.	Ni
Main Rod....	92900	110000	25.0	64.4	.31	.78	.027	.026	.25	2.75
Main Rod....	86500	104500	25.5	65.6	.32	.86	.034	.032	.29	2.69
Main Rod....	86360	104400	26.0	64.8	.32	.86	.034	.032	.29	2.69
Main Rod....	87850	102350	26.0	66.2	.31	.89	.037	.025	.32	2.69
Front Rod....	86000	102250	25.0	67.3	.29	.82	.035	.027	.24	2.71
Front Rod....	83900	104250	25.0	66.1	.29	.82	.035	.027	.24	2.71
Front Rod....	86850	104250	27.0	66.1	.32	.86	.035	.025	.30	2.65
Front Rod....	89500	107050	25.5	65.6	.32	.86	.035	.025	.30	2.65
Back Rod....	89500	107650	25.0	62.7	.30	.79	.030	.025	.22	2.71
Back Rod....	87500	106450	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	87000	105600	25.0	65.4	.29	.82	.035	.027	.24	2.71
Back Rod....	88150	104850	25.0	66.8	.29	.82	.035	.027	.24	2.71

Specimens Taken from Mid-Section of Prolongations of the Forgings

The above table compiled by the American Locomotive Company shows the chemical compositions and mechanical properties of some normalized, quenched and tempered nickel steel front, main and back rods recently produced as replacement rods for locomotives being speeded up and rebalanced. These values are typical of replacement rod forgings recently tested by that company.

Quenched and tempered nickel steel forgings of this type provide high tensile strength and ductility, combined with unusual toughness and high fatigue strength—qualities which tend to obviate breakage when employed as rods in railroad service.

A booklet entitled, "NICKEL ALLOYS IN RAILWAY EQUIPMENT," describes important and varied uses of nickel steels and other alloys of nickel. Send for your copy today.

* Nickel

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

STEEL
October 23, 1944

A Challenge!

It is no exaggeration to say that the 1944 National Metal Congress and War Conference Display held in Cleveland last week was a revelation to every one of the tens of thousands who attended it. In 28 years' experience as an habitual observer of most of the conventions and shows pertaining to the iron, steel and metalworking industries we can recall no meeting or exposition which came even close to matching last week's event in interest, attendance or significance.

Thousands of technicians, executives, operating officials, educators and interested laymen came to the Metal Congress expecting to see evidences of great wartime progress in the fields of activity with which they are immediately identified. They were prepared for moderate surprises, but they were not prepared for the overwhelming spectacle which greeted them.

What they saw and heard—in exhibits, in prepared addresses and in discussions from the floor—was a panorama and a series of symposiums of unprecedented achievement not only in their own spheres of interest but in all of the ramifications of the metalworking industries. The overall effect was stupendous. The advances in materials, in processes, in equipment, in the organization of these facilities, in research and in the practical application of new knowledge are overpowering. Great and extensive as was everything connected with the Metal Congress, it still remains as only a token symbol of what the American industrial giant of 1944 really is.

This giant has tremendous potentialities. It has proved its power in war. Soon its effectiveness will be tested in peace. In it are forces which, if utilized and applied intelligently, can do more to promote wholesome social and economic progress for the people of this nation and of the world than any other force within our control.

To develop it into a powerful influence for good and to prevent it from becoming a modern Frankenstein is one of the great challenges of the next decade. Somehow we must find a way to co-ordinate technological progress with that in the social, economic and political sciences. We must key our educational efforts and our national thinking to a new concept of balanced progress in these fields. We must help the public to understand industrial achievement and scientific progress so thoroughly and so sympathetically that never again will it be possible for the people to think—as some of them did in 1933—that machines are a menace to society.

BLUEPRINT FAULTY? Speed as an imperative feature of reconversion was stressed at the annual meeting of the National Machine Tool Builders Association at Hot Springs, Va., as it had been at the meeting of the American Society of Tool Engineers in Syracuse in the previous week.

Speaking to the machine tool builders, Walter K. Bailey, vice president, Warner & Swasey Co., said that conversion from war to peacetime economy to be successful must be fast. "Industry should be encouraged to make maximum use of machine tools built for war and to put that equipment to work at the earliest possible moment for large scale production of peacetime products." Only in this way, declared Mr. Bailey, can we keep employment going at the time when the boys are coming back from the war.

James Y. Scott, president, Van Norman Co., said that in order to reconvert many industries—the automobile industry in particular — must have certain

(OVER)

types of machines. They need them "right now" and the machine tool builders should be permitted to begin working on these now, he contended.

There are numerous blank spots on our blueprint for reconversion. —pp. 40, 72

* * *

WAR PREVENTIVES: In discussing ways and means of preventing enemy nations from again plunging the world into war, Walter S. Tower, president of the American Iron and Steel Institute, told members of the American Society for Metals that neither Germany nor Japan is well endowed with metallic resources and suggested "that the simplest way of insuring a continuing peace would be to keep such resources out of their hands for the purpose of making weapons. The real key to such controls," he said, "is in the metals."

Many industrialists will agree that control of certain ferrous and nonferrous metals not only is the simplest solution but also is a practical solution. However, as one observed the hundreds of top-flight metallurgists, engineers and operating men at the Metal Congress, one could not help thinking of the creative power in the heads of these specialists. If American industry were destroyed overnight, these men could re-create it in a few years.

No one has yet found a way to control the real origin of wars—the thoughts in men's minds.—p. 35

* * *

MORE CONFUSION: Members of some of the agencies which will be charged with the responsibility of disposing of surplus government property under the Surplus Property Disposal act signed reluctantly by the President several weeks ago complain that the act is unworkable.

Ordinarily when persons in an agency in the executive branch of the government speak critically of a bill passed by Congress, the criticism arises from the three-term feud between New Dealers and certain factions in the House and Senate. This present case is somewhat different. Many persons who ought to know feel that the legislators tried to cover too much territory in a single bill. They also frown upon the idea of an administrative board of three instead of a single administrator.

Disposing of the surplus property is so important that it is distressing to contemplate results of the delay and confusion which will be caused by the present squabble. —p. 42

WIRE AND SHEETS: Impact of the war was reflected realistically in the programs of several of the conventions held last week. In Pittsburgh members of the Wire Association were cautioned that wire for the Signal Corps still is on the critical list. D. D. Buchanan, president of the association, urged every wiremaker to "keep his shoulder to the wheel" so that there will be no decline in the supply of this essential wire product to the armed forces.

In Atlantic City members of the National Association of Steel Metal Distributors reviewed the effect of the war upon the distribution of sheets. Whereas normally about 65 per cent of the output of galvanized sheets and roofing is distributed through warehouses, during the war about 35 per cent has been allocated to warehouses.

The distributors believe that flat-rolled products will hold their own in postwar markets, due partly to new requirements for freezing and air conditioning equipment. —pp. 39, 41

* * *

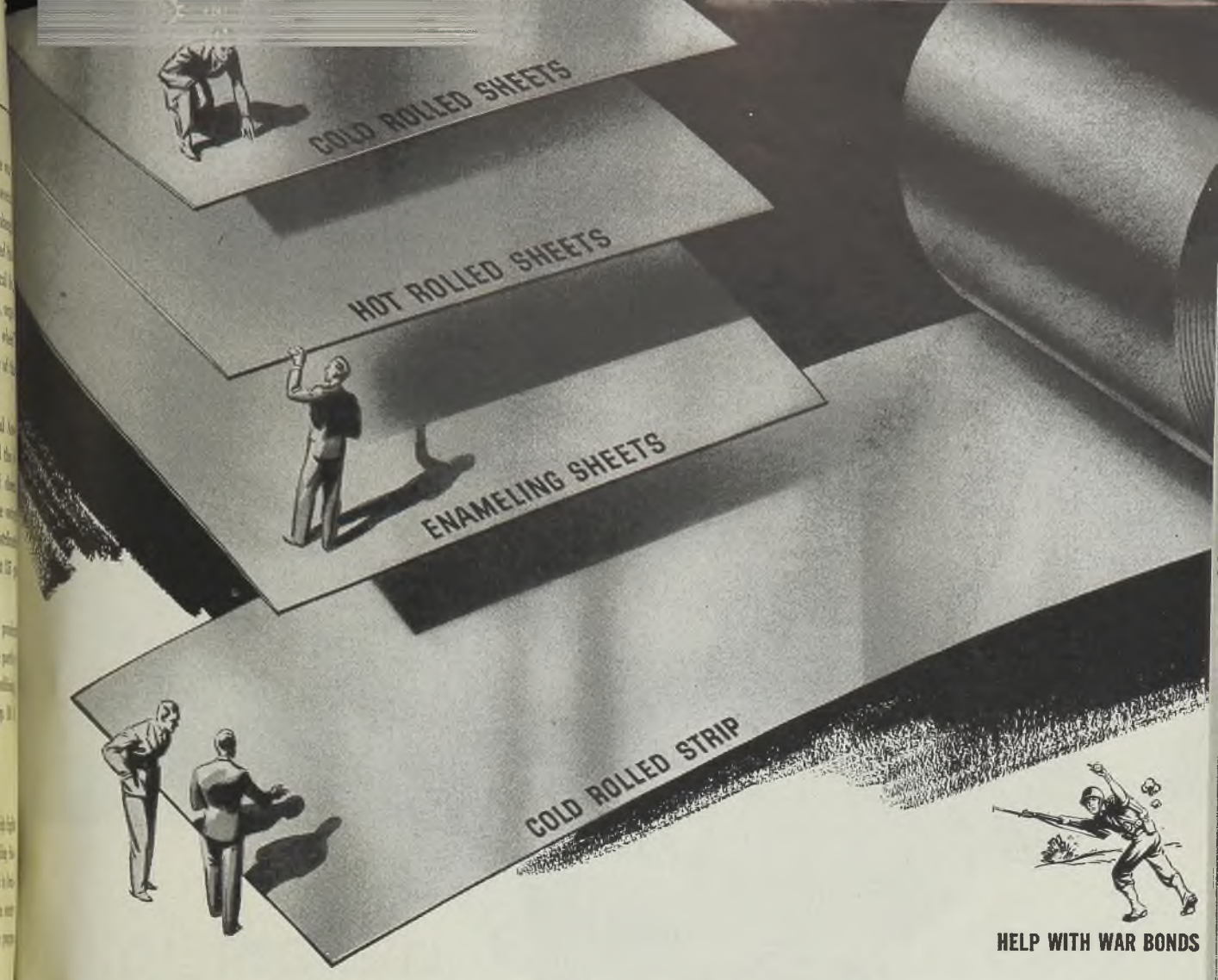
AWARD FOR WELDING: A high light of the annual meeting of the American Welding Society was the presentation by the Army of its Ordnance Distinguished Service Award to the society "for outstanding contributions to ordnance progress during the war."

This richly deserved tribute came at a time when the members of the welding society, fully conscious of the greatly expanded role of welding in the present war, were looking forward to further research into problems yet to be solved. This commendable attitude of not resting upon present laurels was voiced by President David Arnott when he pointed out that "with the great extension in modern welding techniques have come problems which must and will be solved." A tremendous amount of research work is necessary just to keep pace with the unprecedented current developments, to say nothing of exploratory work into new fields.

When the war is finished and one can look back in retrospect at the production achievements of the past few years, it will be clear that welding has been an outstanding factor in the success of America's "arsenal of democracy." —p. 36

E. L. Shaner

EDITOR-IN-CHIEF



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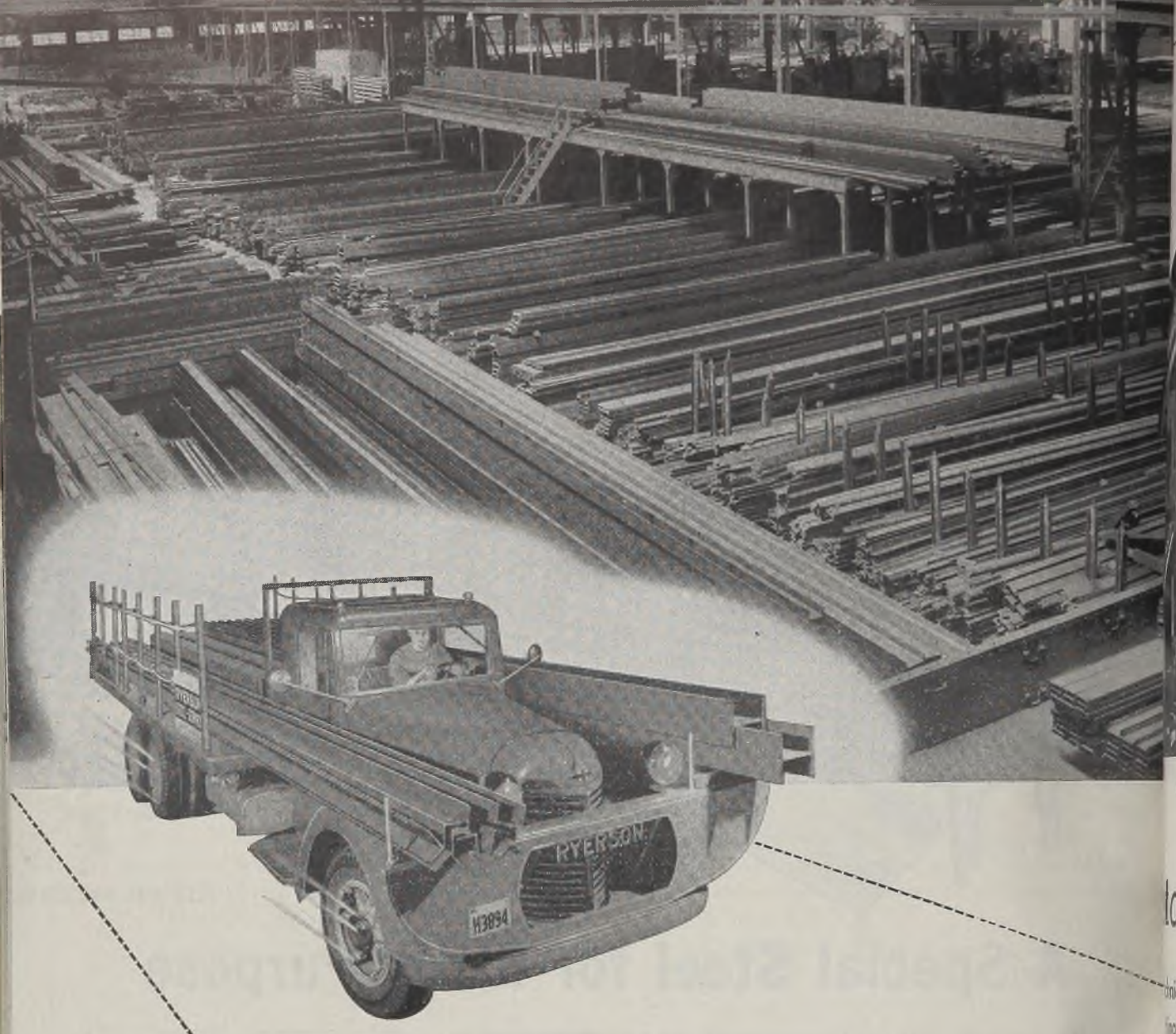

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General view of a section of the National Metal Exposition in Public Auditorium, Cleveland

Metal Industries Look to Future

Technical and general discussions of societies participating in National Metal Congress at Cleveland Oct. 16-20, directed to problems of peacetime production. More than 400 exhibitors display equipment

CLEVELAND

WITH the technology of war production licked, the metal industries have turned their thinking power in the direction their productive power must follow to rebuild America's peacetime lines.

Ideas in that direction were what the thousands of visitors to the twenty-sixth annual National Metal Congress held in Cleveland, Oct. 16-20, were busy looking for, and most of them were able to find what they wanted.

The participating societies — American Society for Metals, American Welding Society, Institute of Metals and Iron and Steel divisions of American Institute of Mining and Metallurgical Engineers, Society for Experimental Stress Analysis, American Industrial Radium and X-Ray Society, and several others—reported unusually heavy attendance at the technical sessions, which began Monday morning and continued every day through 10 p.m., with as many as nine simultaneous sessions at times.

In the scores of technical sessions were presented literally hundreds of technical papers on almost every subject from mining the ore to packaging the finished product. Some of the more active topics under discussion were covered in the panel sessions of the American Society for Metals, in which a group of authorities discussed with each other and with the audience metal cutting, metal finishing, subzero treatment of metals, shot peening, light weight construction, hardenability bands and the specification of steel by this method, and other current metal problems.

The War Conference Display in Cleveland Public Hall held in connection with the Congress was the most heavily attended in the history of this industrial exposition. Machine tools and virtually all other types of equipment were on display, many of them in operation. More than 400 exhibitors were on hand to help find the answer to manufacturing industry's postwar production problems. Included in the list of exhibitors were a number of new companies as well as some long established concerns exhibiting for the first time, demonstrating some of the shifts in products which have come as a result of war production.

Four so-called "Victory Sessions" were sponsored by ASM at 11:30 a.m. Monday, Tuesday, Thursday, and Friday. Speakers at these sessions included Walter Tower, president, American Iron and Steel Institute, and high ranking officers from Navy, Army Ordnance, and Army Air Forces.

In addition to co-operating organizations mentioned above, meetings were held by the Metal Powder Association, International Acetylene Association, Resistance Welders Association, Industrial Gas Association, American Foundrymen's Association and committee A-7, American Society for Testing Materials.

Maj. George Fielding Eliot, military commentator, was the principal speaker at the annual dinner of the ASM. Three medals were granted by the society at this meeting, the Sauveur, Howe, and ASM research awards.

Technical Sessions and Panels Feature ASM Annual Convention

DUAL programming featured the twenty-sixth annual meeting of the American Society for Metals last week in Cleveland. Regular technical sessions were scheduled for each morning, with panel-type sessions holding interest each afternoon and evening.

Dr. Kent R. Van Horn, research metallurgist, Aluminum Co. of America, Cleveland, was inducted into the office of president of the society at the annual business meeting on Oct. 18, to succeed Dr. Marcus A. Grossmann, director of research, Carnegie-Illinois Steel Corp., Chicago. Dr. Charles H. Herty Jr., assistant to vice president, Bethlehem Steel Co., Bethlehem, Pa., is the new vice president. William H. Eisenman begins another two-year term as secretary.

Three new trustees were introduced as follows: Lewis S. Bergen, associate director of metallurgy and research, Crucible Steel Co. of America, New York; Robert W. Schlumpf, metallurgical engineer, Hughes Tool Co., Houston, Tex.; and Arthur E. Focke, research metallurgist, Diamond Chain & Mfg. Co., Indianapolis, the latter appointed by the board of trustees to serve out the remainder of the unexpired term of Dr. Herty.

Reports for the past year were presented by the president, secretary and treasurer. Two changes in the constitution were approved, these having to do with nomination of national officers.

"The art of heat treatment of metals has been changed to a science in recent years, whereas the melting and refining of metals is still an art," declared Dr. G. R. Fitterer, head, department of metallurgical engineering, University of Pittsburgh, Pittsburgh, in presenting the 1944 Edward de Mille Campbell memorial lecture of the American Society for Metals following the annual business meeting. Title of the lecture was "Phase Equilibria in the Acid Open Hearth Process."

"At the lower temperatures of heat treatment fewer experimental difficulties are encountered than at the higher temperatures of liquid steels," Dr. Fitterer stated. Many attempts to apply the laws of physical chemistry to the acid open hearth steel processes have failed to clarify the mysteries of its operation."

The process is responsible for approximately two to three million tons of steel annually in this country. Its products are large forgings and castings required—large caliber guns, marine crankshafts and connecting rods, steam turbine shafts, locomotive parts, steel mill roll housings and rolls, as well as wire rope for suspension bridges, etc., are examples.

Fails To Produce Control Methods

"The usual physical chemical treatment of acid open hearth refining reactions involves a study of the thermodynamic properties of elements and compounds encountered in the steelmaking reactions and the subsequent determination of equilibrium constants for the slag-metal reactions. This treatment has failed to produce control methods or to clarify the operation of the acid open hearth.

"Instead of using thermodynamic methods, known equilibrium diagrams have been correlated to illustrate the changes occurring in the acid open hearth slag during the refining period. This treatment resulted in the explanation of the differences between acid practice in this country and in Europe. It was shown that whereas some 4 to 7 hours are required to refine 40 to 60 tons of steel by the acid process in Europe, only 2 to 2½ hours are needed in modern American practice. In some plants the refining rate is greater than one-half ton per minute.

"An explanation of this improvement in American practice is possible by consideration of the equilibrium diagram for the slag constituents," said Dr. Fitterer. "In addition, the mechanism of oxidation in the acid open hearth process is easily understood if the phase diagram are considered."

The lecturer proposed a new theory accounting in part for the oxidation of the steel during the refining period, and described a method for controlling heat during the refining stage. This procedure, he asserted, is being used widely in the industry and is easily applied by the melt shop personnel. This simple method of control has a complicated background made up of factors concerning equilibrium diagrams, fuel, dimensions of the furnace and materials charged. The average melter, however, has little difficulty in understanding and using the control method.

Award of medals featured the annual dinner of the American Society for Metals on Oct. 19. One of these, the ASM Medal for advancement of research, was presented to Robert C. Stanley, president, International Nickel Co. of Canada Ltd., New York. The Henry Marion Howe Medal for the best paper published in *Transactions* was given to R. A. Flinn, Earnshaw Cook and J. A. Fellows, American Brake Shoe Co., Mahwah, N. J. The Past President's Medal was given to Dr. Herbert J. French, International Nickel Co. Inc., New York.

The Albert Sauveur Achievement Award, recognizing "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," was awarded to Walter E. Jominy, chief metallurgist, Dodge Chicago plant, division of Chrysler Corp., Chicago. This award was a tribute to Mr. Jominy for developing the well-known end-quench hardenability test which bears his name. A pioneer in the field of hardenability, he

(*Please turn to Page* 154)

KENT R. VAN HORN
Elected president, ASM

JOMINY RECEIVES ALBERT SAUVEUR AWARD

WALTER E. JOMINY

Mr. Jominy, chief metallurgist, Dodge Chicago Division of Chrysler Corp., received the Albert Sauveur Achievement Award at the ASM annual dinner Oct. 19 for developing the end-quench hardenability test which bears his name. A pioneer in the field of hardenability, Mr. Jominy has been with Chrysler Corp. since 1941 and before that was for seven years metallurgist in the Research Laboratories division of General Motors Corp. He also has done important work on the scaling of steel during forging at the University of Michigan's Department of Engineering Research and as research metallurgist for A. O. Smith Corp.

International Control of Metals Advocated as Key to World Peace

Civilian steel demands will be insufficient to consume all possible output of war-expanded American capacity immediately after war ends, W. S. Tower, president, American Iron and Steel Institute, warns American Society for Metals

WALTER S. TOWER

A NUMBER of years will elapse before civilian steel demand becomes great enough to absorb all the possible output of our war-expanded capacity, was the warning sounded by Walter S. Tower, president, American Iron and Steel Institute, before the American Society for Metals in Cleveland last week.

Under the stimulus of World War I, Mr. Tower pointed out, steelmaking capacity was expanded rapidly and output for the first time rose to more than 50 million tons of ingots. It took seven years after war needs ceased for growth of civilian demand to put steel production definitely above that figure. Again the stimulus of war requirements has led to rapid expansion of plants and output for the first time has risen above the 90 million ton level.

"It would be encouraging if we could feel that this time seven years would suffice for growing civilian demand to put steel production definitely above 90 million tons a year. But prior to the onset of war demand in 1940, this country had not seen any period of consecutive years when it needed an average of as much as 60 million tons. In fact, only one year topped that figure. Neither growth of population nor increase of per capita consumption seems promising enough to bridge the wide gap between the old level of average demand and present potential supply."

Mr. Tower expressed concern over the depletion of the country's mineral reserves. By the end of December, the steel industry will have used approximately 350 million tons of iron ore.

"Thus we come to the question of whether the leading nations of the world can afford to let recurrent global wars accelerate the depletion of vital metal resources," Mr. Tower said. "We come to the question: How can the Allied Nations make sure that victory over Germany and Japan shall be followed by a peace which does not again allow those nations to pervert the use of metals into implements of war?"

The speaker noted various proposals that Germany be split into several political units, none of which would be economically strong; that the Ruhr should be internationalized to isolate its metalworking activities; that selected basic industries, like steel, be wiped out.

On the latter proposal he pointed out elimination of German steel industry would destroy the means of livelihood of a large segment of the people of Europe. Furthermore, the German steel industry could be replaced quickly.

"For example, in the last five years we have created in this country new steelmaking facilities as large as Germany was using prior to 1930. Over a span of 15 or 20 years, a new industry, modern and efficient to the last degree, could be built, and Germany would be ready to prepare for its third world war.

"No peace can impose terms too harsh for that part of German industry which existed chiefly to make war supplies. How much should be taken away for that reason should not be hard to ascertain. As for the rest, it seems far wiser to leave Germany such industry as its reasonable domestic economy requires, in steel and other metals as well, governed by proper international controls."

Mr. Tower pointed out that neither Germany nor Japan is well endowed with metallic resources and suggested that the simplest way of insuring a continuing peace would be to keep strict control over such resources.

"The real key to such controls is in the metals. For however vital coal, oil, rubber or chemicals may be in preparing for and in waging war, their efficient production and effective use depend on the application of metals. Obviously there can be more than one manner of control, such as control of supply or rationing; control of facilities to fabricate; control of volume or use of products made from metals . . . In any case, limitation on supply of metals and specific controls of their use offers a direct and effective way to insure that present enemy countries shall never again possess the sinews of war."

AMERICAN BRAKE SHOE CO. MEN RECEIVE HOWE MEDAL

J. A. FELLOWS

R. A. FLINN

EARNSHAW COOK

O. B. J. FRASER
Treasurer of AWS

A. C. WEIGEL
Elected AWS president

ISAAC HARTER
First vice president of AWS

American Welding Society Holds 17 Technical Sessions at Meeting

Wide range of welding subjects covered in 60 prepared addresses. Presentation of Ordnance Distinguished Service Award to society feature. Other awards made. A. C. Weigel elected president to succeed David Arnott

TURNING the tables on the American Welding Society, which each year presents several prizes and awards at its annual meeting, the Army presented the society with its Ordnance Distinguished Service Award for outstanding contributions to ordnance progress during the war at the twenty-fifth annual meeting of the society held last week in Cleveland in connection with the National Metal Congress.

The award was authorized by Ordnance July 20, and was formally presented Oct. 16 by Col. S. B. Ritchie. David Arnott, society president, accepted the honor on behalf of the members.

Seventeen technical sessions which included more than sixty papers on welding subjects featured the annual meeting of the society. Headlining the speakers at the opening session was Admiral H. L. Vickery, U. S. Maritime Commission, who outlined the part welding has played in wartime shipbuilding programs.

Colonel Ritchie, in addition to presenting the Ordnance award, read a paper showing the importance of welding in construction of ordnance materials. In general, although many of the papers covered subjects of extreme importance to the postwar industrial picture, for the most part the emphasis was on war production and experiences gained through military production programs. Papers attacked welding problems from production and supply angles as well as engineering and research.

Second annual Adams lecture was delivered by Augustus B. Kinzel, vice-president, Electro Metallurgical Corp., New York, on the subject of "Solid Phase Welding." The Adams lecture was established last year by the board of directors of the society in honor of its founder and first president. The lecture last year was presented by Dr. C. A. Adams.

New officers elected by the society at the annual business meeting Thursday include A. C. Weigel, vice-president Combustion Engineering Co., president; Isaac Harter, vice president, Babcock & Wilcox Co., Barberton, O., first vice president; W. F. Hess, associate professor in metallurgical engineering and head of the welding laboratory, Rensselaer Polytechnic Institute, Troy, N. Y., second vice president; O. B. J. Fraser, Director of Technical Service, International Nickel Co., New York, treasurer. Directors at large include Roger W. Clark, General Electric Co., Schenectady, N. Y.; L. W. Dellii, Western Pipe & Steel Co., James F. Lincoln, Lincoln Electric Co., Cleveland; and H. Malcolm Priest, United States Steel Corp., New York.

Awards Presented at Meeting

Awards presented at the annual meeting include the Samuel Wylie Miller Memorial Award, given to F. T. Llewellyn, director of research, Carnegie-Illinois Steel Corp., Pittsburgh, in recognition of his contributions to the structural welding field. W. F. Hess and Lieut. D. C. Herrschaft won the Lincoln Gold Medal for their work at Rensselaer Polytechnic Institute on "Spotwelding of SAE 1020-1035-1045 Steels in 0.040-inch Thickness." The University Prize of $100, provided by the Resistance Welder Manufacturers Association, was awarded fo the same paper.

For a paper on "Dynamic Properti of Flash Welded Tubing," P. E. Sandor and R. B. Bland, senior research eng neers, Lockheed Aircraft Corp., Los A geles, were awarded the $100 Industri Prize.

Technical sessions covered a wi range of subjects. The opening meeti set the theme for all sessions, "Weldi Aids the War Effort." Following th general session and the talks by Admi Vickery and Colonel Ritchie, small group sessions got under way. Subjec under discussion at these sessions i cluded Welding and Cutting in the Hea Industries, Railroad and Transportatio Weldability, Resistance Welding, R search, Structural, Ships, Aircraft, M chinery, Piping and Pressure Vessels, an Foundry.

In his annual address to the membe President Arnott pointed out that the can be little doubt the welding indust in this war has given the nation the grea est production tool of modern times f construction of ships, tanks, planes an implements of war.

With the great extension in mode welding techniques come problems whi must and will be solved, he said, poin ing out the tremendous amount of r search that is constantly being carri on in an effort to keep pace with the u precedented development of weldin

"We must be careful to resolve th art and science of welding into certa fundamentals," President Arnott sai "and not clutter up procedures wit minutiae so that only a hierarchy of ex perts understands how to weld. We shou not consider welding as a substitute fo riveting without taking into consider tion the necessity for changes in desig and materials. Weldability is a charac teristic which should be fully understoo so that new alloy metals may be welde efficiently."

President Arnott went on to say tha when this war is over it should be th earnest hope that the lessons in weldin technique which we have learned durin

it will be put to the use of our American civilization and the world. He said our industrial development has been great, but sociological wounds of a serious nature have been inflicted on civilization.

Experimental Stress and Other Groups Meet

Meeting for the first time during the Metal Congress, the Society for Experimental Stress Analysis held its four-day session at Hotel Carter last week. The technical sessions and special meetings were devoted to strain measurements and problems relating to that subject.

Two special sessions devoted to specific subjects were held. The first of these, a symposium on crankshaft stresses, featured papers from Chrysler Corp., Packard Motor Car Co., and Caterpillar Tractor Co.

The second special session covered strain gages, and featured a paper by H. C. Robert, University of Illinois, presenting a general review of the field.

Twelve papers on various phases of industrial radiography were presented in the technical sessions of the American Industrial Radium and X-Ray Society.

The Robert F. Mehl lecture was delivered by George L. Clark, head, department of chemistry, University of Illinois.

In addition to these two societies, meetings and sessions were held by the Metal Powder Association, International Acetylene Association, American Gas Association, American Foundrymen's Association and Resistance Welders Association.

Glenn O. Carter, Linde Air Products Co., New York, was elected president of the International Acetylene Association; R. B. Swope, Southern Oxygen Co. Inc., Washington, vice president; H. F. Reinhard, Union Carbide & Carbon Corp., New York, secretary; and Philip Kearny, K. G. Welding & Cutting Co., New York, treasurer.

EXPOSITION HIGHLIGHTS

National Metal Show in Cleveland during Metal Congress Week attracts largest attendance in history of event

"Where do they all come from" appeared to be the general sentiment of exhibitors (412) at the largest National Metal Exposition on record, which inundated Cleveland last week. The city's Public Auditorium for five days buzzed with tens of thousands of men and women who trudged over 166,000 square feet of exhibit space inspecting latest developments in the metalworking and allied industries.

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Lacking was the "military flavor" of exhibits which has been apparent in recent years, apparent indication that exhibitors were looking ahead to a booming postwar industrial period. There were a few shells, bombs and related ordnance items, but in general the war production aspect was subdued.

* * *

Big as the show was, it still did not completely fill Cleveland's vast exhibit areas, a portion of the underground hall being occupied by ordnance materiel stored by the Cleveland Ordnance District.

* * *

A "stopper" was the exhibit of Harper J. Ransburg Co. where electrostatic spray painting and detearing of dipped articles mystified onlookers. By surrounding an object to be painted with a high voltage field, sprayed paint was literally made to follow a circular path and completely cover a suspended part.

* * *

That boy who had his $50,000 car of the future on display seemed to get a lot of customers but we still are in the dark as to what his company makes or just why the car was there.

* * *

There was a great deal of attention given to the machine tools designed for powder metallurgy work. In fact, all the machine tool exhibits—and they were legion—had a good play.

* * *

X-ray inspection and spectroscopy, fluoroscopy, and allied arts are beginning to cut a wider swath in the metals industries if the exhibits at this show are any criterion. There were a good many exhibits ranging from X-ray film to the electron microscope.

* * *

SRO signs were out constantly in the exhibit where Jominy end-quench tests were performed. That ties in with the fact that hardenability seemed to be one of the key words at the show—sharing the spotlight with subzero treatments, high frequency heating and electronics and X-rays in all their forms.

* * *

Of more than passing interest were the synthetic sapphire displays. A wide variety of plug gages made from sapphires, as well as other applications

(*Please turn to Page* 154)

RECEIVE AWARDS BY AMERICAN WELDING SOCIETY

LIEUT. D. C. HERRSCHAFT
Co-recipient of Lincoln Gold Medal

R. B. BLAND
Co-recipient of Industrial Prize

PAUL E. SANDORFF
Co-recipient of Industrial Prize

WENDELL F. HESS
Co-recipient of Lincoln Gold Medal

Attendance Heavy at Sessions of Metals Divisions, A.I.M.E.

Record registration of 450 reported at annual meeting of Institute of Metals and Iron and Steel Division in Cleveland Oct. 16-18. Broad range of technical subjects discussed in numerous papers

ANNUAL meeting of the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers held at Hotel Statler, Cleveland, Oct. 16 to 18, drew a record registration of 450.

Particular interest was shown in a paper presented by J. S. Marsh, Bethlehem Steel Co., Bethlehem, Pa., on "Slag-Metal-Oxygen Relationships in Basic Open Hearth and Electric Processes."

A study on the "Distribution of Carbon Between Titanium and Iron in Steel," by W. P. Fishel and Bryson Robertson, Vanderbilt University, Nashville, Tenn., also prompted considerable discussion.

Other subjects covered in the Institute's Iron and Steel Division program included:

"Recovery of Cold Worked Aluminum-Iron as Detected by Changes in Magnetic Properties," presented by J. S. Stanley, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Transformation of Austenite in a 3 Per Cent Chromium 1 Per Cent Carbon Steel," by E. P. Klier, Pennsylvania State College, State College, Pa.

"Measurement and Control of Hydrogen Embrittlements in Type 440C Stainless Steel Wire," by C. A. Zapffe and M. Eleanor Haslein, Rustless Iron & Steel Corp., Baltimore.

"Effect of Time Storage on Ductility of Welded Test Specimens," by C. E. Jackson and G. G. Luther, Naval Research Laboratory, Anacostia, Washington, D. C.

Recent developments in dilatometric analysis were discussed by R. D. Potter, Massachusetts Institute of Technology, Boston, in his paper on "Dilatometric Analysis of Subatmospheric Transformations." Other discussions on the same subject included the following topics:

"A High-Speed Dilatometer and the Transformational Behavior of the Steels," by A. L. Christiansen, E. C. Nelson, and C. E. Jackson, Naval Research Laboratory, Anacostia, Washington, D. C.

"Precise Expansion Measurements on Nonferrous Alloys and Glasses," by W. E. Kingston, Sylvania Electric Products Inc., New York.

"An Interference Type Dilatometer and Some Typical Results," by W. L. Fink and L. A. Willey, Aluminum Co. of America, Pittsburgh.

The symposium on steelmaking included a discussion on "Theoretical and Practical Aspects of Deoxidation in Basic Open Hearth Practice," by T. S. Washburn, Inland Steel Co., Chicago. Other topics were "A Rapid Laboratory Method for Estimating Basicity of Open-Hearth Slag," by W. O. Philbrook, A. J. Jolly Jr., and T. R. Henry, Wisconsin Steel Works, Chicago; and "Application of pH Slag Basicity Measurements to Basic Open-Hearth Phosphorus Control," by Michael Tenenbaum and C. C. Brown, Inland Steel Co., Chicago.

Bolt, Nut, Rivet and Screw OPA Committees Organize

Organizational meetings were held in Cleveland last week by members of two industry advisory committees which were appointed recently to advise and consult with the Office of Price Administration on problems that arise in the pricing of bolts, nuts, rivets and screws which are covered by price regulation No. 147.

Members of the Bolt, Nut and Rivet Industry Committee are: J. C. Miller, manager of sales, Bethlehem Steel Co., Bethlehem, Pa.; C. L. Turner, vice president, Buffalo Bolt Co., North Tonawanda, N. Y.; R. C. Klemm, manager of sales, Republic Steel Corp., Cleveland; H. E. Smith, president, Vulcan Rivet & Bolt Corp. Inc., Birmingham, Ala.; S. N. Comly, vice president, Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.; R. D. Baker, vice president, Pittsburgh Screw & Bolt Corp., Pittsburgh; W. R. Batty, vice president, Standard Nut & Bolt Co., Valley Falls, R. I.; Meyer Paper, president, Lewis Bolt & Nut Co., Minneapolis; E. C. Harris, general manager, Pawtucket Mfg. Co., Pawtucket, R. I.

Members of the Screw Industry Advisory Committee are: R. B. Plumb, vice president, Eagle Lock Co., Terryville, Conn.; A. H. Charles, vice president, National Lock Co., Rockford, Ill.; H. Cooper, president, Cooper Screw Mfg. Co., Los Angeles; C. S. Trott, sales manager, Parker-Kalon Corp., New York; C. O. Drayton, general sales manager, American Screw Co., Providence, R. I.; E. C. Paddock, general sales manager, Corbin Screw Corp., New Britain, Conn.; C. E. Kramer, vice president, United Screw & Bolt Corp., Cleveland; D. Jennings, vice president, Central Screw Co., Chicago; W. C. Stauble, executive vice president, Holo-Krome Screw Corp., Hartford, Conn.; J. W. Fribley, president, Cleveland Cap Screw Co., Cleveland; R. D. Oldfield, sales manager, Western Automatic Machine Screw Co., Elyria, O.; E. M. Whiting, vice president, Pheoll Mfg. Co., Chicago; C. Ottemiller, treasurer, Wm. H. Ottemiller Co., York, Pa.

Metal Powder Association, New Technical Group, Looks to Future

NEWCOMER to the ranks of technical associations, the Metal Powder Association keyed its annual meeting with the Metal Congress and heard reports by seven authorities in this field. Dr. Richard Snutt, Glidden Co., Cleveland, reviewed the use of metallic pigments in paints. Of 30 varieties of powders, aluminum, copper, brass, zinc, lead, tin, silver and gold have found use in paints, the last three in only limited quantities. By far the greatest proportion of such paints is the aluminum type, although copper paints have found extensive use as anti-corrosive and antifouling paints on ship hulls.

H. E. Hall, Metals Disintegrating Co., Elizabeth, N. J., is president of the Metal Powder Association which was organized this spring at a meeting in New York. Twenty-three companies have joined in the association. S. J. Wellman of the S. K. Wellman Co., Cleveland, is vice president.

W. B. Roberts, Aluminum Co. of America, Pittsburgh, presented a report for the association's flake powder committee, calling attention to the fact that in 1939 about 12,000,000 pounds of aluminum powder were produced.

Clyde S. Batchelor, Raybestos Division, Bridgeport, Conn., spoke on the use of metal powders in sintered friction materials, and urged manufacturers of powders to attempt to reduce their costs of production, since in many types of parts using friction surfaces of sintered metal powders, the cost of the material amounts to 50 per cent of the price of the part. Reviewing the development of this type of part, used extensively in brakes and clutches for heavy-duty war equipment, Mr. Batchelor gave as his opinion that the greatest future postwar lies in the field of trucks, earth movers, and farm and industrial mobile equipment.

Reporting for the granular powder standards committee, Julius F. Sachs, Metals Disintegrating Co., described work which his committee has initiated in standardizing test methods. Wide variations were noted in results obtained by different laboratories, indicating the need for further standardization.

Wiremakers Told Signal Corps' Needs Pressing

Pittsburgh meeting, attended by 350, asked to maintain peak production. Various technical problems discussed

SIGNAL Corps wire still is on the critical list and every wiremaker should keep his shoulder to the wheel so there will be no decline in the supply required by the armed forces.

This plea was made by D. D. Buchanan, president of the Wire Association and manager of operations, Union Drawn Steel (division of Republic Steel Corp.) Massillon, O., in opening the annual meeting of the Wire Association at William Penn hotel, Pittsburgh, Oct. 16-19. Registration was 350.

The Wire Association in former years participated with the National Metal Congress which met in Cleveland last week but because of insufficient hotel accommodations the board of directors decided to meet this year at Pittsburgh, Mr. Buchanan stated. He announced far reaching developments in plastic insulation which will affect both ferrous and nonferrous fine wire.

Each year in memory of John Mordica, first president of the Wire Association, a metallurgist is selected, based on a meritorious paper on wiremaking or fabrication, to present the Mordica memorial lecture. This year the honor fell to M. A. Reeder, metallurgical engineer, Jones & Laughlin Steel Corp., Pittsburgh. He spoke on "Carbon Steels for the Wire Industry" at the Wednesday morning session.

At the annual luncheon of the association Wednesday, the guest speakers were Capt. R. C. Heimer, United States Coast Guard, and Lt. Col. G. R. Mountfort, assistant director of Ordnance Service, British Army Staff, British Ministry of Supply, Washington.

Because of war conditions the recipients of the association's medal and honorable mention award received certificates. The medal will be delivered when metal may again be used for this purpose. The medal award for 1943 went to J. C. Aiken, assistant superintendent of rod and wire mills, Jones & Laughlin Steel Corp., Aliquippa, Pa. The honorable mention award was presented to E. J. Crum, general foreman, Bethanizing and Galvanizing departments, Bethlehem Steel Co., Sparrows Point, Md.

Officers of the association, elected last March, are as follows: President, D. D. Buchanan, manager of operations, Union Drawn Steel Division, Republic Steel Corp., Massillon, O.; vice presidents, E. W. Gundstrom, assistant plant manager, Rome Cable Corp., Rome, N. Y., and R. M. Hussey, superintendent, wire department, Jones & Laughlin Steel Corp., Aliquippa, Pa.; secretary, R. E. Brown, Stamford, Conn.

John C. Callaghan, works manager, Canada Works, Steel Co. of Canada, Hamilton, Ont., was selected to present the Mordica Lecture for 1945. Four additional directors of the association were nominated as follows: Leroy D. Seymour, superintendent, wire mills, John A. Roebling's Sons Co.; N. H. Charrusun, vice president, Atlantic Steel Co.; Sidney Rolle, assistant secretary, Scomet Engineering Corp.; John A. Moritz, superintendent, wire mills, Keystone Steel & Wire Co. Ballots will be mailed members of the association for ratification of the nominations.

Detailed report of the technical sessions will be presented in the Oct. 30 issue of STEEL.

Present, Past and Pending

TIN PLATE OUTPUT MAY BE INCREASED SOON

WASHINGTON—Tin plate industry can increase production in December and first quarter of 1945, if its steel allotments are raised, WPB has been informed. Facilities and manpower are ample to roll the 750,000 tons so far allotted for the current quarter.

CIVILIAN PRODUCTION AUTHORIZED IN OVER 750 PLANTS

WASHINGTON—Civilian goods production has been authorized in more than 750 plants under the "spot authorization" plan and about 500 new applications are arriving weekly.

CHINESE RAILROAD REBUILDING TO COST $100 MILLION

BOSTON—In order to rebuild destroyed railroad lines and to complete those started since the outbreak of war, China will need at least 500,000 tons of rails, 9000 cars and 800 locomotives, at an estimated cost of $100 million, says Dr. H. H. Kung, minister of finance, China.

WPB STEEL EXPANSION SURVEY TO BE READY DEC. 1

WASHINGTON—Survey of the WPB steel expansion program will be completed Dec. 1 by W. A. Hauck, chief, Control Branch, Steel Division.

STEEP ROCK IRON ORE SHIPMENT ARRIVES IN U. S.

CLEVELAND—Shipment of 12,500 tons of Steep Rock iron ore, reportedly testing 61 to 63 per cent pure iron, was unloaded here last week from the Cleveland-Cliffs Iron Co.'s freighter PONTIAC for shipment to the Wheeling Steel Corp., Wheeling, W. Va. (See page 65 this issue for additional details on Steep Rock iron mines).

NELSON HONORED AT TESTIMONIAL DINNER

WASHINGTON—Top staff of the War Production Board held a testimonial dinner for Donald Nelson, former WPB chairman, here last Wednesday at the Statler hotel.

FOY CLARIFIES PROCEDURE FOR IDLE STEEL DISPOSAL

WASHINGTON—Norman W. Foy, director, Steel Division, WPB, explains in detail to steel distributors direction 44 to CMP regulation No. 1, which deals with he disposal of off-grade, rejected, idle or excess inventory steel.

RUSSIA MAY PAY FOR PETSAMO NICKEL PROPERTIES

NEW YORK—International Nickel Co. of Canada may receive a monetary consideration from Russia for its nickel-copper property, located near Petsamo, Finland, recently ceded to Russia under the armistice terms with Finland.

NATIONAL ASSOCIATION OF MANUFACTURERS TO MEET

NEW YORK—National Association of Manufacturers' forty-ninth annual Congress of American Industry, Dec. 6-8, will be dedicated to planning the reconversion of industry back to peacetime production. It will be held here at the Waldorf-Astoria hotel.

Calls for Realistic International Policy

"The shape of things to come in the postwar world will depend in goodly measure upon a realistic United States policy capable of integration especially with that of Great Britain and Soviet Russia," George W. Wolf, president, United States Steel Export Co., recently told the Foreign Trade Reconstruction session at the Hotel Pennsylvania, New York.

He said that our own domestic recovery and reconstruction will greatly influence world reconstruction and should go hand in hand with our preparations for international collaboration. As a necessary prerequisite to any world collaboration that will endure, we must import as well as export.

Maximum Use of Tools Built for War May Speed Reconversion

Government restrictions on output for peacetime purposes held threatening country's postwar program for high productivity and full employment. Key types now for automotive and other consumer durable goods manufacturers advocated

CONVERSION from war to peacetime economy to be successful must be fast. Industry should be encouraged to make maximum use of machine tools built for war and to put that equipment to work at the earliest possible moment for large scale production of civilian products.

This was the view forwarded by Walter K. Bailey, vice president, Warner & Swasey Co., Cleveland, before the forty-third annual meeting of the National Machine Tool Builders Association, Oct. 19 and 20, at the Homestead hotel, Hot Springs, Va.

"To keep employment going at a high level—at the very time when our boys are coming back from the war—we've got to have assured mass markets. We can only assure mass markets by low production costs. We can only assure low production costs by maximum utilization of the best machine tool equipment that is available.

"Our industry can't build enough new machine tools fast enough to do this job. And we should not be asked to build them in large quantities when we have already produced the machines that can do the work.

"The best solution, as I see it, is for the factories of the United States to throw old machine tools out, bring in all of the war-built machine tools, use them to the best possible advantage in the intermediate conversion period, and then later install our real postwar models, as fast as we can develop them, perfect them, and put them on the market."

Government restrictions upon production of machine tools for peacetime purposes are threatening the country's postwar program of production and employment, said James Y. Scott, president, Van Norman Co., Springfield, Mass., and president of the association.

"In order to reconvert," Mr. Scott said, "many industries—and the automobile industry in particular—must have certain types of machine tools which it cannot get either from the wartime machine tools now on factory floors in that industry nor from the vast supply of wartime machine tools built for other industries.

"There are key machine tools which the automobile industry needs right away, if it is to be able to effect a quick conversion from war to peace.

"The automobile industry is not getting those machine tools.

"Until the various governmental agencies concerned in this problem realize that unless the machine tool industry is permitted right now to build and ship certain critical machine tools, the postwar re-employment program of the United States may run onto the rocks.

"Today it's manpower. It used to be materials. Tomorrow it may be something else. What's needed is a change in government attitude. If we are going to 'win our peace,' we've got to start now. It is later than you think."

During the meeting tribute was paid to four men who long have played leading roles in the industry and who served as presidents of the association more than 20 years ago. These men are: Frederick L. Eberhardt, president, Gould & Eberhardt Inc., Irvington, N. J. (president of the association, 1907-09); Edward P. Bullard Jr., president, Bullard C Bridgeport, Conn. (1911-13); James Doan, chairman, American Tool Wo Co., Cincinnati (1915-18); August Teuchter, president, Cincinnati Bickf Tool Co., Cincinnati (1920-22).

JOSEPH L. TRECKER

Joseph L. Trecker, executive vice pr dent, Kearney & Trecker Corp., Milw kee, was elected president of the asso tion to succeed James Y. Scott, preside Van Norman Co., Springfield, Mass.

A complete report of the meeting v appear in the Oct. 30 issue of STEEL.

Foundry Equipment Backlog Abou Three Months, Convention Told

AVERAGE backlog of orders of the foundry equipment industry is from three to three and one-half months, Bradley Stoughton, Foundry Equipment and Supplies Section, Tools Division, War Production Board, Washington, told the Foundry Equipment Manufacturers Association at its annual meeting at Hot Springs, Va., Oct. 13-14.

Ralph W. Hisey, president of the association and vice president, Osborn Mfg. Co., Cleveland, opened the meeting which drew the largest attendance in the history of the association. He outlined the work of the various committees during the past year and stressed the contacts which the executive secretary made with various departments in Washington and with other organizations connected with the foundry industry.

The various problems connected with reconversion pricing were discussed by Riley M. Simrall, Processing Machinery Section, Machinery Branch, Office of Price Administration, Washington.

Finance Committee report was made by Arthur J. Tuscany, executive secretary and treasurer of the association. Otto A. Pfaff, president and general manager of the American Foundry Equipment Co., reported on activities of the Membership Committee and W. L. Dean, vice president and general manager, Mathews Conveyer Co., Ellwood City, Pa., about the Committee on Taxes.

At the banquet, plaques were prese ed to Thomas Kaveny Jr., vice preside Herman Pneumatic Machine Co., Pit burgh, and to Frank G. Steineba editor, *The Foundry*, Cleveland, for th work with the Foundry Equipment S tion of the War Production Board.

Following directors were elect M. F. Becker, vice president, Whiti Corp., Harvey, Ill.; H. S. Hersey, v president, C. O. Bartlett & Snow C Cleveland, and P. J. Potter, vice pre dent, Pangborn Corp., Hagerstown, M

Thomas Kaveny Jr. was elected pre dent and Otto A. Pfaff was elected vi president at the annual meeting of t board of directors following the busine session.

28 Workers Strike at Niles Steel Product Plant

Production of bogie wheels for tan and the shipment of bomb cannisters w seriously handicapped recently due to strike of 28 members of the United Ste workers of America-CIO at the Nil Steel Product plant, Niles, O., of Repu lic Steel Corp.

Twenty-two employes of the bog wheel line stopped work in an effort secure a higher wage rate.

Warehouse Sheet Demand Heavy

Postwar requirements for deep freezers and air conditioning equipment, plus normal prewar goods, assures flat-rolled products will hold position

RECONVERSION of sheet mill facilities for production of gages and qualities generally distributed by warehouses presents no problem and there should be no time lapse or difficulty in again processing those grades through normal channels, J. V. Honeycutt, assistant vice president, Bethlehem Steel Co., Bethlehem, Pa., told members of the National Association of Sheet Metal Distributors at the thirty-fourth semiannual meeting in Atlantic City, N. J., Oct. 17.

Very high demand would materialize with cessation of hostilities although this has been to a surprising extent a "flat-rolled war," he said. Of slightly more than five million tons of finished steel products required a month, almost half has been flat rolled plates, sheets, strip and hot rolled bands. Despite this, pentup demand for sheets will present need for a large distribution through warehouses.

During the period of limited supply of steel sheets available for peacetime products there have been substitutes offered, some reasonably satisfactory, but on the whole at higher costs. On the whole, sheet steel will more than hold its own in the postwar period, he declared. In addition to backed up demand for repairs and civilian goods, Mr. Honeycutt cited rapidly growing market for deep freeze units and air conditioning, among others.

Effect of war on distribution of galvanized sheets has been great. Normally 65 per cent are sold through warehouses, also roofing, but it has been possible to allocate but 35 per cent of galvanized to warehouses. Production of galvanized sheets is slightly more than half prewar level in each of last three years. Several plants have stopped production of galvanized sheets of their own accord. War Production Board halted two and restricted all others to meet urgent military demands for hot rolled.

Impact of war on merchant trade wire products was also reviewed by Mr. Honeycutt. Nails have ebbed and flowed, but postwar should be active. Demand for barbed wire and fencing will continue high for several years. Capacity for producing merchant trade products is sufficient to fill all demand as soon as steel is permitted to flow without restrictions.

That distributors may be caught in a squeeze between increased costs of materials and a controlled maximum selling price before or after war is won was voiced by Thomas J. Quinn of W. F. Potts Son & Co. Inc., Philadelphia. Survival, he said, may depend not only on keeping in effect economies forced during war but by putting into effect additional economies in handling and delivering steel. Small and seemingly unimportant details of standardization add up to important items of cost in wholesale distribution.

Roger Becker, Ohio Valley Hardware & Roofing Co., Evansville, Ind., cited standard packing of merchandise by manufacturers in lots handled by wholesalers in warehouses without charge, without unpacking or repacking. Discussing reductions in distributor's overhead, Mr. Becker said packages should be in decimal units, 10, 25, 50 to 1000 pieces and not in unnatural combinations of dozens, gross, etc. Thus, store pipe packed in 25 joints per carton is packaged correctly, but conductor pipe elbows as packed cannot be defended on any basis of logic.

Bruce Haines of E. E. Souther Iron Co., St. Louis, is new president of the association, succeeding Eugene Foley, Bayonne Steel Products Co., Newark, N. J. Vice presidents are A. Vorys, Vorys Bros. Inc., Columbus, O., and William Vernier, Superior Safety Furnace Pipe Co., Detroit.

POSTWAR PREVIEWS

MAINTAINING THE PEACE—Key to a continuing peace may lie in international control of metals, restricting supplies to known aggressor nations. See page 35.

WELDING—Lessons learned during the wartime emergency should be adapted to production of peacetime products, AWS president admonishes. See page 36.

MACHINE TOOLS—Conversion to civilian economy to be successful must be fast and tools built for war should be put to maximum utilization in making civilian products. See page 40.

SURPLUS PROPERTY—Disposal act complicated and confusing. Many observers believe it will be unworkable. See page 42.

HONING—New developments in field of precision honing promise to accelerate adaptation to mass production processes. See page 51.

JET PROPULSION—Manufacturer believes development, now in experimental stage, will revolutionize aircraft industry after the war. See page 58.

CANADA—Steep Rock Iron Mines to step up production of high grade ore to 5000 tons daily. Officials see continuing market in United States. See page 65.

MULTIARC WELDING—Developed as part of project for welding thin metals, multiarc process opens the way to finer achievements in joining aluminum alloys. Twin-carbon torch simultaneously produces five arcs to deliver concentrated heat under perfect control. Immediate fusion produces uniform penetration, free from porosity. See page 68.

INTERIM TOOLING—Period between V-day and completion of industry's changeover foreseen by tool engineers as one of intense activity, with use made of whatever standard machine tools are available for redesigning to peacetime requirements, and with great emphasis on economy both in tooling and production. See page 72.

SUB-ZERO TREATMENT—Fundamentals of hardening steels at low temperatures now better understood and value of process unquestioned; thus it may become routine part of normal heat treating practice. See page 78.

ELECTROSTATIC CLEANING—Steel plant experience indicates wider use of electrostatic air cleaning to safeguard life and reduce maintenance of prime movers. See page 86.

Says Nation's Technological Strength Rests in Research

More than 80,000 postwar jobs for workers in the steel industry will depend on export trade, according to Basil Harris, president, the United States Lines. Mr. Harris cited this fact as a vital reason for unified backing for an adequate American merchant fleet.

Surplus Property Act Is Termed Unworkable by Affected Agencies

Provisions of measure are confusing. First effect has been to slow down disposition of surplus lands and large plants due to fears of government officials that they will unwittingly violate law and be called on congressional carpet

SINCE the President, on Oct. 3, with "considerable reluctance," signed the Surplus Property Disposal act, government agencies affected by this legislation have been studying it carefully. The general feeling among them is that the act, as retiring Surplus War Property Administrator William L. Clayton put it some weeks ago, is "unworkable." A typical attitude is that expressed by a key official when he remarked to STEEL's representative: "If you can figure out how to make this law work you are smarter than I am."

First effect of the enactment of the law has been to slow down the disposal process. About two months ago, when the law's pattern was beginning to emerge, Mr. Clayton put a halt to sales of surplus lands and large plants, and this ban continues in effect and will be left for the new Surplus Property Board, still to be appointed, for such action as it may take. Otherwise the disposal process goes on, but with hands on the brakes; the agencies hesitate, for example, to sell any large items lest they be called on the congressional carpet at a later date for unwittingly violating the law.

Mr. Clayton and his Surplus War Property Administration, incidentally, are still on the job and will continue so until such time as the President appoints the new board. Predictions are that when the new board takes office, the disposal process will slow down further because of complications in the act.

First confusing feature of the act is its list of "objectives," which covers a lot of territory, calling for effective use of surplus property for war purposes, maximum aid in the re-establishment of a peacetime economy, discouragement of monopolistic practices, encouragement of family-type farming, help to returning veterans, encouragement of postwar employment, development of foreign markets, elimination of speculators as purchasers of surplus property, avoidance of economic dislocations, distribution of surplus commodities to "consumers" at fair prices, prompt and full utilization of surplus property, utilization of normal channels of trade, fostering the development of new independent enterprise, prevention of excessive profits being made out of surplus property and, obtaining, as nearly as possible, the fair value of the surplus property.

The board, says the act, is to be established in the Office of War Mobilization and Reconversion and is to be composed of three men to be appointed by the President, with one of them named chairman. Without regard to the civil service laws, the board may employ any assistants necessary in carrying out its work. It shall "designate one or more government agencies to act as disposal agencies," but "the United States Maritime Commission shall be the sole disposal agency for surplus vessels."

Must Make Prompt Report

Each owning agency shall promptly report to the board and the appropriate disposal agency all surplus property, and "whenever in the course of its duties the board has reason to believe that any owning agency has property in its control that is surplus . . . and which it has not reported as such, the board shall promptly report that fact to the Senate and House of Representatives."

Next, the board is instructed to prescribe regulations for disposition of surplus property "to states and their political subdivisions and instrumentalities and to tax-supported and non-profit institutions." This section covers property appropriate for use in schools, hospitals and other institutions. Property having no commercial value may be donated to these institutions, whereas equipment having no commercial value and not suitable for installation in such institutions, is to be destroyed or otherwise disposed of after 30 days' public notice.

The act authorizes owning agencies to dispose of any property for war production, or to empower any contractor or subcontractor to make disposition of property for this purpose, subject only to price policies of the Surplus Property Board. Or, agencies may take possession of surplus inventories and dispose of them under the board's regulations. "The agency may dispose of such property by sale, exchange, lease, or transfer, for cash, credit, or other property, with or without warranty, and upon such other terms and conditions as the agency may deem proper, provided, however, that in the case of raw materials, consumer goods, and small tools, hardware and nonassembled articles which may be used in the manufacture of more than one type of product, no extension of credit under this act shall be for a longer period than three years." However, suitable preferences are to be afforded war veterans to aid them in establishing "their own small business."

The Smaller War Plants Corp., fair haired child of Congress, is given power under this act much greater than it previously held. One government officia

REHABILITATION: Flame cutting side frames from steel plate at By-Products Steel Corp., division of Lukens Steel Co., Coatesville, Pa., for hundreds of railway locomotives, most of which will be used to restore transportation facilities in Europe

says: "The act enables the SWPC to skim the cream off of all the surplus property lists. If there are two milling machines, for example, one relatively new and the other badly worn, the SWPC can pick out the best one and put it in storage for such disposition as it finally elects. . . . In the light of its enlarged responsibilities, the SWPC certainly is in a fine position to get larger appropriations from Congress in the future than in the past."

The Smaller War Plants Corp., the act reads, "is hereby specifically charged with the responsibility of co-operating with the board and with the owning and disposal agencies, of making surveys from time to time, and bringing to the attention of the agencies and the boards the needs and requirements of small business, and any cases or situations which have resulted in or would effect discrimination against small business in the purchase or acquisition of surplus property by them and in the disposal thereof by the agencies.

"The Smaller War Plants Corp. is hereby authorized and directed to consult with small business to obtain full information concerning the needs of small business for surplus property. The Smaller War Plants Corp. shall have the power to purchase any surplus property for resale, subject to regulations of the board, to small business (and is empowered to receive other property in exchange as partial or full payment therefor), when in its judgment such disposition is required to preserve and strengthen the competitive position of small business, or will assist the corporation in the discharge of the duties and responsibilities imposed upon it. . . . The Smaller War Plants Corp. is hereby authorized, for the purpose of carrying out the objectives of this section, to make or guarantee loans to small business enterprises in connection with the acquisition, conversion and operation of plants and facilities which have been determined to be surplus property, and, in co-operation with the disposal agencies, to arrange for sales of surplus property to small business concerns on credit or time bases."

Experienced government administrators who have studied this language say that it paves the way for large-scale functioning by the SWPC, and they feel that business concerns who have not already become acquainted with the SWPC should lose no time in doing so. SWPC officials, incidentally, now are studying the act and expect to set up a special unit to administer that part of the disposal program for which the SWPC is responsible.

The section of the act which caused Mr. Clayton to put a halt to sales of large plants provides that the board "shall prepare and submit to Congress within three months after enactment of this act, a report as to each of the following classes of property (not including any plant which cost the government less than $5 million): 1—Aluminum plants and facilities; 2—magnesium plants and facilities; 3—synthetic rubber plants and facilities; 4—chemical plants and facilities; 5—aviation gasoline plants and facilities; 6—iron and steel plants and facilities; 7—pipelines and facilities used for transporting oil; 8—patents, processes, techniques, and inventions, except such as are necessary to the operation of the plants and facilities herein listed; 9—aircraft plants and facilities and aircraft and aircraft parts; 10—shipyards and facilities; 11—transportation facilities; 12—radio and electrical equipment:

"A—Describing the amount, cost and location of the property and setting forth other descriptive information relative to the use of the property;

"B—Outlining the economic problems that may be created by disposition of the property;

"C—Setting forth a plan or program for the care and handling, disposition, and use of the property consistent with the policies and objectives set forth in this act."

In case the board cannot make a complete report of this character within three months, it is to submit an interim report in that period and a complete report "as soon thereafter as possible." The board, within the same period, may report to Congress recommendations for any modifications in the general disposal plan.

The board may sell any plants listed in classes 9 to 12, inclusive, above listed. It may not sell any plants listed in classes 1 to 8, inclusive, until 30 days after such report, or additional report, has been made "while Congress is in session." This means a delay of at least four months after the new board takes office before it will be able to sell any of the properties, costing the government $5,000,000 or more, in classes 1 to 8. Actually the delay may be greater—stretching perhaps into years—for Congress, in incorporating this provision, gave ample indication that it proposes to keep a watchful eye over sales of the large plants and perhaps hold hearings before authorizing them.

The act provides that before any plant costing the government $1 million or more may be sold, the attorney general will have to be fully informed and called on for advice as to whether the transaction would violate the antitrust laws. This same stipulation also applies to sales of patents, processes, techniques and inventions.

All government-owned accumulations of strategic minerals and metals shall be transferred, when declared surplus, to the Treasury Procurement Division and shall be added to the stockpile authorized by the Act of June 7, 1939 (53 Stat. 811), as amended, and shall be subject to its provisions; provision is made for conversion of minerals and metals "into forms best suited for storage and use for the common defense."

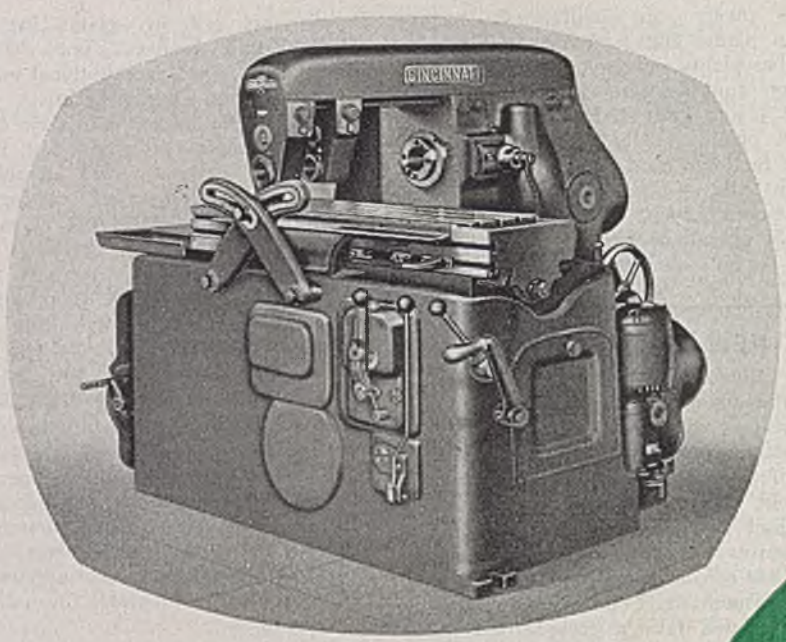
Strategic minerals and metals, as used in this section, are enumerated as copper, lead, zinc, tin, magnesium, manganese, chromite, diamonds, cadmium, fluorspar, cobalt, tantalite, antimony, vanadium, nickel, molybdenum, tungsten, mercury, mica, quartz crystals, industrial diamonds, platinum, beryl, graphite . . . and aluminum or any other minerals and metals in such quantities or amounts as the Army and Navy Munitions Board may determine to be necessary . . . and shall include ores, concentrates, alloys, scrap, and partially and completely fabricated articles." While the war lasts, the War Production Board will be called on to state what the amount of surplus metals and minerals will be, over and above war requirements.

The act contains a comprehensive section which provides for the disposal of surplus real property not desired by states or municipalities, or by public institutions. The prewar owner gets first chance to buy and has 90 days to come forward. If he is dead his widow gets priority. Next in order, his heirs, any previous tenant, then war veterans, may apply, each apparently having 90 days to act. This section of the act, liberally larded with penalties for fraud, is confusing as it stands and no doubt will require revision by Congress after the new Surplus Property Board has accumulated some headaches in its administration. In any event, this section, as now on the books, seems to put a premium on slow motion in disposing of government-owned real property.

NEW CENSUS STUDIES

Bureau of the Census and the Bureau of Labor Statistics plan studies early next year to supply statistics to measure "the impact of the war on the American people." The Census Bureau will conduct several studies, including a census of manufactures to show 1944 consumption, production, employment etc. The Census bureau also will take a cross-section of typical American families to show incomes during 1944, and seek to measure the effect of the war on family incomes. A third study by the Census bureau will show where people are working, in what industries, employment of women, etc. This special study will report employment by all industries and locations. Census bureau also will conduct the regular 5-year agricultural census. It also has plans for conducting a sample of the population, to be taken in 1946. In addition the bureau is planning for the regular biennial census of manufacturers to be taken early in 1946.

Supplementary studies will be undertaken early in 1945 by the Bureau of Labor Statistics to show wartime spending and saving.

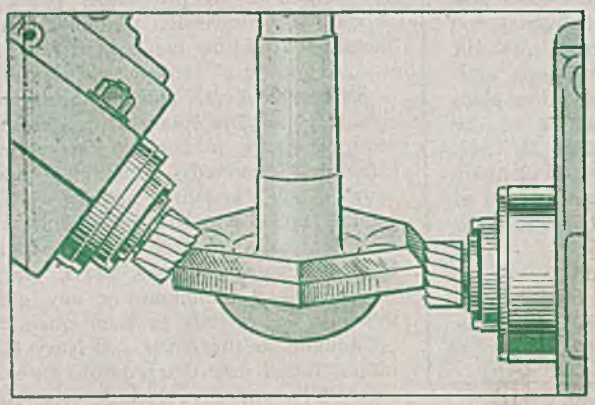


CINCINNATI *No. 4-36 Plain Hydromatic Milling Machine. Catalog No. M-955-1 gives complete specifications. For a brief description of these machines, look in Sweet's Catalog File.*

Two

are

EXTRA SPINDLE TAKES OPERATION AT THE



This simplified sketch shows the cutters and the surfaces milled. Six cycles are required to complete the job. Automatic table feed and rapid traverse of the CINCINNATI *Hydromatic are important features in handling jobs like this.*

Here a CINCINNATI No. 4-36 Plain Hydromatic Milling Machine has been modified by the addition of a special angular headstock to handle a single-purpose job of milling 12 flats which actually form two hexagons, the sides of one of them being at a 22° 2″ angle. By cocking the left-hand spindle head at an angle, the angular hexagon is milled at the same time the conventional head (right hand) is milling the straight side. Special equipment also included tailor-made, hand-indexing fixture. ¶ The development of extra equipment for standard machines to handle special jobs is the sole function of CINCINNATI Application Engineers. They have succeeded in handling many highly specialized jobs on modified standard machines. So, before you buy a special machine to handle some specific job, talk it over with our engineers. They may be able to work out a more economical and satisfactory method of handling the work.

THE CINCINNATI

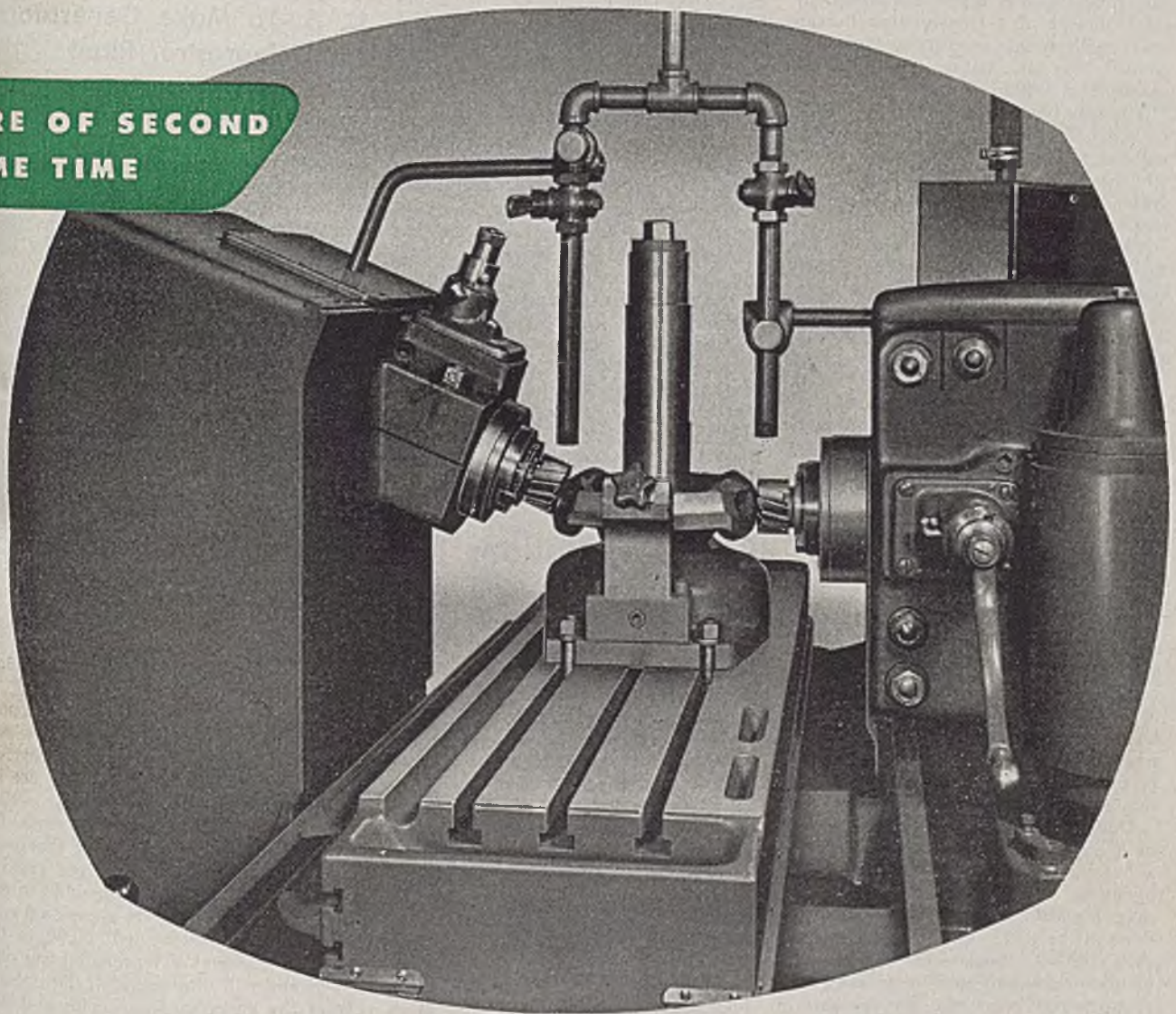
MILLING MACHINES

HEADS

CINCINNATI

more productive than one

CARE OF SECOND SAME TIME



Milling 12 flats on aircraft propeller shaft. The machine is a CINCINNATI *No. 4-36 Duplex Hydromatic Miller with special left-hand headstock.*

MILLING MACHINE CO. CINCINNATI 9, OHIO, U. S. A.

BROACHING MACHINES • CUTTER SHARPENING MACHINES

New Construction Bureau Will Handle All Problems in That Field

Bureau, responsible to operations vice chairman, will be headed by A. J. McComb. It will promote construction work in reconversion period. W. C. Skuce gets new post following termination of CMP Division and Production Controls Bureau

THE War Production Board is being streamlined in order to handle war production as well as reconversion problems more efficiently. The latest step in this program was taken last week by establishment of a Construction Bureau which will provide a centralized point of control over all matters pertaining to construction within WPB.

The new bureau, responsible to Hiland G. Batcheller, operations vice chairman, will be headed by Arthur J. McComb who has been serving as director of the Office of Industry Advisory Committees.

The Construction Bureau will include the existing Building Materials Division, the Construction Machinery Division, the Plumbing and Heating Division, and the bulk of the Facilities Bureau, which is being abolished.

A Bureau Requirements Committee is being established to pass on all construction requirements and construction programs and all major construction projects. It will also review the requirements of the divisional requirements committees of the components divisions of the Construction Bureau. Appeals from its determinations will be taken only to the central requirements committee of WPB.

WPB Chairman J. A. Krug pointed out this bureau not only provides a centralized point of control for the handling by WPB's operating divisions of all problems in the construction field, but also furnishes a mechanism through which construction work can be actively promoted whenever diminishing war requirements make that possible.

Under the new setup, a manufacturer or a contractor who seeks approval for a building project will go to the WPB operating division that has jurisdiction over his field, just as he would have done in the past. The Construction Bureau will not eliminate the responsibility of these divisions and their respective requirements committee for sponsorship of such projects, but it will provide a means through which the prospective builder can have all of his problems handled in one place, so that it will not be necessary for him to deal with a number of separate WPB divisions.

The Facilities Committee will be abolished as soon as the Bureau Requirements Committee is in full operation, WPB said. The Materials Control Division, the Project Analysis Branch, and the Tax Amortization Branch of the Facilities Bureau's Project Essentiality Division are being transferred to the Construction Bureau.

Mr. McComb went to WPB in June, 1944. He previously was a vice president of the Otis Elevator Co. He is being replaced as director of the Office of Industry Advisory Committees by Josiah G. Fort, previously the deputy director of that office.

Walter C. Skuce has been appointed executive officer to the Chief of Operations Hiland G. Batcheller. In his new position, Mr. Skuce will co-ordinate staff activities and help direct the carrying out of policy decisions. He has been with WPB since November, 1942, and has been serving as deputy director of the Production Controls Bureau and director of the Controlled Materials Plan Division. Coincident with announcement of his new position, it was announced that this bureau and this division have been abolished, with the bulk of the work previously performed in them being transferred to the Office of the Program Vice Chairman.

John Gregg, of Washington, who has been serving as chief of staff in the Office of Operations has resigned.

Other changes which have occurred recently in the WPB organization have included the following: Donald D. Davis has resigned as vice chairman for field operations and has been succeeded by James Folger; L. J. Chatten has been appointed director of the Radio and Radar Division, succeeding Ray Ellis who has returned to General Motors Corp. in New York city; Dr. R. S. Alexander has resigned as head of the Wholesale and Retail Trade Division, Office of Civilian Requirements; and Conservation and Redistribution divisions have been abolished.

U. S. To Make Generators for Dnieprostroi Plant

Manufacture in this country of nine hydro-electric turbine generators for the Dnieprostroi plant in the Soviet Union has been approved by the War Production Board. Manufacture of the generators having a capacity of 900,000 horsepower will require at least four years for completion. They will be financed by the U. S. S. R.

Approval for manufacture was granted on the condition that no fixed delivery date would be promised; that manufacture would not be allowed to interfere with production of war supplies or equipment needed for essential civilian purposes or with any important phase of reconversion of the war economy to civilian production.

OCS Regulations Nos. 5, 6 and 7 Speed up Settlement of Terminated War Contracts

DELEGATION of authority to all war contractors to make final settlements of net claims submitted to them for less than $1000 where claimant keeps or disposes of all inventory is included in regulation No. 6, one of three new regulations issued by the Office of Contract Settlement to speed up settlement of terminated war contracts, as mentioned in Oct. 16 issue of STEEL.

Regulation No. 5 deals with statement of cost principles forming a part of the Uniform Termination Article for Fixed Price Supply Contracts. It eliminates certain provisions which have been found impracticable and which in view of recent federal income tax regulations were deemed unnecessary to protect the interest of the government. The first provision eliminated is that portion which provided that the loss on special facilities with respect to which a contractor was entitled to reimbursement should not exceed the adjusted basis of such facility for federal income tax purposes immediately prior to the date of the termination of a contract. Elimination of this provision will relieve the government and war contractors of the necessity of ascertaining the federal income tax status of such facilities.

A further elimination was of that portion which provided that costs, which were charged off during a period covered by a previous renegotiation, may not be included later in the termination settlement of a refund which was made for such period, or to the extent that such charging off is shown to have avoided such refund. Nothing comparable to this provision is applicable to completed contracts. Its elimination will facilitate the speedy settlement of terminated war contracts and will dispense with the necessity of the government agencies and war contractors ascertaining the renegotiation treatment of costs included in claims.

Regulation No. 7, dealing with fair compensation, also was approved. It establishes the standards and methods to be used in the negotiation of settlement by agreement under the Contract Settlement act of 1944 in those cases in which settlement is made on the basis of costs and profits. This regulation provides for the exercise of good business judgment in negotiations in order to insure fair compensation and speedy settlement.

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: Requirement that applications addressed to WPB by consumers of aluminum must specify the particular form or forms desired has not been relaxed. WPB had directed that allotments of aluminum would no longer be made in the eight forms formerly specified in schedule 1 of CMP regulation No. 1.

GAGES: Because production of gages and precision measuring hand tools is now adequate for all essential demand, suppliers may purchase these items without ratings. For these goods, the use of form WPB-547 has been discontinued.

L ORDERS

REFRIGERATORS: Domestic ice refrigerator production quotas totaling 116,800 units for the fourth quarter of 1944 have been assigned to 17 manufacturers. Quotas for the third quarter totaled 128,175 units. Under terms of the schedule, each manufacturer may make his quota of refrigerators only in his own plant and at the location designated in the schedule. The units may contain a maximum of six pounds of iron and carbon steel. (L-7-c)

METAL SIGNS: Iron and steel in frozen, idle or excess inventories, and aluminum and magnesium, may now be used in the manufacture of metal signs. Sign manufacturers may apply for permission under the "spot authorization" plan established in priorities regulation No. 25 to use other metals besides aluminum or magnesium or to use iron and steel not now permitted for sign manufacture. (L-29)

ALUMINUM HOUSEHOLD ARTICLES: Applications from 10 manufacturers for permission to produce aluminum cooking utensils, kitchenware and other household articles under terms of order L-30-e have been granted to the following companies: Hayward Nonferrous Foundry, Hayward, Calif.; San Francisco Die Casting Co., San Francisco; Kinney Aluminum Co., Santa Barbara, Calif.; Rubon Woodfinishing & Products Co., Kansas City, Mo.; Zeroll Co., Toledo, O.; Tray Service Co. and J. C. Williams Aluminum Casting Co., Dallas, Tex.; Farber & Shlevin, Brooklyn, N. Y.; Leyse Aluminum Co., Kewaunee, Wis.; West Bend Aluminum Co., West Bend, Wis. Manufacturers who wish to make aluminum household may make applications for allotments of aluminum and other materials and for authorized production schedules by filing form WPB-4000 with the nearest WPB field office in accordance with terms of priorities regulation No. 25. Form WPB-3820 is to be filed at the same time. (L-30-e)

LICENSE PLATES: Restrictions have been removed on production of all kinds of metal license plates issued by state or other local governments. (L-32, 32-a, 32-b)

OIL BURNERS: Oil burner manufacturers now may apply for permission to produce the 80,000 domestic type oil burners for which material has been authorized for fourth-quarter production. Any manufacturer who wishes to produce domestic type oil burners (class B) must apply for authorization by letter to the nearest WPB field office, following his consultation with his WPB field office to determine whether it will be necessary for him to file form WPB-3820 for manpower clearance. Where the applicant will need controlled materials in order to produce the equipment, the letter should be accompanied by an application on form CMP-4B for the controlled materials. If the application is approved, the manufacturer will receive authorization to produce on form GA-1850 from WPB. (L-74)

STOKERS: Stoker manufacturers now may apply for permission to produce the 37,500 domestic type stokers for which material has been authorized. Any manufacturer who wishes to produce coal stokers must apply for authorization by letter to the nearest WPB field office. Where the applicant will need controlled materials in order to produce the equipment, the letter should be accompanied by an application on form CMP-4B for the controlled materials. (L-75)

INDEX OF ORDER REVISIONS

SAFETY EQUIPMENT: Order L-114, which restricted the use of copper-base alloys and other metals in the manufacture of safety equipment, has been revoked. Use of rubber and tin in the manufacture of safety equipment is still restricted by orders R-1 and M-43, respectively. (L-114)

BATH CABINETS: Manufacture of bath cabinets, used in physical therapy, is now permitted. Veterans Administration has been added to the list of military agencies to which items controlled by order L-259 may be sold. Manufacturers must make quarterly reports to WPB on shipments of electric bakers, infra-red generators and ultra-violet radiation equipment to purchasers other than the military and lend-lease agencies. (L-259)

M ORDERS

CANS: Packers of such products as inks, glues, nonalcohol antifreeze, shellacs, cements and polishes now are permitted to pack their full quotas in metal without reference to their glass quotas. (M-81)

PRINTING PLATES: Restrictions on use of copper and zinc for printing plates, as established in order M-339, have been relaxed; and order M-99, which required the scrapping of obsolete plates, has been revoked.

Order M-339, as amended, removes the requirement of a preference rating for delivery of zinc to platemakers, but does not provide for any increase in permitted use of zinc. Permitted use of copper has been increased from 60 to 75 per cent, by weight, of the copper that the platemaker used in the corresponding calendar quarter of 1940. Any person may use 100 pounds of copper for platemaking in any calendar quarter beginning with the fourth quarter of 1944.

Electrotypers and gravure platemakers must now use three pounds of every five pounds of copper in the form of printing industry scrap copper, recast anodes of such scrap, or new cast anodes received by the platemaker in return for an equal amount of printing industry scrap copper.

The requirement that platemakers report to WPB the weight of copper used in plates ordered by any department or agency of the United States, although such copper continues to be excepted from the restrictions of the order, was removed. It is no longer required that copperplate engravers deliver to a scrap dealer old plates in an amount equal to weight of copper used in making new engravings. The provision that permitted the use of 16-gage photoengravers' sheet copper, finished before July 1, 1943, at the rate of four pounds for every three pounds charged against the photoengravers' allowable usage, also was eliminated. All copper must now be counted at its full weight.

Platemakers who find their supplies of copper and zinc inadequate may now file requests with WPB for special authority to use these materials even if they have never established a base quota. (M-99, 399)

PRIORITIES REGULATIONS

MACHINE TOOLS: Necessity for WPB authorization to place unrated purchase orders for machinery and equipment covered by the WPB items on list A of the regulation has been eliminated. Policy with respect to the assignment of preference ratings on purchase orders needed for resumption or expansion of civilian production has been tightened. Preference order E-1-b, which regulates the production and distribution of machine tools has been amended to eliminate the necessity for ratings on purchase orders and permit unrated orders to share in the percentage of production that is set aside for nonmilitary production. Ratings will be assigned only under priorities regulation No. 24 in cases where some extremely urgent need for priorities assistance is demonstrated. (PR No. 24, E-1-b)

WPB Revokes Five Orders Governing Various Tools

Five orders and two limitation order schedules under jurisdiction of the Tools Division, War Production Board, have been revoked. Backlogs of unfilled orders for the items involved have been reduced sufficiently so that no difficulty is anticipated in meeting future requirements. Delivery of tools and related products involved still are subject to priorities regulation No. 1, which provides for the filling of rated orders ahead of unrated ones. Delivery also is subject to other applicable WPB regulations.

The orders revoked are E-5-a (gages and precision measuring hand tools); E-7 (metal cutting bandsaw blades and hacksaw blades); E-9 (precision measuring instruments and testing machines); E-11 (foundry equipment and electric metal melting furnaces); M-211 (heat treating equipment). The revoked schedules are Nos. 5 and 6 to limitation order L-216, controlling the manufacture of files and vises, respectively.

Appointments-Resignations

Gardner Ackley has been appointed division economist and economic advisor to the director of the Office of Price Administration's Consumer Goods Price Division. He succeeds L. B. Lovell who is now with OPA's division of Industrial Manufacturing and Industrial Materials.

Fisher Body Receives New Tank Contracts

New government orders placed with GM division total $300 million for M-4 tanks, etc. Accelerates tank program

FISHER BODY DIVISION, General Motors Corp., Detroit, announced recently that it has executed additional government contracts totaling $300 million for production of thousands of General Sherman M-4 medium tanks and other land battlewagons.

The new contracts, accelerating the GM division's tank program, cover orders for the next 12 to 14 months. At the same time Fisher Body officials disclosed that the division's Flint and Grand Blanc, Mich., tank plants had doubled their monthly rate of production since January and currently are "well ahead" of government schedules.

Fisher Body has built more than 14,000 tanks and tank destroyers, including the M-36 "Slugger," since its tank production program was begun early in 1942. The "Slugger," mounting a 90-millimeter gun, spearheaded the allied assault into Germany. In addition, Fisher Body has produced turret and hull assemblies for the M-18 "Hellcat."

Ingersoll Steel & Disc Marks Sixtieth Anniversary

Ingersoll Steel & Disc division, Borg-Warner Corp., Chicago, founded by the late S. A. Ingersoll at Sandovall, Ill., in 1884 recently celebrated its sixtieth anniversary in Chicago with elaborate ceremonies.

Highlighting the observance of the company's milestone was a talk by Eric A. Johnston, president, Chamber of Commerce of the United States. Three sons of the late S. A. Ingersoll, all directors of Borg-Warner, attended. They are Roy C. Ingersoll, vice president of the corporation who heads the Ingersoll division as president, Harold G. and Stephen L. Ingersoll, division vice presidents. Robert S. Ingersoll, grandson and works manager at the Kalamazoo, Mich., plant also was present.

Ingersoll Steel & Disc division is operating plants now in Chicago, Chicago Heights, and New Castle, Ind., as well as at Kalamazoo. It became a division of Borg-Warner in 1930.

Its peacetime products include soft center and solid plow steels, ensilage cutter, section knife and disc steels, shovels, harrow and grain drill disks, tool and saw steels, armor plate, solid stainless, heat-resisting and stainless-clad steels, screens, washing machine tubs, steel barrels, etc.

YEARS OF SERVICE: Here are four veteran employes of the National Malleable & Steel Castings Co., Cleveland, who were honored at a dinner recently. Their combined service record with the company totals 222 years, each of them boasting over 50 years. They are, left to right, Henry F. Pope, Joseph Stedronsky, LeRoy Gould and Raymond E. Miller

BRIEFS . . . .

Paragraph mentions of developments of interest and significance within the metalworking industry

Levinson Steel Sales Co., Pittsburgh, has been appointed exclusive distributors in the Pittsburgh district and certain sections of Ohio and West Virginia for the Walter Bates Co., Joliet, Ill.

—o—

Pacific Pump Works, Huntington, Calif., has changed its corporate name to Pacific Pumps Inc. Corporate name of Mid-Continent Pump Supply Co., Tulsa, Okla., has been changed to Pacific Pumps Inc., Mid-Continent division.

—o—

Committee For Economic Development, New York, has issued a booklet titled, "C. E. D. Community Handbook on the Special Problems of Small Business." It points out what each community can do for the postwar prosperity of its own small business concerns.

—o—

General Electric Co., Schenectady, N. Y., has developed a portable mechanical smoke generator for use in warfare. Known as the M-2 smoke generator, the device is no larger than a soldier's foot locker and weighs only 180 pounds empty.

—o—

Bird-White Co., Chicago, has developed a new purofier to eliminate free moisture, oil and all foreign matter with a heavier specific gravity than air from passing through the compressed air line.

—o—

E. I. du Pont de Nemours & Co., Wilmington, Del., reports its Rubber Chemicals division will establish a branch office and completely equipped technical service laboratory in Akron, O., soon.

—o—

Columbia Steel & Shafting Co., Pittsburgh, announces the consolidation of its sales offices along with the Summerill Tubing Co., Pittsburgh, and Edgar T. Ward's Sons Co., Pittsburgh.

—o—

Crosley Corp., Cincinnati, recently appointed the Superior Distributing Co. as its distributor in eastern Kansas and western Missouri.

—o—

Allegheny Ludlum Steel Corp., Pittsburgh, announces redemption of all preferred shares of its stock on Dec. 1 at $110 per share plus the regular quarterly dividend of $1.75 a share will be made from working capital without assistance of outside financing.

—o—

Stevens War Industries Training School, Hoboken, N. J., is conducting a course of 24 lectures on the fundamentals of foundry engineering at Stevens Institute of Technology, Hoboken, N. J., in co-operation with the American Foun-

drumen's Association. Tuition is free. Lectures began Oct. 13 and will continue until Jan. 5, 1944.

—o—

Associated Alloys, Burbank, Calif., has taken over the business and contracts of the Molybdenum Steel Co. There is to be no change in products produced.

—o—

Brown Instrument Co., Philadelphia, reports development of an improved electronic recording instrument, so compact and well balanced it can withstand drop hammer vibrations and still maintain a sensitivity of six points in 10,000.

—o—

Quality Hardware & Machine Corp., Chicago, has been acquired by Continental Industries Inc., New York.

—o—

A. B. Equipment Mfg. Co., Chicago, has been acquired by Continental Products Co. Inc., Chicago.

—o—

Henry Disston & Sons Inc., Philadelphia announces appointment of Dempster-Ross Steel Co., Newark, N. J., as representatives in the northern New Jersey and metropolitan New York districts.

—o—

Stokes Industries Inc., Covington, Ky., announces sale of its assets to the Winfield Baird Foundation, New York.

—o—

U. S. Steel Corp., New York, and its subsidiary Federal Shipbuilding & Dry Dock Co., report that they have made contributions to the National War Fund totaling $52,450.

—o—

Society of Automotive Engineers, New York, announces that John Otto Almen, head of Mechanical Department No. 1, General Motors Research Laboratories, Detroit, has been awarded the Manly Memorial Medal for his work in developing methods and data for increasing the working strength of metals and of engine parts.

—o—

General Motors Corp., Detroit, reports its employes have purchased more than 13,000,000 series "E" war bonds with an aggregate maturity value of more than $400 million.

—o—

Ergolyte Mfg. Co., Philadelphia, has purchased the equipment and inventory of the Precision Engineering Co., Chicago.

—o—

Dow Corning Corp., Midland, Mich., reports that "silicones", a new class of organo-silicon insulating materials, are now in commercial production.

—o—

Heating & Air Conditioning Supply Inc., Reno, Nev., has been appointed distributor of the Crosley Corp., Cincinnati, in the northeastern part of California and most of Nevada.

AWARDS . . .

General Machinery Co., Spokane, received second star.

Heller Bros. Co., Newcomerstown, O., receives second star.

Firth-Sterling Steel Co., McKeesport, Pa., receives second star.

Allen Industries, Leland & Grand Trunk plant, Detroit.

Anaconda Wire & Cable Co., Sycamore, Ill.

Applied Arts Corp., Grand Rapids, Mich.

Ames Baldwin Wyoming Co., Parkersburg, W. Va.

Certain-teed Products Corp., Pantex Ordnance plant, Amarillo, Tex.

Crown Zellerbach Corp., Seattle Charcoal division, Seattle.

Detroit Brass & Malleable Works, Detroit.

Eddy Shipbuilding Corp., Bay City, Mich.

Electronic Corp. of America, New York.

Essex Speciality Co., Hackettstown, N. J.

L. H. Eubank & Son, Inglewood, Calif.

Foley Mfg. Co., Minneapolis.

Groisser & Shalager Iron Works, Somerville, Mass.

Gruen Watch Co., Cincinnati.

Heckethorn Mfg. & Supply Co., Littleton, Colo.

Hercules Powder Co., Lawrence, Kans.

Imperial Knife Co., Providence, R. I.

Kadin Bros. Inc., Hudson, N. Y.

Mohawk Novelty Co. Inc., Hudson, N. Y.

Lakeside Laboratories Inc., Milwaukee.

Lincoln Steel Works, Lincoln, Nebr.

Massillon Aluminum Co., Massillon, O.

Oak Mfg. Co., Chicago.

Packard-Bell Co., Los Angeles.

Ready-Power Co., Detroit.

A. G. Spalding & Bros. Inc., Brooklyn, N. Y.

Standard Pressed Steel Co., Jenkintown, Pa.

Star Drilling Machine Co., Akron, O.

United Air Lines Inc., Modification Center, Cheyenne, Wyo.

Vernay Patents Co., Yellow Springs, O.

NATIONAL TOOL AND DIE MANUFACTURERS ASSOCIATION ELECTS NEW OFFICERS

RICHARD F. MOORE

RICHARD F. MOORE, president, Moore Special Tool Co. Inc., Bridgeport, Conn., was elected president of the National Tool and Die Manufacturers Association recently.

Other officers elected are: Vice president, Willis G. Ehrhardt, president, Ehrhardt Tool & Machine Co., St. Louis; treasurer, H. F. Jahn, president, B. Jahn Mfg. Co., New Britain, Conn.; and secretary, Ben Buerk, president, Buerk Tool Works, Buffalo.

On the board of directors are L. A. Sommer, Cleveland; Eugene J. Rowan Jr., Nelpin Mfg. Co., Long Island, N. Y.; Carl A. Erickson, president, Erickson Machine Works Inc., Minneapolis; K. Janiszewski, president, Superior Steel Products Corp., Milwaukee; William R. White Jr., vice president Midwestern Tool Co., Chicago, and W. J. Tallmann, National Tool & Machine Co., Rochester, N. Y.

The association has launched its second year with a statement of policy covering the following objectives:

1. To contribute in the highest possible degree toward speedy and successful culmination of the war.

2. To insure maximum use of the tool and die industry in reconversion period.

3. To promote fullest possible utilization of the facilities of the tool and die shops in normal times.

4. To oppose bureaucratic ideas and unfair government competition and inequalities to small plant owners.

5. To expend efforts to assure the tool and die shop owners that they may have the most efficient and equitable conditions under which to carry on their business in harmony with one another.

6. To develop a sound apprenticeship program.

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

New developments in field of precision honing may accelerate adaptation of honing to mass production processes by insuring automatic, repetitive sizing of parts at increased speed and improved abrasive stone wear

DETROIT

THREE important new developments in the field of precision honing, sponsored by Micromatic Hone Corp. here, bid fair to accelerate the adaptation of honing to mass production processes by insuring automatic, repetitive sizing of parts at greatly increased speeds and with vastly improved abrasive stone wear. They are: New type of plastic mounted light-weight abrasive stones for honing tools; a simplified and stronger type of tool construction made possible primarily by the new plastic mounted stones; and sizing rings which, used in conjunction with the new type of tool and stones, permit automatic gaging of the honed hole.

An accompanying cross section drawing (Fig. 1) compares the old type honing tool with the new type carrying the plastic mounted stones. The abrasive is molded into the plastic with plastic on the ends, sides and bottom, leaving only the top surface exposed and flush with the plastic. The molded plastic material also extends beyond the ends of the stone. This "socket" mounting of the abrasive in plastic minimizes spalling of the ends and side edges of the abrasive. A reinforcing strip of steel underlies the abrasive to strengthen the molded piece which is formed to close tolerances to fit snugly in milled slots in the honing tool. The abrasive may also be given an impregnation treatment known as Harzlite which further extends its service life.

Because of the light weight of the plastic mounted stones, it has been possible to redesign honing tools, making them much simpler (15 parts against the former 50), stronger, shorter where necessary, and less expensive to manufacture. No spring retainers are necessary to hold the stones which, being shorter than the conventional honing stones, may be arranged in multiple banks around the tool body.

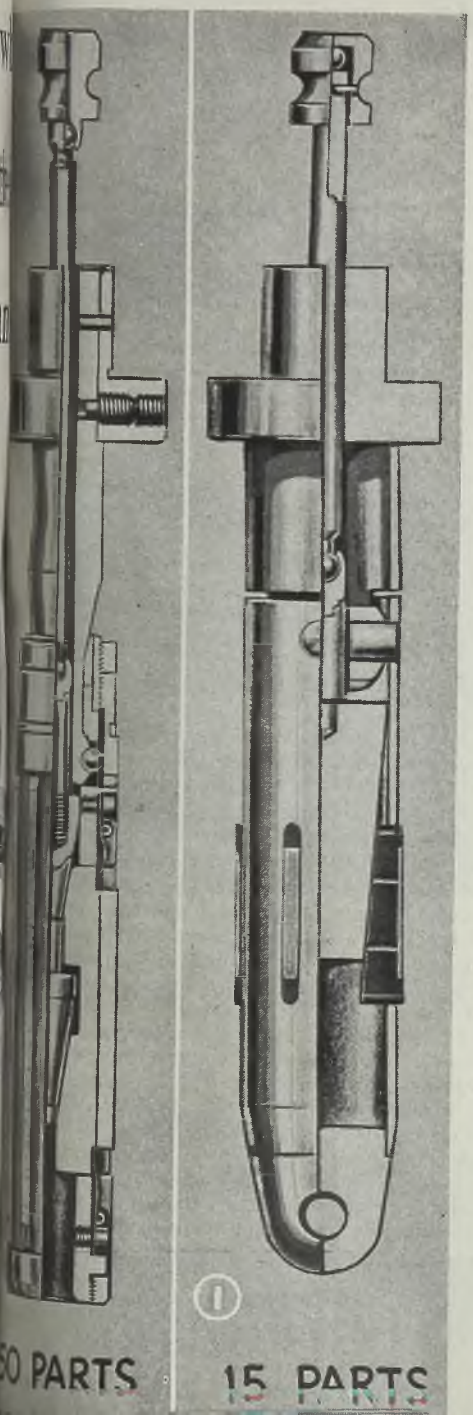


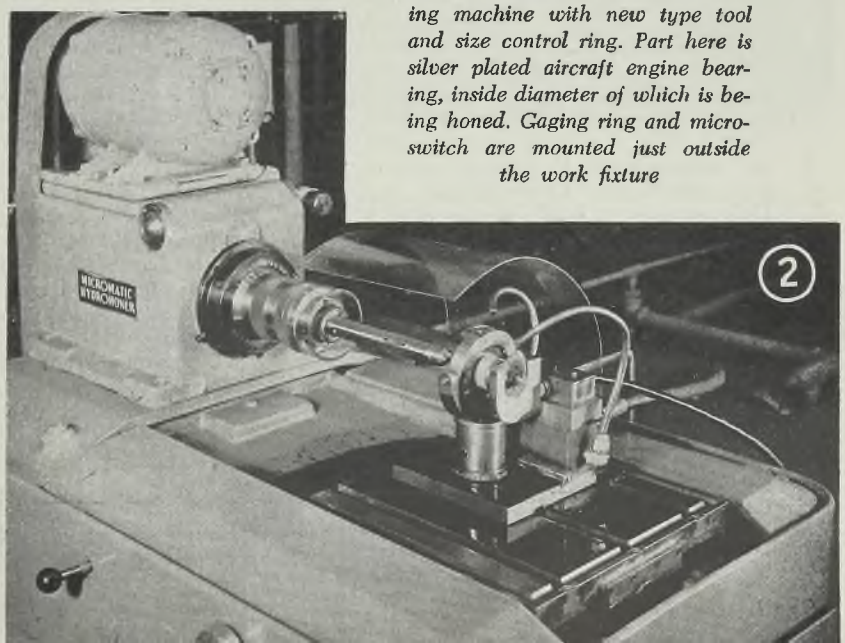
Fig. 1—Sectioned views of old and new type honing tools, showing simplicity of construction of newer design employing plastic bonded abrasive stones. Several banks of stones may be incorporated

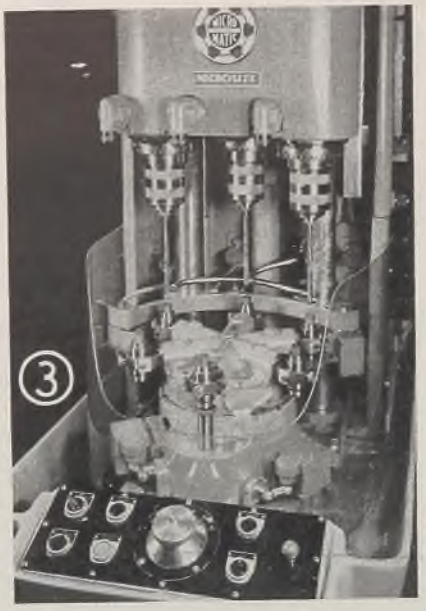
The most important aspect of the plastic mounted stones, however, appears to be the fact that the plastic end tabs are designed to pass inside a gaging ring with each stroke of the honing tool. This ring is machined and honed to the finished diameter desired in the hole and as the stones expand with stock removal the end tabs contact the inner diameter of the gaging ring when the finished diameter has been reached. This serves to rotate the gaging ring sufficiently to trip a solenoid and stop the honing spindle precisely when the correct diameter has been attained. In effect, the honing tool itself acts as a plug gage and the sizing ring as a master ring gage. In combination they relieve operators of the responsibility for gaging or watching gage dials.

With these three basic developments in hand, Micromatic Hone engineers moved forward to the study and development of a wide variety of novel production honing arrangements, for with automatic sizing control it became possible at once to design either progressive or multiple setups which greatly speed up the process where it is repetitive on large quantities of identical parts. One development is a three-spindle vertical hydraulic honing machine (Fig. 2) with a rotary indexing six-station table suitable for rapid honing of small parts as bushings or gears. Under a progressive arrangement, one spindle would do rough honing, a second semi-finish honing and the third finish honing, the table indexing one station at a time. Work stations are at the rear of the table and the front stations provide the operator ample time to load and unload the pieces.

The same type of indexing table can be adapted to a two-spindle machine (Fig. 3) where it is not necessary to re-

Fig. 2—Closeup of horizontal honing machine with new type tool and size control ring. Part here is silver plated aircraft engine bearing, inside diameter of which is being honed. Gaging ring and microswitch are mounted just outside the work fixture





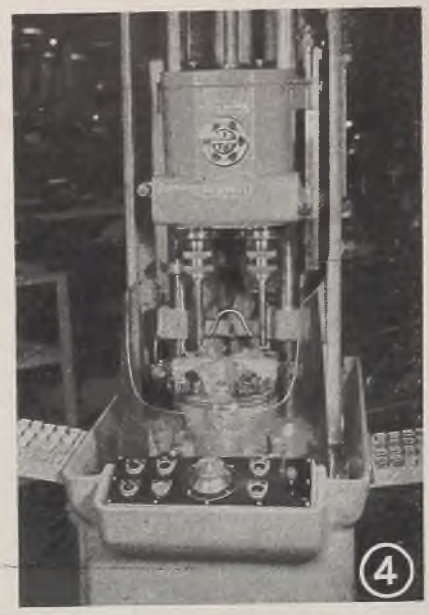


Fig. 3—Three-spindle hydraulic production honing machine with six-station indexing table. As table indexes, bushings move under rough, semifinish and finish honing spindles in sequence

Fig. 4—Two-spindle hydraulic honer for multiple honing. Bores in two gears are honed simultaneously, with automatic size control insuring precision. Note feed control dials on each spindle

Fig. 5—Vertical Barnes honing machine for large diameter honing, fitted with hydraulic size control or "fluid gaging" arrangement

move as much stock as in the previous case. Here the work indexes from rough honing to a cooling station between the spindles and then to the finish honing. This setup is usually recommended for maximum stock removal ranging from 0.0035-inch in ¼-inch diameter bores to 0.005-inch in 1-inch diameter bores, while the three spindle arrangement is recommended for maximum stock removal ranging from 0.007-inch in ¼-inch bores to 0.010-inch in 1-inch bores.

A third arrangement, for multiple honing, uses the same type of indexing table but involves two spindles performing the same operation simultaneously at the two rear stations. The table indexes two stations at a time, bringing two stations loaded with stock under the honing spindles and advancing two honed parts to the front for removal. This method is usually recommended for maximum stock removal ranging from 0.0005-inch to 0.0015-inch for hardened parts (55 Rockwell C or better), 0.001-inch to 0.003-inch for soft or medium hard parts, in bores from ¼ to 2 inches diameter.

With all these arrangements, each station on the indexing fixture has its own gaging ring which trips the spindle when the end tabs of the stones make contact with it. This type of machine has been used to provide high-speed sizing of such parts as diesel fuel injectors, pinion gears, precision bearings, compressor housing bores, piston pin holes, connecting rods, bushings, valve guides, hydraulic pump bores, rocker arms, ceramic tubes and valve bodies.

While the automatic size control feature would appear adaptable to practically any diameter, so far it has been applied principally in the smaller diameter ranges. It is believed 4 inches may be the maximum practical limit. It is of course adaptable to both vertical and horizontal types of honing machines.

One interesting application of a horizontal machine has been the production honing of a silver plated bearing for the Rolls-Royce Merlin engine (Fig. 4). Previous practice was to broach the hole in the bearing, silver plate, ream the hole and face the ends, rough bore the silver, grind the small O.D. and face, grind the large O.D. and face, semifinish bore the silver and precision bore the silver. This setup required three boring machines to finish the hole, with total boring time of 3 minutes and 36 seconds.

By what amounts to "turning the process inside out" and generating the outside diameter from the precision honed inside diameter, it was possible to substitute two honing machines for the three boring machines and cut the finishing time to 2 minutes and 20 seconds. Overall costs were reduced 50 per cent. Sequence of operations with honing is: Broach the hole, silver plate, bore the inside diameter, rough hone the inside diameter, then grind the two outside diameters and finally finish hone the inside diameter to size.

For size control on larger diameter bores, Micromatic Hone engineers have experimentally fitted a large Barnes vertical honing machine (Fig. 5) with ingenious hydraulic size control syst based on the solex principle of fluid g ing. The honing tool is arranged v several hydraulic lines dischar through port openings in the O.D. the hone body. Pipelines are fitte these holes and coolant fluid is pum under pressure through them. At start of the honing operation there i certain back pressure on these li which is proportioned to the clearan between the outlets and the I.D. of bore. As the honing proceeds and diameter is enlarged, the pres drops because the fluid can escape m readily in the space between the ft outlets and the wall of the bore. properly calibrating this pressure dr it is possible to develop an indic which will show when the proper amo of stock has been removed.

Several hundred production engine master mechanics and their staffs h visited demonstrations of these machi at the Micromatic plant in the p week or two and have come away c siderably impressed. Some of th have stated the developments lik will require them to change their pl for postwar machining setups; this fact is one reason why Kirke W. Conn Micromatic president, and his associa decided to hold the demonstration. (viously present restrictions prevent company from building and selling new types of equipment, but if p pective customers can be at least formed of what is "in the wo so to speak, their planning will be ed just that much.

MEN of INDUSTRY

A. WARD JENKS

PETER ROBERTSON

JOHN D. GORDON

CHESTER L. SHAW

A. Ward Jenks has joined Crucible Steel Co. of America, Pittsburgh, as sales manager, Forge Blanks division, making his headquarters in Detroit.

—o—

Henry E. Mooberry, for the past year assistant director of advertising and publicity, United Aircraft Corp., East Hartford, Conn., has been appointed assistant to the president.

—o—

Harry H. Marsales, general traffic manager, Wickwire Spencer Steel Co.'s River road plant, Buffalo, has been named chairman of the Transportation Section, Buffalo Chamber of Commerce.

—o—

Robert B. Algie has been made resident manager of sales for the office which Jones & Laughlin Steel Corp., Pittsburgh, has opened in the Union Trust building, New Haven, Conn.

—o—

Appointments by General Electric Co., Bridgeport, Conn., include: **M. B. Ross,** manager, heating device and fan divisions; **R. O. Fickes,** manager, clock division; **George E. Mullin Jr.,** sales manager, electric sink and water heater division; **R. E. Boian,** sales manager, heating devices, and **C. R. Thorson,** sales manager, clocks.

—o—

John W. Price has been appointed assistant purchasing agent, National Tube Co., Pittsburgh.

—o—

Arthur G. Neubauer has been made sales manager in charge of jobbing sales for Mid-West Abrasive Co., Detroit.

—o—

Harry D. Grow has been appointed district purchasing agent of the Lackawanna plant of Bethlehem Steel Co.

—o—

Col. Donald J. Keirn, Army Air Forces, has been selected to receive the 1944 Thurman H. Bane Award of the Institute of Aeronautical Sciences for his work in the development and utilization of the new jet propulsion engine.

—o—

James A. Baubie, assistant manager, public relations department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received the company's Order of Merit in recognition of exceptional ability in his field.

—o—

Peter Robertson, assistant chief industrial engineer, Republic Steel Corp., Cleveland, has been appointed works manager of the Youngstown, O., plant, Truscon Steel Co., Republic subsidiary. Mr. Robertson succeeds **W. M. Kelley,** who recently was appointed assistant to the vice president in charge of operations of Republic.

—o—

John D. Gordon, formerly executive assistant to the president, Federal Machine & Welder Co., Warren, O., has joined Progressive Welder Co., Detroit, as general sales manager. **K. Swanson,** formerly chief engineer, Federal Machine & Welder Co., also has joined Progressive Welder Co., as chief engineer, and **W. Kaiser** has become affiliated with the company as development and application engineer. **L. M. Benkert,** plant manager, assumes additional responsibility as supervisor of service and service engineering. New members of the Progressive sales organization are **T. E. Kirchner** and **J. A. Gable.**

—o—

Charles H. Slaughter, formerly general sales and dealer relations manager, Liberty Planers Inc., Hamilton, O., has been named national sales manager, Thomas Machine Mfg. Co., Pittsburgh.

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R. L. Wilcox, who has been affiliated with the Conservation Division, WPB, since March, 1942, as zinc consultant and later as chief of the Metals Branch, will return to the New Jersey Zinc Co. and will be located in the Chicago office after Nov. 1.

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A. P. Lee, consultant of the WPB Steel Division, Forging and Casting Division, has returned to Bethlehem Steel Corp., Bethlehem, Pa.

—o—

Carl E. Schubert, assistant professor of mechanical engineering, University of Illinois, has been granted a one year leave of absence to serve as manager, Certified Core Oil & Mfg. Co., Cicero Ill. He will spend much of his tim visiting and consulting with foundrie in all parts of the country.

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Chester L. Shaw has been appointe personnel director, Warren City Mfg Co., Warren, O. Mr. Shaw was for merly divisional manager of industria relations, Willys-Overland Motors Inc. Toledo, O.

—o—

John H. Rothermel, assistant to th district manager and industrial relation representative for the eastern district Westinghouse Electric & Mfg. Co., Eas Pittsburgh, Pa., has received the com pany's Order of Merit.

—o—

Dr. M. H. Kronenberg, formerly chief Division of Industrial Hygiene, Illinoi State Department of Health, has been appointed assistant to the medical director, Caterpillar Tractor Co., Peoria, Ill., and **Dr. S. M. Scalzo,** on Caterpillar's medical staff since 1942, has been named chief plant physician.

—o—

John C. Lee, who has served as acting general manager, Aeronautical Chamber of Commerce, for the past three months, and former manager, Aircraft War Production Council, West Coast, has been elected president, Menasco Mfg. Co., Burbank, Calif.

—o—

M. A. Cornish, superintendent, has been placed in full charge of the Carbondale, Pa., plant and office of American Welding Co., subsidiary of American Car & Foundry Co., New York.

—o—

John W. Sands, who has been with the Conservation Division, War Production Board, since January, 1942, has resumed his duties with the Development and Research division, International Nickel Co. Inc., New York.

—o—

Francis D. Bowman, formerly advertising manager, has been appointed director of public relations, Carborundum Co., Niagara Falls, N. Y. The company's advertising department has been consolidated with the merchandising depart-

J. A. PROVEN

WALTER H. WIEWEL

JOHN S. HUTCHINS

ment, and all industrial advertising will be under the supervision of **M. S. Ireys**, director of merchandising, with Mr. Bowman continuing to direct the company's advertising in national mediums.

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J. A. Proven, formerly general sales manager, Sterling Tool Products Co., Chicago, has been elected vice president. He will continue to be responsible for policies relating to sales and advertising.

—o—

Harold B. Donley has been made manager, Radio Receiver division, Westinghouse Electric & Mfg. Co., Baltimore. Until recently Mr. Donley was general appliance manager of the company's subsidiary, Westinghouse Electric Supply Co.

—o—

L. B. Neumiller, president, Caterpillar Tractor Co., Peoria, Ill., has been elected a trustee of the Illinois Institute of Technology and Armour Research Foundation.

—o—

James McClure has been appointed public relations representative for the Pacific region, Allis-Chalmers Mfg. Co., Milwaukee, with headquarters in the company's San Francisco office.

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John Otto Almen, head of mechanical department No. 1, General Motors Research Laboratories, has been awarded the Manly Memorial Medal by the Society of Automotive Engineers for his work in developing methods and data for increasing the working strength of metals and of engine parts.

—o—

Burton M. Riker has been appointed assistant to the executive vice president, Toastmaster Products division, McGraw Electric Co., Elgin, Ill. He will continue to handle war contracts for the company until all war production obligations are terminated.

—o—

Newly-appointed district managers for Graybar Electric Co. Inc., New York, include **G. T. Marchmont**, Southwestern district, Dallas, Tex.; **W. E. Henges**, Erie district, Cleveland, and **R. W. Kimberlin**, Mississippi Valley district, St. Louis. Mr. Marchmont and Mr. Henges succeed **M. A. Buehler** and **A. L. Perry**, respectively, both of whom are retiring. Mr. Marchmont's appointment becomes effective Nov. 1, while the other two will become effective Nov. 15.

—o—

Walter H. Wiewel, who has served the War Production Board for several years as chief, Tubing Branch, Steel Division, and as vice chairman, Production Directive Committee, and formerly assistant general manager of sales, Jones & Laughlin Steel Corp., Pittsburgh, has been appointed assistant to the president, National Tube Co., Pittsburgh.

—o—

John S. Hutchins, since Jan. 1 vice president in charge of sales, Ramapo Ajax division of American Brake Shoe Co., New York, has been appointed executive vice president.

—o—

D. G. Christen has been appointed land commissioner, Southern Pacific Co., succeeding the late Turner McAllaster.

—o—

Dr. Richard M. Hitchens has been named associate research director, Organic Chemicals division, Monsanto Chemical Co., St. Louis. Previously he had been assistant research director.

—o—

J. P. Pettigrew has resigned as assistant deputy minister, Department of Munitions and Supply, Ottawa, Que., Canada. Mr. Pettigrew will continue to serve on a part time basis as general consultant, on loan from Philips Industries Ltd., of which he is the managing director.

—o—

George Mast will join Milwaukee Metal Spinning Co., Milwaukee, Nov. 1, as engineering and production supervisor.

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Donald L. McGee has been appointed director of advertising, Corronizing division, Standard Steel Spring Co., Coraopolis, Pa.

—o—

Henry G. Goehring, formerly assistant director of industrial relations, White Motor Co., Cleveland, has been named director of industrial relations, succeeding **Lon A. Fleener**, who returns to his former position as manager, Wholesale division.

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F. C. Harry Vaughan has been appointed to the Midwest sales office of Yarnall-Waring Co., Philadelphia.

—o—

Lee F. Sickler, formerly associated with Ampco Metal Inc., Milwaukee, has been named works manager, Maysteel Products Inc., Mayville, Wis.

—o—

R. P. M. Carmody has been appointed sales representative in the Buffalo area for the Storage Battery division, Philco Corp., Trenton, N. J.

—o—

Don A. Imus has been appointed shop superintendent, Pacific Engineering Corp., Los Angeles; **Ambrose Wirkus** has been named assistant shop superintendent, and **Charles Roth** is purchasing agent.

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Westinghouse Electric Supply Co., New York, has announced the following appointments: **Robert Hills**, central district stores manager, Detroit; **A. C. Kacher**, manager of the Minneap-

GEORGE L. SNYDER

Who has been named chief engineer and assistant to the general manager, Lukenweld Inc., Coatesville, Pa., noted in STEEL, Oct. 16, p. 83.

olis branch; **Austin B. Watson,** purchasing agent for the newly-established purchasing department, Dallas, Tex., and **Russell N. Chapman,** apparatus and supply manager, New England district, Boston.

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M. J. Dreifus has been appointed general sales manager, General Maintenance Engineers, Philadelphia. Previously he had been general superintendent of Good Roads Machinery Corp., Kennett Square, Pa.

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Donald Teetor, recently named general sales manager, Perfect Circle Co., Hagerstown, Ind., has been elected vice president in charge of sales.

—o—

Evelyn S. Carlson has been named sales and production co-ordinator at the Newark, N. J., plant of Wickwire Spencer Steel Co.'s subsidiary, Wickwire Spencer Metallurgical Corp.

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H. W. Brown has been elected vice president and general manager, Kelley Mfg. Co., Houston, Tex., **H. L. Slaughter** has been elected vice president and assistant general manager, and **L. C. Klump** is purchasing agent.

—o—

J. W. Ackerman has been appointed district sales manager of the New York and Boston territories of American Chain & Cable Co. Inc., Bridgeport, Conn. **Donald T. Ward** has been named plant manager, and **Duncan L. Edwards Jr.** is production manager of the company's Pennsylvania Lawn Mower division, Primos, Pa.

—o—

Robert C. Downie, district chief, Pittsburgh Ordnance District, has been promoted from lieutenant colonel to colonel.

—o—

Roy T. Giles has been appointed sales manager, Atlas Lumnite Cement Co., New York, United States Steel Corp. subsidiary.

—o—

M. W. Cole has been appointed assistant general manager western sales, Bethlehem Steel Co., Bethlehem, Pa., and will make his headquarters in Detroit. For almost three years Mr. Cole has served as chief of the Plate and Shape Branch, WPB Steel Division.

—o—

Myron C. Bosworth has been appointed division superintendent at Central Furnaces and Docks of American Steel & Wire Co., Cleveland. **Joshua B. Lee** succeeds Mr. Bosworth as general foreman, furnaces.

—o—

H. T. Dyett, previously president, Rome Cable Corp., Rome, N. Y., has been elected chairman of the board, and **A. D. R. Fraser,** formerly secretary, has been elected president.

—o—

Sperry L. Searles has been elected president of H. B. Fuller Equipment Co., Cleveland, distributor in northern Ohio for industrial electric lift trucks, industrial cars and quarry cars, etc., built by Easton Car & Construction Co., Easton, Pa.

—o—

Frederick H. Eaton, sales engineer for American Car & Foundry Co., New York, until recently attached to the company's sales office in Washington, has been transferred to the New York sales office.

—o—

Harry M. Dunn has been appointed sales and service representative in the south Texas territory for Eclipse Counterbore Co., Detroit.

—o—

Oscar C. Gruender has been appointed consulting engineer, Crusher & Screen division, Nordberg Mfg. Co., Milwaukee. Mr. Gruender has been associated with the company since 1928, serving most of that time as general manager, Crusher division.

—o—

A. F. Colling Jr., formerly assistant manager of sales, Sheet and Strip Steel division, Weirton Steel Co., Weirton, W. Va., has been appointed manager of sales, National Steel Products Co., Houston, Tex.

—o—

Walter Sormane, formerly sales manager, Heating division, Schwitzer-Cummins Co., Indianapolis, has been appointed general sales manager, Conco Engineering Works, Mendota, Ill.

OBITUARIES

Roland Kelley, 51, for many years advertising manager, Timken Roller Bearing Co., Canton, O., died recently in Philadelphia. Mr. Kelley had resigned last January, and had since made his home in Philadelphia.

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John B. Cameron, 43, superintendent of open hearth furnaces of the Canton, O., division, Republic Steel Corp., Cleveland, died Oct. 9 at his home near Canton.

—o—

Daniel J. Lloyd, 38, head of the cost and production department of Jones & Laughlin Steel Corp., South Side works, Pittsburgh, died recently in that city.

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Brig. Gen. J. H. Gardner, 51, assistant chief of the procurement and distribution service, Army Signal Corps, died Oct. 11 in Walter Reed General hospital, Washington.

—o—

Ward K. Jones, director of Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., died Oct. 16 in New York. Mr. Jones was the grandson of the late William L. Ward, founder of the company.

—o—

Arthur V. Carroll, 69, founder and head of the A. V. Carroll Machine Tool Co., Norwood, O., until his retirement in 1929, died Oct. 14 in Cincinnati. He was recognized as a pioneer in designing of machine tools.

—o—

Anthony Malloy, 53, president of Rex Metal Parts Co., Cleveland, which he founded more than a quarter of a century ago, died Oct. 15 in Cleveland.

—o—

Stanley Gorczyca, 56, locomotive engineer at Republic Steel Corp., Cleveland, died there Oct. 11.

—o—

Jack G. Hurd, 26, industrial engineer, North American Aviation Inc., Inglewood, Calif., died recently.

—o—

Albert E. Petermann, president and general manager of Calumet & Hecla Consolidated Copper Co., Boston, since 1941, died Oct. 15 in Calumet, Mich. From 1912 until his election to the presidency Mr. Petermann had been general counsel for the company. Mr. Petermann was chairman of the board of control, Michigan College of Mining and Technology.

—o—

Harry D. Hopkins, 67, head of the purchasing department, Waukesha Motor Co., Waukesha, Wis., died Oct. 13 in that city.

—o—

Frederick B. Cooley, 68, board chairman and former president of New York Car Wheel Co., Buffalo, died Oct. 12 in that city. Mr. Cooley had been in the car wheel business 47 years and had purchased New York Car Wheel Co. 31 years ago.

—o—

Guy Franklin Creveling, 54, vice president and secretary, African Metals Corp., New York, died Oct. 12 in Morristown, N. J. For many years Mr. Creveling was affiliated with Penton Publishing Co., Cleveland, publisher of STEEL and other business publications in the capacity of associate editor, specializing in nonferrous metals.

—o—

John H. Goss, 72, former president, Scovill Mfg. Co., Waterbury, Conn., died there Oct. 16. At the time of his death he was board chairman of the company. Mr. Goss had been chairman of the executive committee, New Britain Machine Co., New Britain, Conn.

—o—

Henry May Sr., 83, the last of the Pierce-Arrow Motor Car Co. executives, died Oct. 15 in Buffalo.

—o—

Charles Eugene Wendnagel, 79, owner of Wendnagel & Co., Chicago, died Oct. 14 in Chicago.

—o—

Robert J. Morgan, 69, superintendent of machine shops at Bethlehem Steel Co.'s San Pedro, Calif., shipyards, died Oct. 12 in Long Beach, Calif.

August Steel Shipments Increase

Gain of about 240,000 tons over July total of 5,597,631 tons reported by American Iron and Steel Institute. Plates lose first place in shipment tonnage to sheets

STEEL shipments of 5,837,328 net tons in August were reported last week by the American Iron and Steel Institute, compared with 5,597,631 tons in July. Shipments for eight months totaled 46,-342 tons, compared with 44,246,548 tons in the comparable period in 1943.

Plates lost first place in tonnage, sheets gaining it in August. Hot-rolled sheets totaled 1,139,406 tons, 67.5 per cent of capacity, while plate tonnage reached 1,047,554 tons, 76.7 per cent of capacity. In July sheet production was 1,120,912 net tons, for hot-rolled, which was 66.1 per cent of capacity. Plate output in July was 1,055,204 tons, 77.9 per cent of capacity.

Other August figures included 324,-318 tons of structural shapes, standard rails 195,819 tons, 742,066 tons of hot-rolled carbon bars, 263,867 tons of alloy bars, 156,260 tons of cold-finished carbon bars and 32,619 tons of cold-finished alloy bars, 189,056 tons of seamless pipe, 312,696 tons of drawn wire, hot-dipped tin and terne plate 197,675 tons and electrolytic 51,508 tons, cold-rolled sheets 322,910 tons, galvanized sheets, 124,451 tons, hot-rolled strip 230,212 tons and cold-rolled 99,257 tons.

Of total August production 677,914 tons were shipped to members of the industry for conversion into further finished products. During 1943 the companies included in this compilation represented 98.9 per cent of total output of finished rolled steel products as reported to the Institute.

Lists DPC Plants To Be Sold When Declared Surplus

Jesse H. Jones, Secretary of Commerce and chairman of the Defense Plant Corp., has issued a descriptive list of government-owned plants which eventually will be declared surplus and offered for sale.

(A comprehensive report on the Surplus Property Disposal act, which was signed by President Roosevelt on Oct. 3, is published in Windows of Washington, page 42 of this issue).

In a letter addressed to bank presidents, he said, as head of the Reconstruction Finance Corp.:

"As you know, we have always stressed that we are not in competition with private lending institutions. However, we do stand ready to consider participating with you in loans that you may make in connection with financing the purchase or operation of these plants."

Properties listed include those operated by Republic Steel Corp., National Acme Co., Eaton Mfg. Co., Ferro Enamel Supply Co., General Electric Co., Towmotor Corp., Cleveland Automatic Machine Co., Warner & Swasey Co., Wellman Bronze & Aluminum Co., Marquette Metal Products Co., National Aluminum Cylinder Head Co., Ohio Crankshaft Inc., Ohio Emergency Pipeline Inc., Pipe Machinery Co., Pesco Products Co., and Cleveland Graphite Bronze Co., all in Cleveland. Similar plants located in other sections of the country are also described in the list.

AMERICAN IRON AND STEEL INSTITUTE
CAPACITY, PRODUCTION AND SHIPMENTS

Period AUGUST - 1944

Steel Products	No. Companies Reporting	Line	Maximum Annual Potential Capacity (Net Tons)	Current Month: Production Net Tons	Current Month: Production Per cent of capacity	Current Month: Shipments (Net Tons) Total	Current Month: Shipments (Net Tons) To members of the industry for conversion into further finished products	To Date This Year: Production Net Tons	To Date This Year: Production Per cent of capacity	To Date This Year: Shipments (Net Tons) Total	To Date This Year: Shipments (Net Tons) To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	49	1	xxxx	xxxx	xxx	759,985	263,377	xxxx	xxx	5,852,659	1,951,055
Structural shapes (heavy)	10	2	8,942,250	324,318	43.9	297,809	xxxx	2,654,326	45.3	2,575,702	xxxx
Steel piling	4	3		8,033		9,339	xxxx	49,187		51,071	xxxx
Plates (universal and sunmaxal)	23	4	16,113,620	1,047,554	76.7	1,003,342	145,030	9,055,061	84.3	8,795,801	525,417
Rails	6	5	xxxx	xxxx	xxx	70,454	54,684	xxxx	xxx	556,500	434,362
Rails—Standard (over 60 lbs.)	4	6	3,625,000	195,819	53.7	177,191	xxxx	1,531,655	63.4	1,510,585	xxxx
Rails—All other	6	7	525,000	14,675	33.0	17,528	xxxx	128,657	36.8	131,611	xxxx
Track accessories and tie plates	13	8	1,745,500	66,179	44.8	66,350	xxxx	539,226	46.4	552,403	xxxx
Axles	10	9	350,640	12,763	43.0	13,514	xxxx	98,350	42.1	104,927	xxxx
Bars and Tool Steel Bars—Carbon	37	10	xxxx	742,066	xxx	589,045	79,257	5,823,911	xxx	4,819,965	622,135
Bars—Reinforcing—New billet	15	11	xxxx	49,333	xxx	51,675	xxxx	319,439	xxx	338,497	xxxx
Bars—Rerolled	14	12	xxxx	3,117	xxx	3,452	xxxx	46,708	xxx	57,532	xxxx
Bars—Alloy	24	13	xxxx	263,867	xxx	188,295	33,820	2,085,688	xxx	1,516,885	290,799
Bars—Total	47	14	21,965,470	1,058,383	56.9	832,471	113,077	8,275,746	56.5	6,732,879	912,934
Cold Finished Bars—Carbon	23	15	xxxx	156,260	xxx	155,585	xxxx	1,201,247	xxx	1,196,609	xxxx
Cold Finished Bars—Alloy	22	16	xxxx	32,619	xxx	31,344	xxxx	275,506	xxx	248,035	xxxx
Bars—TOTAL	30	17	2,728,850	188,879	81.8	186,929	xxxx	1,476,753	81.2	1,444,644	xxxx
Pilings, steel sheet	17	18	262,120	12,804	57.6	12,812	xxxx	96,615	55.3	92,780	xxxx
Pipe and Tubes—Butt weld	16	19	2,186,870	124,685	67.3	125,196	xxxx	948,659	65.1	948,266	xxxx
Pipe and Tubes—Lap weld	8	20	920,200	46,419	59.5	47,160	xxxx	384,639	62.7	384,922	xxxx
Pipe and Tubes—Electric weld	9	21	1,304,100	76,861	69.5	79,097	xxxx	546,753	62.9	544,542	xxxx
Pipe and Tubes—Seamless	15	22	2,617,300	189,056	86.2	194,797	xxxx	1,554,151	89.1	1,568,246	xxxx
Pipe and Tubes—Conduit	7	23	187,000	5,425	34.2	6,325	xxxx	38,440	30.8	38,510	xxxx
Pipe and Tubes—Mechanical tubing	12	24	1,050,400	69,904	78.5	65,298	xxxx	546,748	78.1	541,900	xxxx
Wire—Basic	26	25	7,019,370	386,390	65.0	119,621	39,481	3,026,075	64.7	926,080	304,148
Wire—Drawn	42	26	5,670,980	312,696	65.1	192,041	9,229	2,453,759	64.9	1,441,963	68,070
Wire—Nails and staples	19	27	1,247,720	52,640	49.8	53,177	xxxx	450,309	54.1	440,062	xxxx
Wire—Barbed and twisted	15	28	546,030	21,948	47.4	22,190	xxxx	169,399	46.5	167,495	xxxx
Wire—Woven wire fence	16	29	1,112,200	32,313	34.3	31,790	xxxx	255,212	34.4	251,092	xxxx
Wire—Bale ties	12	30	149,500	6,254	49.4	6,980	xxxx	52,437	52.6	50,703	xxxx
Tin Plate—Ordinary	9	31	xxxx	xxxx	xxx	44,299	22	xxxx	xxx	321,045	908
Tin Plate—Chemically treated	8	32	464,000	9,424	24.0	8,673	xxxx	99,235	32.1	93,711	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,719,650	197,675	62.7	192,689	xxxx	1,276,222	51.5	1,346,392	xxxx
Tin Plate—Electrolytic	10	34	2,155,100	51,508	28.2	45,707	xxxx	439,688	30.6	414,387	xxxx
Sheets—Hot rolled	26	35	19,932,600	1,139,406	67.5	574,176	27,975	8,425,510	63.4	4,262,175	176,514
Sheets—Cold rolled	14	36	7,316,380	322,910	52.1	167,639	xxxx	2,456,724	50.4	1,328,150	xxxx
Sheets—Galvanized	15	37	2,826,130	124,451	52.0	125,423	xxxx	869,749	46.2	868,807	xxxx
Strip—Hot rolled	22	38	8,584,200	230,212	31.6	146,445	25,039	1,787,345	31.2	1,141,245	185,935
Strip—Cold rolled	34	39	3,249,470	99,257	36.0	95,461	xxxx	784,787	36.2	734,275	xxxx
Black plate (for tinning, rolled steel)	5	40	348,800	22,764	87.2	24,594	xxxx	195,797	84.2	191,255	xxxx
Skelp	6	41	416,170	17,420	49.4	16,357	xxxx	137,383	49.5	132,273	xxxx
All other	5	42	172,290	5,033	34.5	4,669	xxxx	30,650	26.7	30,584	xxxx
TOTAL STEEL PRODUCTS	154	43	xxxx	xxxx	xxx	5,837,328	677,914	xxxx	xxx	46,599,642	4,538,173
Pickling and finishing capacity	154	44	64,722,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Ratio of shipments to effective finishing capacity	154	45	xxxx	xxxx	xxx	94.1 %	xxxx	xxxx	xxx	97.4 %	xxxx

WING TIPS

Ten thousandth Flying Fortress delivered to Army Air Forces. Spotlights unique and successful production pool by three companies—Boeing, Douglas and Lockheed. Similar plan is being used to mass-produce B-29 Superfortresses

DELIVERY of the 10,000th Boeing Flying Fortress, spotlighting one of the most successful and unique war production "pools" in American industrial history, was announced recently by the Aircraft War Production Council on behalf of the Boeing, Douglas and Lockheed aircraft companies.

The Army Air Forces took delivery of Flying Fortress No. 9999 from Douglas Aircraft Co. in Long Beach, Calif., No. 10,000 from the Boeing Aircraft Co. in Seattle and No. 10,001 from the Lockheed Aircraft Corp. in Burbank, Calif.

"At the time it was organized, the B-17 production pool was pointed to as the outstanding example of the aircraft industry's willingness to put patriotic duty above its own interests," said William F. Peters, manager of the Aircraft War Production Council.

"One firm agreed to share its design information while the other two agreed to set aside some of their own work to co-operate in building a single type of plane," he commented. "It will go down in history as a symbol of American industry's resourcefulness and spirit of co-operation in the national emergency."

Of the 10,001 Flying Fortresses which have been delivered since Pearl Harbor—Dec. 7, 1941—6143 have been built by Boeing, 1982 by Douglas and 1876 by Lockheed.

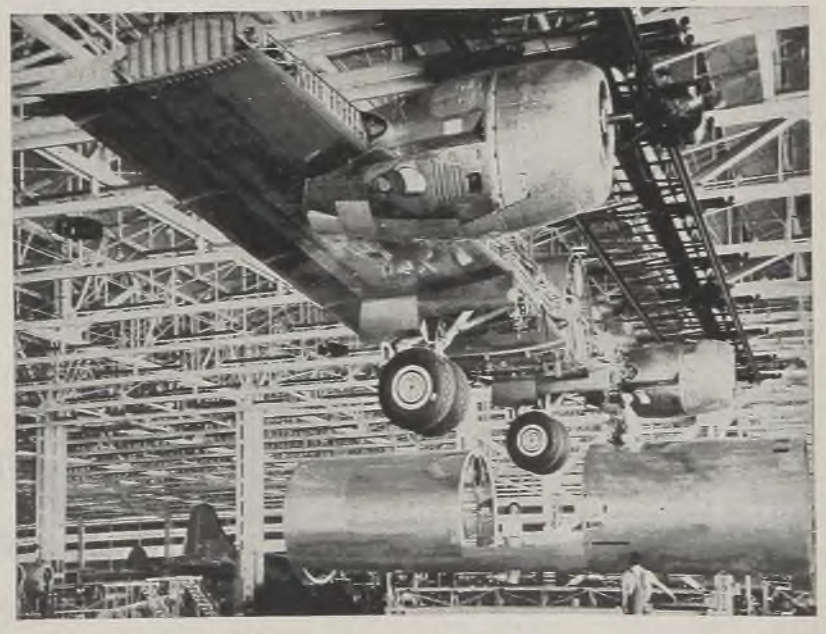
These three aircraft companies were brought together in May, 1941, in the unprecedented production pool which was organized to meet the Army's tremendous need for the Flying Fortress.

Before this date, the Boeing company in Seattle had been the sole producer of Flying Fortresses, the first of which made its original flight in 1935. Under the pool arrangement, Boeing was charged with furnishing its engineering data and production information to Douglas and Lockheed to facilitate their getting into immediate production. With the airplane to be built at three separate points and with hundreds of subcontractors and suppliers furnishing subassemblies and parts that had to be interchangeable, a central control organization for operation of the pool was a necessity.

This problem was solved by organization of the Boeing-Douglas-Lockheed B-17 committee, made up of representatives of the Army and each of the three participating companies. This committee, with headquarters in Seattle, has met regularly to co-ordinate production problems confronting the manufacturing pool.

This plan was so successful that a similar one was set up when the Boeing B-29 Superfortress was thrown into nation-wide production program with Boeing again furnishing engineering and production data to other firms for building the Boeing product.

The Aircraft War Production Council is the co-ordinating agency of the Boeing, Consolidated Vultee, Douglas, Lockheed, North American, Northrop and Ryan aircraft manufacturers, all committed to the policy of industrial teamwork and exchange of "know-how" and resources for the duration.



PERFECT FIT: Prefabricated units, manufactured separately, make for rapid completion of the B-29 Superfortress at the Boeing Wichita, Kans., plant. Here a 17-ton main center wing section with two engines and landing gear is lowered to join fuselage bomb bay section. Because of the perfect fit, the bomb bay section is jacked up to allow a quarter of an inch tolerance spread as the two nestle together. NEA photo

Predicts Jet Propulsion To Revolutionize Industry

Although jet propelled airplanes are still in the "experimental stage" and "not too economical to make," Lawrence D. Bell, president, Bell Aircraft Corp., Buffalo, predicts "jet propulsion will completely revolutionize the aviation industry after the war."

Within five years, jet planes "will definitely eliminate all other types of fighter planes, and some time in the future will be used in bombers and transport planes," Mr. Bell said.

Jet propulsion, Mr. Bell asserted, "will enable the industry to get a new start. There is no doubt that jet planes will make all present aircraft obsolete in years to come.

"In the same line, we also have buzz bombs and remote controlled bombing planes. That's coming too. We'll have bombing planes not operated by human beings."

And then, "sometime in the future," he continued, "perhaps longer in the future than the time required for conversion of regular type aircraft to jet propulsion, we'll probably also have a helicopter."

Eastern Air Lines Plans $25 Million Expansion

A $25,000,000 expansion of Eastern Air Lines' Great Silver Fleet through the purchase of multi-engine Curtiss-CW-20 Commando transport and Douglas DC-4 was announced recently by Capt. Eddie Rickenbacker, president and general manager, Eastern Air Lines, New York.

Signing of a contract by G. A. Vaughan, president, Curtiss-Wright Corp., and Captain Rickenbacker followed approval of the huge expansion program by Eastern's board of directors.

Captain Rickenbacker said that Eastern hopes to begin operation of high speed twin-engine Commandos by the end of 1945, war conditions permitting, and of four-engine DC-4's as soon thereafter as possible. The new equipment will make it possible to multiply plane mileage about five times in a three-year period of Eastern Air Lines' domestic and international expansion program. This constitutes approximately 50 per cent of an over-

Short Cut ON MACHINING NITRIDED STEEL

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speeds cutting of aircraft cylinders at 266 S.F.P.M.

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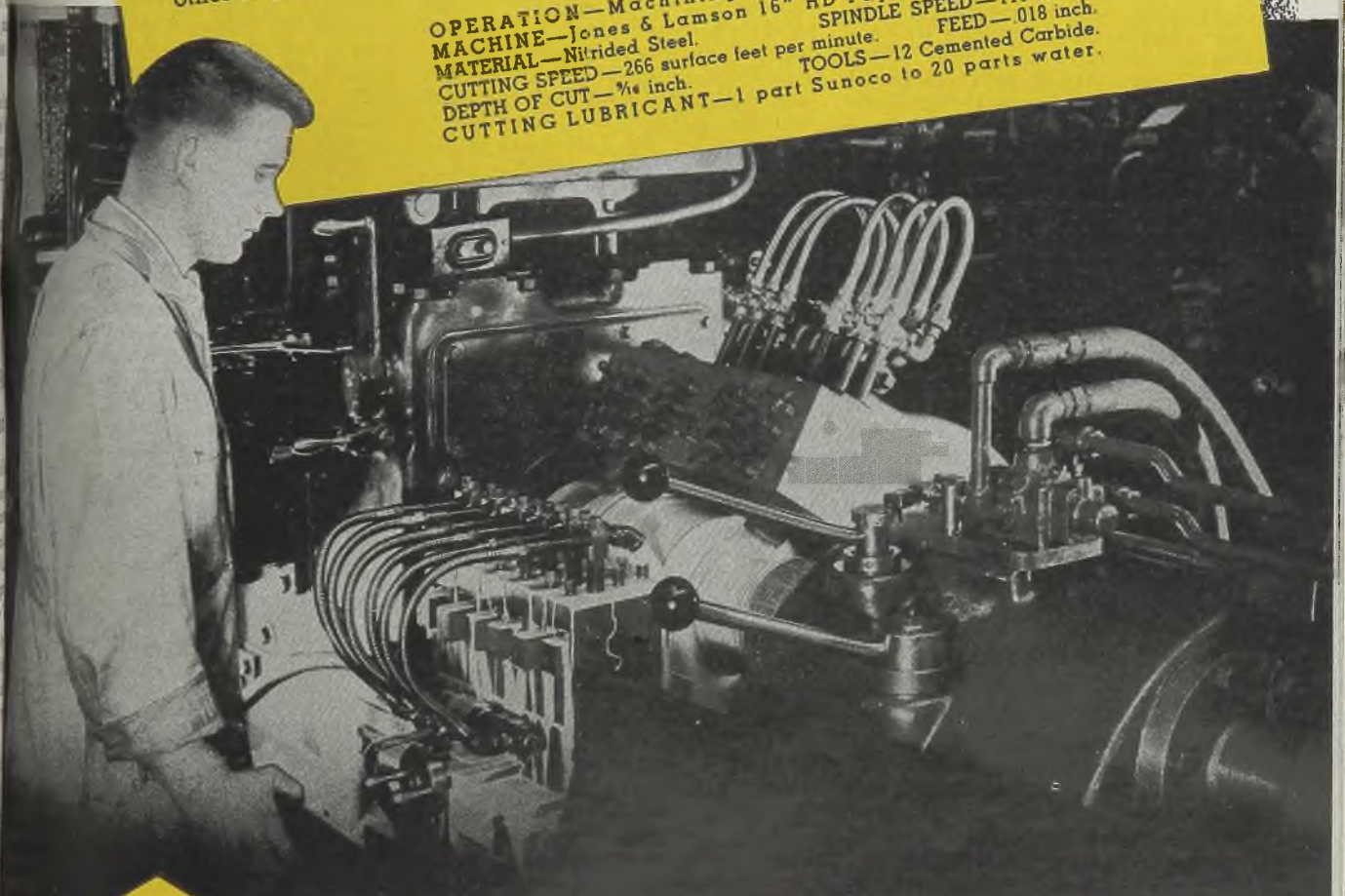
PERFORMANCE DATA

OPERATION—Machining Airplane Engine Cylinder.
MACHINE—Jones & Lamson 16" HD Fay Automatic Lathe.
MATERIAL—Nitrided Steel.
CUTTING SPEED—266 surface feet per minute.
SPINDLE SPEED—116 R.P.M.
DEPTH OF CUT—9/16 inch.
FEED—.018 inch.
CUTTING LUBRICANT—1 part Sunoco to 20 parts water.
TOOLS—12 Cemented Carbide.



SUNOCO

SUN INDUSTRIAL PRODUCTS

HELPING INDUSTRY HELP AMERICA

MADE FOR EACH OTHER: This speedy 7-ton tank now has a specially built glider to carry it into airborne invasion operations. Tailored to fit around the tank, the British Hamilton glider already has seen action in the invasion of Holland. Here the light tank moves into the glider under its own power. NEA photo

five-year expansion plan of the company.

The big new four-engined DC-4's which Eastern is purchasing are the commercial version of the famous C-54's.

Originally designed as a commercial air transport, the Curtiss CW-20 Commando was quickly adapted to military duty as the Army C-46. The Commando is the largest twin-engine transport plane in the world. The CW-20 was developed by Curtiss-Wright in co-operation with airline engineers to meet a definite demand for larger payload with greater reliability and reduced operating costs in the 200-700 mile range which accounts for over 80 per cent of the total of all commercial air travel in this country.

Captain Rickenbacker announced that Eastern's new Commando Silverliners will be equipped with giant 18-cylinder Wright Cyclones. These engines power the Army Lockheed C-69 Constellation transport, the world's record Martin Mars flying boat, and the B-29 Superfortress.

Wright, Eglin Fields Partners in Tests

An aeronautical partnership within the Army Air Forces is making possible miracles of engineering which pay off in the global skies.

The partners are engineers of the Air Technical Service Command, Wright Field, O., who develop new airplanes and equipment, and engineers of the AAF Proving Ground Command at Eglin Field, Fla., who make exhaustive operational tests on items which are the result of ATSC ingenuity.

Although the Engineering Division of ATSC uses cold chambers, all-weather rooms and other devices for laboratory testing and gives planes and equipment flight tests, it cannot do the thorough job of testing possible at Eglin Field with its great natural facilities and its concentration on proving. At Eglin Field, a sprawling giant on the Florida gulf coast, every type of test may be run. In collaboration with the AAF Board at Orlando, Fla., the PGC, which has established a cold-weather test detachment in an Arctic climate, casts a critical and practical eye at the products of the ATSC laboratories.

One example of how this teamwork pays off, is the famous ball turret on the B-17 Fortresses and the B-24 Liberators. Late in 1941, the idea of the ball turret was born out of the travail following Pearl Harbor. In four months of early 1942, the first ball turret was designed and built—one of the fastest jobs of experimental engineering on record. The Wright-Eglin partnership bore fruit in the months ahead.

The first ball turret was extremely heavy. Ammunition capacity was limited by space. There was no room for the gunner to wear a parachute. The turret was not adaptable to the Liberator which rested close to the ground.

By placing ammunition boxes outside the turret and feeding the ammunition downward through flexible chuting, the ammunition problem was solved. The seat of the turret was lowered so it became possible for the gunner to wear a back-type parachute without boosting his eyes above the gunsight line.

To allow for increased numbers of turret mechanisms and more ammunition within the turret, the contour of the turret was somewhat changed. It was made retractable by a hydraulic system which made it usable on the Liberators. Total weight of the ball turret was reduced.

All these things, and others, came about because of the partnership of the ATSC and PGC, and close liaison with civilian industry.

Novices Learn To Fly Small Plane Quickly

Four-year development of a small economical, civilian airplane, the "Ercoupe," which is simple to operate and safe to fly was reported to SAE National Aeronautic meeting in Los Angeles, Oct. 6 by Fred E. Weick, Engineering & Research Corp., Hyattsville, Md.

Mr. Weick said the plane, production of which was halted by war, has a simplified control system which eliminates foot pedals and requires co-ordination only of two controls; is spinproof and provided with effective lateral control of all speeds; and is equipped with tricycle gear which permits the plane to be landed at twice minimum speed without tendency to leave the ground after contact.

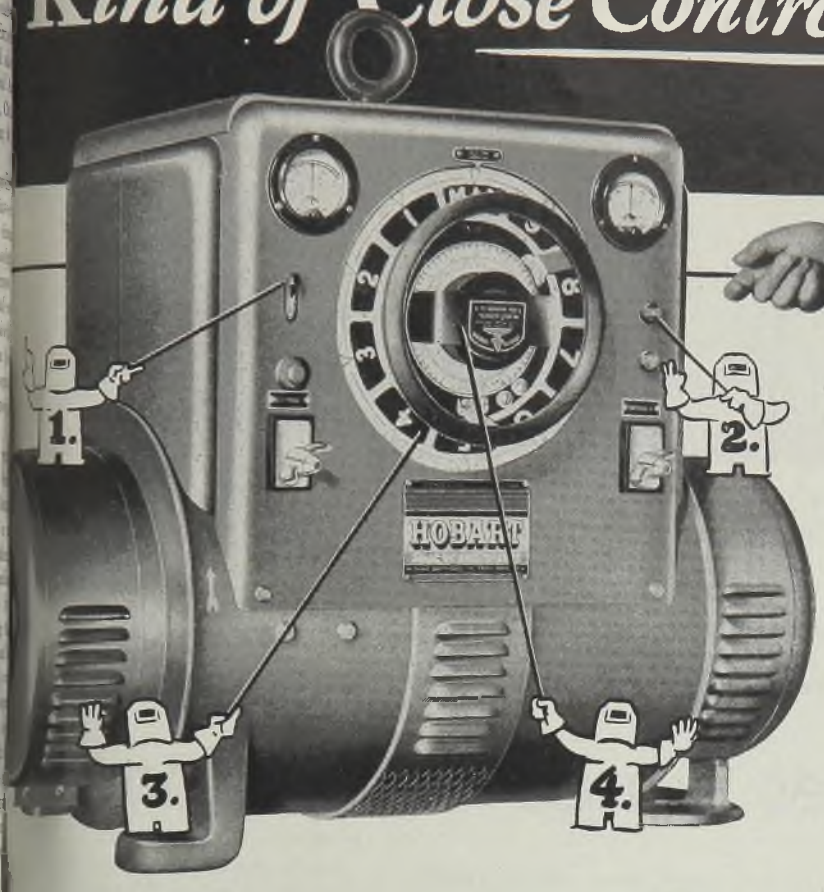
Describing the ease with which the two-place "Ercoupe" can be flown and the short time required for learning to fly it, Mr. Weick said that in a number of cases civilians who were taking their first ride in any airplane handled the controls after brief coaching by the pilot in taxiing, taking off, flying straight paths and turns, approaching, and landing. In one case, he said a woman passenger without operating experience found herself flying solo when the plane took off after she had opened the throttle instead of closing it while the pilot was adjusting the engine on the ground. At 2000 feet, the woman experimented with the controls, learned how to operate them, brought the plane to a safe landing, but opened the throttle in error and took off again. She flew about, and finally came in for a second landing in which the plane slid to a stop without damage.

In tests made under Civil Aeronautics Administration direction, Mr. Weick explained, college students, tradesmen, business and professional men, and housewives, ranging in age from 18 to 4[illegible] years, learned to fly within a period averaging three hours and a half to five hours. Flying students obtained private pilot certificates after 21 hours of flying, he added, and learning to fly this plane has, in general, reduced the novitiate by about 50 per cent.

Wright Engine Plant Sets Horsepower Output Record

Cincinnati plant of the Wright Aeronautical Corp. for two consecutive months produced and shipped more total engine horsepower, including both completed engines and spare parts, than any other aircraft engine plant in the nation and probably in the world, a survey of aircraft production figures for July and August indicates.

Today's Welding — Calls for HOBART's Kind of Close Control



Note the liberal design and exclusive features of the 300 ampere Electric Driven Welder illustrated above.

The strength and high quality of the weld is due to the close control of the arc for the various types of electrodes used. That's why these "Close Control" features were incorporated in Hobart's exclusive design. **1.** Convenient and simple switch for changing polarity to suit the different types of electrodes. **2.** Starting switch located inside turret top. Start, stop and reset buttons on outside of cabinet. Switch fully protected against overload, under-voltage and conditions of phase unbalance in power supply. **3.** Outer wheel and dial for selecting the desired welding range. It provides 10 steps which, with the 100 steps in the inner wheel, makes possible a wide range of 1,000 volt-ampere combinations. **4.** Inner wheel and dial for adjustment of heat and of relation between voltage and current. Removable for Remote Control.

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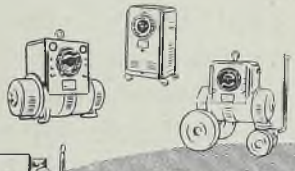

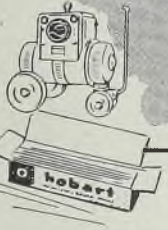

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Comfortable iron ore stocks at lower lake ports and furnaces will make possible early closing of the Great Lakes shipping season, before the weather becomes hazardous. Some vessels already have been transferred to the grain trade

Inventories Generally Are Ample; Coal Supplies Cause Some Concern

CLEVELAND

WITH the exception of coal, the steel industry's raw material supply position is considered more than ample to serve maximum production needs throughout the winter months.

Inventories of most basic raw materials are only moderately below those recorded at this time last year, while consumption is somewhat lower and there is prospect of a sharp temporary curtailment in production before the close of the year if the European war ends this year.

Steel officials are somewhat concerned only about the adequacy of coking coal stocks, for some plants at Pittsburgh and Youngstown, O., have but three or four days' supply. Any serious interruption of the flow of coal from mines to consuming points due to strikes, rail breakdowns or unusually severe weather might be quickly reflected in curtailment of steel operations at some steel centers this winter.

Tightness in coal supply is further indicated by Solid Fuels Administrator Harold L. Ickes, who recently said that production of bituminous coal from Sept. 23 last to next March 31 would have to be stepped up about 344,000 tons per week above the average weekly output of 11,804,000 tons mined since April 1,

Scrap and ore stocks sufficient for winter months. Youngstown and Pittsburgh mills low on coal. Mine strikes or interruption of rail traffic might cause critical shortage

1944, to meet overall estimated requirements of 626 million tons for the "coal year" ending March 31. Latest available figures as of Aug. 31 show by-product coke stocks of 985,629 net tons, or equivalent to 23 days' requirements at the August consumption rate. The by-product coke production facilities expansion program was believed to have been completed in August with the placing in operation of 75 new Wilputte ovens during the period.

Inadequacy of coking coal and by-product coke stocks also would be quickly felt if the present 14 blast furnaces, now down because there is no need for the hot metal due to curtailed steelmaking operations, were forced back into service by a substantial increase in demand. Ten additional blast furnaces are being relined.

Despite the substantial increase in p iron capacity within the past year, co sumption of Lake Superior iron ore du ing September was estimated at 7 milli gross tons, compared with 7,493,000 to in like 1943 period and 7,140,000 f corresponding month in 1942. In t nine months ended Oct. 1, consumpti of this ore totaled 66,004,000 tons, slightly under the total for like period year ago. Monthly Lake Superior ir ore consumption comparisons are sho in the following table.

Iron Ore Consumption
(000—Gross Tons)

Month	1944	1943	194
Sept.	7,000*	7,493	7,1
Aug.	7,342	7,617	7,1
July	7,372	7,156	7,1
June	7,112	6,940	7,0
May	7,558	7,374	7,2
April	7,273	7,186	7,0
March	7,659	7,723	7,1
Feb.	7,207	7,104	6,4
Jan.	7,482	7,765	7,1
Total	66,004*	66,258	63,4

*Estimated.

Steady downward trend in shipmen of Lake Superior iron ore by vessel t past few weeks, in contrast with the a

out effort this time a year ago to speed-up the movement, is indicative of the comfortable iron ore supply situation. Trend in latest weekly shipment figures is indicated by table presented below.

Iron Ore Shipments
(Gross Tons)

Week Ended	1944	1943
Oct. 16	2,470,685	2,654,790
Oct. 9	2,434,584	2,768,616
Oct. 2	2,463,307	2,946,408
Sept. 25	2,562,593	3,044,794
Sept. 18	2,707,651	2,866,444
Season to Oct. 16	71,271,355	71,067,689

Most iron ore vessel interests report substantial cancellations of shipping contracts for the balance of this season. This has led some to anticipate an early closing of the shipping season around Nov. 15. In 1942 and 1943 about 700,000 tons of ore were brought down the lakes after Nov. 31 despite the exceptionally high insurance rates then in effect and adverse shipping weather. Monthly comparison of shipments to date this season compared with 1943 and 1942 are given in the table below.

Iron Ore Shipments
(000—Gross Tons)

Month	1944	1943	1942
Oct.	10,500*	11,613	11,417
Sept.	11,329	12,743	11,848
Aug.	12,289	13,977	13,236
July	12,909	13,589	13,405
June	11,975	11,864	12,625
May	12,114	10,975	12,677
April	5,288	1,955	7,789
March	.....	.....	793
Total	75,603*	76,715	83,859

*Estimated.

Very little scrap is moving to steel plants, even at the reduced price levels. This is indicative of the supply outlook situation in this commodity. Latest figures show stocks at consumers' and producers' plants on July 31 of 5,909,000 gross tons, or about one million below that recorded the same date last year. Consumption of scrap for each of the last four months has been under that of a year ago.

Indicative of the overall easing in the materials supply situation, the Conservation Division, War Production Board, states that its recently published No. 14 issue of Material Substitutions and Supply list will be the final one; and that an additional 42 materials have been removed from the Group 1 category which signifies those materials that are insufficient to satisfy war and essential industrial demands. However, 17 materials were placed in Group I in this last report. Steel castings and wire rope were listed among those materials added to the Group I classification.

Supply of some fabricated and semi-fabricated metal products continues to be tighter than the metals themselves, due to shortages in either manpower or manufacturing facilities. Among such ferrous items are malleable iron castings, small and medium size steel castings, automotive type gray iron castings, wire rope and rope wire, and quality carbon bars and forging billets.

WPB also announced that the Conservation Division is being abolished because the diminishing amount of work remaining to be done in connection with conservation can be handled satisfactorily by other WPB divisions at this stage of the war.

Reports on raw materials in the various districts throughout the country follow:

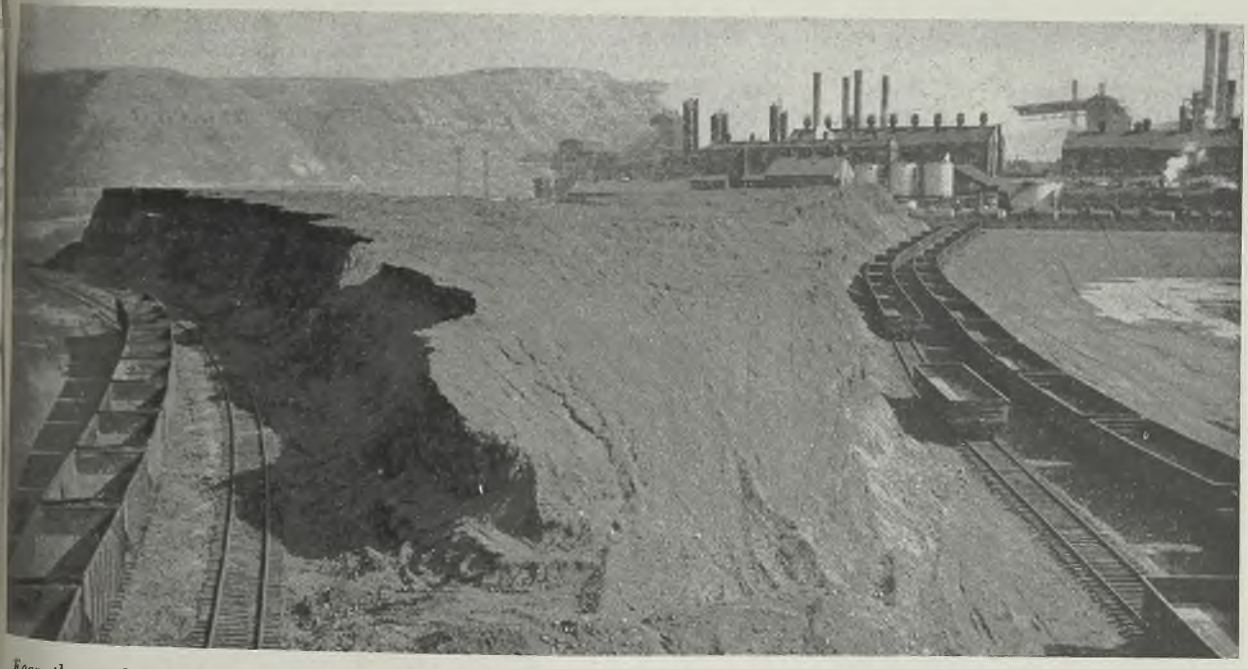
CHICAGO — Coal looms as the only raw material which might become critical to full capacity steelmaking operations in the winter months ahead. It is generally agreed inventories of iron ore and limestone are more than adequate, and the sagging situation in the scrap market indicates no trouble is likely to be anticipated from this quarter.

Now that victory in Europe cannot be safely predicted for this year, steel industry executives are not so sure that operating rates will turn down as quickly as seemed probable a few weeks ago and therefore are taking a critical look at their position. Labor shortage appears to be a more important factor than raw materials.

Ore brought down already plus shipments over the next month will provide a sufficiency for maximum operation of blast furnaces until shipping resumes in the spring. Shipments are fully equal to and in some instances exceed quotas set at the beginning of the shipping period. Somewhat the same position applies to limestone.

Scrap on hand and in transit is adequate for from 60 to 90 days at full capacity steelmaking. In recent months, steelmakers have been virtually out of the market and prices are off. Unless the scrap collection and distribution system gets too far out of line through inaction, consumers can contract for needed material handily.

The possible precarious position of coal arises from several causes. In the first place, the loss from last spring's miners' strike never was made up. This coupled with labor shortage at the mines has made it impossible for mills to build up normal stocks for the coming winter. In some instances, too, captive mines have under government order been forced to divert supplies to other consumers. Mills which receive their coal by a combination of water and rail shipment will as soon as lake shipping ends be forced



Fears that coal shortages may interrupt coke and steelmaking are felt in certain districts. New strikes in the mines or any breakdown of rail transport would be quickly reflected in decreased steel mill operations, which might be disastrous should the war take an adverse turn. Above is shown fairly normal stockpile at a Pittsburgh mill. NEA photo

to depend entirely upon rail. It is assumed this transportation will prove adequate, however, should car shortages or manpower deficiencies develop in the carriers, trouble may lie ahead.

NEW YORK — Consumer inventories of pig iron and coke average around 45 to 60 days in this district. Following letters from the War Production Board last summer to reduce inventories, most buyers for some time past have been reducing stocks on hand. In some cases pig iron inventories at present do not run over 30 days' supply; however, it appears that WPB is assuming a little easier attitude with respect to inventories, especially with winter now only a few weeks off.

Pig iron producers are still finding it more or less touch-and-go in keeping up with requirements, due to shortage in manpower and to the fact that some furnaces are not producing as much as they should because of mechanical difficulties. There appears that some furnaces now in operation will go out of blast as soon as possible.

While most industrial coke consumers, following a period when they let their inventories go down a bit, not only because of warnings from Washington but because of possibility of an early cessation of hostilities in Europe, are now trying to build up their stocks again, especially with indications that the European war may run longer than anticipated.

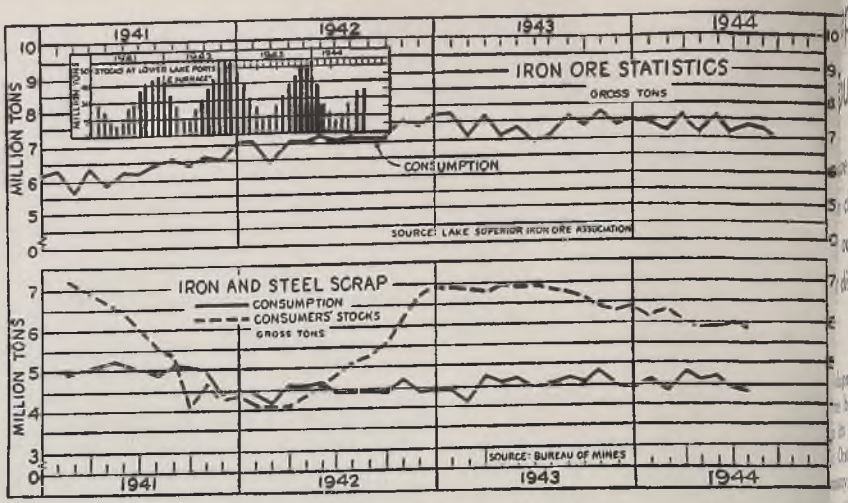
As for coal, the power utilities have about 80 days' supply on hand, with most other industrial plants averaging around two months' supply and the railroads about 45 days'. Here also inventories have been built up a little recently, because of the rather stringent outlook for this winter.

BUFFALO — Ample supplies of raw materials for steel production are indicated for the industry here during the winter. While the ore movement may fall short of an all-time record this season, the transfer of ore-carrying freighter to the grain traffic indicates the success in building up reserves.

The CHAMPLAIN, one of the Maritime Commission-built ships which is part of the Cleveland-Cliffs fleet has tied up at the local harbor breakwall with a cargo of storage grain. In addition, other boats are reported transferring from ore to grain at the head of the lakes. They expect to moor here shortly as the winter storage grain fleet gets an early start. All of which means that Great Lakes shipping industry has achieved its goal in ore receipts from local consumers.

Coal receipts will undoubtedly shatter all previous records. While industrial consumers are well supplied, householders' supplies are still inadequate.

PITTSBURGH — Mine strikes have caused a coal and coke shortage at some steel producers' plants here which probably will adversely affect mill operations. Normally coal stocks are built up to about 60 days' supply during the summer months to hedge against possible strikes and winter freezeups on the rivers. At present, one producer has only seven days' supply and this is scattered in such a way as to make continuous operations difficult.



In general, all companies are in good shape on ore, and the United States Steel Corp. subsidiaries are shutting down on shipments about ten days early this year because their stocks are adequate to carry them through the winter. National Tube reports coal and coke stocks are in good shape at both Lorain, O., and McKeesport, Pa., with a little better than 30 days' supply on hand at both of the points.

There may be some difficulty later in the winter at McKeesport if a bad combination of weather and strikes occurs and shuts off supply for an extended period. Lorain is out of danger on all counts, however. Carnegie-Illinois is somewhat apprehensive regarding coal and coke, inasmuch as they have not been able to rebuild their stocks to adequately high levels. If they can maintain present levels, they will be clear, but at some points the pile is down as low as 15 days' supply and with continued heavy consumption taxing all delivery facilities, any interruption might create problems.

CINCINNATI — Raw materials supplies will be available in the next few months in volume at least as great as last winter. In some cases the market is distinctly easier.

Labor troubles in coal mines which threatened fuel supplies, including coke, last winter are not evident now, and oven interests show no anxiety, forecasting adequate production.

The recent break in scrap prices reflected drying up in demand. Dealers' stocks are low—there is marked hesitancy in taking on tonnages in a falling market—but no doubt the buying holiday has helped to restore accumulations which may be tapped in case demand is restored during the winter.

BOSTON — Steel mills and foundr will enter winter with inventories scrap and pig iron below normal, barring a breakdown in transportati little concern is felt as to adequacy supplies. The margin of safety, es cially in pig iron, will be small reserves currently from 45 to 60 d

More iron, notably basic, will m from Buffalo and the strain on railro will be heavy. Barge movement scrap and pig iron has been light, pr tically nil north of Cape Cod canal

The volume of coal carried into N England is far above the normal ra

SAN FRANCISCO—Winter prosp for supplies of raw materials for st producing hinges chiefly on finding a quate labor. This is particularly true operations at Geneva Steel Co., accord to Columbia Steel Co. executives, w point out that serious manpower defici cies are continuing in the Utah c fields, in the coking ovens and also the Geneva mills. Given a suffici labor force, all materials will be in a quate supply in coming months, it is lieved. Most plentiful material at pr ent is scrap.

YOUNGSTOWN — Local steel pla are going into the winter with nor stockpiles of raw materials with the ception of coal and coke. Major p ducers report iron ore and scrap pi are sufficient even should operati return to capacity levels.

Coke and coal supplies are caus concern. Mills which operate their o ovens say thay have enough to maint production if there are no interrupti at the mines. And strike at the mi or carriers would be almost immedi reflected in operations.

BIRMINGHAM — Prospects of a shortage in this area are as preponder as usual at this time of the year, even the face of the fact that more coal been mined in the district than at time since 1922—a half-million more than then.

Steep Rock Iron Mines Producing About 3500 Tons of Ore Daily

Hope to ship more than 400,000 tons before navigation season closes. Company's estimated production program calls for output of 2 million tons annually. Steep Rock interests not disturbed by talk of drop in market demand

TORONTO, ONT.

FIRST shipment of high grade hematite iron ore by Steep Rock Iron Mines Ltd., from its property in the Atikokan section of Ontario was made recently. The company, which was financed through the assistance of Reconstruction Finance Corp., the U. S. government agency, the Canadian government and private capital, is now producing at a rate of 3500 tons per day and will step up to 5000 tons daily soon in an effort to make shipments totaling 400,000 to 500,000 tons before the close of navigation this year.

The company's estimated production program calls for output at the rate of 2 million tons per year. The ore requires no treatment and will be shipped as mined, chiefly for open-hearth furnace use.

In 1943, Steep Rock Iron Mines Ltd. entered into an agreement whereby Premium Iron Ores Ltd., a company formed in Canada by the Cyrus Eaton interests, was appointed exclusive sales agents for Steep Rock ore. Premier has undertaken to sell 10 million tons of the company's ore during the first 10 years of production, with 500,000 tons minimum in any full season, and is to receive as commission 2 per cent of value of the ore. It is reported that Cleveland-Cliffs Iron Co. has contracted to purchase all the iron ore from Steep Rock in the 1944 season and for substantial tonnages in future years.

The shipment made at the beginning of this month went to Republic Steel Corp., the American interests who have worked closely with the Canadian company in testing the Steep Rock ore. Several other American and Canadian steel producers, a total of 10, also have placed orders for ore from the Steep Rock Mines. Canadian mills that have placed orders are Algoma Steel Corp. Ltd., Sault Ste. Marie; Steel Co. of Canada Ltd., Hamilton & Dominion Steel & Coal Corp. Ltd., Sydney, N. S.

Steep Rock interests have made a close study of United States iron ore markets and are not disturbed by the talk of lower shipments of iron ore from Lake Superior next year, nor talk of depression in the scrap markets this fall. Company officials state they are assured there is no need for apprehension on their part. The demand for Steep Rock high grade ore is such as to make them feel that the market will absorb all they can produce.

Steep Rock ore is being developed in what are known as the "A", "B" and "C" zones, originally located under the waters of Steep Rock lake. In order to permit open-pit mining in the "B" zone, the body from which ore now is being drawn, and for later development of the "A" and "C" zones, the Seine river has been diverted by two canals so that it does not flow through that portion of Steep Rock lake in which the three zones lie, except for the west arm, which has been dammed off. The lake has been pumped out sufficiently to permit open-pit mining of the "B" zone.

Ore Samples Are Analyzed

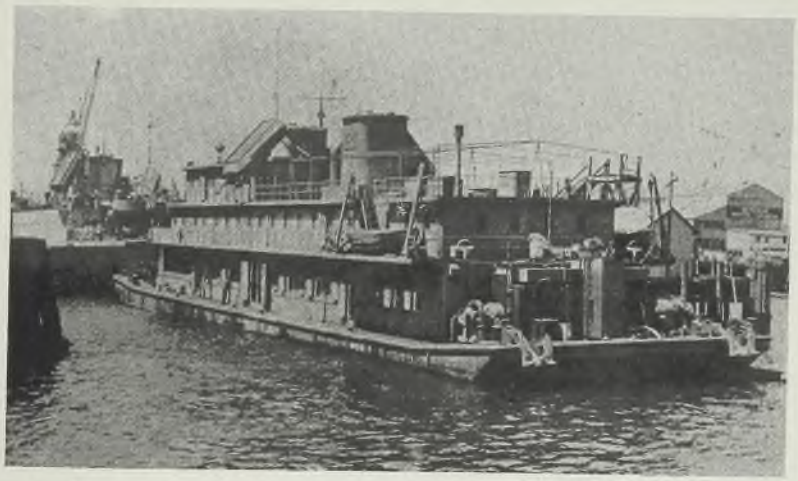
Analyses of composite samples from churn drilling gave the following results (dry analyses): "A" zone—iron, 61.80% (natural iron 58.09%); phosphorus, 0.023%; silica, 2.76%; manganese, 0.22%; alumina, 0.90% and sulphur, 0.038%. "B" zone—iron, 60.80% (natural iron 56.54%); phosphorus, 0.017%; silica, 3.42%; manganese, 0.19%; alumina, 0.72%; sulphur, 0.039%. It is estimated that at least 25 per cent of production will be lump ore.

Ore reserves, proven and probable, exclusive of possible ore in "A" and "B" zones, are officially estimated as follows: "A" ore body—1,525,320 tons proven and 9,828,090 tons of probable open pit ore, for total of 11,353,410 tons. "B" ore body—14,462,771 tons of proven ore and 756,702 tons of probable open pit ore, or total of 15,399,473 tons; plus 1,075,989 tons proven and 3,751,214 tons probable underground ore, or total of 4,827,203 tons. Total proven and probable ore in the two zones is estimated at 31,580,086 tons, with vast additional tonnage of possible ore.

In connection with the decision of directors of the Steel Co. of Canada Ltd. to proceed with construction of a modern 51 inch strip mill for production of sheets and tin plate, it is officially reported that this addition will represent an expenditure of $8 million. This is in addition to the expenditure of $6 million during the war period.

It is further pointed out that the combined expenditures on these three units do not cover all the plant expansion of Steel Co. of Canada during the war, for the enlargement program included construction of a blast furnace, an open-hearth furnace and an electric furnace. Some idea of the extent of the plant expansion program is indicated by the fact that an increase of over $14 million alone is indicated in the valuation of fixed assets in the balance sheet between the end of 1939 and 1943, this being up from $49,746,000 to $63,983,000.

The size of the new development may be indicated by the fact that new buildings required, work on which already is in progress, will be one-quarter of a mile in length and will cover an area of approximately four acres. The plate mill, which went into operation in April, 1941, has produced over 725,000 tons of plate in the past three years.



GENERATOR ON BARGE: When Sacramento, Calif., Army engineers needed electric power for dredging a river at a point where electric power was not available, they had a problem. They solved it by installing a diesel-electric generating plant on this sea-going barge, the ELECTRA. The floating unit can generate enough power to supply the needs of a city of 30,000. NEA photo

THE BUSINESS TREND

Pace of Industrial Output Little Changed

PACE of industrial activity has recorded little change in recent weeks. Order backlogs and cancellations have tended to increase, but pressure for quick delivery on the great majority of war programs continues unabated. Additional downward revisions of some key war programs are expected regardless of the possibility of the European war dragging through the winter months.

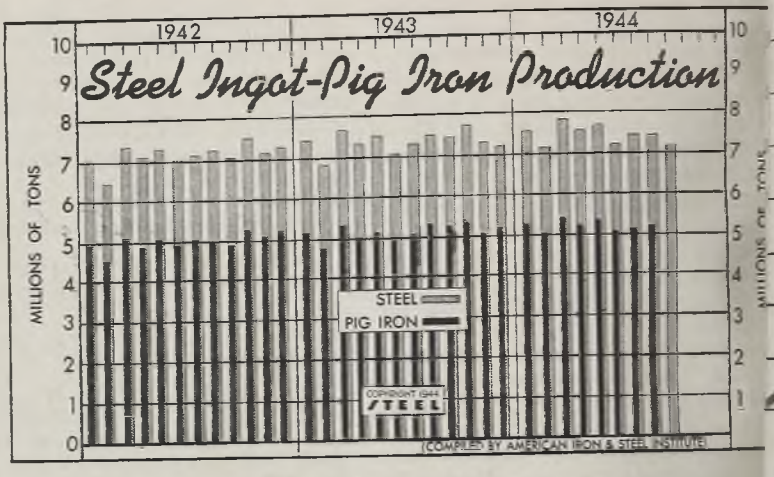
During the latest period the national steel ingot rate held unchanged at 95.5 per cent of capacity, in sharp contrast with 100.5 per cent in the comparable 1943 week. The industry has experienced a falling off in new orders the past two months, and reports that order backlogs have been reduced on some items because of cutbacks. Slight seasonal gains were recorded in revenue freight carloadings, electric power consumption and truck assemblies during the latest week, but in each instance remained below that registered last year at this time.

EMPLOYMENT — About a year has passed since the peaks in wartime factory employment and production were reached. Since then there have been gradual decreases in both output and employment. Manufacturing employment has increased by well over 50 per cent during the war years, which poses very difficult problems for this segment of our economy in the immediate period following the defeat of Germany. Brig. Gen. Leonard P. Ayres estimates a total of 4 million workers, half of them now making ships and airplanes, will lose their jobs after the European war.

Latest available figures show that on Aug. 1 last factory employment totaled 12,923,000, or about one million less than on the same date last year. Employment in the steel industry throughout August averaged 583,000, compared with a total of 625,000 in August, 1943. The peak reached on steel employment during the war period was 659,000 in June, 1942.

RECONVERSION—The War Production Board does not intend to grant priority ratings for industries returning to civilian production. While each industry will be given as much aid as possible in the transition period, WPB Chairman Krug states that it will be impossible to draw lines between them and give some priority over others. Similarly, no major construction programs can be started at present because there is no way to determine which should proceed first. If all got going together, Mr. Krug said, there would be a huge manpower drain on war output.

WAR EXPENDITURES—A decline of 9 per cent in monthly expenditures for war occurred during September to $7,104,000,000. This compares with $7,798,000,000 in the preceding month and represents the lowest monthly total since last December. On a daily average basis expenditures during September were also the lowest recorded this year, amounting to $273,200,000.



Iron, Steel Production

(Net tons—000 omitted

	Steel Ingots			Pig Iron		
	1944	1943	1942	1944	1943	19
January	7,587	7,425	7,112	5,276	5,194	4,9
February	7,189	6,825	6,513	5,083	4,766	4,5
March	7,820	7,675	7,392	5,434	5,314	5,0
April	7,569	7,374	7,121	5,243	5,035	4,8
May	7,680	7,550	7,383	5,343	5,173	5,0
June	7,217	7,039	7,015	5,057	4,836	4,7
July	7,474	7,408	7,145	5,157	5,023	5,0
August	7,470	7,586	7,228	5,210	5,316	5,0
September	7,193	7,514	7,058	....	5,226	4,9
October	....	7,814	7,580	....	5,324	5,2
November	....	7,372	7,180	....	5,096	5,0
December	....	7,255	7,305	....	5,213	5,2
Total	....	88,836	86,030	....	61,777	59,7

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	95.5	95.5	96	100.5
Electric Power Distributed (million kilowatt hours)	4,355	4,375	4,395	4,382
Bituminous Coal Production (daily av.—1000 tons)	1,933	2,008	1,808	2,014
Petroleum Production (daily av.—1000 bbls.)	4,727	4,692	4,746	4,412
Construction Volume (ENR—unit $1,000,000)	$57.7	$26.5	$42.5	$72.9
Automobile and Truck Output (Ward's—number units)	19,435	16,865	20,865	19,535

*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	883†	878	892	912
Business Failures (Dun & Bradstreet, number)	15	27	23	30
Money in Circulation (in millions of dollars)	$24,099	$23,881	$23,495	$18,979
Department Store Sales (change from like week a year ago)‡	+12%	+9%	+15%	−5%

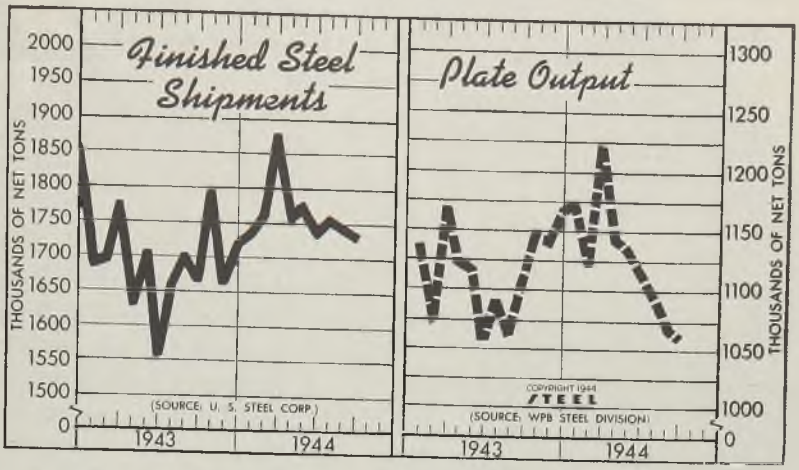
†Preliminary. ‡Federal Reserve Board.

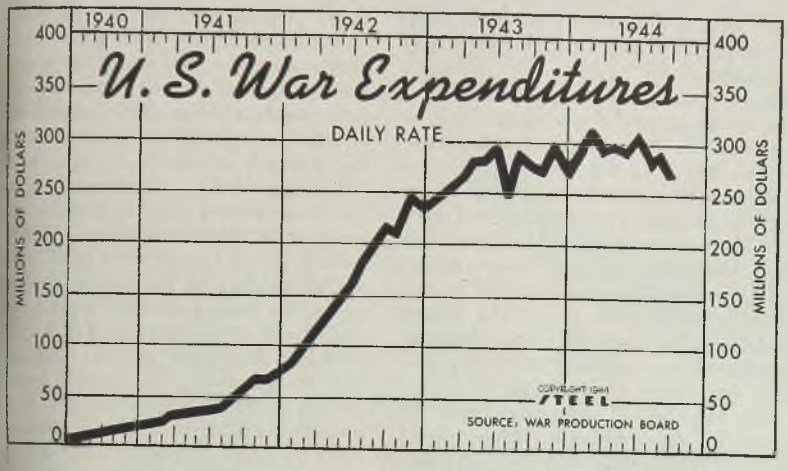
Steel Shipments†—Plate Production‡

(Net tons; 000 omitted)

	—Shipments—		Plate Output	
	1944	1943	1944	1943
Jan.	1,731	1,686	1,173	1,135
Feb.	1,756	1,692	1,122	1,072
Mar.	1,875	1,772	1,223	1,168
Apr.	1,757	1,631	1,142	1,122
May	1,777	1,707	1,132	1,115
June	1,738	1,553	1,112	1,056
July	1,755	1,661	1,093	1,090
Aug.	1,743	1,705	1,067	1,061
Sept.	1,734	1,665	1,060	1,106
9 mo.	15,865	15 070	10,123	9 925
Oct.	....	1,795	....	1,147
Nov.	....	1,661	....	1,142
Dec.	....	1,720	....	1,169
Total	....	20.245	....	13,382

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





War Expenditures

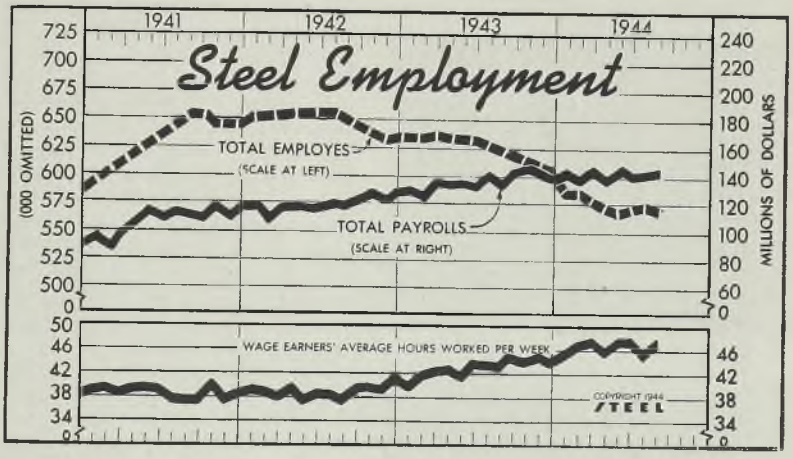
(millions)

	1944		1943	
	Monthly Expenditures	Daily Rate	Monthly Expenditures	Daily Rate
Jan.	$7,416	$285.2	$6.254	$240.5
Feb.	7,808	312.3	6.081	253.4
Mar.	7,948	294.4	7.112	263.4
Apr.	7,493	299.7	7,290	280.4
May	7,918	293.3	7.373	283.6
June	7,957	306.0	7 688	295.7
July	7,355	282.9	6.746	249.9
Aug.	7,798	288.8	7.529	289.6
Sept.	7,104	273.2	7.212	277.4
Oct.	....	....	7.105	273.3
Nov.	....	....	7,794	299.8
Dec.	....	....	6,951	267.3
Total	Av....	Tt'l. 85,135	Av.	272.9

Steel Employment

	—Employes— (000 omitted)			—Total Payrolls— (Unit—$1,000,000)		
	1944†	1943	1942	1944	1943	1942
Jan.	583	637	651	$141.8	$129.7	$118.8
Feb.	588	635	651	137.6	122.8	108.5
March	578	637	653	145.3	136.8	117.0
April	578	634	654	138.9	133.3	118.5
May	569	632	656	145.4	137.4	117.4
June	570	631	659	140.5	136.2	118.0
July	571	627	655	141.7	142.8	120.7
Aug.	569	625	647	143.9	139.9	118.7
Sept.	....	620	641	....	143.8	124.8
Oct.	....	615	635	....	144.9	126.6
Nov.	....	611	632	....	141.5	122.8
Dec.	....	605	638	....	140.2	129.3

†Monthly average; previous reports showed total number regardless of whether they worked one day or full month.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,049	$10,537	$9,331	$7,118
Federal Gross Debt (billions)	$211.2	$211.0	$211.3	$165.0
Bond Volume, NYSE (millions)	$31.2	$43.2	$30.8	$36.2
Stocks Sales, NYSE (thousands)	2,959	4,634	3,644	2,368
Loans and Investments (millions)†	$54,436	$54,673	$55,493	$51,278
United States Government Obligations Held (millions)†	$40,506	$40,731	$41,446	$36,215

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	249.0	253.3	250.1	248.2
Industrial Raw Materials (Bureau of Labor Index)‡	113.7	113.2	112.8	112.1
Manufactured Products (Bureau of Labor index)‡	101.2	101.1	101.1	100.2

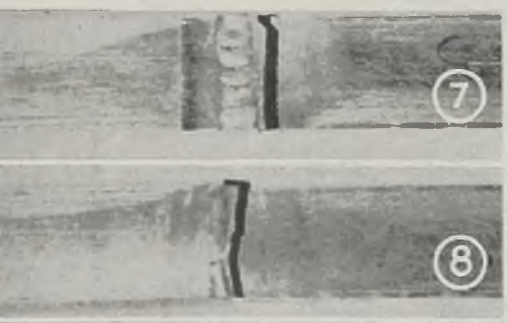
†1931 = 100; Friday series: ‡1926 = 100.

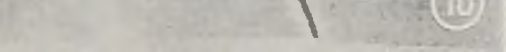
By MALCOM C. RIVENBAUGH
Research Engineer
And
C. WESTON STEWARD
Head, Metal Fabrication Section
Research Laboratory
Curtiss-Wright Corp.
Buffalo

A new fabrication meth

MULTIAR

Twin carbon torch produces five arcs simultaneously to delive concentrated heat under perfect control. Developed as part c a project for arc welding thin metals, process also was reporte last week before annual meeting of American Welding Societ Data are presented on joining aluminum





BECAUSE an airplane is designed to carry certain loads and travel through all kinds of weather, atmosphere and temperature, all welding of its parts must be sound, corrosion resistant and able to transmit the necessary load to each member of a plane's construction.

Since 24S-T alclad aluminum is one of the most essential aluminum alloys used in airplane construction and fabrication, new methods of joining this alloy should be and are being considered seriously. As this material is one of the most difficult to join by fusion welding, it is apparent that development work on welding methods, material and design is necessary.

Arc welding of aluminum and its alloys is very difficult when sheet thickness is less than 1/8-inch. In addition, it is not considered satisfactory because of spatter and excessive porosity. Porosity weakens the weld and prevents making joints liquid or gas-tight. The high melting rate of most aluminum electrodes necessitates welding rapidly. This, in turn, usually results in the use of heavier electrodes in order to carry sufficient heat for good fusion and penetration. The quality of work produced by this method is unsatisfactory. Therefore, the standard rule has been to gas weld all so-called weldable aluminum and aluminum alloy assemblies.

The most weldable aluminum material is 2S (commercially pure aluminum). However, 3S (an alloy of alum inum and manganese) has higher me chanical properties and good weldin characteristics. Where still higher te sile strength is desired, other alloys a now used such as 52S (composed aluminum, magnesium and chromium the strength of which is approximatel twice that of 3S. Cracking in or ne the heat-affected zone may occur unle welding is done carefully. This ma terial is not as easy to weld as 2S and 3S

Gas welding of the strong aluminu alloys has been somewhat limited, espe cially with such alloys as 24S-T (whic contains aluminum, copper, magnesiu and manganese). The tensile strengt of this material is approximately 65,00 pounds per square inch and, because o good physical properties and resistanc to corrosion, it is used extensively fo aircraft fabrication. Many methods o joining this material are being used such as metal stitching, riveting an spot welding.

If fusion welding of this alloy were practical, it would contribute many de-sirable features, such as saving weight and time in fabrication, and eliminating lap joints, riveting, dimpling and drilling. Lighter gages could be used and at the same time, greater strength per unit could be obtained. It would be an ideal material for gas tanks. Tanks could then be pressurized for high altitudes and low temperatures, so as to eliminate boiling and bubbling of gaso-

Fig. 1—Work side of 0.016-inch 24S alclad butt joint welded without using a back-up strip

Fig. 2—Back side of the joint in Fig. 1. Note the uniform, smooth penetration

Fig. 3—Work side of 0.032-inch 24S-T alclad butt joint. Note the uniform, well-formed bead

Fig. 4—Back side of joint in Fig. 3. Note the well-formed, uniform penetration

Fig. 5—Work side of 0.040-inch 24S-T alclad butt joint

Fig. 6—Back side of joint in Fig. 5. Note the well-formed, smooth, uniform welding. Subjected to tensile loading until failure occurred, as shown at 63,000 pounds per square inch

Fig. 7—Work side of 0.016-inch 24S-T alclad butt joint heat treated and tested to failure at 63,600 pounds per square inch

Fig. 8—Back side of joint in Fig. 7. Under tensile loading, failure occurred at 64,500 pounds per square inch

Fig. 9—Butt joint of 0.125-inch 3S½H aluminum, subjected to tensile loading until failure occurred at 16,800 pounds per square inch

Fig. 10—Butt joint of 0.081-inch 52SO aluminum subjected to tensile loading until failure occurred at 30,700 pounds per square inch

ELDING

ne and associated vapor lock.

As part of a project to develop a ethod for arc welding thin metals, a ew process has been invented, named ultiarc welding. In order to favorably resent its development, it is necessary explain the function of each circuit nd the initial objective—the arc-pro- ss welding of relatively thin sheet uminum alloy. Study of accompany- g illustrations will help to clarify w points of procedure which are in estion.

Essential elements of the process are in carbon torch, a heavily coated

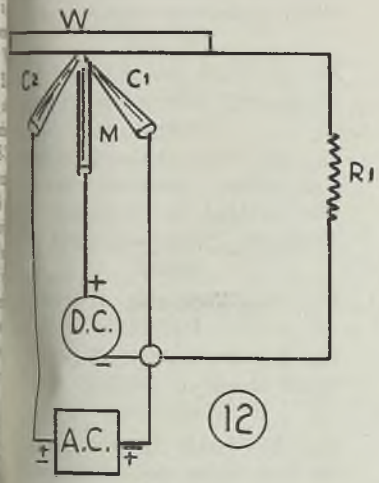


Fig. 11—The multiarc welding process in operation

Fig. 12—Diagram of electrical circuit used for multiarc process. W stands for work piece, R 1—resistance; C 1—carbon electrode; C 2—carbon electrode; M—flux-coated metallic electrode; A.C.—alternating current welding machine; D.C.—direct current welding machine

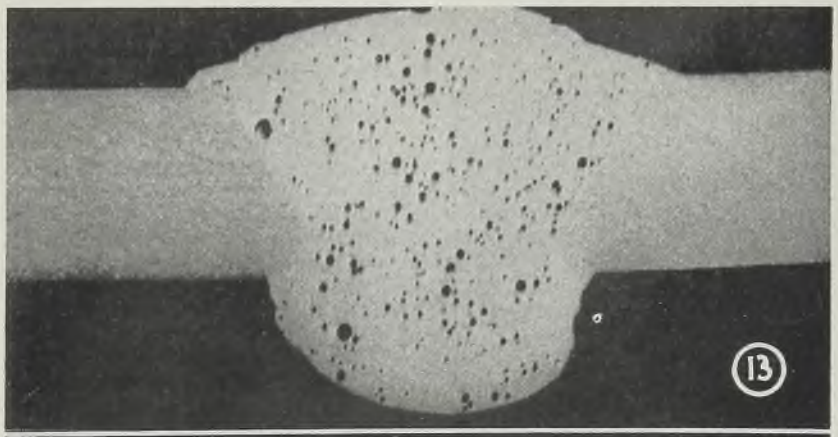
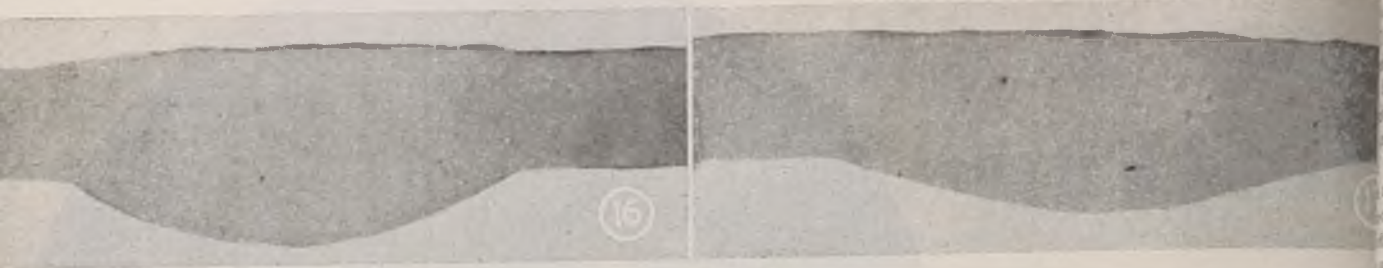
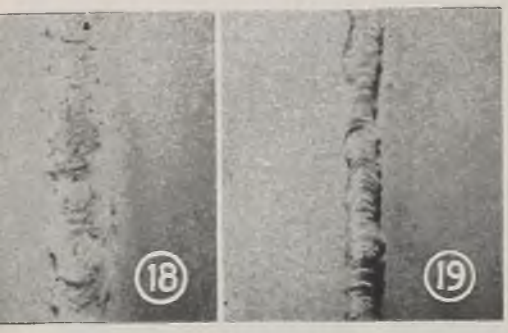


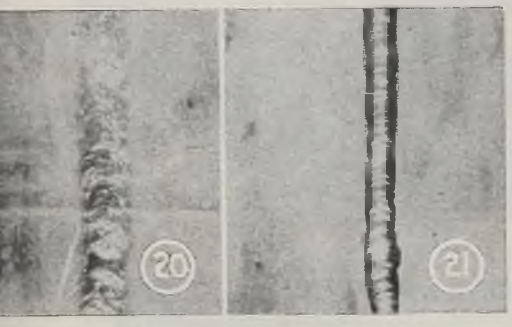
Fig. 13—Cross section of 0.125-inch 3S½H aluminum, metallic arc welded butt joint, at 8X magnification, showing porosity

Fig. 14—Cross section of 0.125-inch 3S½H aluminum multiarc welded butt joint, at 8X magnification, showing no porosity

Fig. 15—Cross section of 0.125-inch 3S½H aluminum oxyacetylene welded butt joint, at 8X magnification, showing slight porosity







metallic electrode, a metallic electrode holder, the part to be welded and two sources of current. One source is alternating current, used to supply the twin carbon torch because it results in even burn-off of the carbons, and the other may be either alternating current or direct current for supplying the metallic electrode. This combination is particularly good as a source of energy for welding because heat may be concentrated efficiently and accurately controlled. The metallic electrode holder is designed to use electrode sizes from 3/32 to 3/16-inch, inclusive. Rod size, for a given thickness of stock welded, is not critical; for example, an 0.081-inch 52S butt joint may be welded with either a 3/32, ⅛, or 5/32-inch rod, the only difference being in welding speed. Best results have been obtained with a heavy flux coated 5 per cent silicon, 95 per cent aluminum rod.

In operation, the twin carbon torch is held in the right hand so that the carbons are in a plane which is at an angle of 30 degrees to the vertical and moved along the joint traveling from right to left, keeping the joint to be welded midway between the points, with the carbons about ⅛-inch above the work.

In order to weld successfully various types of joints and different gages of material, it is necessary to use carbon electrodes ranging in diameters from 5/32 to ¼-inch. The 5/32-inch electrode is used to weld gages as light as 0.016-inch 24S-T. The ¼-inch carbon is used to weld thicknesses equal to 0.125-inch 3S aluminum.

A certain degree of arc heat control is obtained by adjustment of the arc gap.

Fig. 16—*Cross section of* 0.081-*inch* 52SO *aluminum multiarc welded butt joint, at* 8X *magnification, showing no porosity*

Fig. 17—*Cross section of* 0.081-*inch* 52SO *aluminum heliarc welded butt joint, showing slight porosity*

Fig. 18—*Work side of* 0.068-*inch* 3S *aluminum multiarc welded butt joint*

Fig. 19—*Back side of joint in Fig.* 18, *showing uniform penetration*

Fig. 20—*Work side of* 0.125-*inch* 3S½H *aluminum multiarc welded butt joint*

Fig. 21—*Back side of joint in Fig.* 20, *showing uniform smooth penetration*

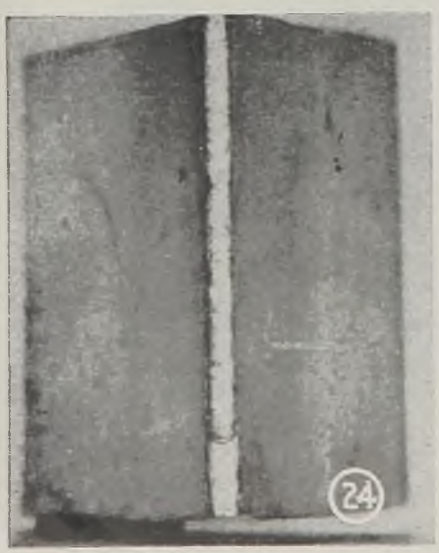
Fig. 22—*Cross section of* 0.1875-*inch* 3S½H *aluminum multiarc fillet welded to* 0.062-*inch* 3S *aluminum. Note penetration obtained*

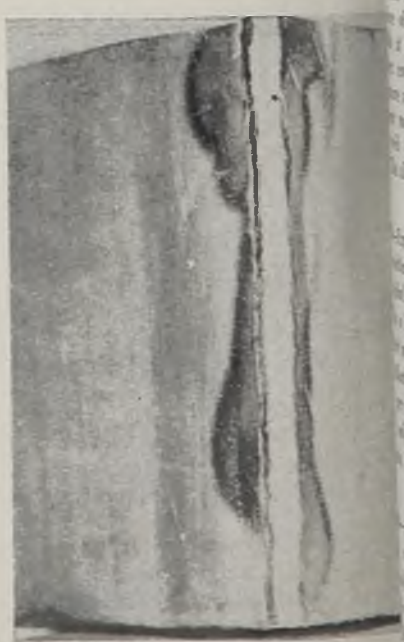
Fig. 23—*Work side of joint in Fig.* 22

Fig. 24—*Work side of* 0.062-*inch* 3S½H *aluminum multiarc welded corner joint*

Fig. 25—*Inside of joint in Fig.* 24. *Note fusion and uniform penetration*

Fig. 26—*Work side of* 0.125-*inch* 3S½H *multiarc welded corner joint*





The operator makes such necessary adjustments while welding, as conditions demand. The arc is started by depressing a thumb lever which extends back midway to the thumb side of the twin carbon torch handle, causing the two carbons to contact each other, producing an arc. By releasing the pressure slightly, the arc gap is easily adjusted.

The twin-carbon-torch arc is then moved to within ⅛-inch of the workpiece where welding is to begin. A circular arc motion is employed for about 5 seconds, tending to preheat the work at the starting point. At this time, auxiliary arcing takes place between one of the carbons and the workpiece.

The next operation is the metallic electrode introduction. It is held in the left hand, placed directly over the seam to be welded, and contacts the workpiece surface at the starting point. Twin carbons and metallic rod are now approximately 3/16-inch apart. Arcing takes place between metallic electrode and carbons, from one carbon to the other, from metallic electrode to workpiece and from one carbon to workpiece.

Five Arcs Act in Unison

When confined, this produces five individual arcs functioning as one. Arc action causes immediate fusion of metallic rod deposit and parent metal, producing a completed weld free from porosity, with uniform penetration. The current supply for any individual circuit is not sufficient to produce welding by itself. A constant, smooth arc is maintained from metallic electrode to carbons and ground because of ionization produced by the carbon arc flame. As a result, heat control is such that it has been possible to weld 0.016-inch 24S-T alclad aluminum alloy without a back-up strip. The electrical circuit is shown in Fig. 12. Reverse polarity is used while welding aluminum. However, straight polarity may be used.

The important function of the multiple arc is that large amounts of heat can be delivered in concentrated form to the surface of the material being welded, while at the same time being under perfect control. Heat transfer and temperature are of a nature which permits parent metal to receive a preheat and weld deposit to acquire a postheat. This allows all gases and impurities to escape to the surface of the molten metal before it becomes plastic enough to entrap them and cause porosity. Weld surface appearance sometimes is affected by this action, but it is only a surface condition.

Multiarc welded aluminum alloy specimens have been subjected to visual examination, tensile, X-ray, microscopic and corrosion tests. Study of the completed weld appearance for smoothness, evenness and uniformity of bead, as well as penetration, slag inclusions, porosity and undercut, if present—is also helpful in determining the quality of a weld.

The fact that, so far, 2S, 3S, 52S and 24S-T alclad aluminum alloys, from 0.016 to ⅛-inch have been welded, as well as 57S and 52S, magnesium, stainless steel, brass and copper, testifies to multiarc welding process flexibility. With 24S-T alclad, approximately 45,000 pounds per square inch tensile strength is developed in the as-welded condition. By subsequent heat treating, a maximum of 64,500 pounds per square inch has been attained.

X-rays were taken of weldments showing particularly bad surface pitting or roughness, to determine the presence of porosity caused by this condition. The X-rays were somewhat misleading because the negative indicated what was believed to be an overdose of porosity. However, this was thought to be only a picture of surface pitting, confirmed when weld metal was machined flush with parent metal and X-rays retaken. There was no porosity whatsoever, definitely eliminating the relation between surface pitting and porosity, or gas pockets, in deposited weld metal. It also was confirmed by metallographic studies of cross sections.

Results of tensile tests of multiarc welded 0.016-inch 24S-T alclad and 0.040-inch 24S-T alclad are tabulated in Tables 1 and 2.

A comparison of multiarc, metallic arc and oxyacetylene welding of 3S½ H aluminum alloy is tabulated in Table 3, which gives comparative results of tensile tests.

A few specimens of multiarc welded, 24S-T alclad material were subjected to preliminary corrosion tests to determine susceptibility. Specimens submitted to salt spray for 200 hours showed evidence of corrosion after 96 hours at a magnification of 30 X, on both unwelded strips

(*Please turn to Page* 96)

Fig. 27—Work side of 0.064-inch 2S½H aluminum multiarc welded butt joint

Fig. 28—Back side of 0.064-inch 2S½H aluminum metallic arc welded butt joint. Note irregular penetration, which is difficult to control

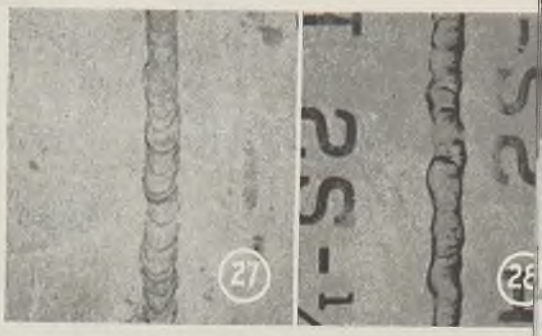


Fig. 29—Experimental pressure tank of multiarc welded 0.051-inch 24S-T alclad. Pressure was increased by a hydraulic pump, with an attached pressure gage, until the rupture illustrated occurred at 350 pounds per square inch. Before rupture, only deformation was at end heads, spun from 0.064-inch alclad

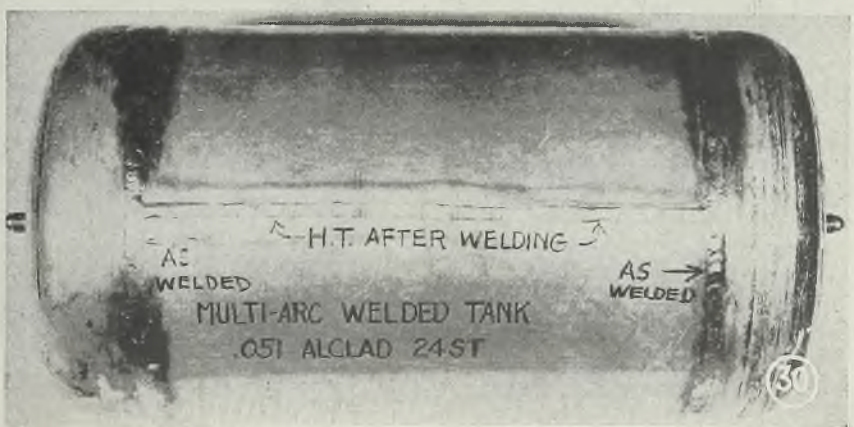


Fig. 30—Experimental pressure tank of multiarc welded 0.051 24S-T alclad, heat treated as shown. Ends are spun from 0.064 24S-T alclad sheet

Tool Engineers

Are Primed For Decisive Action

EMPHASIS on the suddenness with which reconversion to peace will be thrust upon American industry, and the vital need for quick, decisive action on the part of industry when it does come, was pounded home to more than 500 members of the American Society of Tool Engineers at Hotel Syracuse, October 12, 13 and 14.

The entire situation facing the metalworking industry was summed up by James Y. Scott, president of the Van Norman Co., Springfield, Mass., who as president of the National Machine Tool Builders' Association, was guest speaker at the semiannual banquet. Reconversion to peacetime production, said Mr. Scott, must be accomplished to a considerable degree in a matter of weeks rather than months, if serious dislocations in the national economy, and widespread unemployment are to be avoided.

Just as conversion to war work was first and foremost the responsibility of the tool engineering profession, so it is about to be again—but under even more pressure than attended conversion for war. He predicted that in the initial stages of the coming conversion, there will be no time to build, install and tool up the highly specialized machine tools which will eventually be the key to success in competitive postwar mass production.

Therefore, in the interim period, tool engineers will be called upon to do what they did early in the war production period. That is, they will be called upon to seize upon whatever standard machine tools—good, bad and indifferent—that they can get their hands on, and tool them up as quickly as possible and as ingeniously as possible to make goods and to make jobs as soon as possible after V-day or partial V-day. The difference from the early war situation will be that even in this interim tooling a great deal more attention will have to be paid to economy both in tooling and in production through its use, than was true in the emergency war tooling. In other words, the period will be one of crisis involving economics as well as national welfare.

There will be no rest for the weary either among tool engineers or machine tool builders at the close of the war or in any foreseeable time thereafter, according to Mr. Scott. While the tool engineers are pushing through this interim tooling program, machine tool builders—to avoid drowning in a flood of surplus machine tools—will push with unprecedented vigor and speed the redesign and building of new models. This will be true especially in the field of highly specializ "process machines" which Mr. Scott visions as literally taking raw material at one end and ejecting finished (e assembled) product at the other end

In this manifestation of Americ genius in designing, building and uti ing labor-aiding, cost-cutting, specializ equipment, Mr. Scott sees America's sal tion in the fiercely competitive post world. In this effort college and univers research and training will tie right with native ingenuity and skill, he lieves, thus making America continue the land of plenty and of opportunity a badly disrupted world which must c tinue to look to us for hope and for he

In his statement as to the scope of meeting, Douglas D. Burnside, presid of ASTE, sounded a note similar to of Mr. Scott. Mr. Burnside said:

"The world wide conflict at this m ment is at a critical stage. Developme

Modern tool engineering brings the shop to the laboratory. Here we see M. F. Jirka, in charge of the temperature controlled gage testing room at Joshua Hendey Iron Works, Sunnyvale, Calif., checking an angle block on a Robbins compound sine table. Through this laboratory, dimensional control is maintained not only throughout the Joshua Hendey shops but also in those of more than 100 subcontractors. Charles E. Moore, president of the company, says: "If a tool needed for any job isn't available—make it. If nothing like it ever was made—invent it!"

By GUY HUBBARD
Machine Tool Editor, STEEL

During ASTE meeting at Syracuse, wartime achievements in large scale production control, in processing of new materials, in improvement of machine tools, and in technical education, are reviewed in preparation for "tooling up the postwar world"

...econversion

...mmediately after victory will determine ...ur goals. Experience and circumstances ...ill control the future planning of our ...ation and of this society. If we make ...good use of the knowledge which we ...have gained in the immediate past, we ...will be able to do an outstanding postwar ...job also.

"In the light of this situation the program of this meeting is exceptional. A remarkably expanded concept of our responsibilities as tool engineers is demonstrated in its makeup—and this is exactly what we need. It indicates a gain in knowledge overall, and an increase in value of the society to the tool engineer as an individual. For instance, the program includes discussion of a 'new metal' (magnesium), its production, its fabrication, its workability. The program covers tool engineering education—tooling, management, cost control. It contains intimate information about our Canadian neighbors' production and tooling achievements. All this is of tremendous importance to the tool engineering profession."

Speaking of magnesium, Carl J. Wiberg, supervisor, Special Process division, Wright Aeronautical Corp., Paterson, N. J., gave some interesting background information on the industrial use of this material.

"The commercial development of magnesium (or Elektron as it was commonly called) appeared at first glance from the beginning to offer tremendous advantages to the aircraft engine builder. More than 20 years ago, two German scientists were offered the facilities of the Wright Aeronautical Corp. foundries and for many months they conducted experiments in casting this then new and temperamental metal. A lot of smoke and fireworks were produced, but not a single casting. After several months of futile endeavor that project was abandoned—that is for the time being.

"Development work did continue, however, and finally—in 1928—the technique of handling molten magnesium became sufficiently understood for Wright to open up a small foundry area in which supercharger rear covers were successfully produced. From that time on the use of the metal increased progressively, until today more than 200 parts, ranging from small details to some of the largest single elements, are made from it."

Regarding its machining, Mr. Wiberg said in part: "In preparing the castings for machining, they are horizontally, vertically and radially targeted 100 per cent in a qualifying fixture which divides the casting errors. This takes the place of initial inspection and tedious layout, making it possible to determine at a glance whether the casting is usable. While still in this fixture, three 'rest spots' are machined—from which subsequent operations are located.

"Drills should be reground with rake on the lip removed to show at least 1/32-inch flat at point of land. Thinning of the web at the point to as little as 1/32-inch also is beneficial. In thinning the web, side of grinding wheel is used to remove lip rake. Helix angles can well be increased to as much as 40 or 45 degrees, especially on deep hole work. Normal 118 degree drill point is all right. Top side rake varies from 12 to 15 degrees. Polished flutes, preferably with a flash of hard chrome plate are necessary to prevent clogging with chips. Drills up to ⅜-inch can be run dry, but beyond that oil improves cutting and improves finish.

"Lands 0.010 to 0.015-inch wide eliminate burrs and sluggish cutting of reamers. Lip clearance gives better cutting and finer finish. Brush on the oil—that is sufficient. High speed steel or carbide blades both work well. Carbide has longer life.

"Practically all milling is done dry. Single blade carbide cutters are highly satisfactory on face milling. Chamfering, profiling and spot facing are performed

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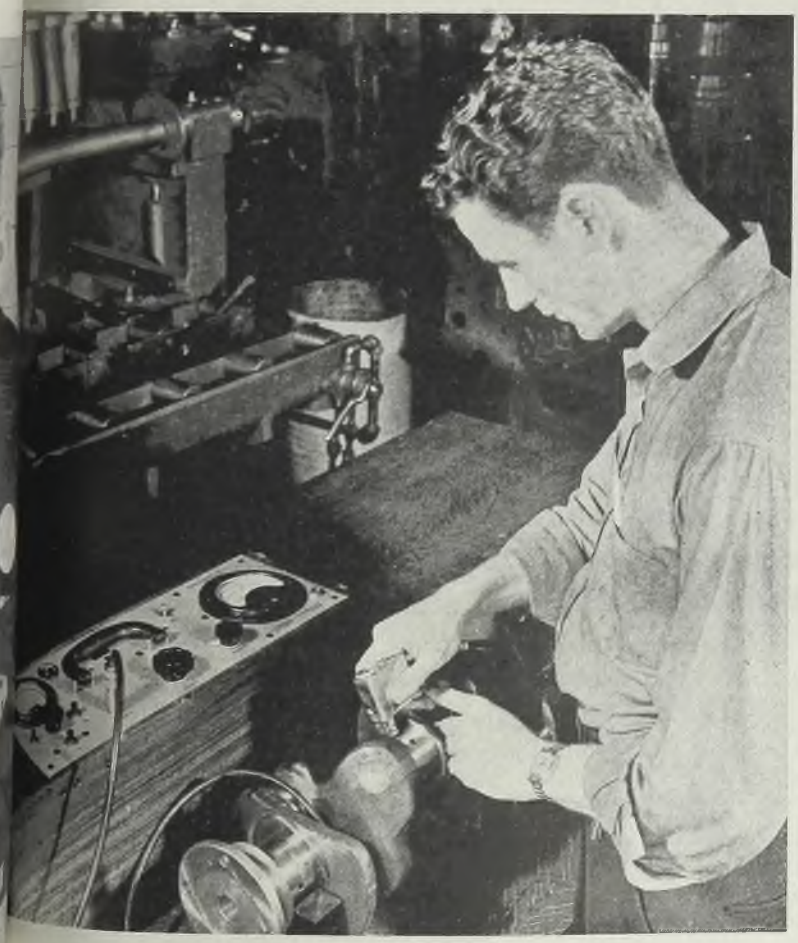
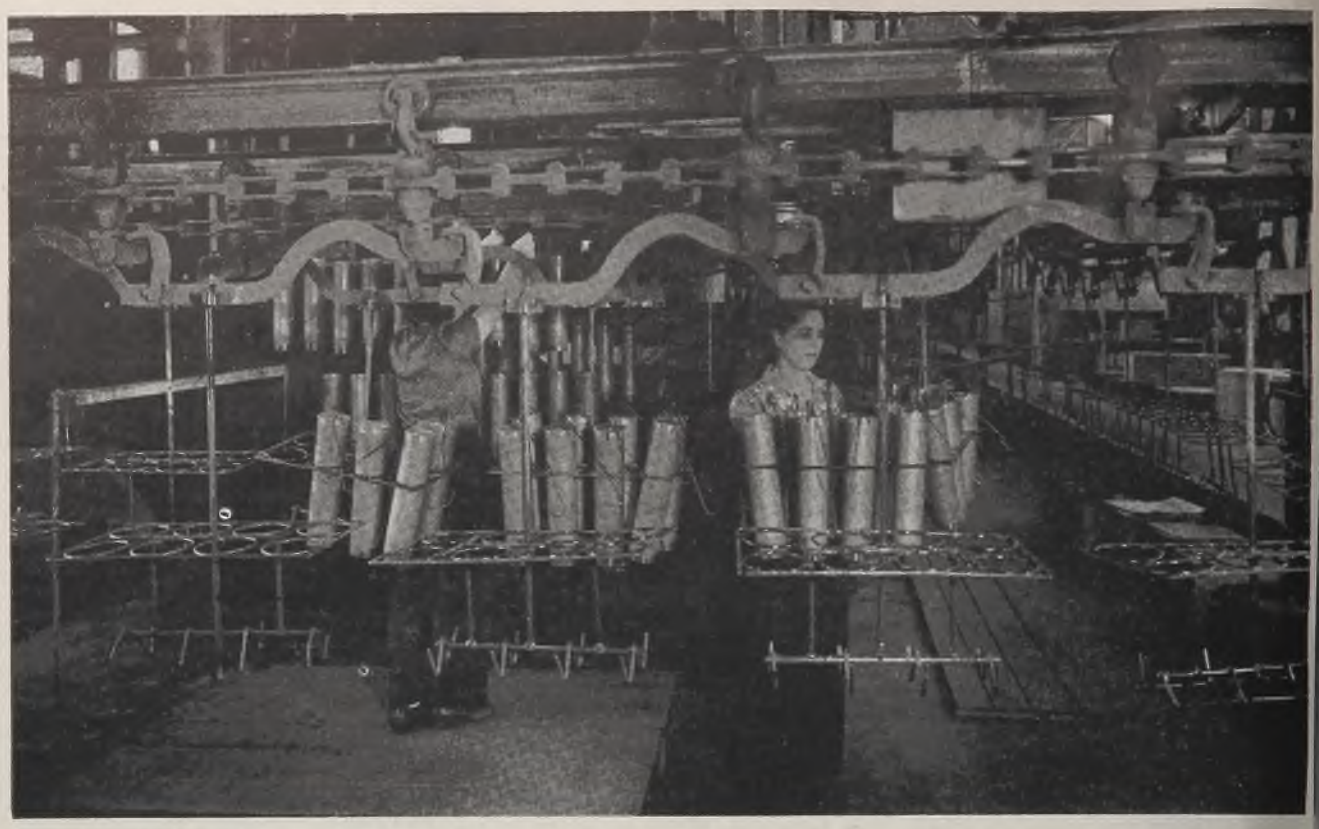


Modern tool engineering also brings the laboratory to the shop. Within a few short years commercial limits have tightened to such an amazing degree that "millionths" actually have replaced "thousandths" in specifications of fit and finish. When David Wallace of Chrysler first talked of "2 or 3 microinches" in connection with super-finish, that sounded both unattainable and unmeasurable. Today, however, the inspector with the profilometer checking finish to microinches, is a familiar figure in the shop



Cleaned cartridge cases are transferred to crossbar conveyor shown here and carried in banks of 10 through the dipping vat, detearing equipment and drying oven

DIP COATING

. . . . made to produce more uniform results by electrostatic detearing

IN ALL of the procedures set up by various manufacturers for the production of steel cartridge cases, the final operations involved a careful cleaning followed by the application of a protective coating which had to meet strict specifications and inspection. Various methods were developed for both the manufacture and the coating of the cases.

For the record in providing hints which may prove helpful in finishing other types of products, a description is presented of the method followed by one of the large automobile body builders in producing 75-millimeter cases. This company set up a dip-coating, oven-baking method which was extremely successful.

Several problems had to be solved in working out a dependable dip-coating operation that would give a coating of a thickness not to exceed 0.0005-inch, inside and out, with no fat edges or beads clinging to the lowest edges of the conveyor-suspended cases. Obviously, the method had to be one that would assure satisfactory results, without excessive cost for operation or maintenance.

A 75-millimeter cartridge case is tubular in shape and closed at one end, except for a small central hole in the head, ½-inch in diameter. It is about 3 inches in diameter and 14 inches long. Each case was given a single coat of baked-on synthetic varnish, a phenol-formaldehyde-resin varnish.

The cases hung 10 in a row from overhead crossbar conveyor. The crossbars were spaced 30 inches apart on the center. An expanding type of hook from the crossbars was inserted through the hole in the top of the shell. The cases tilted as they entered the dip tank, so that the head end was lower than the open end, and a complete flow-in of varnish through the large open end was assured.

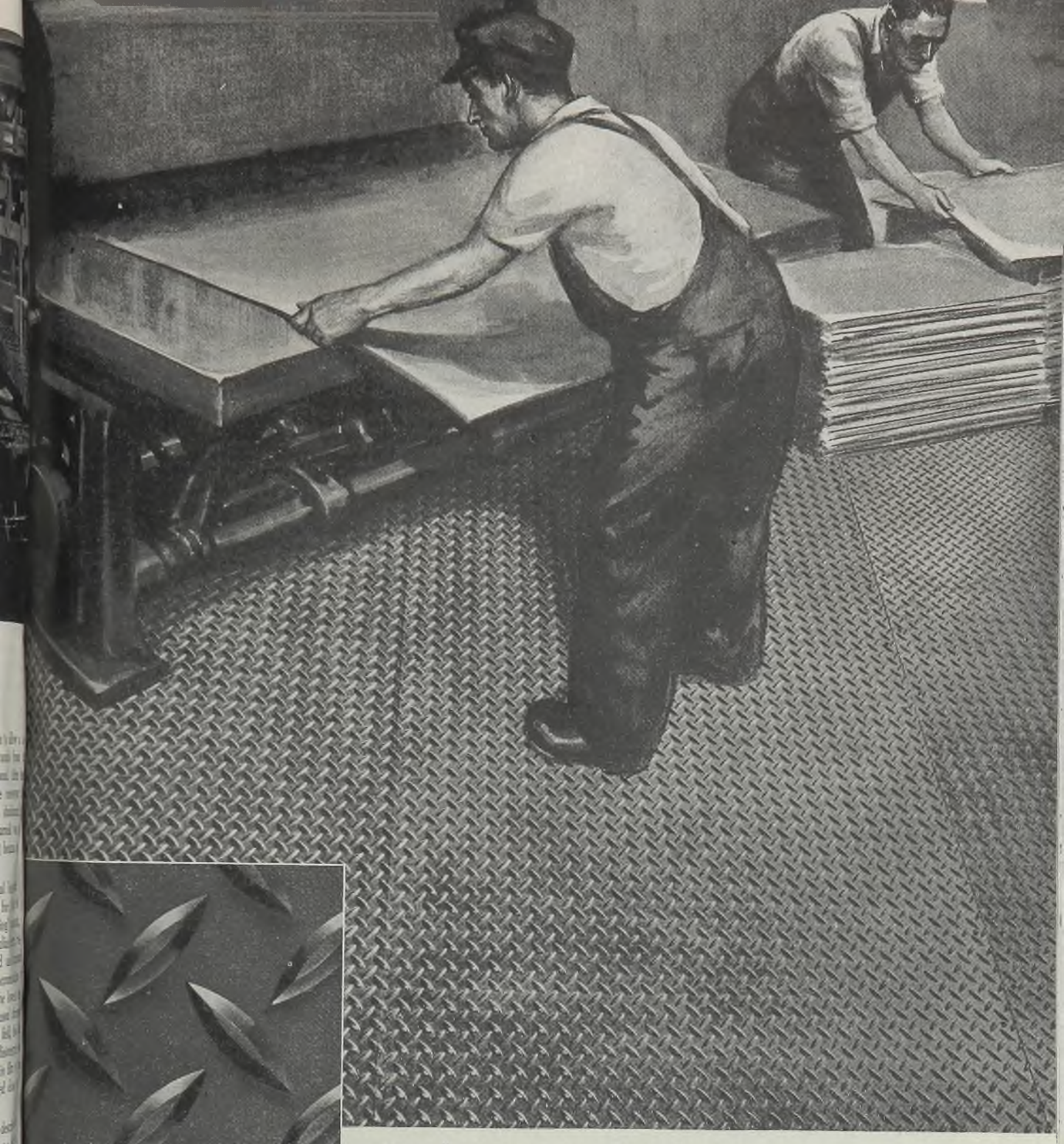
The case also emerged from the varnish in a tilted position to allow a satisfactory flow-off of varnish from the top flat surface of the head. After leaving the dip-tank, the conveyor line moved its load over a drainboard; the flow-down of excess varnish was completed; and the coating became set and began to dry.

Detearing: A special feature made dip-coating practicable for this type of work—electric "detearing" equipment, which, through a peculiar electric repelling action, removed and dispersed the beads or thick accumulations of varnish that clung to the lowest edges. As the coated cases passed through a high-voltage electrostatic field, the beads of varnish seemed to disintegrate and leave undamaged the thin film of varnish coating that adhered closely and properly to the metal.

Harold P. Ransburg described the principles involved in some detail in STEEL, Aug. 9, 1943, p. 106.

The sections from which the paint had been dripping, that is, the drain-off points, were subjected to a powerful electrostatic field designed to set up an attractive force between the grounded article and a high-voltage electrode, properly spaced from the object.

In this operation, the time between leaving the dip-tank and entering the electric field is not highly critical. The proper timing is dependent on the size and shape of the article, the flowing characteristics of the coating material, and the evaporation rate of the solvents in the coating material. In general,



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Other products include Plates, Sheets, Billets, Blooms, Slabs—Carbon, Copper or Alloy analyses.

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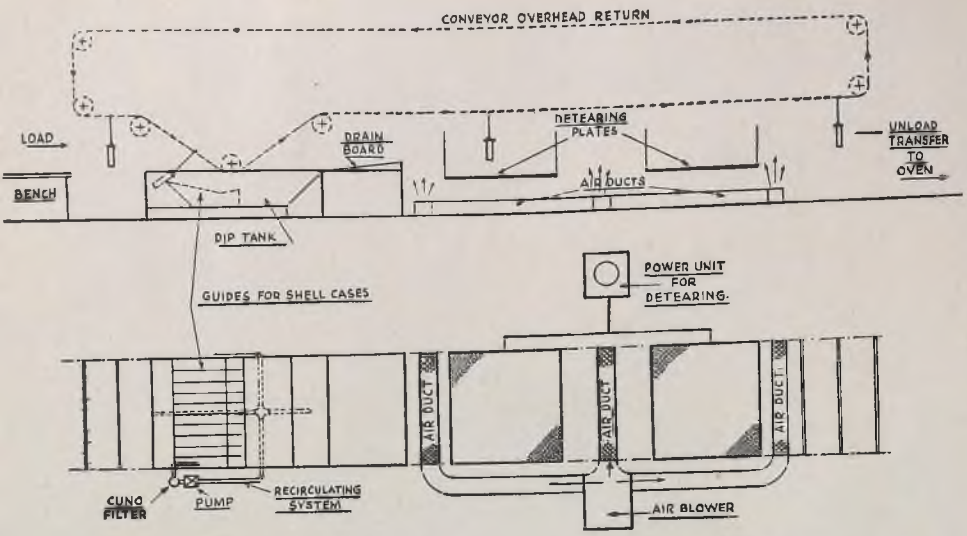

This is a diagram of an installation set up to apply varnish to steel cartridge cases. The cases are suspended open side down. A blade in the dip tank permits the varnish to enter. On emerging from the tank, the cases straighten up again to allow draining before detearing

this time will be between 1 and 4 minutes.

Electrodes are specially designed. Each drain-off point, from which excess material is to be removed, is exposed directly to the high-voltage plates. Any portion of the article that is electrically shielded from the field is less affected in direct proportion to the extent to which it is shielded. The electrodes are of material that presents a relatively continuous electrical conducting medium (for example, panels of expanded metal).

The electric field is energized by a specially designed power pack that produces a half-wave, direct-current vo age of considerable magnitude but l power. A short circuit will not produ a current of more than 5 millia.nper In a normal application it will oper at a value in the neighborhood of 2 microamperes at 85,000 volts. It is self-contained, oil-immersed unit, w no moving parts, and requires a prim power source of 220 volts, 60 cyc drawing approximately 3 amperes.

In the cartridge case operation, the purpose of dispelling all solv vapors temporarily trapped within dip-coated shells and that tended to c centrate throughout the high-voltage e tric field, a ventilating system provi a strong draft of air upward from g and duct work directly below the panded metal electrode plates.

Two sets of high-voltage electric fi and two sets of up-draft ventilation v arranged in tandem, about 5 feet a This arrangement took care of remo any beads of paint that partially formed at the lower edges of the c after passage through the first ele detearing field.

This possibility can occur if the veyor speed is slightly increased or if flow-down and setting of the coating terial are slower, or if other factors slightly. The detearing equipmen designed to fit a particular dipping but is capable of considerable ad ment to meet changed conditions in p uct or coating material.

Using electricity in this way to the drip or tear off the lip of a ca thus the latest painting trick. Dip was an ideal way of painting narrow-mouthed shells, but had drawback of forming beads during

(*Please turn to Page* 122)

Here bank of 10 cartridge cases is passing over first set of detearing screens. Cases are grounded to conveyor, forming one electrode; expanded metal screen forms other electrode. Potential of 85,000 volts between the two forms powerful electrostatic field which rapidly dissipates tears or clinging beads of varnish on drain-off points of the work. Data and photos from Pittsburgh Plate Glass Co., Pittsburgh

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Sub-Zero Treatment of Steels

Value of process unquestioned and it is likely to become routine part of normal heat treating practices. Author presents fundamentals involved in hardening steels at low temperatures

By H. C. AMTSBERG
Feeder Engineering Department
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

LARGE numbers of reports and se eral articles have been written on t improved properties and performan brought about by sub-zero cooling steel parts, particularly tools.

Claims of several hundred per ce improvement in life, while probably e aggerated, are not uncommon. In oth cases, the treatment was a partial cu for improper initial heat treatment. Ne ertheless, the value of the process is u questioned. It is likely to become routine part of normal heat treating pra tices and sufficient authoritative inf mation is already in evidence to warra a vigorous program of actual exploitati in the shop and further study in t laboratory. It appears, therefore, that presentation of the fundamentals cooling hardened steels to temperatu considerably below room temperatu properly correlated with the basic tre ment cycle and related structu changes, is in order.

Ideal Transformation Sought

When steel is heated to its hardeni temperature, the structure consists of solid solution of carbon in iron, kno as austenite, with or without alloyi elements in solution, and with or witho free iron or alloy carbides, depending the composition and temperature. Au tenite is relatively soft, tough, and du tile, even at room temperature. The ca bides are very hard compounds of ca bon and iron or alloying elements su as chromium, tungsten, molybdenu and vanadium. When hardening su steel by cooling in some suitable mediu the austenite transforms to martensi a hard and strong constituent that is aggregate of finely dispersed carbides iron. This aggregate bears one sim larity to suspensions such as colloid graphite in water except that the pa ticle size in the former is much finer.

As explained in greater detail late an ideal hardening operation would h one in which all of the austenite w transformed to martensite upon reachi room temperature. This is true even the final hardness desired is much low

Fig. 1—Hubbing master and milling cutter following the sub-zero treatment. Each was hardened in the conventional manner, then tempered, then cooled in the sub-zero chamber. Additional tempering will produce a combination of strength and toughness, that is much better than by conventional quench and temper treatment

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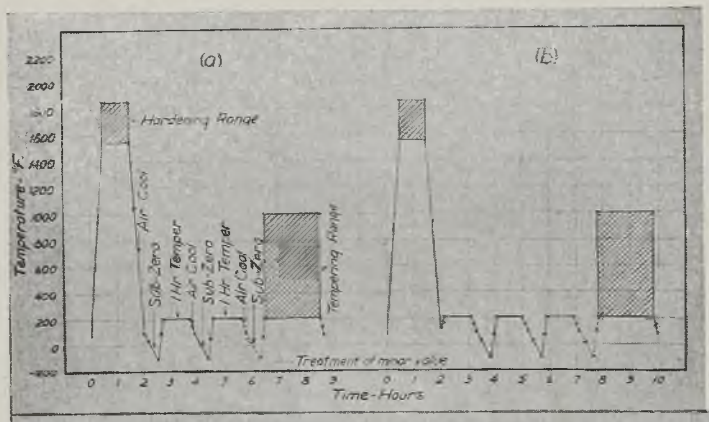
than would result from this ideal hardening, for it is well known that the best physical properties are obtained by quenching (i.e., water, oil, or air) to maximum hardness, then tempering to the desired combination of hardness and strength versus ductility and toughness.

In many steels, however, the transformation of the soft high-temperature constituent austenite to the hard constituent martensite does not always go to completion. In other words, after the steel has been cooled to room temperature some austenite has still been retained. This is illustrated in Fig. 4 showing isothermal time temperature transformation curves of a high speed steel determined by Gordon, Cohen, and Rose[1] and an air hardening die steel by Payson and Klein[2] on which cooling curves for standard treatments have been superimposed. In Fig. 4b, it is seen that oil quenching 18-4-1 high speed steel to room temperature transforms only about 75 per cent of the structure to martensite while 25 per cent remains as untransformed austenite. Fig. 4a shows that about 5 per cent of austenite remains in the chromium air-hardened steel after cooling in air to room temperature. Many other steels retain austenite in a similar manner provided the cooling is sufficiently rapid to prevent transformation at a high temperature to a relatively soft product—pearlite. The cooling rates of the steels in Fig. 4 could be reversed and the amount of austenite retained in each case would be approximately the same. Furthermore, K. Honda and K. Iwase[5] have shown that more austenite may be retained by oil quenching than by water quenching probably due to the greater degree of thermal stress in the latter. It is further believed that the same phenomenon exists in higher alloy steels when air and oil quenched, respectively. It is impossible to state a specific rule, but it may be generally said, that the higher the carbon and alloy content and the higher the hardening temperature, the greater will be the tendency to retain austenite. Thus, structures of this nature may be present frequently in "as quenched" steel.

Retained austenite can be made to



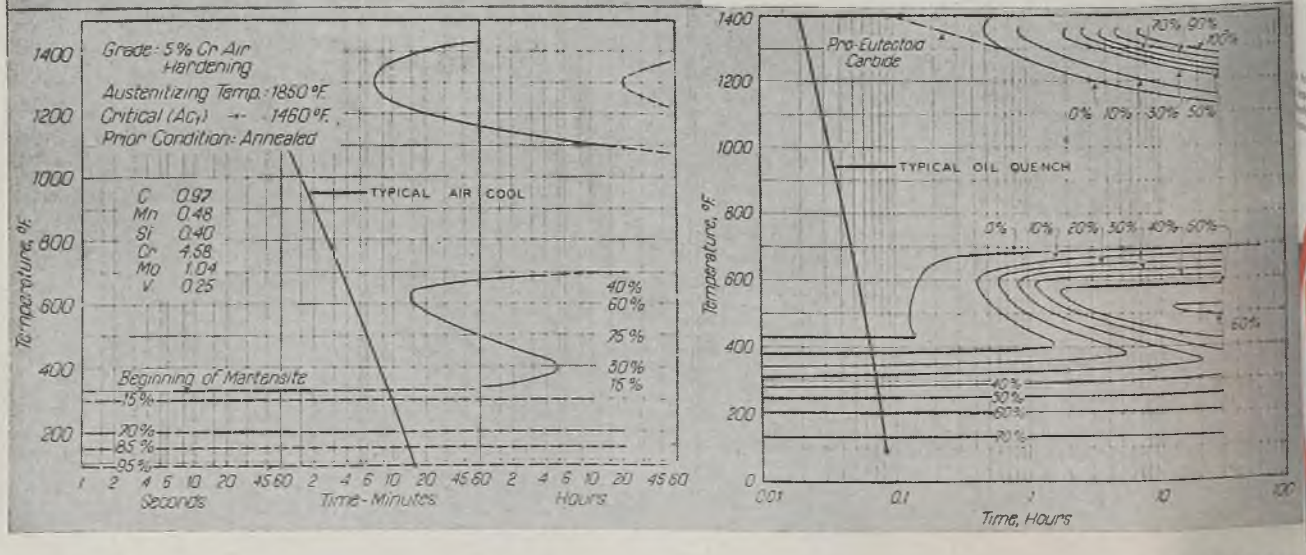


Fig. 2 (Above, left)—Milling cutter of high-speed steel being removed from sub-zero chamber. It was oil quenched from 2350 degrees Fahr. then tempered at 1050 degrees Fahr. for 2½ hours before the sub-zero treatment. The milling cutter will be ready for use following another temper of 1 hour at 1050 degrees Fahr.

Fig. 3 (Left)—Cycles for chromium-molybdenum, manganese-chromium-molybdenum and high-carbon high-chromium air hardening tool steels

Fig. 4a (Below, left)—Time—temperature transformation curve for 5 per cent chromium air hardening steel

Fig. 4b (Below, right)—Time—temperature transformation curve for 18-4-1 high speed steel

Illustrated: Moly Closed-Back Scoop—with Steel I-Beam Handle Reinforcement.

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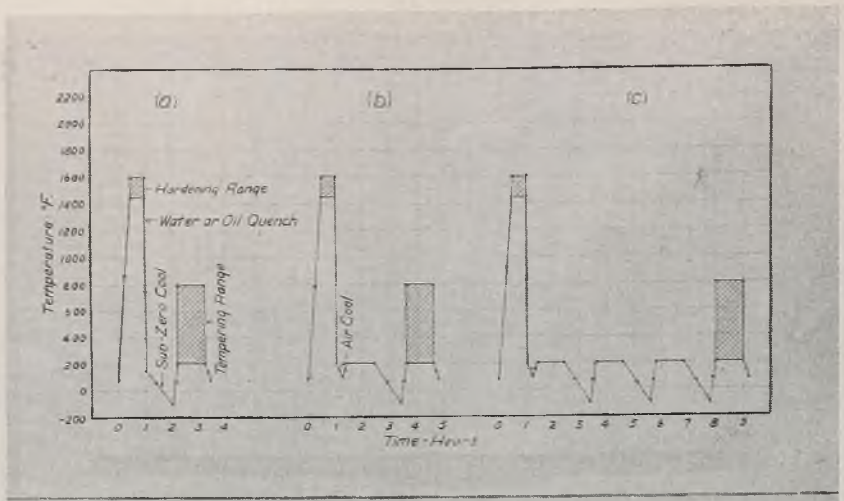

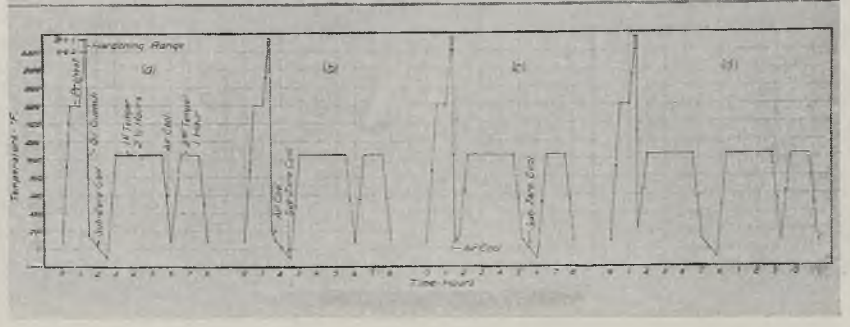

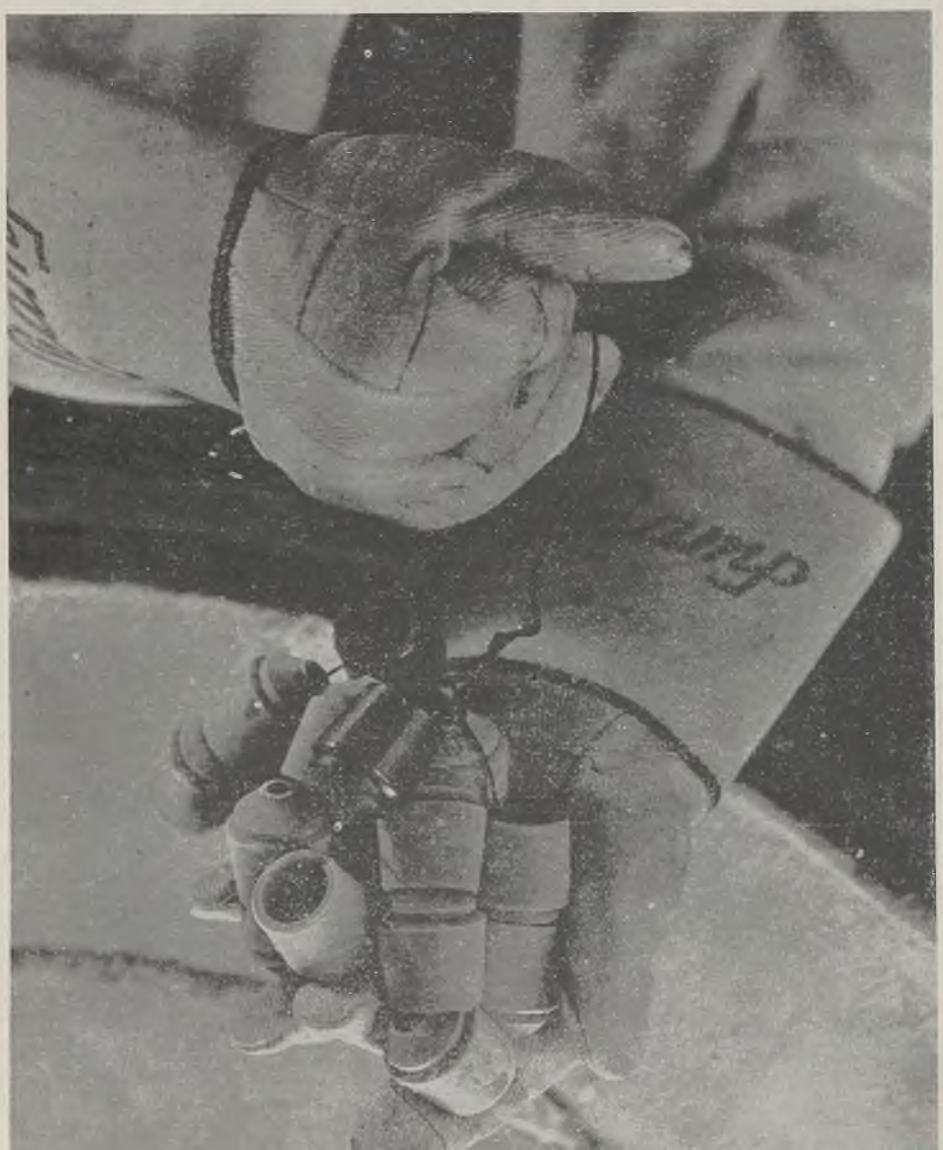

transform in a number of ways. In few steels, in which the amounts of r tained austenite are relatively small, sufficient length of time (sometim months or years) at room temperatu will change all or nearly all of it martensite. This, of course, is frequen disadvantageous particularly for dies a gages because full hardness and dime sional stability are not obtained at on This explains the inability of many gag to maintain shape and size accurat over a long period of time. In all stee the austenite can be transformed tempering, but frequently such hi temperatures are required as to l hardness of the martensite and ca transformation of the austenite to softer product—bainite.

Continued Cooling Effective

By again referring to Fig. 4, it is vious that this purpose may be complished by simply continuing co ing of the steel to considerably bel room temperature. Gordon and Coh have shown how such treatment redu the stability of the retained austen that is, reduces its reluctance to tra form. In many plain carbon and l alloy steels, either medium or high c bon (including carburized), one co ing to temperature of minus 100 d grees Fahr. is sufficient to virtually co plete all transformation. In other ste particularly the hi hly alloyed die ste several such opera'ions may be nec sary with intermediate tempering b tween each sub-zero treatment. Inde high speed steel must be tempered the conventional manner at least on durin" the heat treatment cycle in or to obtain transformation of all of t austenite.

Now that it has been determined h an austenite-free structure may be o tained. is it worthwhile to go to all th trouble? It is well-known that, fro the mechanical property standpoint, t amounts of retained au'terite and u tempered martensite should be at absolute minimum in the final produ Repeated tests by Cohen and his c workers[3,7] have indicated higher streng and toughness without appreciable l in hardness when all the austenite h been transformed by tempering or su zero treatment. especially the latter, a this is particularly so when the co pletely transformed structure is follow

Fig. 5 (Top, le't)—Cycles for water and oil hardening tool steels, alloy carburizing steels, SAE-52100

Fig. 6 (Center left)—Cycles for high speed steels

Fig. 7 (Left)—Shaving dies of high-carbon high-chromium tool steel. They are hardened to 65 rockwell C; tempered for one hour in boiling water; and are brought to 67/68 rockwell C by sub-zero treatment at minus 100 degrees Fahr.

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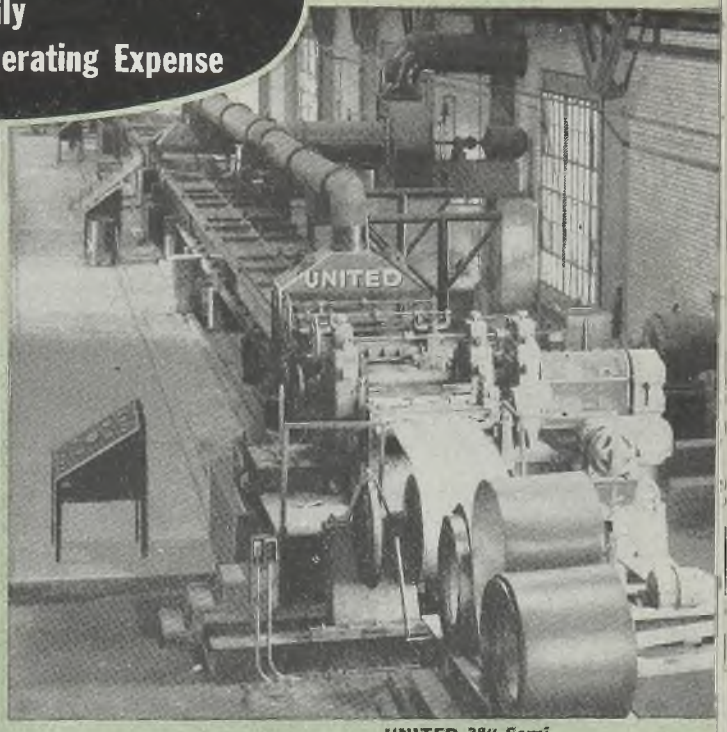
- Require Minimum Plant Area
- Process Coils Individually
- Reduce Operating Expense

Delivery end of UNITED Semi-Continuous Strip Pickler



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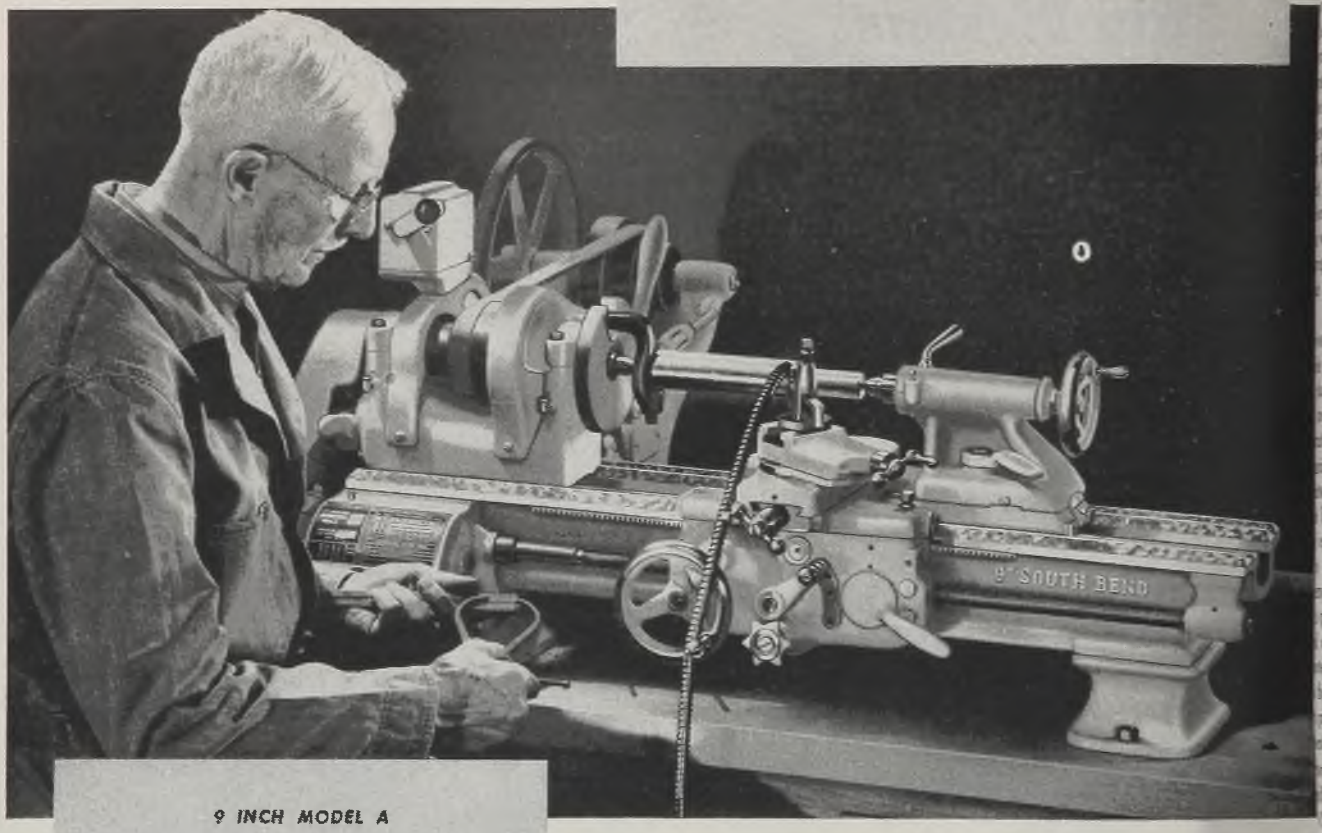

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Superfinished spindle with large bearings.

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Thread cutting range—4 to 224 per inch, right hand and left hand, 48 pitches.

Precision lead screw for thread cutting.

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Whether your problem is the quantity production of small accurate parts, or the efficient machining of small work in the tool room, experimental shop, or laboratory, you will find a lot of possibilities in the 9-inch South Bend Lathes. Modern in design, built with the same care as the larger sizes of South Bend Lathes, they are fast, accurate, and versatile. Substantial savings in capital investment, power consumption, floor space, and labor costs have often resulted from their installation.

In addition to the 9-inch Lathes, we manufacture 10″, 13″, 14½″ and 16″ lathes in Quick Change Gear and Toolroom types. Also the Series 900 and Series 1000 Precision Turret Lathes having ½″ and 1″ collet capacity respectively. Write for a catalog, stating the size and type of lathe you need.

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by a final temper for stress-relief. H. Scott and T. H. Gray[3] have shown (see Fig. 9) a more than 200 per cent increase in transverse bend strength over a considerable range in hardness by a cyclic treatment after hardening. This consisted of alternately tempering in boiling water cooling to minus 100 degrees Fahr. three times followed by the final temper to the desired hardness. Evidence has been offered for high speed steel, showing that all of the austenite may be transformed by tempering one or more times at the usual temperature (1050 degrees Fahr.) with cooling to room temperature following each such tempering. The amount of austenite that will transform is dependent on the time at the tempering temperature, and the effect on the properties of the progressively reduced amounts resulting therefrom is shown in Table 1 (from Cohen[8]).

The effect of these improved properties has been substantiated by actual shop results where reduced breakage and edge chipping, longer cutting life, and more blanks per grind have all been reported.

As previously pointed out, it is usually desirable to have the transformation take place at relatively low temperatures (under 300 degrees Fahr.). This necessitates a note of caution, since steels containing considerable proportions of austenite are provided with a "cushion" of high plasticity for accommodation of considerable stress. If this "cushion" is removed, particularly at very low temperatures where plasticity in general is quite low, stresses resulting from dimensional changes occur which connotes a serious cracking hazard. With these facts in mind then, an approach to practical application of sub-zero treatments can be made.

For carbon or moderately alloyed steels of medium carbon content such as SAE-1045, 4140, 4340 and NE equivalents, the practical value of sub-zero cooling is questionable because the amounts of retained austenite are either nil or relatively small. Furthermore, in most engineering applications of steels of this type, tempering temperatures are fairly high and hardness considerably reduced, wherein the conversion of the austenite to bainite would not be objectionable. Bainite, untempered or tempered, is known to have excellent properties for applications not requiring maximum hardness.

On water and oil hardening tool steels, alloy carburizing steels, and other low alloy high carbon steels such as SAE-52100, the treatment has been found frequently beneficial. Typical cycles are illustrated in Fig. 5. In general, cycle (a) is satisfactory for virtually all alloy carburizing steels and, in some cases, the other steels as well. Cycles (b) and (c) offer considerably reduced danger of cracking, particularly where sharp corners or edges are present or where the part has hardened throughout the cross-section. Cycle (c) is especially advantageous for gages since it offers the greatest degree of stabilization. In all cases, the final temper is the last operation and this is true of all subsequent treatments discussed. The curves indicate actual steel temperature. While the time relationships are not intended to be exact (except where specifically stated), it is significant to note that it is not deemed necessary to hold the steel at the sub-zero temperature for any appreciable length of time. It is important, however, that the steel reach the temperature given.

Treatments for the highly alloyed die steels, as shown in Fig. 3, are very simi-

(*Please turn to Page* 124)

Fig. 8 (Above)—Hubbing master of high-carbon high-chromium tool steel for sinking plastic mold die cavities. It is hardened in conventional manner to 65 rockwell C; tempered in boiling water for one hour; cooled to minus 100 degrees Fahr. in sub-zero chamber; warmed to room temperature; and tempered at approximately 900 degrees Fahr. to a hardness of 60/62 rockwell C. This results in a combination of strength and toughness that is much better than by conventional quench and temper treatment.

Fig. 9 (Below)—Effect of cyclic treatment on the bend strength of a 1 per cent carbon, 5 per cent chromium, 1 per cent molybdenum air hardening steel

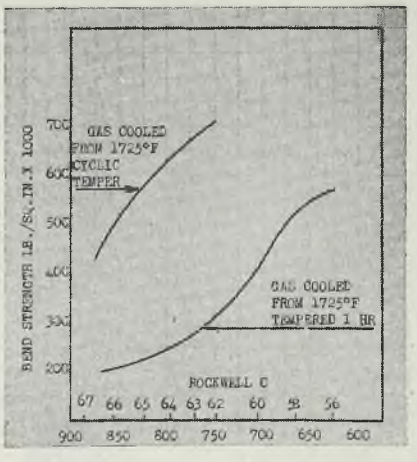


TABLE I

TEMPERING 18-4-1 HIGH SPEED STEEL AT 1050 DEGREES FAHR.

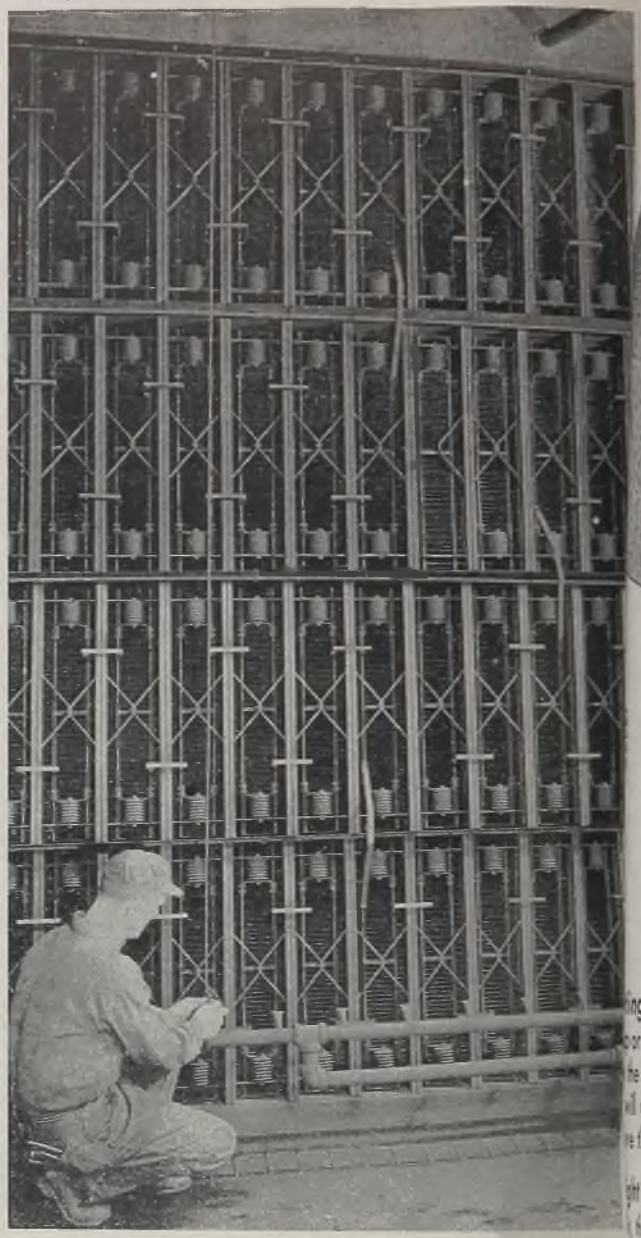
		Hardness	Transverse Strength	Torsion Impact	Hot Hardness*
Single Tempering	6 min.	65.1 Rc	312,000 psi	16 ft.-lbs.	55.0 Rc
	½ hr.	65.7	270,000	30	57.0 Rc
	2½ hrs.	65.0	408,000	48	58.0
	5 hrs.	64.5	410,000	48	57.0
	24 hrs.	63.8		39	55.0
Double Tempering plus	2½ hrs.	64.5	454,000	63	57.0
	2½ hrs.				

*Measured at 1000 degrees Fahr.

Electrostatic Air Cleaning

Safeguards Weirton's electrical equipment

Maintenance work on prime movers is reduced one-half and their life increased considerably by cooling with cleaned air. Bank of cells now employed to supply clean air to electrical units serving electrolytic tinning lines are relieved of entrapped dirt by automatic washer, thus insuring continuous operation



Output side of bank of Precipitron cells which feed cleaned air into electrical equipment of Weirton's three electrolytic tin lines. Sliding baffles removed to show interior construction

AIR CLEANING in a modern steel mill is difficult, but it pays big dividends. A supply of clean air to cool electrical equipment can reduce service work on motors, generators, breakers and switchgear as much as 50 per cent. Modern practice finds it economical to use electrostatic air cleaning for this purpose and, as a result, units such as the Precipitron developed by Westinghouse Electric & Mfg. Co. are finding wide use.

Probably the most difficult problem presented by dirt in the atmosphere is its effect on motor-generator sets on mill drives. In the past it has been standard practice to use a closed system to cool these units. This avoided any necessity for air cleaning but had the disadvantage that all the dirt brought in by the original air remained in the equipment. The air was circulated through the motors, passed over water-cooled coils, and then was recirculated through the system. Although there was no expense involved in cleaning the air, there was considerable expense involved in the cooling water. In some of these systems. filters were used to remove the larger dirt particles. However, no filter could be devised which would eliminate all the harmful dirt particles until the advent of the electrostatic cleaner.

Weirton Steel Co., Weirton, W. Va., has had considerable experience with Precipitrons. The first major installation in this plant was in 1939 in the motor room of a 4-stand tandem cold mill. This installation has since been enlarged and many more have been added. The accompanying table shows the size in cells of the units and their capacity in cubic feet per minute.

The latest and probably the most ambitious installation is the bank of cells used to clean air moving into the electrical equipment for the electrolytic tinning lines. Drives on the three lines are centrally located, together with the induction-type flow-brightening equipment and the maze of process controls required to maintain continuous operations on the three lines at speeds ranging above 1000 feet per minute. In this installation air is pumped directly from the bank of the Ohio river through a bank of 400 Precipitron cells and into the rooms on two levels where all electrical equipment is installed. This area is maintained at slightly higher than

Air direct from bank of Ohio river enters here and passes through cells of Precipitron. This particular unit is one of the largest, with 400 cells and a capacity of 240,000 feet per minute

Different grades and makes of Insulating Firebrick have widely differing properties. To obtain the maximum value for a given application, select the brick that will best fulfill the following:

1–*Limiting Service Temperature*—
The group or grade of insulating firebrick is established by the maximum temperature at which your furnace will operate. Select the group or grade *next* above this temperature.

2–*Weight and Conductivity*—
Generally, the lighter the brick, the lower the conductivity will be. Heat losses can be kept at the minimum only by selecting the lightest brick with the lowest conductivity. Compare conductivities based on ASTM test C-182-43T. Do not compare results obtained by different testing methods; they cannot be correlated.

3–*Stability*—
Cold crushing strength does not always indicate the stability of an insulating firebrick under fire. Compare the hot-load strengths. This is an essential factor for spring arch and for high wall construction and an important indication of length of service to be expected.

4–*Durability*—
Insulating firebrick should show little or no permanent volume change after heating to their recommended temperature limits. Compare results based on ASTM test C-93-42.

5–*Responsibility*—
Consider the manufacturer's responsibility, his ability to produce uniformly high quality materials, and his knowledge and experience with applications of insulating firebrick to different types of furnaces.

6–*Value*—
An evaluation of benefits and advantages for your particular furnace application should be made as a final step. Price alone is no criterion—a low price may result in an expensive investment.

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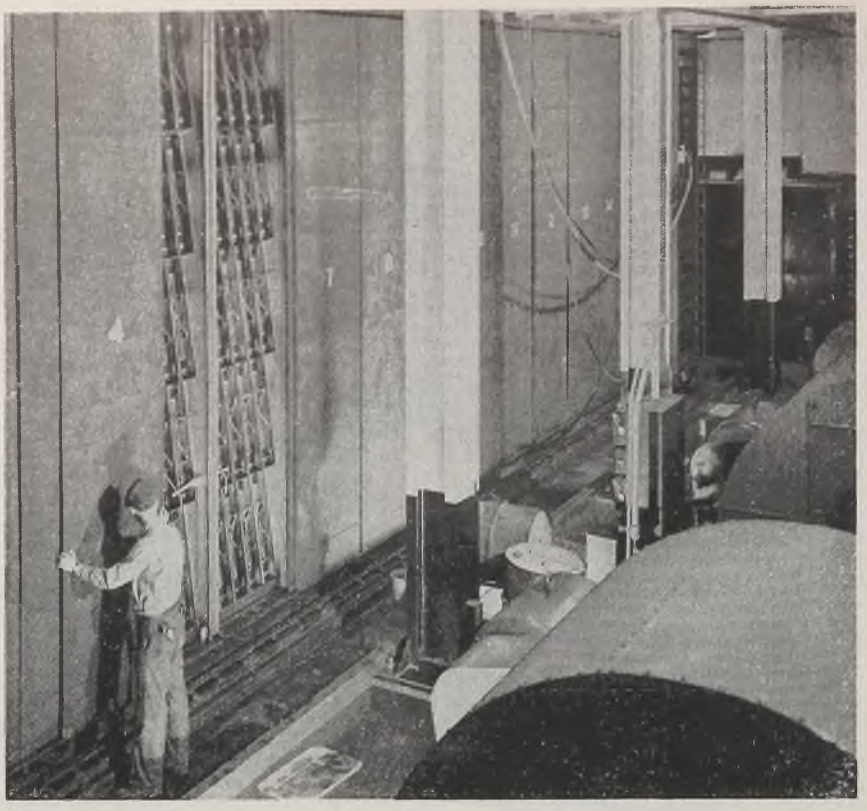

At extreme right of this view of output side is portable washer unit with hoses connected. Unit moves on trolley directly in front of cell bank. Workman is replacing sliding baffles

atmospheric pressure so that there can be no influx of uncleaned air from any point. Air is supplied to this installation at the rate of 240,000 cubic feet per minute.

The Precipitron consists of a cell in which fine tungsten wires are stretched across the leading edge and parallel plates are placed 5/16-inch apart in the interior. The wires are charged positively with 13,000 volts direct current and the plates negatively with 6000 volts direct current. The uncleaned air first passes the wire where any dust particles are given a positive charge. As this air passes the plates in the interior of the cell, these dust particles are attracted by the opposite charge. Cleaning efficiency of the cell as measured by the blackness test is 85 per cent or better with a 36-inch cell.

Air Volume, Speed Are Factors

Efficiency of the system is also a function of the volume and speed of the air, and the number of cells required to do a given job is usually determined by the percentage of efficiency required and the volume of air to be handled, as well as the amount of dirt normally present in the atmosphere to be cleaned.

Since the oldest installation at Weirton is now only 5 years old, there are as yet no figures available on motor life to compare with previous type installations. However, the appearance and operation of the motors under present conditions indicate that life may be considerably increased and maintenance work will be reduced by as much as 50 per cent.

Success of the initial installation has brought about its use in many other electrical installations, as well as some non-electrical applications, including units in the laboratory and offices, and possible future applications on such projects as cleaning of fuel gas from blast furnaces and coke ovens.

Several refinements in the Precipitron itself have been developed as a result of operating practice. Probably the most important of these is an automatic cleaning method for the cells. This eliminates the need of a workman cleaning the plates by hand, which was a dirty job at best. The charged plates are covered with a thin film of oil so the particles once attracted to the plates will be retained on the surface and will not be dislodged by passage of air through the cell. After being in service for a given length of time, the cell must be shut down and cleaned. The automatic washer does this job in a much shorter time and also makes possible continuous operation of the unit by keeping only a small section out of operation at one time. Water sprays traveling on vertical conveyer mechanism wash down the plates, removing the accumulated dust particles. Air nozzles then dry the plates and oil sprays recoat them ready for use. The whole apparatus is mounted on a track and as soon as one section is cleaned, it moves to the next.

PRECIPITRON UNITS INSTALLED AT WEIRTON STEEL CO.

Location	No. of cells	Capacity, cu. ft./min.
48-inch Stripsheet mill		
No. 4 tandem	240	144,000
No. 5 tandem	80	48,000
Weirton Tin Mill		
No. 1 skin mill	78	46,800
No. 2 skin mill	78	46,800
No. 1 shear lines	12	7,200
Cleaning lines	24	14,400
Electrolytic tin lines	400	240,000
No. 2 shear lines	80	48,000
Blast Furnaces		
Substation	78	46,800
No. 3 skip house	27	16,200
River Pump House	100	60,000
Coke Plant Substation	14	8,000
Laboratory	45	27,000
Steubenville Plant		
No. 1 skin mill	44	26,400
No. 2 skin mill	76	45,600
Cleaning lines	24	14,400
Shear lines	12	7,200
TOTAL	1362	846,800

Rubber Seal Applied To Slide Fasteners

A rubber seal making metal slide fasteners completely waterproof and preventing escape of air or gases has overlapping rubber lips with initial pressure sufficient to assure a perfect seal against any forces which the slide fastener will withstand. On the inside of the article to be sealed they prevent the escape of air, gases, or liquids held in the vessel. On the outside, they make the article waterproof and prevent the entrance of air or gases.

There are three styles, two of the non-separating type. One seals along its entire length but is open at the top. The second, originally developed as a closure for pressure vessels, is operated from the side opposite the sealing lips. The third style is of the separating type, sealing the entire length but not the ends, with the slider operating from either or both sides. The seal may be applied to metal, fabric, or sheet rubber providing sufficient clearance is allowed for fastener operation. Either stitching or cementing can be used in installation, depending upon the application.

Pressure seals are effective in a wide temperature range, not cracking when bent at minus 70 degrees Fahr., nor becoming soft at 150 degrees Fahr. Construction conforms to changes in warp position and adapts to stresses from movement. Wartime uses include closures on life saving and diving suits, aircraft pressure ducts and other apertures. The seals are said to be completely waterproof when immersed for long periods and hold water, air, or gases without perceptible loss.

—o—

Setting the steel runner spout off center on an open-hearth ladle causes the steel to swirl during the tapping. This results in uniform analysis and the elimination of small bottom skulls.

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TEFC with fan protecting housing removed showing the fan and the openings between the laminations and outer frame.

Century TEFC heavy end bracket.

TEFC frame and field winding. Note the long fit between the frame and end bracket.

Century C MOTORS

392

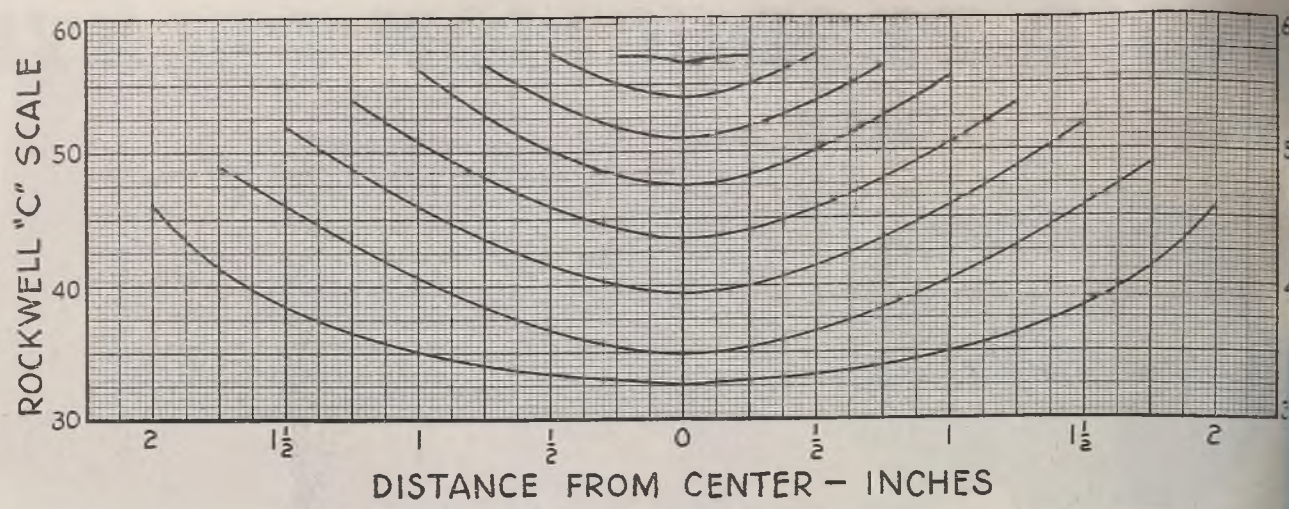


Fig. 1—Hardness of various diameters of SAE-4140 steel

Using the Jominy Test To Predict

Physical Properties after Tempering

Simple tests also accurately determine hardening temperature of quenched steel for predetermined hardness and strength

By EARL R. WEIHER
Chief Metallurgist
Fort Worth Division
Consolidated Vultee Aircraft Corp.

JOMINY hardenability test for several years has been the primary comparison method for determining depth to which a given steel will harden. Now it has been investigated fully enough for far greater usefulness. It will be used here to predict properties of steel after tempering and also to determine tempering temperature used on quenched steel to develop predetermined hardness and strength for any size section.

In order to derive the necessary data, only a few simple tests are made, requiring use of the Jominy test stand and rockwell hardness tester. Tests need not be repeated later unless changes are made in the quenching baths to which they apply. Time and effort required are well worth the accurate and useful data obtained.

Determination Of Quenched Properties

First, an alloy steel capable of fair hardenability is selected from stock and several test specimens are cut from this one piece of steel. Necessary specimens are one Jominy bar and various size rounds from ½-inch to about 3 or 4 inches. The largest round should be the same size as the largest part to be quenched. Length of the rounds must exceed diameter in each case.

In tests conducted to give data for this article, a bar of SAE-4140 steel was selected. Its Jominy bar was heated to 1575 degrees Fahr., placed on the test stand and quenched. Two flats were then machined, 180 degrees apart, on the bar surface and rockwell readings taken at intervals beginning at the quenched end. Data obtained are plotted as "Rockwell Hardness vs. Distance from Quenched End" on a standard form in Fig. 2.

All rounds were heated to 1575 degrees Fahr., held for the necessary length of time and individually quenched in the oil bath under investigation. Then they were sectioned to half length and rockwell readings taken on the surface, at half radius and in the center. These results are shown in Fig. 1, plotted as "Rockwell Hardness vs. Distance from Center of the Round."

It is known that steel hardness after quenching is dependent on the rate at which it cools, a phenomenon investigated in the preceding tests. The Jominy bar was subjected to various cooling rates along its length while rounds had cooling rates through their radii. As it is known that two pieces of the same steel will have, upon quenching, the same hardness wherever the cooling rates are identical, it is possible to set up a relationship between Figs. 1 and 2, which then can be identified as "Diameter of Round vs. Distance from Quenched End."

The oil quench curves plotted in Fig. 2, therefore, represent cooling velocities. They are usable only for this one particular bath, but the same set of data can be derived for any available quenching facilities. Curves are plotted on a standa hardenability chart for use in conjuncti with hardenability tests on other types steel.

When steel stock is received for quenc ing in the previously investigated mediu it is necessary only to machine a Jon bar and test it to obtain accurate inform tion regarding its properties and he treatment. As an example of the use this data, a Jominy bar was made fro SAE-4130 and quenched as before. Da obtained from rockwell tests on this pie of steel are shown on the composite har enability-cooling velocity form in Fig. To learn the properties of a quenche 1½-inch diameter bar of this steel, dra a horizontal line from the 1½-inch dian eter round until it intersects the coolin velocity curves. Draw vertical lines fro these intersections until the hardenabilit curve is intersected. These intersectio then will give rockwell hardness obtaine upon quenching (surface 48C, half radiu 43½C and center 40½C). In this manne the quenched properties of any steel i any size section may be determined.

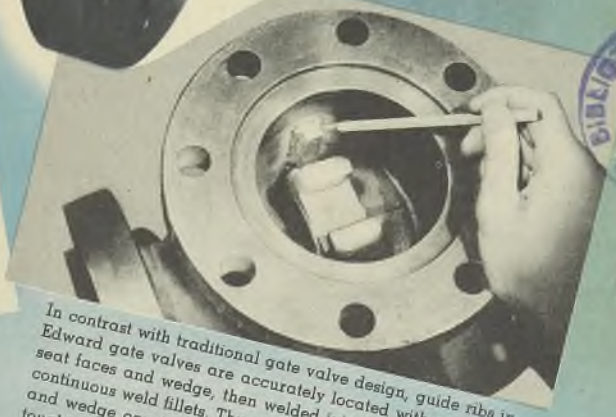
Predicting Heat Treatment

Properly quenched steel may be ten pered at any temperature, but after heat ing at some higher temperature will ex hibit properties characteristic only of th highest temperature used. First temperin operations have no effect upon propertie developed by second and higher tem peratures. Thus the previously usec hardenability bar may be tempered a arbitrarily established temperatures t

a new, better GATE VALVE *by* EDWARD

Basically different in design, Edward cast steel gate valves are tight, *stay* tighter than you thought gate valves could.... Here at last is a gate valve with all working parts in perfect alignment. Close fitting guide ribs, located *after* seat rings and wedge are in place, prevent wedge drag on seat faces. Hard faced seats are integral with body, yet replaceable. And with the new Edward gate valve testing method, *both* seating faces must be tight simultaneously.... The new Edward gate valves are built in 2½ to 12 in. sizes for service from 150 to 3600 lb. In many sizes and pressure classes they are available for immediate shipment.

Simple, functional, long lived, easy to maintain. Edward gate valves have no unnecessary parts, no pockets or recesses within the body to encourage start of excessive corrosion.

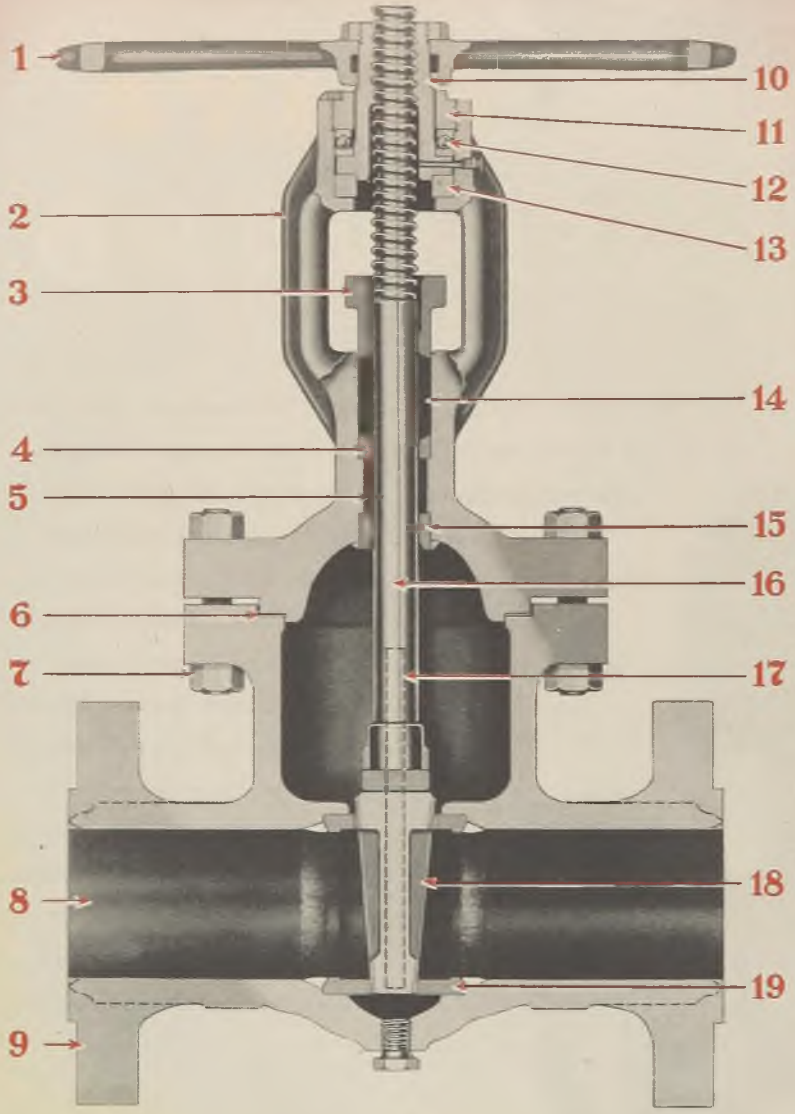


In contrast with traditional gate valve design, guide ribs in Edward gate valves are accurately located with respect to seat faces and wedge, then welded integrally to body with continuous weld fillets. Thus clearances are cut to minimum and wedge can travel practically to closed position before touching seating faces, greatly reducing wear.

DESIGN FEATURES

of the new

EDWARD Cast Steel GATE VALVE



1 Large diameter handwheel. Edward patented Impactor handwheel available on order.

2 Cast steel one-piece outside screw and yoke type bonnet.

3 Steel gland, through-bolted for easy packing adjustment.

4 Junk ring. EValized for resistance to galling and wear.

5 Large cooling chamber protects packing.

6 Edward male-female body-bonnet joint.

7 Alloy steel studs, threaded entire length for evenly stressed fit. Nuts tightened with torque wrenches for uniform gasket loading.

8 Cast steel body with equalized metal sections to prevent stress concentrations. Tapped hole in body below wedge makes clean-out easy.

9 ASA flanged ends or welding ends.

10 Alloy yoke bushing, EValized to reduce wear. Alemite fitting for lubrication of bushing and stem threads.

11 Hardened EValloy stainless steel yoke bushing locknut with flats for easy removal.

12 Ball thrust bearings in sizes where torque to operate valve exceeds that comfortably exerted by one man. Two ball bearings in large sizes, one in medium sizes, EValized non-galling bearing plates in small sizes.

13 EValized steel lower bearing plate reduces friction and eliminates galling.

14 Specially processed EValpak packing. Top and bottom rings jacketed and reinforced with Monel wire.

15 EValloy bonnet bushing for pressure-tight corrosion-proof backseat with stem shoulder.

16 Heat treated EValloy stem of uniform diameter with heavy tee-head making full contact with wedge slot for uniform pull on wedge. Self adjusting radial backseating shoulder.

17 Long steel wedge guides accurately located with respect to seat rings and wedge, then welded integral with body.

18 EValloy or Stellite hard faced wedge with wide contact areas ground to mirror-like flat surfaces.

19 Rolled or forged steel Stellite hard faced seat rings, welded integral with body. Replaceable.

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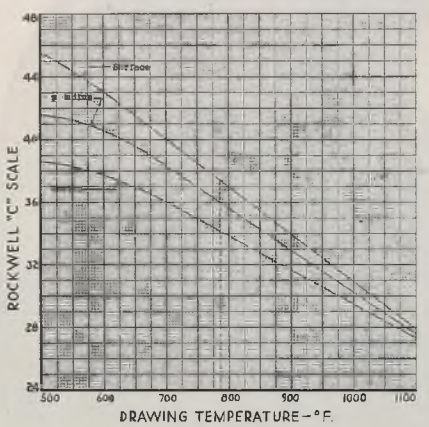
obtain added data. Each successive tempering operation, however, must have temperatures exceeding previous ones.

In this case the SAE X-4130 Jominy bar (used for data in Fig. 2) was tempered for 1 hour at 500, 700, 900 and 1100 degrees Fahr., in that order. Rockwell readings obtained after each tempering operation are plotted on the composite chart shown in Fig. 3.



Properties of the 1½-inch diameter bar may be determined by drawing horizontal and vertical lines as in Fig. 2. Location of intercepts on various curves will show hardness values obtainable by quenching and tempering the bar under these conditions. Hardness can be converted to corresponding tensile properties. By this procedure, the properties of any steel, after tempering, may be determined.

To predict heat treatment necessary for development of predetermined properties in a given size bar, a response to tempering curve must be plotted. Using the data for a 1½-inch diameter bar, hardness values for surface, half-radius and center of the bar are plotted against tempering (drawing) temperature in Fig. 4. This figure, or a similar one for any other steel, may be used to predict drawing temperature. For instance, if the data on hand are used and it is found necessary to heat treat a 1½-inch diameter bar of the SAE X-4130 steel to approximately 160,000 pounds per square inch at the half-radius, consult Fig. Since the required stress is equivalent a rockwell reading of C36, a horizont line is drawn from that point until it i tersects the half-radius curve. A vertic line is drawn from the intersection un it crosses surface and center curves well as the drawing temperature co-ord nate. Then it may be found, by examin tion, that the required stress will be o tained at a half-radius of the bar by ter pering at 785 degrees Fahr., and that t operation will produce a rockwell har ness of C37.5 at the surface (165,0 pounds per square inch) and C34 at t center (153,000 pounds per square inch Thus this is a means of determining he treatment for a 1½-inch diameter b

These tests and results were made p sible by the fact that any one quenchi bath will impart identical cooling ra to all types of steel with identical sectio For example, if three 1-inch diameter b —X-4130, 4140, and X-4340 — a quenched from the required temperatu in any one quench bath, the cooling ra at any one point on the X-4130 bar identical to the cooling rate, at the sa location, of both the 4140 and X-43 bars. Results, therefore, are based up equality of cooling rates in identical s tions of different steels, as well as equali in hardness for two or more pieces the same steel cooled at the same ra

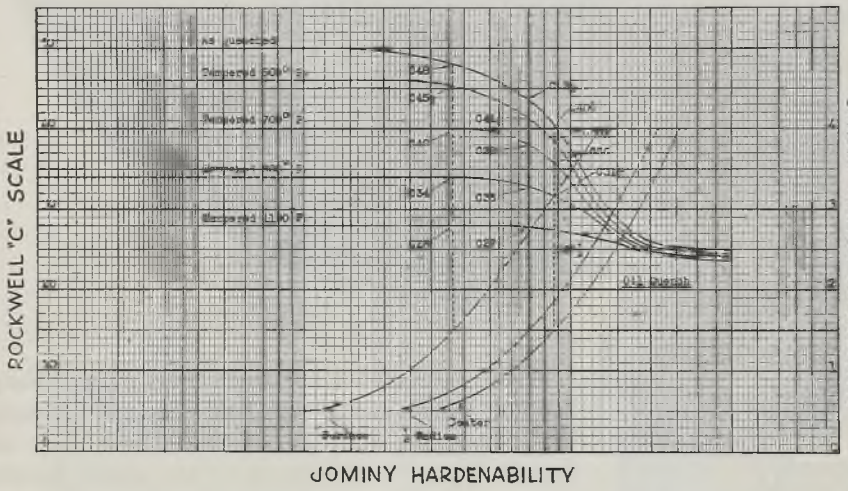
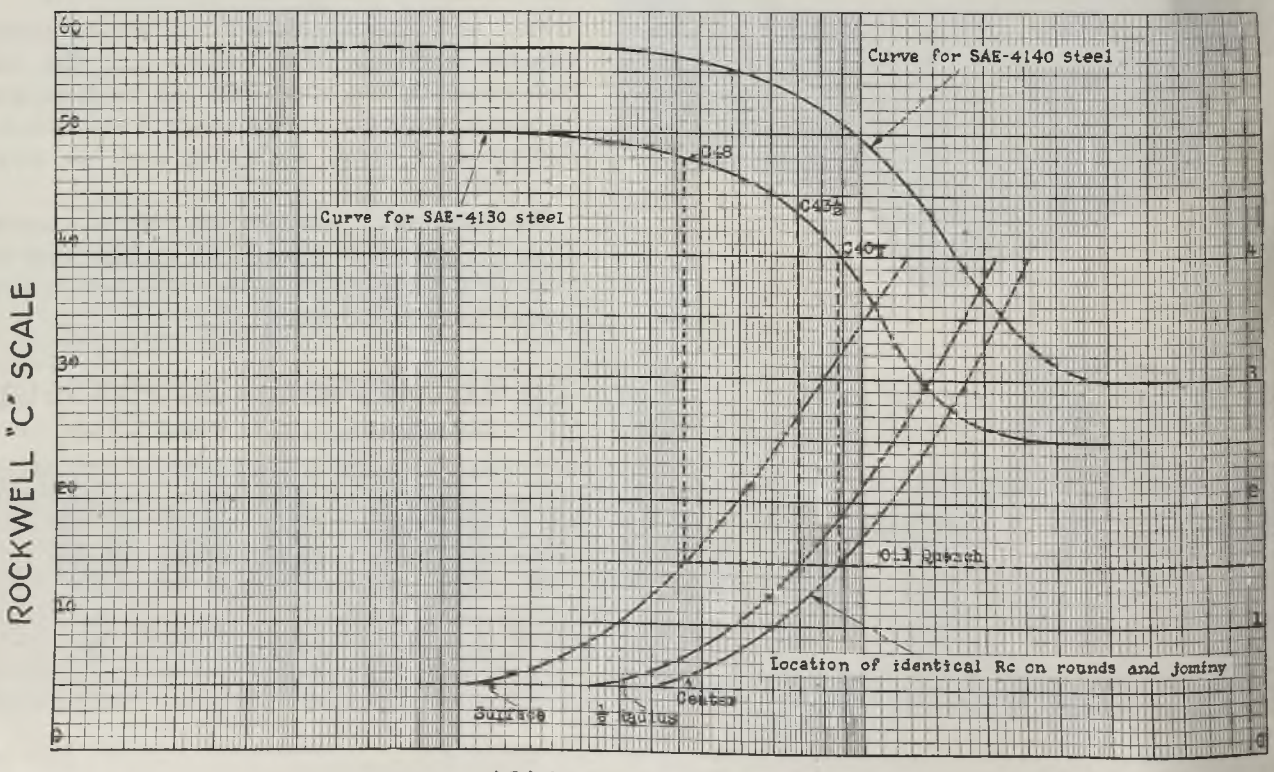


Fig. 4 (Above, left)—Hardness values for surface, half-radius and center of 1½-inch diameter SAE X-4130 steel bar plotted against drawing temperature

Fig. 3 (Center) — Curves for quenched and tempered SAE X-4130 steel

Fig. 2 (Below)—Curves for SAE 4140 and X-4130 steel; also location of identical rockwell hardness



Rough forging, before machining, of towing shackle of Rustless 16-2 stainless steel (Chromium 15-17%, Nickel 1.25-2.50%, Carbon .20% max.), the alloy whose strength, impact and corrosion resistance and favorable strength-weight ratio make it especially valuable in marine and in other exacting services.

IT HAS BEEN SAID that 16-2 stainless steel (Type 431) was forgotten in this country, but Rustless did not neglect it. On the contrary, we learned how to handle it, have produced many thousands of tons of it successfully, and have helped our customers learn how to work it.

This grade is unusually tough in the hardened and stress-relieved condition. In that condition, it has an ultimate tensile strength of 175,000 PSI min.; yield strength, 135,000 PSI min.; elongation in 2", 13% min.; and a minimum Izod impact strength of 35 ft. lbs. It has excellent resistance to certain types of corrosion, especially salt spray, tap water, steam and food products including fruit juices. In fact, 16-2 has the best corrosion resistance of any stainless steel hardenable by heat treatment. This gives it a definite advantage over the more customary 18-8 alloy for parts of such large section that cold working is impractical.

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Multiarc Welding

(*Concluded from page 71*)

and welded strips. Pitting occurred in the parent-metal cladding at the base of the welds and near strip edges. There also were pitted areas distributed somewhat evenly over the entire surface of the parent metal. However, unwelded specimens showed similarly scattered pitting after the fifth day. Such a condition, occurring over a wide area, called pit corrosion, is not caused or aggravated by welding.

Comparative results of tensile tests after exposure are noted in Table 4.

Table 5 contains data obtained while multiarc welding 0.081-inch 52SO alloy.

Figs. 1 to 6, inclusive, show multiarc welded 24S-T alclad aluminum alloy.

The penetration is more uniform and clean-cut than the deposit metal on the work side of the sheet, as escaping gases, formed by the molten metal, cause a somewhat pitted appearance, as mentioned earlier.

Figs. 7 to 10, inclusive, show multiarc welded specimens subjected to tensile tests.

Figs. 13 to 15, inclusive, are of metallic arc, multiarc and oxyacetylene welded ⅛-inch 3S½H aluminum. It is possible to observe the comparative amount of porosity present in the weld produced by the different methods. The multi-arc welded specimen contains less porosity than either of the other two methods.

Figs. 16 and 17 show a comparison of multiarc and heliarc welded 0.081-inch 52SO aluminum alloy.

Figures 18 to 26, inclusive, are of multiarc welded 3S aluminum alloy. Figures 24 to 26, are corner welds showing inside and outside after welding. Figures 22 and 23 show a fillet weld where a 3/16-inch plate is welded to an 0.064-inch plate. The cross section shows the amount of penetration obtained by this process while welding dissimilar thicknesses of material. Figures 27 and 28 show the work side and amount of penetration of metallic arc welded 2S aluminum. They indicated that a weld of exceptionally high quality is produced by the multiarc process.

Figure 29 shows an experimental pre sure tank constructed of 0.051-in

TABLE I—MULTIARC-WELDED 0.016-IN. 24S-T ALCLAD HEAT TREATED AFTER WELDING—WELDED 11/12/43—TESTED 11/22/43—BUTT JOINT

Specimen No.	Widths	Ultimate	K
1	0.921	800	54,200
2	1.000	970	60,500
3	0.965	980	63,600
4	0.943	980	65,000
5	0.950	930	61,250
6	0.958	790	51,600
7	0.938	970	64,750
			Av. 60,128

TABLE II—MULTIARC-WELDED 0.040-IN. 24S-T ALCLAD HEAT TREATED AFTER WELDING—BUTT JOINT—AGING TIME, 72 HOURS

Specimen No.	Widths	Ultimate	K
A	0.968	2300	59,500
B	0.970	2200	56,700
C	0.962	2200	57,100
D	0.984	2340	59,500
E	0.985	2300	58,400
F	0.972	2500	64,200
			Av. 59,233

TABLE III—COMPARISON OF MULTIARC AND OXYACETYLENE WELDING MATERIAL —3S ½H; THICKNESS—⅛-IN.

Specimen No.	Welding Process	Width	Ultimate	Psi.	Distance Fracture Occurred from Weld, In.	Visual Appearance	Porosity
1	Multiarc	0.943	1900	16,100	⅛	Good	None
2	Multiarc	1.00	2100	16,800	¼	Good	None
				Av. 16,450			
1	Metallic arc	0.950	1900	16,000	¼	Fair	Large am
2	Metallic arc	0.968	1900	15,700	¼	Fair	Large am
3	Metallic arc	0.975	2000	16,390	¼	Fair	Large am
				Av. 16,030			
1	Oxyacetylene	0.955	1880	15,750	⅜	Very good	Small am
2	Oxyacetylene	0.966	1890	15,650	⅜	Very good	Small am
3	Oxyacetylene	0.966	1890	15,650	⅜	Very good	Small am
				Av. 15,683			

TABLE IV—PRELIMINARY CORROSION TEST OF THE MULTIARC WELDED 0.041-I 24S-T ALCLAD

Specimen No.	Salt Spray	H. T. After Welding	Width	Type Joint	Ultimate	K	% Loss in Strength Compared with Uncorroded Specimen
4	Yes	Yes	0.991	Butt	1940	47,750	...
5	Yes	Yes	0.998	Butt	2520	61,550	...
6	Yes	Yes	0.981	Butt	2500	62,200	...
						Av. 57,166	2.83
B	Yes	Yes	1.041	Parent metal	2780	65,000	3.77
4A	Yes	No	0.994	Butt	1790	44,000	...
5B	Yes	No	0.950	Butt	1810	46,500	...
6C	Yes	No	1.001	Butt	1700	41,500	...
						Av. 44,000	1.01
Y	Yes	No	1.021	Parent metal	2450	58,500	...
10	None	Yes	1.004	Butt	2300	56,100	...
11	None	Yes	0.987	Butt	2510	62,000	...
12	None	Yes	0.952	Butt	2280	58,400	...
						Av. 58,833	...
13	None	None	0.978	Butt	1700	42,400	...
14	None	None	0.950	Butt	1810	46,500	...
						Av. 44,450	...
15	None	Yes	1.044	Parent metal	2890	67,500	...
16	None	Yes	0.991	Parent metal	2750	67,600	...
						Av. 67,550	...

Fig. 31—Same tank as in Fig. 30, after internal pressure was increased by a hydraulic pump until rupture occurred at 420 pounds per square inch. End heads bulge slightly

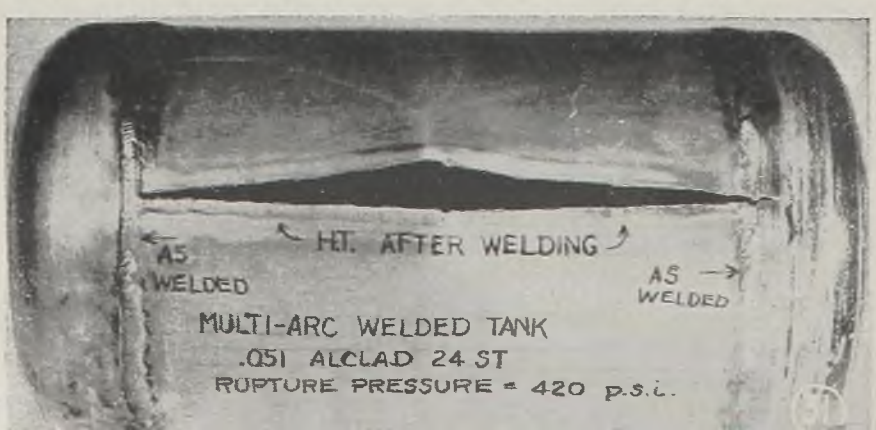


TABLE V—TYPICAL MULTIARC-WELDI DATA

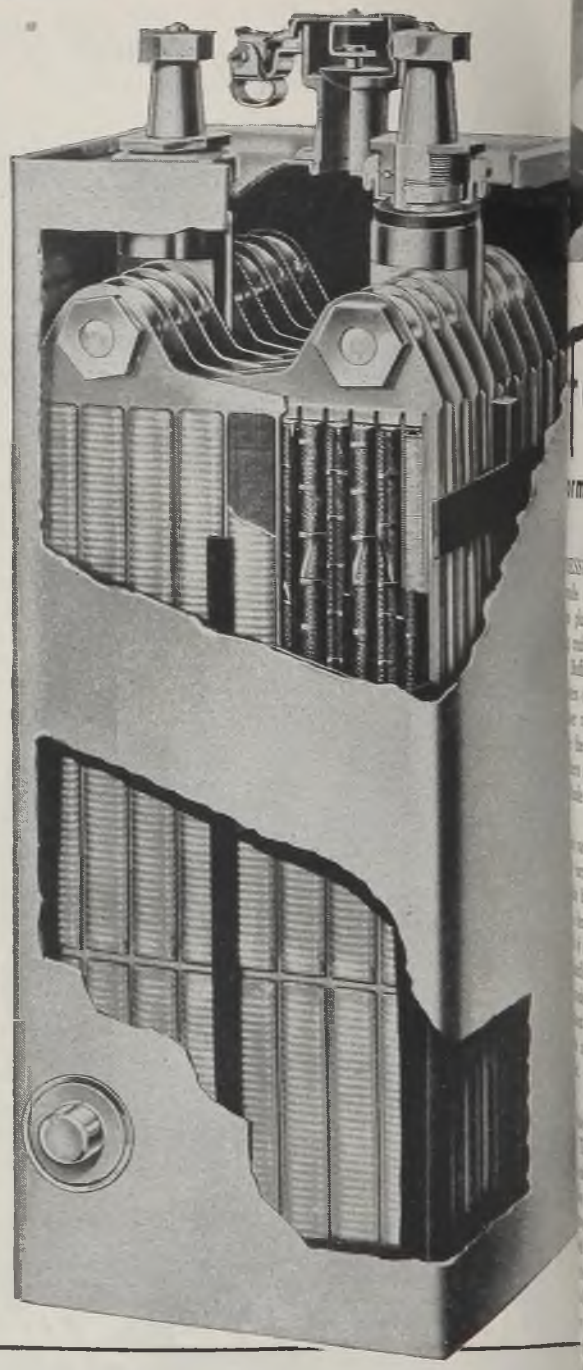
Material—52S aluminum alloy
Material thickness—0.081-in.
Type joint—butt
Electrode size and type—⅛-in. Aluminweld
Inches of weld per rod—12
Weight of coated rod per foot of weld—0.0 lb.
Welding rate—12 in. per minute
Power consumption per foot of weld—0.0 kw.-hr.

24S-T alclad welded by the multia process. End heads were spun fro 0.064-inch 24SO alclad and heat treate after spinning. The tank was tested i the as-welded condition. A hydrauli pump and a pressure gage were con nected, and hydraulic pressure increase until rupture occurred, as shown, at 35 pounds per square inch. The only vi ible deformation before rupture was th of the end heads, which was very sligh

Figures 30 and 31 show a similarl constructed tank, except that the long tudinal seam was heat treated befo the end heads were multi-arc weld into place. Internal pressure require to rupture this tank, as shown, was 42 pounds per square inch.

Because tests conducted so far are of preliminary nature, more extensive ex perimental work has been planned fo future projects.

MOST RUGGED OF ALL



Here is a cut-a-way view of a single cell of a typical Edison Alkaline Battery for operating electric trucks in industrial material-handling services. Note the ruggedness and precision of its construction. The container, cover, pole pieces and other structural parts are made of STEEL. Even the active materials are permanently locked in perforated STEEL tubes and pockets. These in turn are securely assembled into STEEL grids to form the positive and negative plates. The STEEL cover is welded onto the container. This cell construction is entirely different from that employed in other types of storage batteries . . . and every difference is an advantage to users of alkaline batteries in industrial trucks.

Because of their STEEL construction, they are by far the most rugged and durable of all batteries. When it comes to standing up under the shocks, vibration and hard usage in material-handling services, they have no equal. Alkaline batteries in trucks have fallen off loading platforms and docks, turned over, and even dropped down elevator shafts with little or no damage . . . and still delivered their full service life. The fact they can withstand such accidents, indicates the extra dependability that can be expected from them under more normal conditions. Their durable mechanical construction is also one of the principal reasons why alkaline batteries stay on the job and out of the repair shop, give longer life, and help cut material handling costs. *Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.*

Edison
ALKALINE BATTERIES

Sheet stock is removed from incoming cars in unit loads of approximately 3000 pounds. Bridge plates used have welded-on L-sections underneath to hold in place and to facilitate pick-up by fork truck

By GEORGE E. STRINGFELLOW
Division Manager
Storage Battery Division
Thomas A. Edison Inc.
West Orange, N. J.

Fork Trucks, Skids, Pallets

....form unusually effective handling system at Walter Kidde & Co.

HIGH-PRESSURE cylinders filled with carbon dioxide are being used to put out fires on planes, carriers, PT boats and landing craft such as the LST and the Water Buffalo (LVT2). Some of these cylinders carry carbon dioxide to inflate rubber rafts like the one that helped save the life of Eddie Rickenbacker. Others are supplying oxygen to the high-altitude flyers who are bombing Germany.

These and various other military uses have greatly increased the demand upon Walter Kidde & Co. for high-pressure cylinders, a demand that is being met with the aid of a highly efficient plan of materials handling. The methods employed are under the continuous control of a department organized specifically for the purpose and directed by E. W. Schoonmaker, supervisor of materials handling.

The cylinders are cold-drawn from steel disks. The disks are blanked from sheet stock, and passed through one cupping and five drawing operations with anneals between. The open ends are then trimmed and the necks formed by four passes through upsetting presses, the necks of smaller cylinders being swaged down to shape by two passes.

Between all of these operations, the work is handled in unit loads of 4000 to 6000 pounds on either pallet platforms or skid boxes by means of fork trucks. At each operation, the work is taken from one of the unit loads and put directly on another so that there are virtually no handling motions as such.

The sheet stock is received in box cars in packages of approximately 3000 pounds, strapped either on battens or single-face pallets. The packages are unloaded, taken to storage and tiered by fork trucks, then detiered as needed and taken to the first operation, in which each sheet is stamped with the heat number for control purposes.

As they are stamped, the sheets are piled on pallet platforms on which they are picked up and carried, again by fork truck, to the blanking presses. Here the disks are piled on pallet platforms on which they are delivered to the cupping operation, while the scrap webbing is piled on other pallet platforms for delivery to the scrap yard.

Outgoing scrap is elevated for dumping by tiering fork truck as shown here

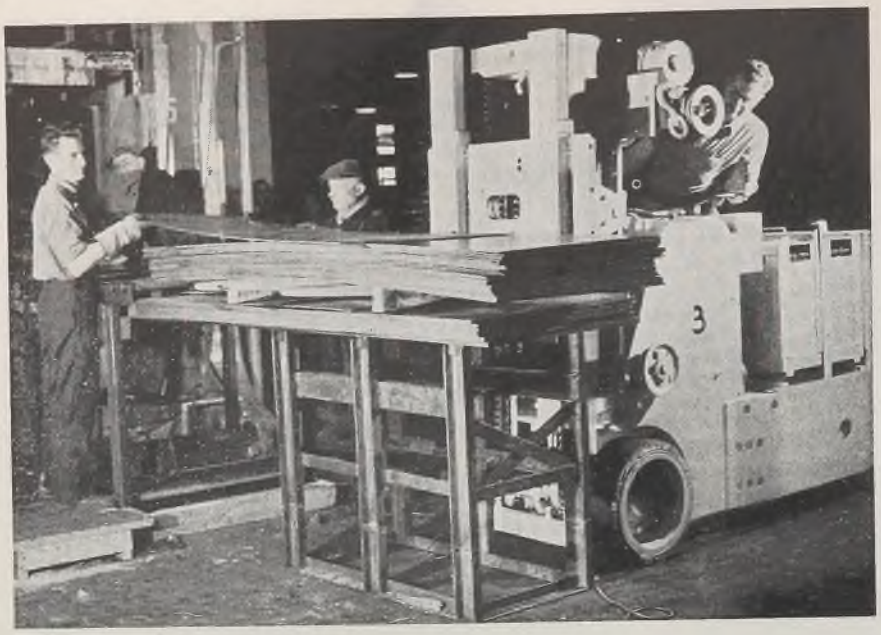
Immediately before being cupped (as well as before each draw), the disks are dipped in a soap solution which takes the place of the oil formerly used as die lubricant and eliminates the need of washing the work before annealing.

The cups are picked up and carried by fork truck to the annealing furnace and then to the first drawing operation in steel skid boxes, 42 x 48 x 48 inches, open on one side. The same procedure is followed between subsequent annealing and drawing operations.

At the annealing furnaces the work is fed into the entry end from a skid box and piled on another skid box at the delivery end. At the drawing presses the work is discharged through the bed of the press upon a conveyor which brings it up to a convenient position for inspection, following which it is piled in a skid box for delivery to the next anneal.

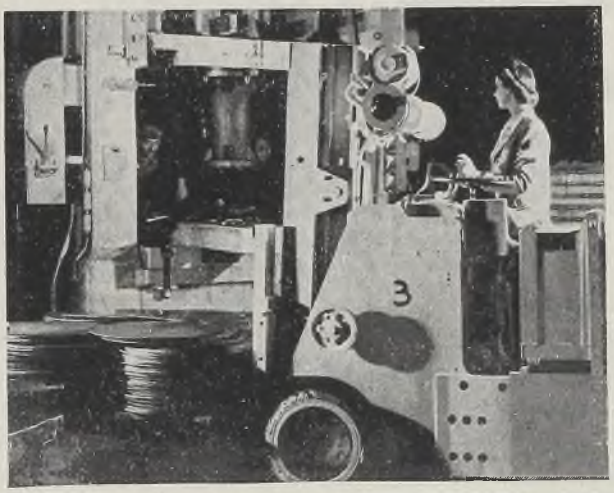
The size of the skid boxes was determined by the bulk of the work after the cupping operation, and permits handling in units averaging from 4000 to 6000 pounds.

Following the last draw, the work is handled in the same containers through

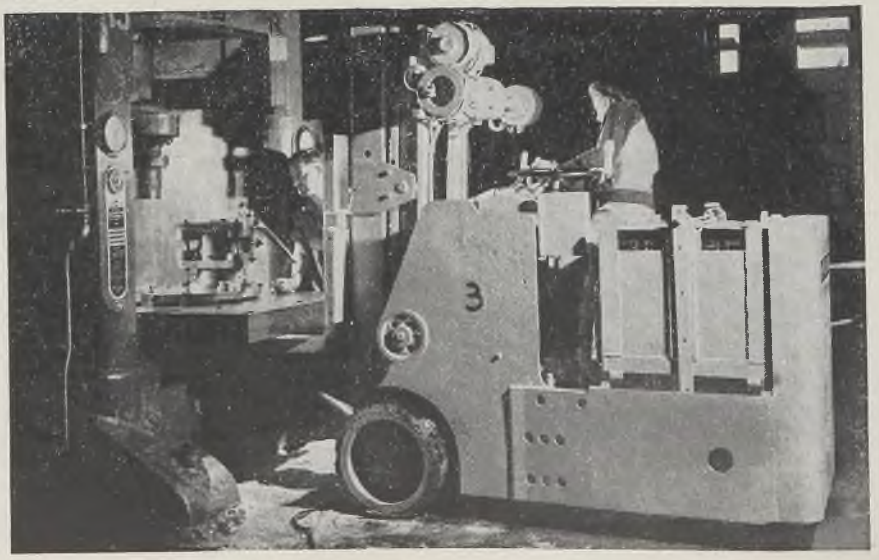


Sheet stock is delivered to feed table beside blanking press by fork truck

(Immediately below)—Blanked disks are piled on pallets as they come from blanking press. This greatly facilitates delivery to next operation. Scrap also is piled on pallets for delivery



(Below) — Fork truck used for changing dies on presses has the important advantage that it can carry die over press bed, directly to position desired. Die then can be lowered into place by blocking



the trimming, upsetting, and swaging operations. At the final pass, the work is transferred to caster-mounted frames in units of approximately 2000 to 3000 pounds, for movement through finishing operations, including pickling, cleaning, parkerizing, painting, wire winding, machining of the neck and inspection.

These operations vary more widely in the time required, hence can be more readily synchronized by the use of small handling units.

Scrap is called for by highway trucks which are loaded by fork trucks. Sheet scrap is elevated, tilted and dumped on the same unit pallet loads in which they were brought from the blanking operation. Other scrap, such as chips and wire, is collected in drums, carried on pallets to the scrap yard and there elevated by fork truck for loading.

The fork trucks are provided with two batteries each, which are charged alternately and exchanged as needed to maintain the trucks in 24-hour operation. The batteries are charged by the automatic modified-constant-potential method, the amount of charge being measured by test fork.

An electric hoist, with spreader bar, trolley and tramrail, is employed to change the batteries.

Two of the trucks are provided with winches for use in changing dies. In comparison to the elevating-platform type of truck more commonly used for this kind of work, the fork truck has the advantage in that it can reach into the press above the bed and actually position the dies. Use of dunnage strips in the die storage racks also enables the truck to pick up and set down.

Seek New Markets for Hydraulic Accumulator

New applications of hydraulics in the machine tool, automotive, railroad and marine fields are looked for following release of a revolutionary type, low-cost hydraulic accumulator formerly available for aircraft exclusively. The new unit, manufactured by Greer Products Co., New York 23, consists of a one-piece seamless steel shell, without welds or joints, which contains a completely enclosed one-piece synthetic rubber bladder having an integrally molded gas valve. Its makers say the accumulator may be adapted readily to many types of presses, riveters, hoists, elevators, marine steering gear, brakes, and especially, portable equipment. Full details of operation, sizes, installation, etc., are given in a new bulletin available on request.

—o—

A new chart by Arcos Corp., 401 Broad, Philadelphia 8, gives the following data on stainless steel and ferrous alloy welding electrodes: Weld metal composition of 42 stainless and all electrodes, heat treatment specifications of welded structures, and identifying grade information.