STEEL

The Magazine of Metalworking and Metalproducing

MAY 29, 1944

Volume 114—Number 22

NEWS

TECHNICAL

FEATURES

MARKETS

No . . . we don't make tea strainers

. . . but we do make them possible.

The lowly tea strainer consumes about 5 million miles of wire a year. It retails for a dime, costs the wholesaler about a nickel—and its profit demands accuracy in every operation.

Where do we come in? *With uniform accuracy at the very beginning.* We build rolling mills that roll the wire rod at speeds in excess of 4,000 F.P.M., with a uniform cross-section ±.005 in.

MORGAN CONSTRUCTION COMPANY
WORCESTER, MASSACHUSETTS

R-125

PLAN NOW WITH **MORGAN**

ENGINEERS AND BUILDERS OF ROLLING MILLS . . . WIRE MILLS . . .
GAS PRODUCER MACHINES . . . REGENERATIVE FURNACE CONTROL

STEEL
May 29, 1944

Integrity in Government:

It is amazing how our overstaffed government agencies always can find time, manpower and unlimited resources to investigate a charge against a corporation, yet cannot find time, manpower, resources or even inclination to look into charges involving wrong-doing by favorites of the federal bureaucracies or by agencies of the government itself. This discrimination—which is evident from hundreds of documented cases—rapidly is becoming a national scandal.

Here is a typical illustration. Most readers will recall that when the government took over the Chicago offices of Montgomery Ward & Co., several scores of FBI operatives were assigned to the task of seeing that nobody violated government regulations. When a company official took down a placard to study it, FBI men pounced upon him, charged him with stealing government property and otherwise treated him as if he were a desperate criminal.

At about the same time in Cleveland, somebody got a hunch that the staffs of local ODT and OPA offices were co-operating with black market operators in a gigantic ration coupon swindle. A local police inspector went to work and uncovered enough dirt to indicate that the public has been defrauded of shockingly large amounts of gasoline and other rationed commodities.

Considerable time passed before any responsible government official took any interest in the case. OPA and ODT chiefs did not act until underlings had been given a week or more to destroy evidence. The federal district attorney acted as if he were bored. FBI thus far has evidenced no interest in the case.

Consider the incongruity of this situation. In Chicago, FBI has 60 or more men available to catch a man who removed a placard from a bulletin board but in Cleveland, where ODT and OPA officials connived with underworld characters to divert hundreds of thousands of dollars worth of gasoline and other commodities fraudulently, FBI and all other enforcement arms of the government seem to be indisposed to act.

Perhaps this is not the fault of FBI. Perhaps the policy handed down from above is that business men and corporations are free game, but that there is a closed season on politicians, petty office holders, racketeers, etc.

This studied discrimination, practiced as part of a comprehensive program of alleged social reform, may appear to be smart politics, but in the end it will trip the new deal. The man in the street still likes to see integrity in his government.

INDUSTRY RELATIONS: Members of the American Iron and Steel Institute who listened attentively to the excellent program at the fifty-third general meeting at the Waldorf-Astoria in New York last Thursday were given a thought-provoking insight into some of the important problems of the steel industry which lie ahead. Throughout the formal addresses of President Walter S. Tower and Professor Leo Wolman and the brief talks by Messrs. Olds, Ryerson and Grace occurred reference after reference to situations and trends which spell potential trouble for the industry unless they are corrected in time.

It was no accident that major emphasis was placed by these speakers upon the subjects of public relations and labor relations. While the steel industry stands higher in public esteem than it did a few years ago, due largely to its excellent war perform-

(OVER)

ance, it still does not command the degree of public understanding and confidence which it deserves. Its labor relations, due largely to conditions beyond the control of the industry, probably never were worse than at present.

High-lighting the importance of public and labor relations at this meeting was timely. If the industry will attack these problems realistically now, it will save itself untold difficulties in the postwar period. —p. 49

° ° °

FLAME-SPUN TUBING: One of the developments in metalworking which has gained headway during the war is the flame-spinning process. It is being used extensively in fabricating many parts for refrigerating systems, automotive shock absorbers, flame-throwers, chemical bombs, hand grenades, bomb fuses, projectiles, etc.

The process is simple and effective. The tubular part to be fabricated is rotated in a lathe or other machine. The tubular end is heated with oxyacetylene flames and then formed to the desired shape by cam tools, shaped rollers or other device while the tube is being spun.

Flame spinning now is being employed by a number of companies engaged in war work on tubing ranging from ½ to 2¾ inches in diameter. It reduces fabricating time appreciably and undoubtedly will find numerous new applications in peacetime manufacture. —p. 84

° ° °

NEED MORE MACHINES: Recent new military programs, including a step-up in the production of heavy artillery and other items, have caused the government to revise upward its estimate of machine tool requirements. WPB representatives have told members of the Machine Tool Industry Advisory Committee that machine tool needs for 1944, including the backlog of unfilled orders, may exceed $600,000,000.

Indicative of the reversal in the demand for machine tools, which first became noticeable some months ago, is the fact that in April new orders received exceeded shipments for the month for the first time since August, 1942. As a result of the renewed demand for machine tools, officials are placing more emphasis upon the need of putting idle equipment to work where it will do the most good. The new pressure for tools also accentuates the manpower problem, which will be a limiting factor in attempts to increase production. —p. 80

TELL THEM THE TRUTH: Virgil Jordan, president of the National Industrial Conference Board, issues a timely warning against "kidding" the returning servicemen. "Let us not tell these sons and brothers of ours," he pleads, "that we, or labor, or government are going to guarantee them economic security in any sense and still leave them their civil liberty and personal freedom. . . .

"Let us tell them rather that nobody can pledge them full employment as workers or permanent purchasing power as consumers without depriving them one by one of every individual freedom they have. . . . Let us not conceal from them the rigorous iron chain of cause and effect which has always bound together and still links compulsory security, compulsory saving, compulsory labor, compulsory consumption, compulsory occupation, location, leisure, speech and finally thought."

This is sound counsel for returning soldiers. It is equally pertinent for stay-at-homes who do not detect the string attached to the glamorous promises of planned security. —p. 77

° ° °

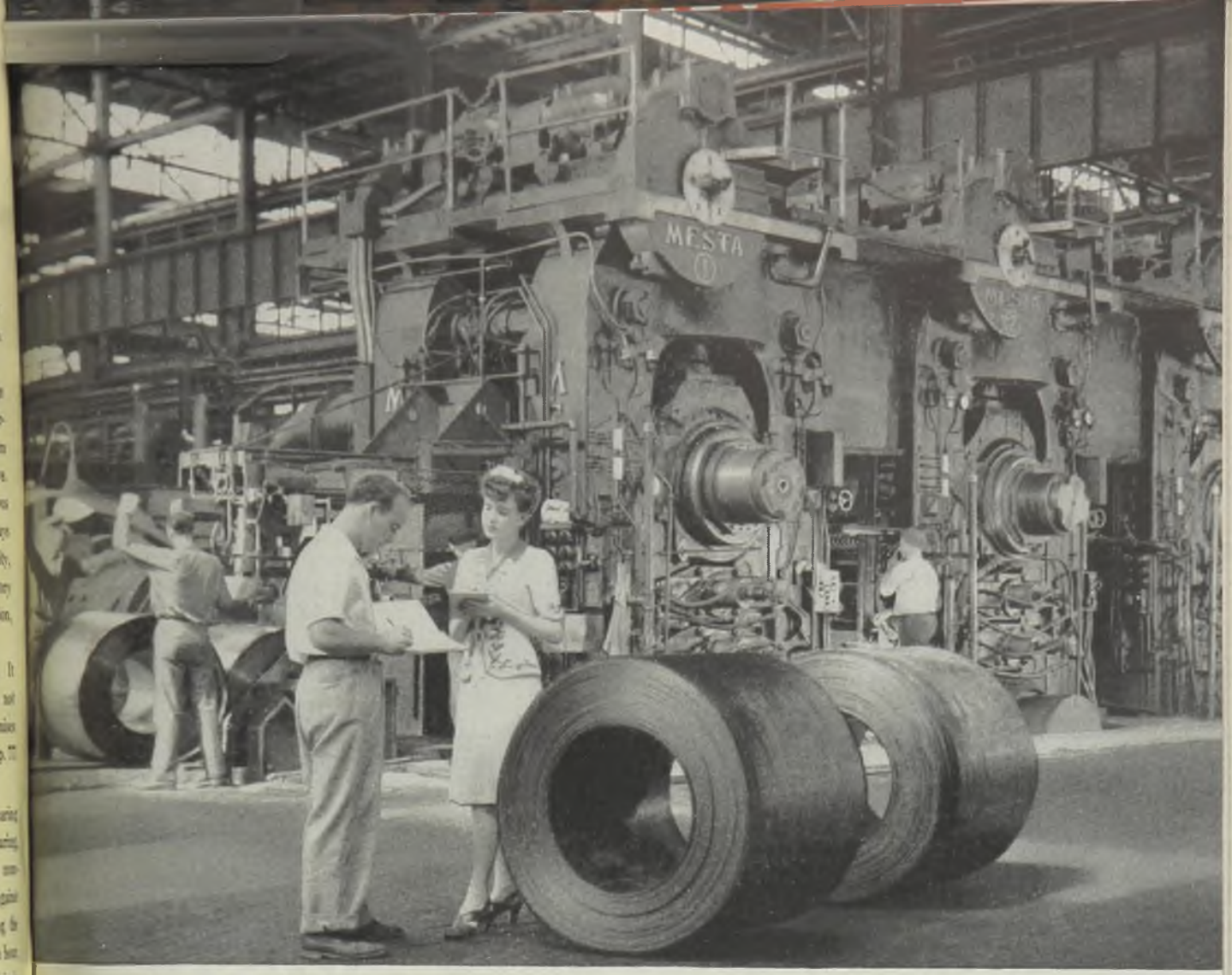
SECURITY VS. FREEDOM: Appearing before a panel of WLB in the steel wage hearing, Enders M. Voorhees, chairman of the finance committee of U. S. Steel, made a strong case against the demands of the steel union. Subjecting the union's request for an increase of 17 cents an hour, wage guarantees and other concessions to the "simple arithmetic" of the corporation's books, he showed conclusively that the demands cannot be met without depriving the owners of an adequate wage for the use of their tools.

This, he argues, places the demands of the unions not upon U. S. Steel but upon the nation as a whole. Denying owners wages for the use of their tools "is on all fours with conscripting men to work without wages. It is not without reason that in those forms of society where all power is lodged in the state and there are no individual rights, the conscription of property is only a stage in the conscription of people."

This danger to members of unions—if all of their demands were granted—is so great that we wonder why the union leadership has been blind to it. Workers can have complete economic security or complete individual freedom, but not both at the same time. —p. 52

E. L. Shaner

EDITOR-IN-CHIEF



One of the Inland cold reduction mills, which reduces strip to precise thickness and produces a lustrous finish.

For Finer Steel Products . . . Tomorrow

Consult Inland when plans are started for parts or products which must have the strength, utility, and beauty that can come only from steel sheets and strip.

Inland was among the first to install modern continuous mills. Its engineers and metallurgists have contributed many notable advancements to sheet and strip production methods and quality control —resulting in unsurpassed uniformity, workability, and finish.

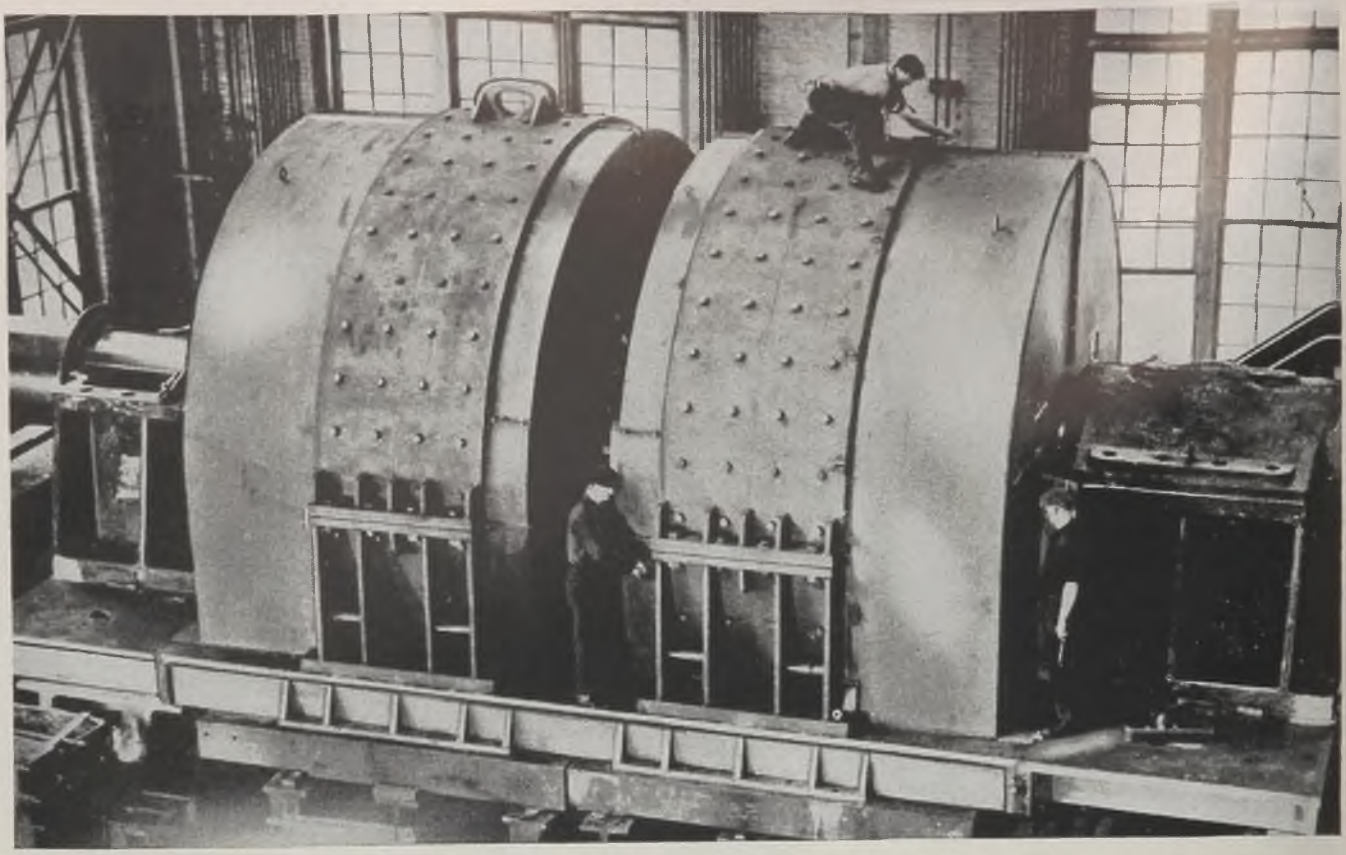
Inland experts are ready to help you select the right steel for finer products and economical fabrication—whether the products are for wartime use, or for the markets that will follow Victory.

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

INLAND STEEL COMPANY

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

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



No. 1 PLATE MAKER

"THE world's most powerful electric motor" of its type, is a 2-rotor reversing unit driving a mill rolling 20,000-lb. plates for west coast shipbuilders. The power of these giant motors is transmitted through reduction gears.

To offset tremendous bearing and tooth pressures, mills everywhere are lubricating reduction gears with *Texaco Meropa Lubricants.*

Meropa Lubricants provide maximum load-carrying capacity, greater resistance to oxidation or thickening, higher viscosity index. They can absorb shock loads in the heaviest steel mill services, and retain their EP characteristics.

Texaco lubricants have proved so effective in service that they are definitely preferred in many fields, a few of which are listed at the right.

Texaco Lubrication Engineering Service is available to you through more than 2300 Texaco distributing points in the 48 States. The Texas Company, 135 E. 42nd St., New York 17, N. Y.

THEY PREFER TEXACO

★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and railroad cars in the U. S. are lubricated with Texaco than with any other brand.

TEXACO

TEXACO Meropa Lubricants
FOR STEEL MILL REDUCTION GEARS

TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Decrease in Overall Steel Output for War Forecast

Military program curtailments expected to exceed expanded civilian goods consumption. This year's production not expected to be much greater than 1943's

DECREASING overall production of steel for direct war uses was predicted by Walter S. Tower, president, American Iron and Steel Institute, at the institute's fifty-third general meeting at the Waldorf-Astoria in New York last Thursday.

Mr. Tower further stated he doubted whether any probable switch toward larger civilian consumption would keep pace with the speed of war program curtailment.

Speaking before more than 1000 steel executives, he predicted a possible production of 65,000,000 to 70,000,000 tons of steel ingots in the good years after the war ends, pointing out, at the same time, that the latter figure would be substantially more than actual consumption of any past peacetime year.

He foresaw the termination of contracts as the European phase of the war nears its end resulting in the cancellation of many millions of tons of steel, with many additional millions of tons left in the accumulated stocks of contractors and presenting grave difficulties unless a wise policy is formulated for disposing of them.

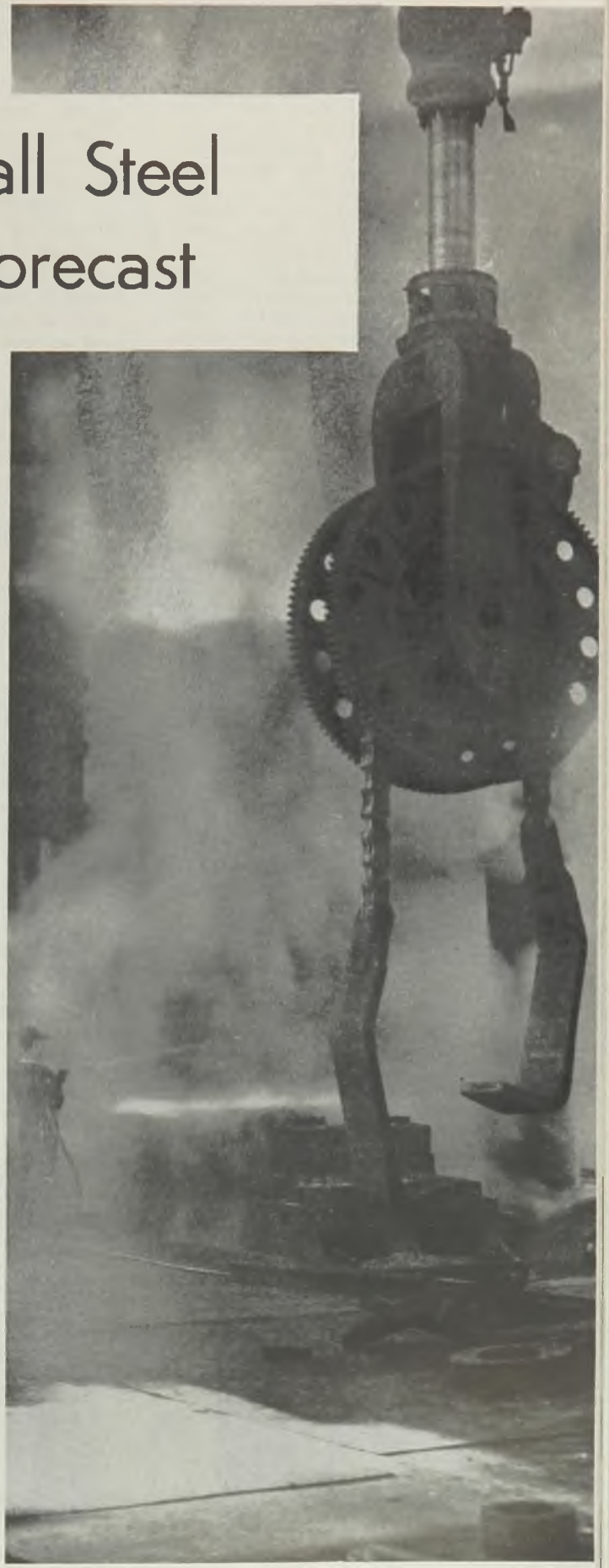
Conversion of steel facilities, he pointed out, will not constitute any large problem. In all probability, he said, producers will be in position to roll products for all regular consuming industries long before some of these industries are in position to place orders and receive shipments. Thus, for steelmakers, the problems of conversion will be largely the indirect effect of the troubles of their customers.

With steel production in the good years after the war probably not representing an operating rate of more than 70 to 75 per cent of present capacity (and with that volume of business, he said, unprofitable for the average producer at the prevailing relations between costs and prices of the common grades of steel products), he could see three main factors in the question as to the utilization of surplus capacity, namely, exports, dismantling of such uneconomical or marginal units as have been kept going solely to swell wartime tonnages, and the treatment as stand-by plants of those government financed units which private interests do not wish to acquire.

He doubted if the export market held any lasting answer, and added that for the present, at least, too many factors affecting the question lie in the zone of future national policy and international understandings to make for a clear picture. As to the marginal or uneconomical units, Mr. Tower believed that probably less than 10 per cent of existing capacity will be scrapped.

He pointed out that all government-financed units are highly modern and add up to about 7,000,000 tons of open-hearth and electric furnace capacity, with the ultimate disposition of many of these units still an open question. He believed, however, that after the process of elimination is done, the industry will come out of the war with a steelmaking capacity of 85,000,000 tons, conceivably 90,000,000 tons a year.

Among the series of problems that might arise as a result of a possible gap of 15,000,000 to 20,000,000 tons between



usable capacity and expectable market demand, a conspicuous one, he said, will be the official attitude toward government-owned facilities for which there is no buyer. He was confident the only sound policy would be to shut them down as soon as shrinking war demand leaves available supply greater than current civilian requirements. Re-employment of returning servicemen and other workers who may have to be released will constitute a problem of no lesser importance, he also pointed out.

Question of government controls will be another of many problems which managerial policy will have to face. "The process of unwinding the tangled skein of governmental controls, regulations and restrictions can readily present tougher problems than were created by their original applications," he declared. And he believed it far from certain that these controls and regulations will disappear with the war programs.

"One may appropriately ask," he said, "when would be a logical time for removal of controls, if they are extended beyond the life of war programs. Controls were imposed when it was feared that military programs were being jeopardized by a narrowing margin between available supplies and prospective demands. They were, in theory at least, purely wartime protective measures.

"When shrinking wartime programs reverse the trend, and prospective supplies are unquestionably beyond actual military needs, such restrictive measures will no longer be required. Materials, labor and facilities, to the extent not needed for war uses, should promptly revert to normal channels of use, from which they were diverted as emergency dictated. Industry should be free again to direct its own affairs."

Mr. Tower emphasized the need for getting into civilian production just as soon as the easing in war requirements merits. "No one would question that the armed forces must have their needs, and in abundance," he said. "But after these needs have been scheduled and are being met, let materials and labor go into civilian goods, rather than keep men and machines idle. If this is not done, the needless hardships will be general, but most severe of all for the smaller companies with their limited lines of products."

Pointing out that another full year has passed without change of price from the levels where ceilings were imposed three years ago, he declared that facts from a representative sample of the industry force the conclusion that higher prices for common grades of steel are necessary to support present costs in which wages loom largest.

"Let those who say that steel companies have profited unduly from war business try to reconcile their charges with a few hard facts," he asserted. He pointed out that in 1929, at the high tide of peacetime output, the steel industry reported net income equal to less than $9 per ton of rolled products made; that in 1937, the last fairly good year before war demand became a factor, the figure was almost $6 per ton; and that in 1943 it was just about $3, a figure that means "less than one-sixth of a cent per pound net for products of an industry where tens of millions of dollars must be invested before the first pound can be produced with modern equipment."

Discussing industry's policy toward labor and pointing to many grave problems ahead, Dr. Leo Wolman, professor of economics, Columbia University, emphasized the importance of direct and close relationship between employers and employes. Employers must speak directly and with greatest candor not only on the questions pertaining purely to wages and hours but also to the broader phases of mutual benefit such as the costs of doing business, matters of taxation and relationship between government and business. The courts, he declared, have now ruled that employers may speak freely on these matters in their relationships with labor.

Another important aspect has to do with trends in administration of collective bargaining. The essence of this problem, he declared, is the widening area of collective bargaining. The trends toward regional and finally nation-wide bargaining must be fully considered. Still another aspect concerns the laws governing organized labor and matters affecting their administration.

The need for good public relations was stressed by Irving S. Olds, chairman, United States Steel Corp., New York, and E. L. Ryerson, chairman, Inland Steel Co., Chicago. Substantial prog-

EIGHTH RECIPIENT OF GARY MEDAL

Quincy Bent, vice president, Bethlehem Steel Co., was awarded the Gary Memorial Medal for "outstanding leadership in the art of steel production and in contributions to the development of alloy steels to meet the needs of the war emergency". The award was the first to be made since 1935 *and previously had been awarded only seven times since it was established* 17 *years ago by the late Judge Elbert Gary*

HENRY J. FORSYTH

JOHN MITCHELL

ress has been made in bringing the steel industry into more favorable light with the public. For instance, there is a much clearer appreciation of what the industry is contributing to the war in volume and quality of steel tonnage. However, there are many phases on which the public needs to be more fully advised. There continues to be the widespread impression that the steel industry is making big money out of the war. There is misunderstanding as to the fine safety record of the industry, a record second to none among the heavy industries. The high wages and relative steadiness of employment are all matters to which the steel industry can well point with pride. Just the proper presentation of facts, not mere propaganda, is what the industry needs to further cement its relationships with the public. It must overcome the handicap of lack of direct relationship with many consumer buyers and should make full use of its collective intelligence in fostering its relations.

Affiliated with the industry for 45 years and all that time with one company, the Bethlehem Steel Co., Bethlehem, Pa., and serving in his present position as president for 31 years, Eugene G. Grace drew on his long and important connection with the industry in discussing briefly some of the broad problems which industry will have to take into account over the next few years.

A double presentation of the Institute Medal for 1943 was awarded to H. J. Forsyth, mill metallurgist, Republic Steel Corp., Buffalo, and John Mitchell, metallurgical engineer, Carnegie-Illinois Steel Corp., Pittsburgh, for their papers respectively on "Effects of Temperature on Blooming Mill Production of Hot-Topped Steels" and "Trends in Alloy Steel".

Lieut. Commander E. G. Touceda, Research and Standards Branch, Bureau of Ships, Navy Department, presented a paper on the "Development of Special Steels for Naval Uses", and L. L. Ferrall, metallurgical engineer, Rotary Electric Steel Co., Detroit, on "Principles Involved in Determining Hardenability Limits for Alloy Steels".

H. C. Boardman, director of research, Chicago Bridge & Iron Co., presented a paper entitled "Stresses in Welded Structures", having to do primarily with fusion-welded structures of plain low carbon steels having well defined plastic yield ranges at about one-half of the ultimate strength.

W. G. Bischoff, metallurgical engineer, Timken Steel & Tube division, Timken Roller Bearing Co., Canton, O., presented a paper on "Some Aspects of Commercial Production of Alloy Steels to Hardenability Requirements."

Outlines Ordnance Items

In a discussion on the development and application of military and special steels for ordnance purposes, Col. John H. Frye, Office of the Chief of Ordnance, War Department, outlined recent trends in the production of ordnance items. Some, he said, have been drastically curtailed.

Recent progress in the scientific application of welding to steel was outlined by Wendell F. Hess, department of metallurgical engineering, Rensselaer Polytechnic Institute, Troy, N. Y.

An exceptionally fine safety record of the steel industry was pointed out by William A. Irvin, chairman, board of trustees, National Safety Council, New York, and former president, United States Steel Corp.

Greatly increased use of electricity in the manufacture of steel, pig iron, and ferroalloys is worldwide, and is a reflection of the war situation, Charles Hart, president, Delaware River Steel Co., Chester, Pa., said, addressing the technical session, his paper being entitled "Electrometallurgical Treatment of Ores."

All officers and directors were re-elected. Officers are: President, Walter S. Tower; vice president, Benjamin F. Fairless, president, United States Steel Corp.; vice president, Frank Purnell, president, Youngstown Sheet & Tube Co.; treasurer, Harold L. Hughes, vice president, United States Steel Corp.; secretary, G. S. Rose, and assistant secretary, S. A. Maxon.

Honorary vice presidents are L. E. Block, chairman of the finance committee, Inland Steel Co., and formerly board chairman of Inland, and W. A. Irvin, former president of United States Steel Corp.

Present, Past and Pending

■ MACHINE TOOL MAKERS DISCUSS SURPLUS PROBLEM

FRENCH LICK, IND.—Method of handling surplus equipment was chief topic of discussion at twentieth spring meeting of American Machine Tool Distributors Association held here last week with 125 members attending. Tell Berna, secretary, National Machine Tool Builders Association, Cleveland, reviewed the present tool manufacturing situation, while A. G. Bryant, president, A. G. Bryant Machinery & Engineering Co., Chicago, outlined the Washington picture.

■ CONTRACTORS WARNED ON DEADLINE FOR FILING REPORTS

WASHINGTON—War contractors and subcontractors are warned that they must file on or before June 1, 1944, standard forms of reports required by the Renegotiation act of 1943. Failure to comply with this provision subjects contractors to a fine of $10,000 or two years in jail. The act does not give the War Contracts Board any authority to grant extensions of time. However, contractors whose fiscal years close on or after March 1, 1944, file reports on or before the first day of the fourth month following the close of the fiscal year.

■ MARITIME COMMISSION MAY BOOST PLATE REQUIREMENTS

WASHINGTON—Maritime Commission may increase its plate requirements for the third and fourth quarters. There is a possibility that it may ask for 60,000 tons more for the third quarter and more for the fourth quarter.

■ FARM MACHINERY OUTPUT RISES 38.3 PER CENT

WASHINGTON—Production of farm machinery in April rose to levels 38.3 per cent above the average monthly output during the last nine months, WPB reported last week. All items showed increases, some amounting to more than 100 per cent. Manufacture of some of the most important implements, including combines, will be stepped up this year far beyond the peacetime rate

■ MALLEABLE IRON CASTING SELLERS GET PRICE REVISION

WASHINGTON—Sellers of malleable iron castings have been authorized to add overtime labor costs to their base period prices, effective May 31.

■ HEAVY ARTILLERY ORDERS SOAR 400 TO 500 PER CENT

WASHINGTON—Orders for heavy artillery have been greatly increased. Requirements have been raised an average of 400 to 500 per cent amounting to 1000 per cent for some sizes. The Army will require 125,000 tons of steel during the first three months of production on new steel ammunition containers which have just been announced. Production orders have already been placed, requiring hot and cold-rolled sheet and strip steel and are expected to absorb almost the entire heavy welding tube steel capacity of the country.

■ WHITING APPOINTED TO OPA ADVISORY COMMITTEES

WASHINGTON—J. T. Whiting, president, Alan Wood Steel Co., Conshohocken, Pa., has been appointed to the Office of Price Administration's General Steel Products and the Pig Iron advisory committees. Mr. Whiting became director of the Steel Division, WPB, in July, 1943, and resigned from that post last March to return to his company.

Guaranteed Wage Impossible, Steel Spokesmen Argue

Union's demands would amount to confiscation of industry, War Labor Board panel told. Producers deny board has power to impose such conditions

ENDERS M. VOORHEES

IF THE demands of the United Steelworkers were granted, the best that could result would be a kind of steelworkers' WPA. At the worst, granting of the demands would result in "a government-controlled economy in which the steelworkers would be the pawns of bureaucracy."

This was the prediction of Enders M. Voorhees, chairman, finance committee, United States Steel Corp., testifying before a panel of the War Labor Board in Washington last week.

Mr. Voorhees asserted the union is really claiming that the sustenance of its members is a national duty not to be hitched to the mere making of steel. He subjected the demand to what he called the simple arithmetic of the corporation's books.

"The union," continued Mr. Voorhees, "asks for a flat wage increase of 17 cents an hour. That is a request to the United States Steel Corp. for an annual addition of $137 million to employment costs—when applied to all employes. The union also makes further demands that we estimate would add about $149 million more to employment costs and, finally, the union asks U. S. Steel to guarantee the wages, as increased, to its present force of workers as an annual income. The possible annual loss on this guaranty to U. S. Steel is speculative. It could run from little or nothing in years of large demand for steel to a billion dollars or more in a year of small demand.

"Those who provide the tools—and that means nearly all of us—must do so out of savings, and any movement—no matter how grandly labeled—which deprives the owners of the tools of a wage for the use of their tools is on all fours with conscripting men to work without wages. It is not without reason that in those forms of society where all power is lodged in the state and there are no individual rights, the conscription of property is only a stage in the conscription of people.

"The union leaders, in spite of their protestations to the contrary, are really urging you to grant to them the right to conscript the wages of the owners of the United States Steel Corp., leaving to the owners the empty shell of legal ownership. These leaders do not ask that the tools which other people have saved for and bought be conveyed to them. But they do ask for the free use of the tools. That is a distinction without a difference. The tools or assets of U. S. Steel are owned by an unknown number of people. We have some 200,000 stockholders of record, but some of these stockholders are trustees, other corporations or investment societies, such as insurance companies, so it may well be that U. S. Steel has ten or twenty million owners. We just do not know. Some of the owners may be rich and some of them may be poor. But the financial status of the owners is of no moment. We are dealing with the freedom to own. That, in America, we have held as a primary freedom."

Mr. Voorhees said that the combination of rising costs and fixed selling prices was already jeopardizing private ownership and that under ordinary peacetime conditions, U. S. Steel could not operate with present costs and prices.

Presents Financial Record

He presented accounts for U. S. Steel for 1944 and 1945 based on 1943 business but with the 17 cents an hour wage increase added. These showed that in 1944, with the wage increase, the government would refund $48 million in taxes and U. S. Steel would come out with a deficit, after paying dividends at the current rate, and that in 1945 the common stock dividend would be wiped out, income would be insufficient to meet the preferred dividend and the government would contribute $5 million in taxes.

Mr. Voorhees lined up the demand for a guaranteed annual wage with the business done in 1937. He found that, if U. S. Steel produced to the capacity of its present 340,000 employes and at 1943 costs, without any increase in pay, i would have to find $582 million ove the amounts received from customers.

"If U. S. Steel," said Mr. Voorhees "had not the orders from customers t keep all its people employed, it would under the guaranteed wage as proposed have the alternatives of going ahead buy ing materials and producing reckless in ventories, or it could stop producing th excess and simply pay wages to worke for not working.

"Suppose that customers' demands fe to the 1937 level—which was the be year in the period the union calls repr sentative—then what would be the r sult if we kept on producing as th union asks? In 1937 we had 261,0(employes and employment costs of $4 million. In 1943 we had 340,000 er ployes and our employment costs we $913 million. I have reduced this $805 million to eliminate overtime pa and the other costs have been appropr ately reduced. Nothing has been add to cover any of the other union demanc If in such a year we kept the full 34(000 employes at work but had only t customers of 1937, we would have find $582 million over and above t amounts we received from customers a we would have developed an excess i ventory of nearly six million tons in th year alone. This inventory would be unknown value—part of it would sur be salable at some price and part of would surely be unsalable at any pri

There is no point in romancing about the make-up of this inventory or where or how it could be kept.

"If we chose not to build reckless inventories and paid a large force of men for not working, our costs would be $281 million more than we received from customers.

"From March to December of 1937 customers' demands dropped from 1600 thousand tons to 500 thousand tons monthly and remained at approximately that level throughout 1938. If we should experience a customer demand similar to that of 1938 then we would have to find $991 million to build an unreasonable inventory or $547 million to cover the loss.

"But who is going to guarantee that customer demands will not dive suddenly as in 1937 or even drop to the levels of 1932—to 350 thousand tons monthly? If that happened, our loss in guaranteeing 1943 employment at the increased costs the union is now demanding would be more than a billion dollars.

"Where is all that money coming from? The carry-back payments, even if they were what the union pretends they are, would be mere chicken feed. Who would find a billion or even half a billion dollars?

"What does all this add up to? The union, in both its wage and guaranty demands, eventually gets around to conscripting the wages of the owners—to foreclosing their savings. But, recognizing that this is not enough, it also demands the benefit of the taxing power. It pretends that for the present the taxing power need be used only to recover certain taxes that U. S. Steel has already paid. But that is just a once-around operation."

Mr. Voorhees presented tables showing that through the use of tools provided by owners, wages had been brought up from $13.75 a week in 1902 to $48.94 a week in 1943 and hours cut down from 68.4 a week in 1902 to 42.2 a week in 1943. The owners provided 155 per cent more tools in 1943 than in 1902, but income was $27 million less in 1943 than in 1902.

"That is, the employes in 1943 worked one-third less hours a week than in 1902 and received over three and one-half times as much wages. The owners, although supplying two and one-half times the tools of 1902, had an income nearly one-third less.

"That, gentlemen, is heading away from the system which we now have and heading into some other system to which I shall not try to give a name. The wage increase now asked will give a big push into that other system.

"I, for one, would not want to scrap the system we have had before I was certain that we had a better one. Our system depends upon the voluntary supplying of the tools of production and exchange, their voluntary use and the voluntary purchase by customers of products and services. That is freedom."

H. W. Boal, vice president and treasurer, Andrews Steel Co., Newport, Ky., argued that the position of the smaller semi and nonintegrated plants was such that the guaranteeing of an annual or weekly wage was impossible.

"Andrews cannot guarantee an annual wage to its employes," he said. "Andrews cannot even guarantee that it can continue to give employment to the approximately 2600 employes, who at the peak of its 1943 operations were sharing in its annual payroll of $5½ million.

"If realism shall prevail over theory and wishful thinking, we certainly hope to work out our future on a basis which will enable us to continue to operate our plants at somewhere near their capacity of 400,000 tons of steel ingots a year, and to continue to play our proper role in the ranks of those small businesses which are vital to the livelihood of the 150,000 people in the Newport, Ky., area. Our efforts would, however, be rendered futile, if the government should yield to the pressure politics behind the union's demands in this case. There are many other companies in the steel industry which are in a similar position.

Would Be Guaranty for Insolvency

"For 40 years the Andrews Steel plants have been the principal source of income to the citizens in the area around Newport, Ky. The monthly payroll of our plants plays an important part in the economy of that area. If that payroll could be guaranteed month after month, certainly it would be an important element in stabilizing the economy of that area. But who is going to guarantee that Andrews will have customers for its steel, without whom the funds for that payroll will not be forthcoming? Even if it were practicable, which it is not, for Andrews to stock steel in inventory against future demands, Andrews does not have the financial resources necessary to finance the production of steel for inventory. For Andrews, a guaranteed annual wage without any guaranty of customers for its steel would be a guaranty of nothing except insolvency."

Mr. Boal cited the earnings of his company for the six months ended March, 1944, to illustrate his point. These were as follows:

October, 1943	Loss	$ 99.79
November, 1943	Loss	80,741.50
December, 1943	Loss	117,159.92
Total fourth quarter loss, 1943		$198,001.21
January, 1944	Loss	$ 69,335.59
February, 1944	Loss	84,652.40
March, 1944	Loss	97,075.16
Total first quarter loss, 1944		$251,063.15

Mr. Boal also called the panel's attention to the Murray plan to "Save Small Steel" which has been offered by the union as evidence in the case. Andrews Steel, he said, objects to the use of its name in the plan "for the self-seeking" purposes of the union. Andrews, he continued, "has not asked and does not intend to ask for government subsidies to enable it to meet the unreasonable and unrealistic demands of the union in this case. . . . We do not ask that anyone shed crocodile tears in our behalf, more especially those who, if they did not directly instigate, were at pains not to discourage a costly strike at our plants less than three months before that pamphlet was presented to the War Labor Board."

Claiming the union's demand for a guaranteed annual wage is but a means for creating a preferred class of labor for the steelworkers and of providing a minimum weekly payment, whether or not any work is performed, John C. Gall, Washington attorney, vigorously opposed this point in the union's program.

EFFECT ON UNITED STATES STEEL CORP. OF 17 CENTS PER HOUR INCREASE IN 1944, 1945

(In Millions)

	1942	1943	1944*	1945*
Received from customers	$1,863.0	$1,976.8	$1,976.8	$1,976.8
Disposed of as follows:				
Employment costs	782.7	912.9	1,050.4†	1,050.4†
Products and services bought	648.4	705.6	705.6	705.6
Wear and exhaustion of facilities	128.2	134.0	134.0	134.0
Estimated additional costs applicable to this period arising out of war	25.0	25.0	25.0	25.0
Interest and other costs on long-term debt	6.2	6.3	6.3	6.3
State, local and miscellaneous taxes	48.2	41.6	41.6	41.6
Estimated federal taxes on income:				
Normal and surtax	65.5	65.5	5.8	5.8
Excess profits	87.6	22.5	—	—
Carry-back	—	—	48.4	4.6
Dividends—preferred	25.2	25.2	25.2	25.2
common	34.8	34.8	34.8	—
Carried forward	11.2	3.4	3.5	12.5
Total	$1,863.0	$1,976.8	$1,976.8	$1,976.8

*Based on 1943 results.
†Includes $137.5 million for cost of 17 cents per hour wage increase plus social security taxes and pensions.

Contract Termination, Disposal of Surplus Goods Occupy Suppliers

Distributors concerned with postwar problems. Many believe job should be approached now. Delegates express hope suppliers will not rush back to discontinued items and in-between sizes eliminated by government limitation orders

TERMINATION of contracts, disposal of surplus war goods and postwar production and merchandising problems largely occupied the attention of mill supply manufacturers and distributors meeting at Chicago last week.

Meetings of the triple mill supply group—the American Supply and Machinery Manufacturers Association, the National Supply and Machinery Distributors Association and the Southern Supply and Machinery Distributors Association—in the past two or three years were principally devoted to the problems arising out of earlier stages of the war, such as priorities and material substitutes.

While deliveries and the like are still difficult, these problems are regarded as being fairly well under control and the industry now is looking ahead to the new problems of the conversion period and peace.

Leading distributors such as Beals, McCarthy & Rogers Inc., Buffalo, already are making a study of postwar lines of mill supplies. Eugene F. McCarthy, vice president, told the delegates that distributors must be receptive to new products to augment current lines but, at the same time, he said, he hopes manufacturers do not plan to rush back into discontinued items and in-between sizes eliminated by government limitation orders. Industrial users have gotten along well with the more simplified products now available, he said. Manufacturers should make a thorough study of all mill supply lines before production is resumed for postwar.

Mr. McCarthy thinks a larger portion of his company's postwar business will come from medium-size and smaller companies and not so much from those with large centralized purchasing setups. Further improvement in service to customers will be necessary through well-trained general and specialized salesmen. His company will build up large inventories of products so that sales can be made immediately for postwar needs as soon as government restrictions are lifted.

Conducts Training Course

One of the outstanding merchandising jobs being done by manufacturers is that of the Carboloy Co. Inc., Detroit. The carbide tool business was started about 1928 and for the first few years creative selling was done through management, which was a requisite since carbide tools are difficult for the inexperienced operator to handle. This procedure usually involved the appointment of carbide tool supervisors in customers' plants who became experts in handling them. The company now conducts a 5½-day course in Detroit which includes the use of six slide films supplemented by actual shop experience. More than 1600 men, including 125 mill supply salesmen, have taken the course. Sales through distributors is now a regular part of the Carboloy plan, which was explained by K. R. Beardslee, vice president in charge of sales, and J. E. Weldy, assistant to the vice president.

R. D. Black, vice president, the Black & Decker Mfg. Co., Towson, Md., said there is no better time than the present to adjust distributor inventories so they will be able to buy after the cessation of hostilities rather than finding it necessary to unload surpluses. Because of the material substitution made, he said, many items will be labeled as "war" products for a long time after the war ends.

Mr. Black considers the postwar era already "under way" but believes that the transition to peace will be gradual. Plans for postwar products are fairly well laid out, he said.

G. W. Wolf, president, United States Steel Export Co., New York, expects that all sections of the country will be export-minded and that foreign countries will be insistent to buy. He thinks the big question will be: "How are we going to get paid?"

Mr. Wolf said he thought trade should be open to all countries on an equal basis; that a return should be made to the gold standard in international relations; and that an international system should be set up for clearing balances. Foreign loans are justified only when they will result in more foreign exchange, such as the construction of a railroad to open up new resources.

Disposal of surplus war goods will constitute a difficult problem. In a paper read for A. C. Mattei, president, Honolulu Oil Corp., San Francisco, it was revealed that the United States Chamber of Commerce has taken the position that a central committee should be set up to handle disposal of government-owned goods. These supplies should be distributed through normal channels and in quantities which will not disrupt the national economy. Prices should be uniform except for slight differentials to account for cost of distribution. The chamber also believes that the government must withdraw from all plants if we are to go forward on a basis of free enterprise. Of the 20 billions spent for new war plants, the government accounted for 16 billions.

Lyon Metal Products Inc., Aurora, Ill. has worked out a procedure for termination of war contracts by which settlements are being reached in about 75 days. This is handled by the company treasurer L. D. Deal, assistant treasurer, explained. "It is just as important to follow a claim as to file it," he said.

Cancellation of contracts came in a flood at the end of the last war, according to A. G. Bryant, president, Bryant Machinery & Engineering Co., Chicago, but will be carried out gradually in this war

H. A. BURDORF

F. J. TONE JR.

T. F. SMITH

R. D. BLACK

He warned against disposal of surplus equipment too soon. "We may need it," he said.

Newly elected officers of the National Supply and Machinery Distributors' Association are:

President, Charles E. Allinger, the Charles A. Strelinger Co., Detroit; vice president, Areas 1 and 2, E. F. McCarthy, Beals, McCarthy & Rogers Inc., Buffalo; vice president, Areas 3 and 4, W. M. Patterson, Frick & Lindsay Co., Pittsburgh; vice president, Areas 5 and 6, E. H. McLaughlin, Union Hardware & Metal Co., Los Angeles.

New officers of the Southern Supply and Machinery Distributors Association Inc. are:

President, Harry P. Leu, Harry P. Leu Inc., Orlando, Fla.; first vice president, Lloyd B. Mize, Mize Supply Co., Waynesboro, Va.; second vice president, T. J. Kenny, Cameron & Barkley Co., Charleston, S. C.

American Supply Officers

The following new officers and executive committee members were named by the American Supply and Machinery Manufacturers' Association:

President, F. J. Tone Jr., vice president and director of sales, Carborundum Co., Niagara Falls, N. Y.; first vice president, R. D. Black, sales manager, Black & Decker Mfg. Co., Towson, Md.; second vice president, T. F. Smith, president, Oliver Iron & Steel Corp., Pittsburgh; treasurer, H. A. Burdorf, vice president in charge of sales, Lunkenheimer Co., Cincinnati.

Executive committee members for the term expiring 1947: D. G. Millar, president, Greenfield Tap & Die Corp., Greenfield, Mass.; G. H. Boucher, general sales manager, Pyrene Mfg. Co., Newark, N. J. J. A. Gardner, vice president and sales manager, Cincinnati Tool Co., Norwood, Cincinnati, O., will fill the unexpired term of Mr. Smith ending with 1946.

Lukens Steel Purchases Coatesville, Pa., Property

Purchase by Lukens Steel Co. of the Coatesville, Pa., property, owned and operated since 1923 by Bethlehem Steel Co., was announced recently by Robert W. Wolcott, president of Lukens.

The Bethlehem properties involved in this transaction cover approximately 35 acres and include the old charcoal boiler tube plant, north of the Lincoln highway; the Bethlehem office building, at the corner of West Lincoln highway and Church street; Corey field, adjacent to the office building and a piece of land with railroad tracks and storage yard, north of the Wagontown road.

Lukens will renovate and occupy the Bethlehem office building, but equipment in the charcoal tube plant will be dismantled for salvage. The buildings and yards will be utilized for storage of materials and scrap, according to present plans. Manufacturing operations at the plant are being discontinued.

Davis Upholds Government Action In Recent Montgomery Ward Case

Labor board chief tells House Committee any business subject to seizure in wartime under powers of the President. Maintains whole nation geared to war; that there cannot be two kinds of strikes since all services are essential

WASHINGTON

THAT the government under an order signed by President Roosevelt can take over any business establishment was the opinion expressed by William H. Davis, chairman, National War Labor Board, appearing as first witness last week before the Ramspeck Select Committee of the House to Investigate the Montgomery Ward plant seizure.

"You can't have two kinds of strikes in this country in time of war," he declared, "one kind at war production plants which can be seized for refusal to accept WLB decisions, and the other at plants and in businesses not engaged on war work which are vital to keep the war production effort going."

One point on which he only partially satisfied the committee had to do with the absence of court procedure in enforcing WLB rulings. He warned the committee such an amendment to the law would destroy the present setup for settling labor disputes; that it would take a year and a half to get a court decision.

Interest in the hearing is intensified by the army seizure, May 21, of the Hummer Mfg. Co., Springfield, Ill., subsidiary of Montgomery Ward.

A verbal battle ensued between Attorney General Biddle and Rep. Charles H. Elston (Rep., O.), member of the special committee investigating the seizure, when Mr. Biddle declared that the President never asked his legal advice on whether John L. Lewis could be seized when the United Mine Workers defied the government during their strike. Mr. Biddle said that the President never considered seizing Mr. Lewis.

Carnegie-Illinois Cleared

Charges of falsification and destruction of records in connection with plate production at Irvin Works dismissed in federal court at Pittsburgh

CARNEGIE-ILLINOIS Steel Corp. last week was cleared of 48 counts charging falsification and destruction of records in connection with plate production at its Irvin Works, Dravosburg, Pa. One indictment, charging destruction of records, was thrown out for lack of evidence, Federal Judge R. M. Gibson instructing the jury to return a verdict of not guilty. Another count was withdrawn on petition by Special Prosecutor Robert L. Wright, who said the government had made a mistake. The remaining 46 counts, all on an indictment charging falsification of records, were thrown out by the jury after 6½ hours deliberation.

Prosecutor Wright's contention that the government had been injured through falsification of records was not upheld by the jury's action. Defense counsel Elder W. Marshall, in his summation, stated the government had failed to produce any witness who could testify that he had been deceived or harmed by the company's action.

Three additional legal actions remain, and there is some doubt as to their disposition. Government attorneys voiced the opinion that the results of the present trial will undoubtedly have some bearing on the remaining actions. One of these is a conspiracy charge jointly against the company and Lawrence S. Dahl, general superintendent. The other two are damage suits, one by the government and the other by a private citizen—an "informer's suit." The conspiracy charge will probably be dropped in view of the acquittal on the falsification of records, although it is possible the damage suits may be pressed.

"We are happy to have the public know that the unfair and unsubstantiated accusations made by the Truman committee of the delivery by Carnegie-Illinois of defective plates have been completely refuted," J. L. Perry, president of Carnegie-Illinois, said in commenting on the case. "No witness," Mr. Perry continued, "testified either before the Truman committee or before the federal court at Pittsburgh that any defective steel plates were ever supplied by Carnegie-Illinois from Irvin Works or elsewhere. . . .

"Carnegie-Illinois is justly proud of its outstanding productive record in support of our country's great war effort, including the delivery of more than 10,000,000 tons of steel plates of all kinds since Pearl Harbor. About one-sixth of these very considerable plate deliveries came from Irvin Works."

Restoration of Reasonable Costs To Be Major Postwar Problem

Manufacturing economies which industry effected during last decade overbalanced by war extravagances, gearmakers told. Training of new employes, which once cost about $200, now requires expenditure of approximately $1200

By GUY HUBBARD
Machine Tool Editor, STEEL

FACILITIES of the Westchester Country Club at Rye, N. Y., were taxed to the limit May 22-24, when the twenty-eighth annual meeting of the American Gear Manufacturers Association rolled up an attendance record of 185 men and 40 women. Well known figures from outside the industry who were guest speakers at this meeting included Jan Masaryk, foreign minister and vice premier of the Czechoslovak government in London, William E. Robinson, vice president, *New York Herald Tribune*, and F. D. Newbury, vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

After telling something of his early days in America, when he learned the trade of iron molder, Mr. Masaryk gave some ideas as to the postwar problems of Europe. Germany, he predicted, must suffer military defeat within her own borders, following which there must be a period of quarantine and a long period of re-education supervised but not carried out by the allied nations. The actual teaching must be done by enlightened Germans who are not Nazis. A big and immediate postwar problem will be the feeding of what Mr. Masaryk called the pale children of Europe who are not to blame for the war but who are its most numerous and pitiful victims.

Sees U. S. As World Manager

"When this war is over," said Mr. Robinson in his luncheon address on Monday afternoon, "this world is going to need management. It is going to need the kind of management that will insure increased material as well as spiritual benefits for most of its population. America is going to be thrust into the role of world management. The United States of America is the only nation which has refined a system for the development of resources and wealth in an efficient, effective manner which results in distribution of the wealth to a large proportion of the population.

"The world knows that—peasants as well as dictators. If, after the war and before final peace settlements are decided upon, we were to open our shores to free and unrestricted immigration, the populations of the world literally would flock to America. We won't do that, of course, but it is my prediction that the people of the world will beg us to send them our managers, our engineers and our scientists for the organization and development of their resources. Therefore, without asking for it, but rather by request, our nation will become—on a fair partnership basis—the greatest economic force for good that the world ever has known."

Mr. Newbury, who developed through important production and engineering positions to become an economist of the Westinghouse company, drove home the point that the many amazing manufacturing economies which have been put into effect since 1929 have been overbalanced of late by various war extravagances, including excessive training costs. While those costs used to run as low as $200 per worker, they now have mounted as high as $1200 per employe in some departments. With all due respect to these factors, it must be admitted that the so-called miracle of war production rests mainly upon expenditures of extremely large sums of money.

One of the biggest postwar problems will be to restore some semblance at least of reasonable operating costs. It might have a healthy effect, said Mr. Newbury, if restraint of production could be given a place on our crime calendar on a level of iniquity with that much publicized misdemeanor called restraint of trade. Mr. Newbury expects in his company's case that over an average period of several years after this war, billings will run about 60 per cent of their current level. This, however, will be 17 per cent of maximum prewar top billing. He believes that general price levels as well as general volume of business will be higher after the war than in 1940. The price level already is one-fourth higher and it may later be one-third to one-half higher.

LOUIS R. BOTSAI
Manager, Gearing division, Nuttall Works, Westinghouse Electric & Mfg. Co., elected president of the Gear Manufacturers Association

W. P. SCHMITTER
Chief engineer, Falk Corp., received the Edward P. Connell award for distinguished service to the gear industry

Many Papers Presented

Among the many technical papers presented, there were two which illustrated two schools of thought in engineering. One, by Michael Malitz, analytical engineer, Kearney & Trecker Corp., dealt with pure mathematics as a "tool" in gear design. The other, by John Almen, research engineer, General Motors Corp., dealt with the subject from the angle of getting definite data on aircraft gearing through statistical assembly of the results of practical tests. Mr. Almen brought out the point that in all too many instances a 10 per cent factor of safety actually means that a designer is 90 per cent ignorant of the true state of things in a part which he has created for production.

In addition to the conferring of the Edward P. Connell award for distinguished service to the industry on Walter P. Schmitter, chief engineer, Falk Corp., feature of the Rye meeting was the election and introduction of new officers for 1944-45. These new officers are: President, Louis R. Botsai, manager, Gearing division, Nuttall Works, Westinghouse Electric & Mfg. Co., East Pittsburgh; vice president, Paul W. Christensen, president and general manager, Cincinnati Gear Co., Cincinnati; treasurer, F. B. Tripp, vice president, Ohio Forge & Machine Co., Cleveland.

New directors are: Allen H. Candee, mechanical engineer, Gleason Works, Rochester, N. Y.; Charles R. Staub, chief engineer, Michigan Tool Co., Detroit; John W. Hertzler, manager, Worm Gearing division, De Laval Steam Turbine Co., Trenton, N. J.; and Walter F. Schneider, vice president, Falk Corp., Milwaukee.

Labor Shortage Plagues Seattle Area; Workers Leaving Shipyards

Puget Sound and Columbia river plants unable to maintain full employment despite intensive recruitment. War weariness evident as imported employes return to former homes. Admiral warns Navy may be short of ships for Pacific push

SEATTLE

MANPOWER shortage again confronts industrial plants in the Puget Sound and Columbia river areas. A major exodus of workers, which began early in the year, has recently become more pronounced. This is attributed in part to war weariness, many southern and mid-westerners leaving for their homes, prompted by a desire to make themselves secure before the war ends.

Many appear to believe the war emergency is over. However, Rear Adm. S. A. Taffinder, commandant of the thirteenth naval district, warns that if production lags the Navy will be short of ships when the major push in the Pacific gets underway. A. F. Hardy, state director, War Manpower Commission, says the shortage is the most critical since the beginning of the war. Although production schedules have been increased, the five major shipyards in this area have lost 2000 workers in the last three months. At the Navy yard the turnover is 6 per cent, compared with 4 per cent a year ago. Up to the middle of May, Boeing's personnel showed a net loss of 2121, in spite of many new workers hired. In one week there were 271 terminations for "personal" reasons, of whom 100 were returning to their former homes or taking better jobs. Despite intensive recruiting Boeing has been unable to offset recent labor losses, notwithstanding increased production schedules due to manufacture of B-29 at the Renton plant and conversion of the Seattle plant from B-17 to B-29. About 5000 additional workers are now needed.

Seattle-Tacoma Shipbuilding Corp. is short 15 per cent of the number of workers allowed by War Manpower Commission. in recent weeks terminations exceeding hirings by 25 per cent. The WMC stabilization program is commended but it is reported to be effective only locally and failing to halt terminations of those who leave the area. This plant is losing 250 men a month. It is resorting to newspaper advertising and has opened downtown employment offices in an effort to overcome the major exodus. Seattle-Tacoma has sufficient work on hand to operate at full capacity the next twelve months.

Associated Shipbuilders reports its labor ranks 500 short of ceiling employment but has been able thus far to meet an accelerated schedule. Pacific Car & Foundry Co., Prescott Iron Works, the two local rolling mills, machine shops and fabricating plants all report labor shortages. While the draft has cut into manpower supply, the major obstacle is the wholesale departure of temporary workers who arrived since Pearl Harbor.

The recent appeal of War Department officials for skilled mechanics to work on the immense military project near Pasco, Wash., the nature of which remains a secret, has had its effect. Union officials report that thousands of building trades workmen have been dispatched from Seattle and other Pacific northwest centers.

POSTWAR PREVIEWS

STEEL PRODUCTION—Postwar operating rates expected to drop to 70 to 75 per cent of capacity. Higher prices needed to support present costs, especially wages. See page 49.

EQUIPMENT—Leading distributors are making a study of postwar line of mill supplies. Distributors must be receptive to new products and manufacturers should not rush back into discontinued items and in-between sizes eliminated by government orders. See page 54.

POSTWAR COSTS—Restoration of reasonable operating costs major postwar problem, gear manufacturers hear. See page 56.

MARKETING—To achieve anything like "full" employment in the postwar era, businessmen must set their marketing sights higher. S. Morris Livingston, economist, National Economics Unit, declared. See page 58.

RADIOS—Pentup demand for between 20,000,000 and 25,000,000 radio receiving sets will accumulate by the end of 1944, according to Philco Corp. president. See page 61.

AUTOMOBILES—Car builders flooding suppliers with letters seeking to learn time required by them to resume manufacture of parts and assemblies. See page 67.

PLANNING—Bendix Aviation Corp. reports that in its early postwar planning meetings opinions not facts prevailed and that a lot of things were going into the hopper but nothing was coming out. More positive approach has been reached. See page 68.

JET PROPULSION—Aeronautical conference in Cleveland was told by Lawrence D. Bell, president. Bell Aircraft Co., that the age of jet propulsion is here. See page 70.

BUSINESS EXPANSION—National Industrial Conference Board recently told the largest single factor needed to assure adequate postwar business expansion is a sound tax program. See page 77.

FLAME-SPINNING—Flame-spinning, used at present as means of closing tube ends on war goods, appears established as permanent and economical fabrication method. See page 84.

"HOT-PRESSED" CARBIDES—New 100-ton press-welder which incorporates pressing, semisintering and sintering of large cemented carbide parts in single operation also designed for production of carbide forming dies for turning out kitchenware, headlamp shells and other peacetime products. See page 99.

FLUOROSCOPY—Industrial applications where fluoroscope is combined with standard radiography now regarded as ideal arrangement for complete inspection of metals, but improved sensitivity of fluoroscope alone augurs for great peacetime expansion of the science. See page 105.

Foresees Peacetime Need For $20 Billion in Goods

Coupled with a warning to industrial rubber products distributors that the days of "windfall business" are nearly past. a Goodyear Tire & Rubber Co. executive predicted today a postwar demand for at least 20 billion dollars worth of automobiles, refrigerators, vacuum sweepers and similar materials.

WINDOWS of WASHINGTON

Bureau of Foreign and Domestic Commerce economist says most businessmen not setting their postwar marketing sights high enough. Holds prewar production and prewar markets are poor guides for the future

MOST businessmen are not setting their postwar marketing sights high enough to achieve anything like "full" employment, according to S. Morris Livingston, economist with the National Economics Unit, Bureau of Foreign and Domestic Commerce.

"The total national output at full capacity is an aggregate of individual items, each of which appears fantastic to the particular industry concerned," writes Mr. Livingston. "It means somewhere around 100,000,000 tons of steel ingots each year, whereas market analysts in that industry are not willing to hazard an estimated demand for more than 70,000,000 tons. Judging by past relationships, it means annual domestic sales of somewhere around 6,000,000 passenger cars, perhaps 8,000,000, including trucks and the export market. Almost any other item in the total might seem equally unrealistic.

"There are plenty of reasons why an arbitrary projection of past relationships will give the wrong answer for any one item; but the point is they cannot all be too high. If one item is too high then there must be an even greater increase in some other industry if they are to add up to a capacity output. It does no good to dodge the problem by blithely assuming that the biggest potential increases are in somebody else's business."

The war is demonstrating our capacity to produce, says Mr. Livingston, and prewar production and prewar markets are poor guides for postwar planning.

"By 1947," he says, "the potential will be 40 to 50 per cent above actual production in 1940—when 46,000,000 were employed and almost 9,000,000 were unemployed—and 70 to 80 per cent above the average for the five years 1935 through 1939. This is in physical volume. The dollar volume will, of course, depend on prices at that time."

In the face of this enormous potential, says Mr. Livingston, postwar planning tends to go to one or both of two extremes.

"In one direction there is the attitude that, because 40 to 50 per cent more production than in 1940 is needed in order to provide reasonably full employment after the war, a volume approaching that level is assured. Further, that because high-level production would automatically provide sufficient income to buy all the goods produced, the problem of selling them will somehow take care of itself.

"At the other extreme there is the attitude that the potential increase in buying power will have no effect on your business; that you can still measure your postwar volume in terms of some average of prewar years; that any major expansion above that prewar average in your industry is just a pipe dream.

Attainment of a high level of productive employment after the war, Mr. Livingston goes on, depends on postwar adjustments of many war-born distortions in our economy—adjustments so complex and violent that they stagger the imagination. Then, there is the need to maintain an adequate flow of investment to use the savings available at a high level of income.

Vast Potential Markets

On the other hand, says Mr. Livingston, few people have an adequate appreciation of the vast potential markets which could be opened up if consumers should have the buying power commensurate with a high level of productive employment after the war.

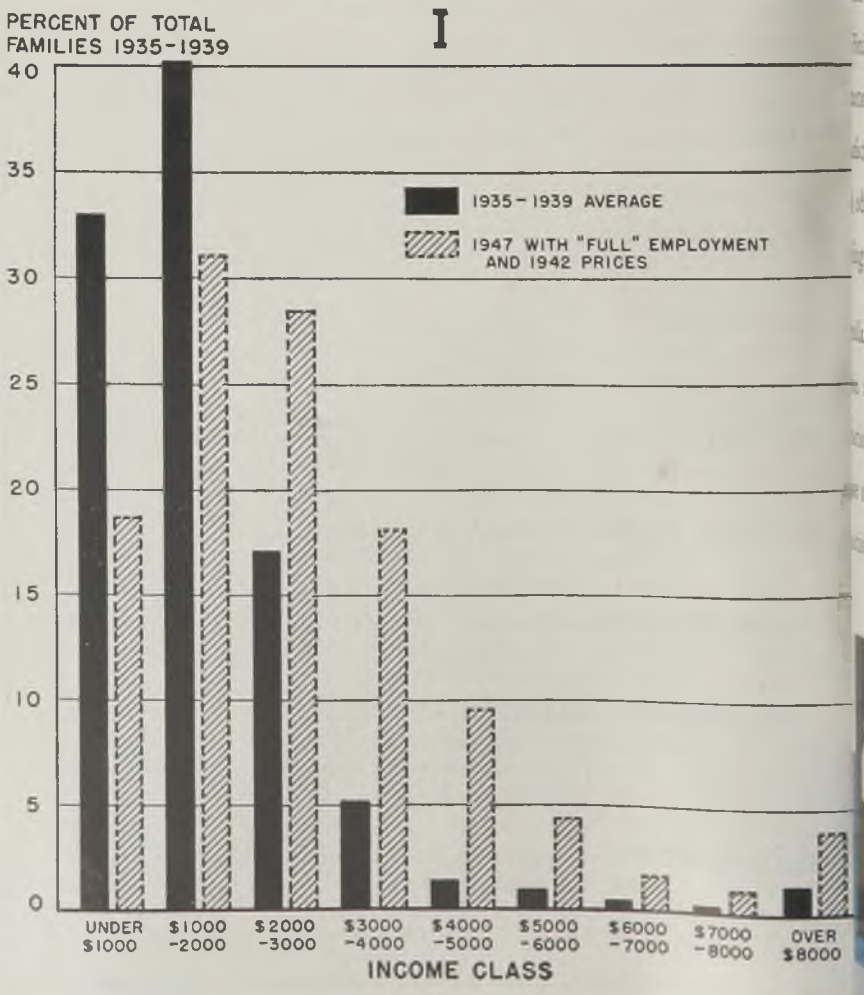
While the deferred demand for durable goods now being worn out will be very large, it will not be sufficient to engage full postwar productive capacity. To do that it will be necessary that people, as a result of the maintenance of their present incomes, will buy things which they could not afford to buy before the war.

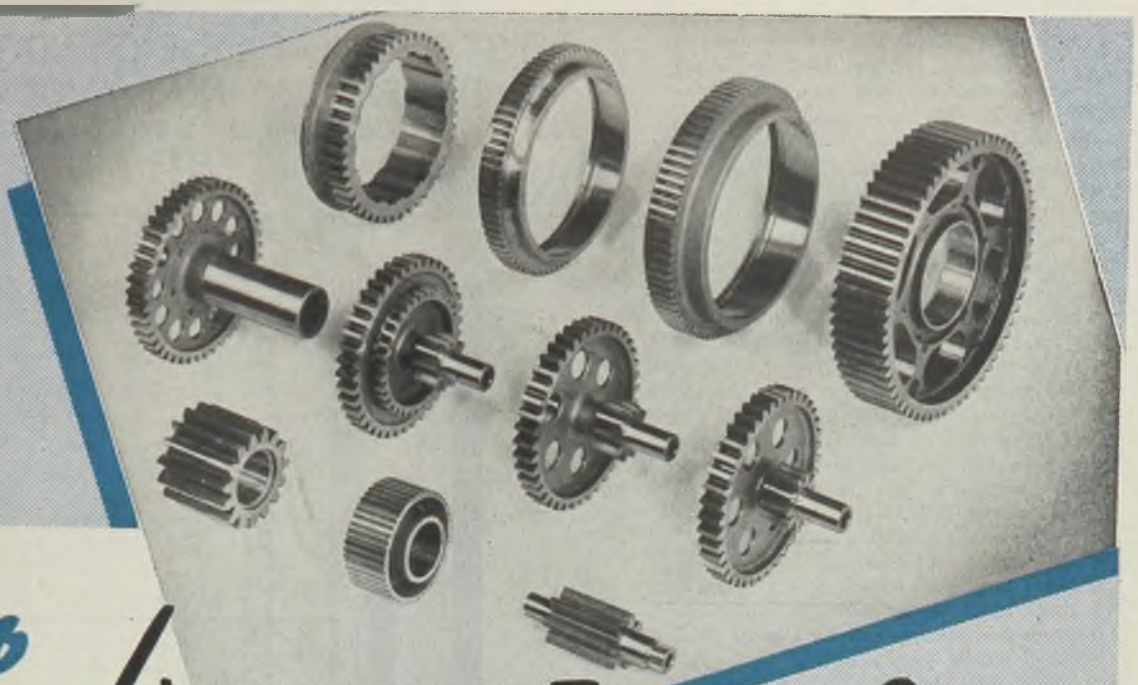
Mr. Livingston raises the question as to how well buying power and confidence can be maintained during the immediate postwar transition. A substantial loss of current income is inevitable during this period, he says.

"Because of the importance of psychological factors, we cannot be sure where this shrinkage will lead," he says, but he holds it obvious that the accumulation of demands and the accumulation of spendable funds in the hands of both producers and consumers strongly favor an expansion of civilian production as soon as possible after war restrictions are removed.

"In any event," he goes on, "it should be emphasized that, while the buying power of the then current income may be insufficient to pay for a capacity output, it cannot be substantially less than the value of the goods produced at that time. Where postwar maladjustments limit employment and consumer income they will also limit the volume of goods produced to be bought with that income. If the nation's potential capacity is fully utilized to produce far more than in the best prewar year, there will be a corresponding increase in the current income to pay for

DISTRIBUTION OF FAMILIES BY INCOME CLASS

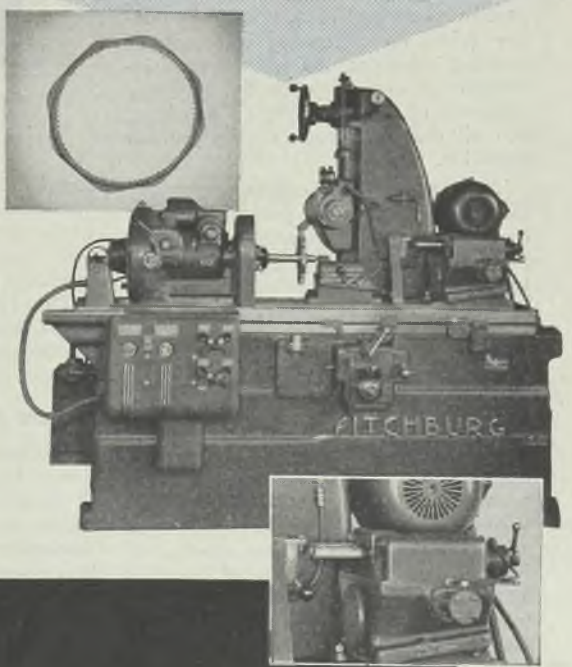




Grind AIRPLANE ENGINE GEARS LIKE THESE ON A FITCHBURG

The internal aircraft engine gears shown here were ground on the new Fitchburg Gear Grinder. As a result Fitchburg has been commended, right down to the operator of the machine, by a leading aircraft engine manufacturer—on the dimensional accuracy and finer finish obtained. These jobs were also performed in less grinding time than was possible before.

Similar results on a variety of work can be obtained on this machine—with the same quality and high production. Let Fitchburg engineers show you how. Prepare now to meet peace-time needs with greater production at low cost.



FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

these goods. Regardless of the amount of unemployment, the use of even a small part of the wartime accumulation of spendable funds in the hands of both producers and consumers would create a demand for more goods than would be produced.

"Whatever the postwar national output, every dollar of gross receipts from the sale of that output will go either to consumers in the form of wages, salaries, dividends, interest or to government in the form of taxes, or it will be retained by business in the form of depreciation, other reserves, and undistributed profits.

"No matter how large the national output, the total of these funds put at the disposal of these three groups will always be sufficient to pay for every dollar of that output. Whether a capacity volume of goods can be sold at a profit depends, of course, on whether these three groups, taken together, are willing to use all of these funds to purchase the consumers' goods and services and the capital goods which can be produced."

Although combined federal, state and local governments may not have a balanced budget during the first few years after the war, says Mr. Livingston, he does not see the likelihood of a surplus "of astronomical size."

Business Accumulates $40 Billion

But American business, says Mr. Livingston, already has accumulated $40,000,000,000 in cash and government bonds for postwar expenditure on the deferred replacement of equipment in non-war fields, the postponed expansion of growing industries, the rebuilding of inventories of civilian goods, the necessary expansion of plant in many civilian lines, and all the other costs of the postwar transition.

To show how "full" employment would increase the purchasing power of families by income classifications, Mr. Livingston prepared chart I, presented herewith. The black columns representing income distribution during the 5-year period 1935 through 1939 are based on data of the National Resources Committee as adjusted by Dr. Rufus Tucker, General Motors Corp. economist, with a further adjustment to allow for the slight difference between the average income per family in the two years 1935-36 and the average for the 5-year period 1935-39. With "full" employment there would be a marked reduction in the number of families that have an income of less than $2000 and which, accordingly, constitute a poor market for many producers. On the other hand, there would be a marked increase in the number of families with incomes in excess of $2000, with particularly marked increases in the number of families receiving more than $3000, $4000, $5000, $6000, $7000 and $8000, respectively.

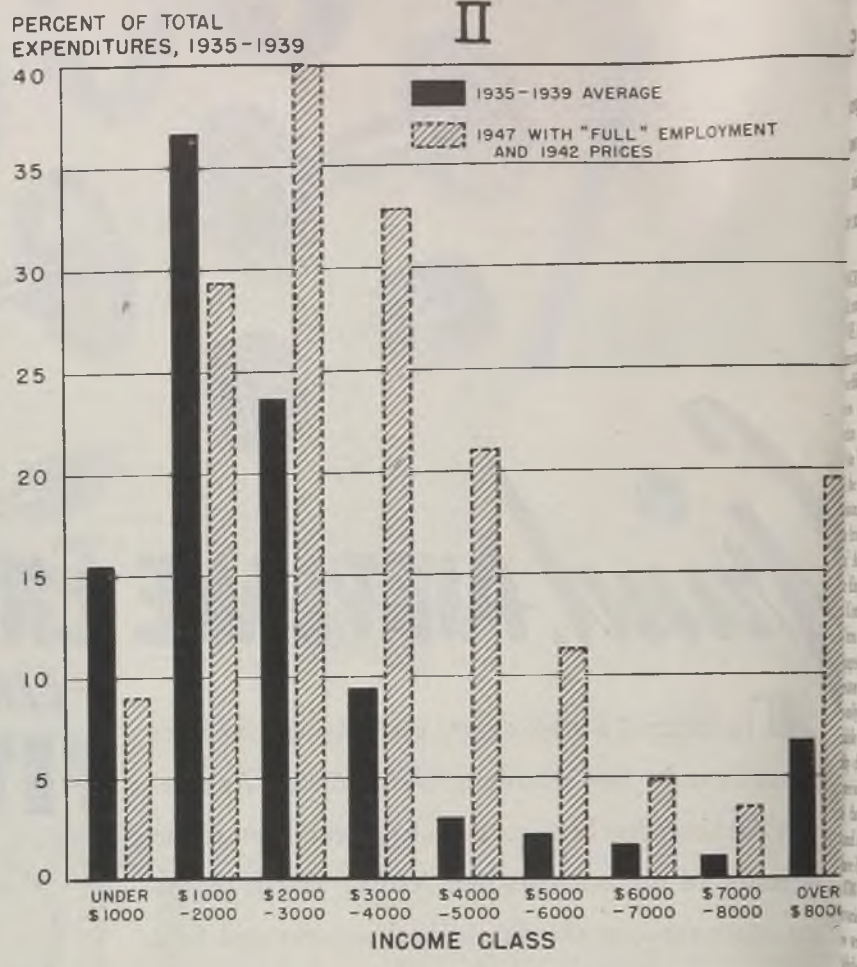
Mr. Livingston emphasizes the importance of the fact that the one-third of the total number of families with incomes of less than $1000 spent a little more than $10 a month for home ownership or rental, $30 a month for ownership and operation of a car, $56 a year for clothing, while very few of them could afford to own mechanical refrigerators, washing machines, and other household equipment.

The 1935-39 mass market, therefore, Mr. Livingston points out, consisted of the 90 per cent of the families that had incomes of less than $3000.

DISTRIBUTION OF EXPENDITURES BY FAMILY INCOME CLASS

(EXCLUDING GIFTS AND TAXES)

II



Bars Are Hypothetical Projections

The bars in chart I that are enclosed by dotted lines are hypothetical projections of the distribution of families by income classes in the year 1947, assuming that demobilization has been completed and that unemployment has been reduced to a practical minimum. They are also hypothetical because they are based on 1942 prices. In other words, they assume a wage and price level higher than prewar, but less than the present—and hence are on the conservative side.

In making up chart I, Mr. Livingston assumed a national income in 1947 less than that actually earned in 1943, also that there would be the same percentage increase in each income group. "Since many of those in the low income group who were unemployed in the prewar period would have jobs if there were 'full' employment," he explains, "the latter sumption may result in an understatem of the shift from low to middle inco groups."

There are many reasons why the po war income distribution probably will look exactly as shown in chart I, says Livingston, but "no possible variat would seriously alter the general patter

In spite of the fact that the 1947 come would be distributed over 20 cent more families, he says, there wo be a little over half as many families the under $1000 class and only ab three-fourths as many in the $10 $2000 bracket. "The mass market," says, "instead of being under $30 would be from $1000 to $5000, w three-fourths of the families within t range. There would be more than th times as many families in the $3000-4(bracket and about seven times as many the $4000-5000 bracket."

In chart II also presented herewi Mr. Livingston reflects the same pictu but in terms of dollar expenditures families according to income groups. sharply reflects the breath-taking exp sion in the 1947 mass market for co sumers' goods that would result unc "full" employment.

Composition of Emergency Steels Are Modified

Changes designed primarily to permit greater consumption of nickel-chromium-molybdenum scrap. New series added

CHANGES in and additions to the chemical compositions of National Emergency (NE) steels were announced by the American Iron and Steel Institute.

The modifications were made by representatives of the Metallurgical and Conservation Branch of the Steel Division of the War Production Board: the Office of the Chief of Ordnance, Technical Division, U. S. Army; and members of the Iron and Steel Division of the Society of Automotive Engineers, the SAE War Engineering Board and the Technical Committee on Alloy Steel of American Iron and Steel Institute.

The changes were made primarily to permit greater consumption of nickel-chromium-molybdenum scrap and also to make available triple alloy steels having hardenability characteristics intermediate between previously existing series. To accomplish those ends, the following changes in and additions to NE steel compositions have been made:

1. The 8700 series has been restored in a wider variety of carbon ranges.

2. A new series, the 9700 series, has been established having hardenability characteristics similar to those of the 4000 series.

3. A new series, the 9800 series, has been established having hardenability characteristics about half way between those of the 8700 series and those of the 4300 series, in the thorough-hardening carbon ranges.

4. A new series, the 9900 series, has been established in the low carbon ranges, designed especially for carburizing and having hardenability characteristics similar to or slightly in excess of the 8700 series.

CARBON-MANGANESE STEELS

	C	Mn	Si
NE 1330	0.28/0.33	1.60/1.90	0.20/0.35
NE 1335	0.33/0.38	1.60/1.90	0.20/0.35
NE 1340	0.38/0.43	1.60/1.90	0.20/0.35
NE 1345	0.43/0.48	1.60/1.90	0.20/0.35
NE 1350	0.48/0.53	1.60/1.90	0.20/0.35

Predicts Postwar Demand For 20,000,000 Radios

Pentup demand for between 20,000,000 and 25,000,000 radio receiving sets will exist by the end of 1944, compared with the industry's all-time high production of 13,000,000 units in 1941, it was estimated recently by Larry E. Gubb, Chairman, Philco Corp., Philadlphia.

NICKEL-CHROMIUM-MOLYBDENUM STEELS

	C	Mn	Si	Ni	Cr	Mo
NE 8612	0.10/0.15	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8615	0.13/0.18	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8617	0.15/0.20	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8620	0.18/0.23	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8622	0.20/0.25	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8625	0.23/0.28	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8627	0.25/0.30	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8630	0.28/0.33	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8632	0.30/0.35	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8635	0.33/0.38	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8637	0.35/0.40	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8640	0.38/0.43	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8642	0.40/0.45	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8645	0.43/0.48	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8647	0.45/0.50	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8650	0.48/0.53	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.15/0.25
NE 8712	0.10/0.15	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8715	0.13/0.18	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8717	0.15/0.20	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8720	0.18/0.23	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8722	0.20/0.25	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8725	0.23/0.28	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8727	0.25/0.30	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8730	0.28/0.33	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8732	0.30/0.35	0.70/0.90	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8735	0.33/0.38	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8737	0.35/0.40	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8740	0.38/0.43	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8742	0.40/0.45	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8745	0.43/0.48	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8747	0.45/0.50	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 8750	0.48/0.53	0.75/1.00	0.20/0.35	0.40/0.70	0.40/0.60	0.20/0.30
NE 9415	0.13/0.18	0.80/1.10	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9417	0.15/0.20	0.80/1.10	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9420	0.18/0.23	0.80/1.10	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9422	0.20/0.25	0.80/1.10	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9425	0.23/0.28	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9427	0.25/0.30	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9430	0.28/0.33	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9432	0.30/0.35	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9435	0.33/0.38	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9437	0.35/0.40	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9440	0.38/0.43	0.90/1.20	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9442	0.40/0.45	1.00/1.30	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9445	0.43/0.48	1.00/1.30	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9447	0.45/0.50	1.20/1.50	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9450	0.48/0.53	1.20/1.50	0.20/0.35	0.30/0.60	0.30/0.50	0.08/0.15
NE 9722	0.20/0.25	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9727	0.25/0.30	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9732	0.30/0.35	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9737	0.35/0.40	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9742	0.40/0.45	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9745	0.43/0.48	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9747	0.45/0.50	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9750	0.48/0.53	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9763	0.60/0.67	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9768	0.64/0.72	0.50/0.80	0.20/0.35	0.40/0.70	0.10/0.25	0.15/0.25
NE 9830	0.28/0.33	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9832	0.30/0.35	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9835	0.33/0.38	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9837	0.35/0.40	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9840	0.38/0.43	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9842	0.40/0.45	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9845	0.43/0.48	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9847	0.45/0.50	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9850	0.48/0.53	0.70/0.90	0.20/0.35	0.85/1.15	0.70/0.90	0.20/0.30
NE 9912	0.10/0.15	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30
NE 9915	0.13/0.18	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30
NE 9917	0.15/0.20	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30
NE 9920	0.18/0.23	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30
NE 9922	0.20/0.25	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30
NE 9925	0.23/0.28	0.50/0.70	0.20/0.35	1.00/1.30	0.40/0.60	0.20/0.30

SILICON-MANGANESE AND SILICON-MANGANESE-CHROMIUM STEELS

	C	Mn	Si	Cr
NE 9255	0.50/0.60	0.70/0.95	1.80/2.20	—
NE 9260	0.55/0.65	0.70/1.00	1.80/2.20	—
NE 9261	0.55/0.65	0.70/1.00	1.80/2.20	0.10/0.25
NE 9262	0.55/0.65	0.70/1.00	1.80/2.20	0.25/0.40

CARBON-CHROMIUM STEELS

	C	Mn	Si	Cr	Ni	Mo
NE 52100A	0.95/1.10	0.25/0.45	0.20/0.35	1.30/1.60	0.35 max.	0.08 max.
NE 52100B	0.95/1.10	0.25/0.45	0.20/0.35	0.90/1.15	0.35 max.	0.08 max.
NE 52100C	0.95/1.10	0.25/0.45	0.20/0.35	0.40/0.60	0.35 max.	0.08 max.

NOTE 1. When electric furnace steel is specified, phosphorus and sulphur contents are to be 0.025% maximum each.

NOTE 2. All National Emergency steels are subject to the conditions outlined for standard steels as listed in Steel Product Manual No. 10 covering alloy steels, pages 14 to 17 inclusive, and page 26. Large sizes are subject to modification of carbon content only to a range of 0.10 as outlined on pages 23 and 26 of the same Manual.

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

L ORDERS

REFRIGERATION EQUIPMENT: Applications for priorities assistance for refrigeration equipment, other than industrial processing and air conditioning equipment must be filed on form WPB-1319 with local WPB field offices. Use of form WPB-2448 has been discontinued. Applications for priorities assistance for industrial processing and air conditioning equipment continue to be filed with WPB in Washington on form WPB-2449. (L-38)

TYPEWRITERS: Applications covering purchase of all typewriters must be submitted on form WPB-1319 and must be filed and processed in WPB field offices. (L-54-a)

LAUNDRY EQUIPMENT: Production of 48 items of commercial laundry, dry cleaning and tailors' pressing equipment for civilian use is now permitted. Manufacturers apply for priorities assistance on form CMP-4B and in processing these applications the WPB is guided by the policy that total production of the entire industry must not exceed the $27 million approved program for these products for both civilian and military use. The application will be denied where resumption of production will interfere with war production. (L-91)

FLOOR MAINTENANCE MACHINES: Program for quarterly production of 750 floor maintenance machines of the heavy-duty type currently required in war industries and by military claimants has been approved by WPB. The limited production is confined to portable electric hand blowers, industrial vacuum cleaners, drum type floor finishing and floor maintenance machines making a 10-inch part or wider. Production of floor sanding and portable rug scrubbing machines is still prohibited, but delivery of floor sanding machines is no longer restricted. Production of the permitted machinery will be limited to orders specifically authorized by the WPB and to a limited quantity each manufacturer may produce for inventory.

Applications for permission to purchase any of the restricted machinery are made to the Service Equipment Division on form WPB-1319. Manufacturers apply for priorities assistance on form CMP-4B. (L-222)

M ORDERS

ALUMINUM PAINT: Distributors of aluminum paint and pigments now are permitted to fill unrated orders or orders rated lower than AA-5 from inventories in their possession on March 15. Paint manufacturers may deliver aluminum paint to their distributors during the period from May 15 to June 30 on unrated or low-rated orders. Consumer uses of aluminum paint or pigment have been raised from 7 to 18. Previously, only orders rated AA-5 or better might be filled, save in quantities limited to not more than two pounds of pigment and one gallon of paint per customer per month. (M-1-g)

NICKEL: Use of nickel, except where necessary for operations purposes, is prohibited in the following items which make up list A of the order: Transportation equipment; building supplies, hardware, ornamental metal work; plumbing, heating and air conditioning supplies, and domestic and institutional appliances and equipment; commercial electrical appliances and domestic ranges; clothing accessories; furnishings and furniture; commercial and industrial appliances and equipment and parts thereof; jewelry, toilet articles, accessories, souvenirs, novelties, games, toys, art objects and musical instruments;

Plating, containers of all types; branding, marking, and labeling devices; fire fighting apparatus and equipment; lighting equipment; nonoperating or decorative uses or parts of installations and mechanical equipment, including frames, bases, standards, and supports; photographic and art equipment and supplies; sporting and pleasure boat fittings and hardware; saddlery and harness hardware and fittings.

Nickel may be used in the manufacture of articles omitted from the list only for any purpose authorized by the WPB regardless of whether or not the used nickel was allocated, or, where allocated, to the user subject to any specific directions issued in connection therewith.

Nickel scrap and secondary nickel may be used where not prohibited, but only to fill a purchase order to which a preference rating AA-5 or higher has been assigned. Exceptions to the prohibitions are implements of war as defined by the order.

If nickel salts are added to or anodes used in solutions, they may be used only to fill purchase orders bearing AA-5 or higher preference ratings which are not prohibited by the order itself. (M-6-b)

COPPER PRODUCTS: Limited restoration has been made of copper and copper-base alloy products in the manufacture of specified items of extended surface heating equipment, including blast-heating coils, convectors and unit heaters. (M-9-c)

CADMIUM: Users of cadmium now are permitted to maintain a 30-day inventory of cadmium-containing items, based on the current rate of deliveries. Laboratory supply houses engaged in buying and selling cadmium to laboratories are considered as "distributors." A manufacturer may not deliver cadmium-containing items until he is in possession of a certified order. The manufacturer of pigments and alloys, not the consumer or user, must appeal to the WPB field office to use cadmium for other than permitted uses. (M-65)

PAPER MACHINERY: Pulp, paper and paperboard machinery has been removed from controls established in order M-126. The change obviates the necessity of appealing under the conservation order and fits in with the general program set up for the manufacture of new machinery and equipment for those industries. (M-126)

SILVER: Exemptions of small manufacturers from restrictions on the manufacture of articles containing silver have been tightened. Provisions which are applicable to "hand tool manufacturers" have been changed so as to apply only to such manufacturers who are engaged exclusively in the manufacture of silver products described in list B of the order. Regardless of rated orders, only domestic silver is permitted for these uses, and then only within quota limitations. Sale of any other silver products by hand tool manufacturers is prohibited. The hand tool manufacturer now must perform all the operations from the primary raw material form to the finished article in his own plant, and the primary forms which he must use are specifically listed. (M-199)

INDEX OF ORDER REVISIONS

PRICE REGULATIONS

IRON AND STEEL PRODUCTS: Exporters of iron and steel products now will determine, effective June 1, their ceiling prices for products classified as "excess stock" by taking the maximum delivered price at the port of exit which a holder might charge a user under the domestic iron and steel regulation.

Holders who sell excess stock to domestic users now have maximum prices equal to the mill base price to the holder, plus the holder's incoming freight from his nearest basing point, plus the outgoing freight to customer.

Sales by holders to domestic resellers are exempt from price control where a firm offer at the ceiling price has not been received from user. Exporters, thus, may be able to buy excess stock at uncontrolled prices. Consequently, they cannot use their supplier's ceiling price as a base price but must use the maximum price the holder could have charged a user at the point of exit.

Exporters with excess stock on hand, for which they already have secured export license at prices higher than now permitted, are given until Sept. 1, 1944, to make shipment on outstanding contracts at prices no higher than formerly allowed. (Export Price Regulation)

COPPER SCRAP: Purchase price for copper scrap will be fixed by OPA when a consumer shows he cannot obtain it because specifications are such that the seller cannot afford to prepare the scrap for him under existing price ceilings. Application should be made in writing to the Nonferrous Metals Branch, Office of Price Administration, Washington 25, for the establishment of the price he may pay for such material. (No. 20)

FROZEN MATERIALS: Provisions of price schedule No. 204, governing prices for special sales of idle or frozen materials have been extended to include idle machinery, tools and other assembled industrial products (No. 204)

CRMB Foresees Need for Maintaining Controls

Supply position for most commodities now under allocation or review by the Combined Raw Materials Board requires some measure of supervision or control until the end of the war. This belief was expressed in the board's second annual report for the year ended Jan. 31, 1944, which has just been issued.

Although in the view of the board a general relaxation of controls is yet possible, it was admitted that more lenient consumption policies could for the time being be justified by the easier position in some raw materials provided no other limiting factor arises.

The report points out that to the extent that relaxation does take place, it will not likely take the same forms in any two countries. Each will concentrate on using the surplus to meet the requirements it thinks most urgent with the result that pots and pans, for instance, will be made in one country, but not electric irons, while electric irons

be made in the second country, but not pots and pans.

While some commodities remained critically short throughout 1943, no serious injury to the war effort had resulted from shortages of materials.

Where available supplies became more than adequate to meet requirements for currently permitted uses, balance can be achieved by (a) reducing output, (b) consuming more, and (c) additional stockpiling. "Availability of adequate quantities of any given material does not of itself permit general relaxation" of controls, the board warned. Other limiting factors, such as manpower shortages, fuel, plant capacity, and shipping must also be taken into account.

The board also pointed out that since the degree of surplus developing in some commodities cannot be fixed with complete certainty at this stage, care must be taken to insure that sudden reductions in production shall not result in deficits later on.

New Flat Iron Production Quotas Issued by WPB

Production quotas totaling 376,768 electric flat irons, bringing the grand total for production authorized to date to 769,338 irons, have been issued to eight additional manufacturers by the War Production Board.

The manufacturers and the production quotas assigned to them are: Cissell Mfg. Co., Louisville, Ky., 7500; Knapp-Monarch Co., Dover, O., 192,000; Metalware Corp., Two Rivers, Wis., 16,500; Reimers Electric Co., West New York, N. J., 2100; Rutenber Electric Co., Marion, O., 4600; Verplex Co., Essex, Conn. (for Landers, Frary & Clark, New Britain, Conn.), 97,868; Waverly Tool Co., Sandusky, O., (for Titeflex Inc., Newark, N. J.), 31,200; and Winsted Hardware Mfg. Co., Winsted, Conn., 25,000.

Output of Chrome Chemicals To Be Boosted 35 Per Cent

Output of chrome chemicals in the fourth quarter of 1944 is expected to be about 35 per cent greater than the third-quarter output, the War Production Board reports. Military requirements, which now consume about 87 per cent of the available supply of chrome chemicals, will absorb most of the increased output. This expanded production will be accomplished by modification of existing facilities and elimination of bottlenecks in present schedules, rather than by the addition of new plants.

Appointments-Resignations

Col. M. J. O'Byrne of Cincinnati has been appointed to head the activities of the Surplus War Property Administration in connection with the disposal of surplus real estate.

War Production Program Entering Critical Period, Nelson Warns

Emphasizes that factors tending to slow down industrial activity must be counteracted by continued close co-operation between labor and management. While some cutbacks have been ordered, urgency for certain war goods is intensified

A CRITICAL point in war production has been reached, said Donald M. Nelson, chairman, War Production Board, at a press conference and Chamber of Commerce luncheon in Cleveland last week. The hardest part of the entire production program will be encountered during the next four months, he warned, adding that continued close co-operation between labor and management is essential if schedules are to be met.

One of the greatest dangers in the present situation, he said, is that workers are tired from the sustained effort that has been put forth since Pearl Harbor and that the intense patriotism displayed in the early months of the war has begun to wane. Another important factor is that there is a normal tendency of workers in certain types of work, including those in foundries and forge shops, to seek less arduous work during the summer months. Mr. Nelson pointed out that the worst bottleneck in the program at present is in foundries and forge shops whose products constitute vital components in the production of ships, tanks, and other heavy war equipment.

He emphasized that if production of any critical component lags, deliveries of equipment urgently required by the armed services are delayed. In the Cleveland district, for instance, 212 war plants are behind shipping schedules. It is the duty of WPB officials, he said, to aid labor and management in these firms, as well as those in other sections of the country in a similar position, in stepping up their deliveries to meet schedules. Problems which must be solved to correct the situation include manpower and increased efficiency.

Steel supply will be adequate, he believes, if the industry can maintain its present high rate of production.

More than $210 billion worth of prime contracts have been placed and $75 billion worth of additional contracts must be let to complete the arms program as presently outlined. Requirements on the active battle fronts are constantly changing, requiring cutbacks in some programs and expansion of others. There now is a very urgent need, for instance, for heavy artillery, artillery shells, landing craft, and similar offensive weapons.

In addition to satisfying demands of the chiefs of staff, industry must continue to produce a vast amount of goods to maintain the civilian economy. Mr. Nelson expressed his faith that the American people will do whatever is asked of them if they are convinced of the necessity and if all share the hardships and share alike.

Further Rise in Output of War Materials Required

American workers have turned out more than $101 billion of war materials since July, 1940, of which 85 per cent came from war plants having union contracts, according to Joseph D. Keenan, WPB vice chairman. Total production for 1944 must be raised about 10 per cent above the present level, he said, and that about two-thirds of the total munitions program, consisting of the most critical types of equipment, must be raised 25 per cent above the present level of output in order to meet the 1944 goals.

Requests for Exemption From Renegotiation Denied

Applications for exemption from renegotiation of numerous articles under the standard commercial articles provisions of the Renegotiation act have been denied by the War Contracts Price Adjustment Board.

The articles are: Aircraft bolts and screws, bolted steel and wood tanks, alcohol, bucket loaders, portable belt conveyers, clam-shell buckets, electrocardiographs and related supplies and repair parts, marine clocks and clock work mechanisms, .22-caliber rifles and spare parts and accessories. Also denied were requests for exemption of general hardware sold at wholesale, metal stampings, cinders, radium luminous materials and products made from ferrous and nonferrous scrap.

Three More Companies File Renegotiation Suits

Arpee Products Co., Glendale, Calif., Arpee Screw Products Co., Glendale, Calif., and Manlove & Spulding Mfg. Co., Los Angeles, recently filed suits in the federal court in Los Angeles asking an injunction and challenging the constitutionality of the Renegotiation act.

The suits state that the 1942 profits of these three firms, amounting to $1,015,000, were declared excessive by the government and ordered returned.

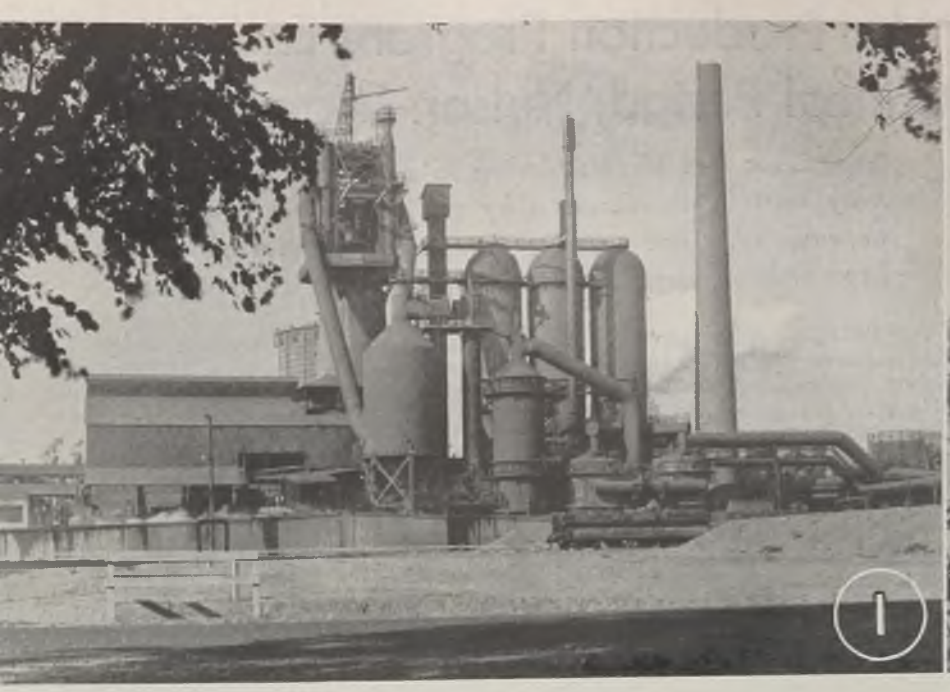


Fig. 1—This 1200-ton blast furnace was constructed in record time. Molten iron from this stack goes into the six 185-ton open hearths

Fig. 2—Raw Materials area of Kaiser Co. Inc. Building at left is sintering plant and in right background are stockpiles of iron ore and limestone. Fine ore and coke breeze are made into clinker in sintering plant. This sintered raw material is used as part of the charge in the blast furnace

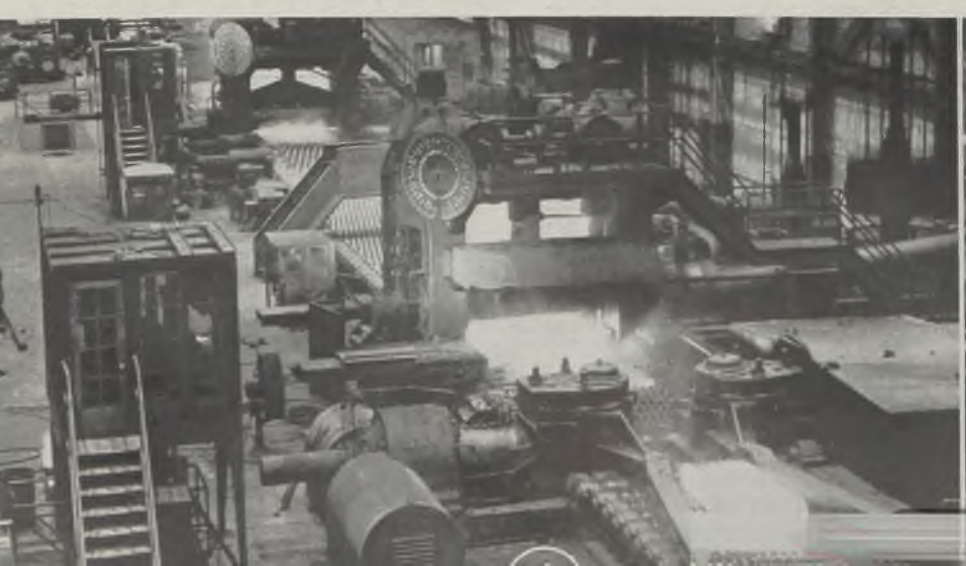
Fig. 3—Coke oven and by-products area includes two batteries of 45 Koppers-Becker-type ovens and provide all the coke necessary for the blast furnace, in addition to many valuable by-products such as ammonium sulphate, benzol, toluol, tar and others

Kaiser's Rolling Mil

ROLLING mills of the Kaiser Co. Inc. iron and steel division near Fontana, Calif., are operating at a rate of more than 360,000 tons of plates a year, or 60,000 tons more than rated capacity. In recognition of this production, the company was awarded the Maritime Commission's "M" burgee May 27.

Slabbing ingots for conversion to plates are broken down on a 2-high reversing stand equipped with 42 x 110-inch rolls direct driven by two 3500-horsepower direct-current motors. Breakdowns delivered by this mill are finished rolled on a 3-high stand equipped with 24 and 38 x 112-inch rolls driven through a stand of pinions by a 7000-horsepower motor.

Speed of construction of this plant is indicated by the following dates: Ground broken April, 1942; 1200-ton blast furnace in operation December, 1942; the first of six 185-ton open-hearth furnaces tapped



lling Mkceed Rated Capacity

May, 1943; and the first sheared plate was shipped August, 1943.

The structural mills will begin operation this month producing billets for shells, on contract with the Ordnance Department of the U. S. Army. These mills comprise a 36-inch, 2-high reversing stand and three stands of 29-inch finishing rolls, two stands of the latter mill being equipped with 3-high rolls and one with 2-high rolls. The mill is laid out so that equipment for rolling rails as well as for increasing the capacity of other shapes may be added when needed.

The ore receiving, crushing, screening, storing and reclaiming system is designed to handle 833,000 tons of ore per year based on an 8-hour turn. The storage piles of finished ore are sufficient for maintaining a 10-day supply of material. The bedding system includes four piles of 12,000 tons each. The raw material storage pile has capacity for 100,000 tons of ore.

Fig. 4—Section of the plate rolling mill. A vertical edger is in the right foreground, 2-high roughing mill in center foreground and 3-high, 110-inch finishing mill in left background. This mill is operating at considerably above its 300,000 tons rated annual capacity

Fig. 5—Finishing ship plate on the 3-high, 110-inch reversing mill. Plates from ¼-inch to 2 inches thick are standard products

Fig. 6—"Bottom pouring" steel ingots at the Kaiser plant. They will be rolled into ship plates or forged and machined into shells


Everything's Under Control!
Spiral Drive Vertical Turret Lathes are built in 24", 36", 42", and 54" table sizes. Also Cut Master Vertical Turret Lathes in 30", 36", 42", 54", 64", and 74" sizes with two or three heads.
THE BULLARD COMPANY

MIRRORS of MOTORDOM

Automotive parts manufacturers' reconversion problem not too difficult. Many now are supplying replacement parts. War Labor Board upholds right of management to discipline employes. Foremen in unenviable position

RECENT meeting of representatives from 16 automotive parts manufacturing companies with the WPB in Washington, at which discussions were held on the subject of the resumption of automobile production, developed little in the way of news, despite some distorted reports of the meeting which appeared in the press. The parts companies' "reconversion" problem is not too difficult, inasmuch as many of them are currently supplying replacement parts, and they should be ready to supply just about anything the automakers' want on short notice.

Next meeting of the automobile manufacturers with the WPB, scheduled sometime in July, should provide a better clue on the "when and how many" of automobile production. Since the first meeting of this group in April, car builders have been flooding their suppliers with letters, seeking to learn how long it would require these suppliers to reshuffle their plant and equipment preparatory to resuming manufacture of parts and assemblies. The following inquiry is typical, having been received by one parts source from an automotive company purchasing agent within the past two weeks:

Request Survey of Equipment

"Prior to the war you supplied us the items listed on the attached sheet for our automotive production.

"Please survey your situation and make sure that you have all necessary tools, jigs and fixtures, as well as machine tools or other equipment available to permit resumption on the above items. That is, unless you have not already done so, we would like to have you locate all of the above mentioned equipment to see if it is in good usable condition, as well as being properly tagged or identified and stored, so that it will be immediately available and usable when required.

"In addition, we would like to ask that you turn over the machinery and equipment which will be needed to make certain they are in operating condition.

"After having made the above survey, please advise the complete situation on all the necessary tooling and facilities for the manufacture of the above items, together with your best estimate as to how soon you would be able to resume production in the event we receive a release to resume the manufacture of cars."

Policy for the increase or resumption of civilian production with respect to labor areas has been announced by the WPB. Specifically, it exempts all plants employing less than 100 persons, and further stipulates that approved production programs must be placed in Group 3 and Group 4 labor areas, the least critical of the four classifications. Portions of such programs may be placed in Group 2 areas if no interference with military production is involved, but this must be approved in Washington. Plants in Group 1 areas, like many industrial centers in Michigan (Detroit, Muskegon, Benton Harbor and Adrian), must obtain clearance and approval from their area production urgency committees.

Right of management to discipline employes who go on strike in violation of a contract has been upheld by the War Labor Board in setting aside a decision of a regional labor board which had ordered that 41 employes of the tube department of the Norge Machine Products division of the Borg-Warner Corp., Muskegon, be reinstated on their jobs without back pay. The workers stalked off their jobs last December as a protest against delay in handling a grievance presented by them to the company against a workman in the same department. The company refused to reinstate them and the plant went on strike for two weeks.

The board held that the UAW-AFL local (note it is not a CIO union) should have appealed the discharges of the men on an individual case basis through the grievance procedure set up in the contract. While refusing to order reinstatement of the 41 men, the board recommended that the ill-advised action of the union should not entirely deprive the men of individual consideration of their claims. Therefore, any of the 41

SPEEDS UP PACKAGING: Parts packaging at the Studebaker military truck plant has been greatly speeded up by the introduction of a sealer for flat packages of gasket sets. In the original practice, girls had to crease acetate tape by hand around the open edges of the packages. With the sealer, an operator merely inserts the package edges at right angles to the flat face of the tape and turns a crank

discharged workers may apply to the company as individuals within 15 days for reinstatement as new employes.

Dr. George W. Taylor, vice chairman of the board, declared in his opinion that "the responsibility for disciplining of employes must rest with management. It is the right of the union to see that discipline of its members is for cause. The union sought to reverse these functions in the present case when it demanded the discharge of an employe fundamentally because of his high rate of production, but in successive grievances protested this employe's rate of production, absenteeism and breakage of his machine."

This ruling seemed a distinct reversal of the position taken in the foremen's strike where the rehiring of striking foremen was made mandatory to employers. Thus, the union claimed that in one case the firing of 41 men was upheld while in another the rehiring of strikers was required.

While many of the current waves of strikes in the motor industry have appeared to originate from trivial incidents there is some question over just what the provocative causes have been. For example, a group in the Chevrolet Saginaw plant was reported to have struck because the management suddenly instituted a no-smoking rule in a department where no fire hazard was involved and where smoking had hitherto been permitted. Result was that the men became irate, all lighted cigarettes and blew their smoke in the supervisors' faces, resulting in their being sent home. Union plant officials say significantly the plant was 50 days ahead of production schedules on propellers.

The subject of postwar planning has been kicked around more in the past 18 months than almost anything else that comes to mind at the moment. At the outset, this much can be said: If any company comes up with a postwar plan that looks workable and profitable, it is being locked up in the safe, away from competitors' eyes. Those postwar plans which do come to the public eye are either so generalized as to not tip the proponent's hand, or are just so much tripe, issued primarily for their publicity value.

An exception may be the comment of Andrew A. Kucher, director of research for Bendix Aviation Corp., a nonpublicity-seeking engineer who was prevailed upon recently to elaborate somewhat on the subject of postwar planning for the Society of Automotive Engineers here at its final meeting of the season.

Gross sales of Bendix for 1943 amounted to over 918 million dollars, or something like ten times the prewar peak, so the necessity for aggressive postwar planning is obvious, even though the present backlog of Bendix orders is roughly a billion dollars. At any rate, Mr. Kucher had the following to observe, in part, relative to Bendix postwar planning:

The long range planning committee of Bendix has devised a positive approach. Consider its organization and planning for the future.

Several roundtable discussions were called during the early part of 1943. They were attended by group executives and general managers of the divisions.

The first of these meetings was truly a roundtable discussion; we went around and around and succeeded in utterly and completely confounding ourselves.

The postwar outlook was grim, with prospects for surplus war products, surplus space and surplus equipment; limited aircraft construction; automobile companies manufacturing more of their supplementals; and increased cost of production.

The vast scope of Bendix in the production of instruments and supplemental devices for aircraft, marine and land vehicles, together with its array of talents and technics, provided a vast field for consideration. At a second roundtable meeting, charts were presented covering every known product category.

Two sectional group meetings were held, attended by prospective members of divisional subcommittees, at which time the aims and objectives of the activities were outlined. Following these sectional meetings, subcommittees were formed in the various divisions, patterned in their makeup after the central committee, having engineering, manufacturing and sales representatives.

The first deliberations of the subcommittees went through the same tortuous procedure as that experienced by the central planning group.

Opinions Not Facts Prevailed

Meetings have been held monthly by the central planning committee, and weekly by the subcommittees. After several months of sincere effort, it became apparent that a lot of things were going into the hopper but nothing was coming out. Things were being fired from all directions. Agenda were overcrowded. Subject matter was incomplete and varied in its presentation. Opinions rather than facts prevailed.

A practical thing was done at this juncture. The central committee requested each divisional subcommittee to make one complete submission. A sample of a hypothetical product proposal was prepared as an outline to guide the subcommittees in presenting the data and information required.

Copies of all product proposals are sent to each member of the central committee between regular meetings.

The agenda for the subsequent meetings thereby are automatically set: Product proposals are considered successively; the tally report is read; a representative of the submitting division presents an explanation; the committee discusses the proposal; and disposition is voted.

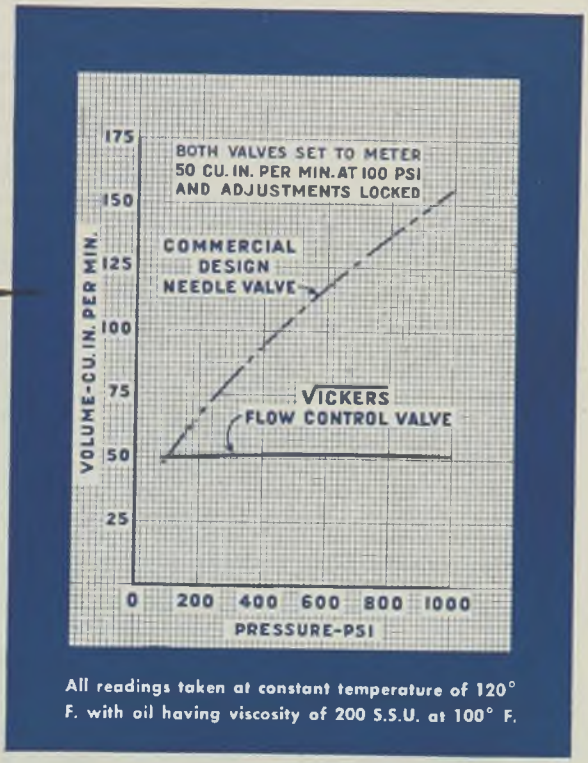
Disposition may assume either of the following forms: (1) A product proposal may be approved for submission to the Administration Committee, or (2) a product proposal may be returned to the submitting division for further information regarding cost, markets, patents, design, competitive situation, originality, or capital and facilities data.

SUPERCRANE: A new independent boom hoist has been added to the crane being manufactured for the war effort by General Excavating Co., Marion, O. The hoist assures faster operation and also adds to lifting capacity and stability. For the duration, General Excavating has enlisted the plant and manpower of Philips & Davies Inc., Kenton, O.

CONSTANT FLOW RATE

Regardless of

VARIATIONS IN FLUID PRESSURE



All readings taken at constant temperature of 120° F. with oil having viscosity of 200 S.S.U. at 100° F.

As shown by test chart at right, the Vickers Flow Control Valve maintains a practically constant metering rate (for a given setting of the control adjustment) regardless of variation in fluid pressure. This ability to accurately control the rate of travel of tool head or slide . . . or the rpm of a hydraulically driven work spindle . . . at all times regardless of the resistance encountered is a fundamental requirement of many types of machine tools and special machinery. The absence of a hesitation, jump or a speed variation with a load change is important because these nearly always are detrimental to tool life, work finish or proper operation. Tool damage when "breaking through" work is eliminated and variations in cut or operating pressure have no appreciable effect upon feed rate. See Bulletin 40-15 for complete information.

Vickers Application Engineers will gladly discuss with you how "hydraulics" can be used to your advantage.

VICKERS

Adjustable FLOW CONTROL VALVES

VICKERS *Incorporated*

1480 **OAKMAN BLVD. • DETROIT 32, MICHIGAN**

Application Engineering Offices: CHICAGO • CLEVELAND • DETROIT • LOS ANGELES
NEWARK • PHILADELPHIA • ROCHESTER • ROCKFORD • TULSA • WORCESTER

Representative of More than 5,000 Standardized Vickers Units for Every Hydraulic Power and Control Function

CONSTANT DELIVERY PUMPS | FLUID MOTORS | DIRECTIONAL CONTROLS | VOLUME CONTROLS | PRESSURE CONTROLS | CONTROL ASSEMBLIES | VARIABLE DELIVERY PUMPS

WING TIPS

Aircraft authorities discuss aeronautical development policies at Cleveland meeting. Age of jet propulsion has arrived, according to Lawrence D. Bell, whose company built the first successful American JP

THE age of jet propulsion is here, Lawrence D. Bell, president, Bell Aircraft Co., builder of the first successful American jet propulsion plane, told a one-day conference on aeronautical development policy in Cleveland recently. The conference was sponsored by the National Advisory Committee for Aeronautics and was attended by high-ranking officers of the Army and Navy air arms and top-flight executives of the aircraft production industry.

Among those attending the conference were: Mr. Bell; J. Carlton Ward Jr., president, Fairchild Corp.; R. E. Gillmore, president, Sperry Gyroscope Co.; Vannevar Bush, chief, Office of Research and Development for the Army; Orville Wright of "first flight" fame; Rear Admiral E. M. Pace; Theodore O. Wright, aeronautical chief of WPB; Glenn L. Martin, president, Glenn L. Martin Co.; William A. Burden, assistant secretary of commerce.

Speaking of jet propulsion planes, Mr. Bell said they are particularly an improvement at high speeds and high altitudes where the propeller as we know it today is inefficient.

"Fuel consumption of JP planes is high at low speeds but they have competitive efficiency at high speeds."

Look to the Future

The conference, an event of significance in future aircraft technical development, was held at the NACA Aircraft Engine Research Laboratory at the municipal airport. In this Cleveland laboratory the NACA has provided means for conducting research and development on present aircraft engines used in the world conflict, but looking to the future, is providing unique facilities for investigating new aircraft propulsion systems that may be used in this war and that undoubtedly will be important factors in further development of aviation in the United States after the war.

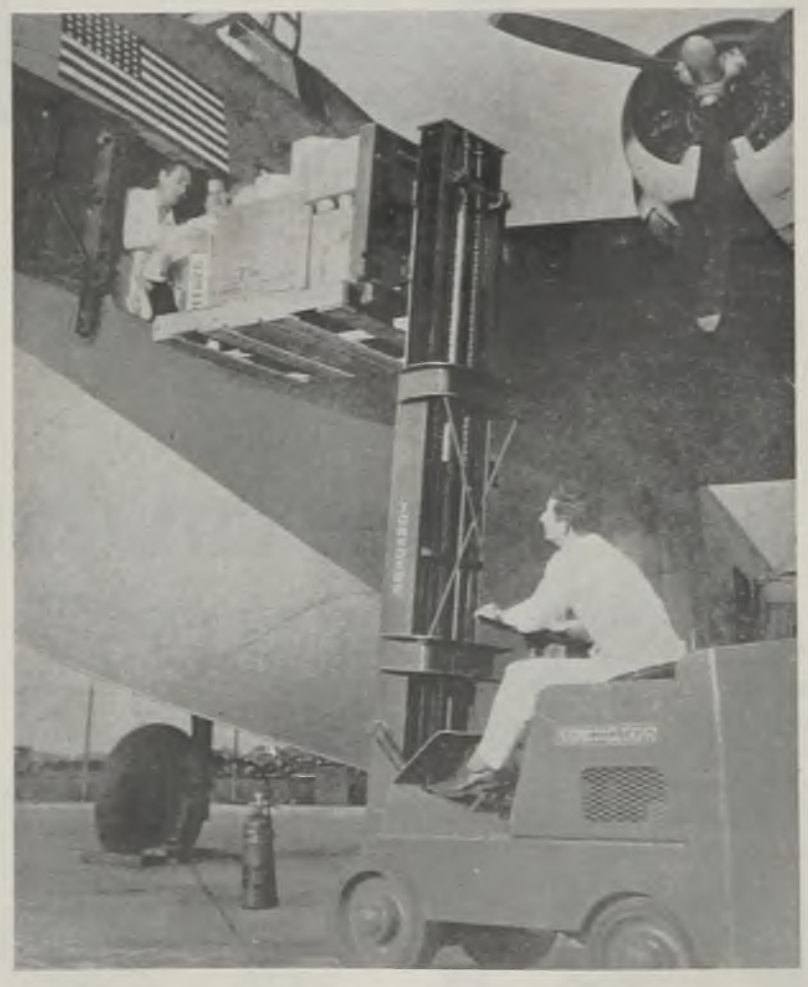
The Cleveland Chamber of Commerce arranged for the visiting groups to meet with a number of Cleveland's leading industrialists engaged in the manufacture of about 25 per cent of the aviation parts and material required by America's aircraft builders. This phase of the program was aside from the official conference.

On their tour of the Cleveland laboratory, the visitors inspected the altitude wind tunnel, in which investigations are made at wind velocities up to 500 miles per hour to develop aircraft power plants for effective operation under conditions of sub-zero temperature and air density existing in the sub-stratosphere; the icing wind tunnel in which icing conditions are artificially created to study means of preventing and removing ice formations; the flight research division where flight tests are conducted to obtain fundamental information on engine performance; the fuels and lubricants laboratory and the engine research building in which numerous test cells and dynamometer rooms are located.

The chief objective of the NACA research on power plants is to obtain increased power and greater reliability, while reducing weight and fuel consumption. To accomplish this the NACA is investigating the overall requirements for cooling, supercharging, ignition, carburetion, lubrication, and many other engine characteristics. It is also engaged in investigations of highly secret jet propulsion systems.

The new Cleveland laboratory has played a vital role in the solution of power plant problems confronting American aircraft designers, and has already obtained much information immediately useful in the war effort.

Extensive research has been conducted in the use of water, injected directly into the engine cylinder with fuel, to cool the engine, prevent knocking, and permit operation of the engine at greatly increased power. This idea is already in limited use, enabling pilots to obtain increased power for brief periods during take-off or during combat emergencies.



THREE-IN-ONE JOB: This Towmotor lift truck performs triple service in loading an American Exports Airlines flying boat. Operated by one man, the unit moves the cargo, lifts it to desired height and loads or unloads it

Recommend Jet Cooling of Pistons

Jet cooling of pistons was recommended to an SAE national diesel fuels and lubricants meeting in Chicago recently as a promising method of combating excessive combustion temperatures which have hampered progress toward increasing the power output and reducing the weight of internal combustion engines.

The recommendation came from G. Flynn Jr., and A. F. Underwood, of Research Laboratories division, General Motors Corp., Detroit, who reported satisfactory service tests with jet-cooled steel pistons in marine diesels and laboratory

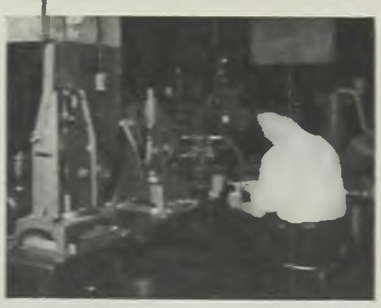
• 2000 tons . . .

AND STILL "ON THE NOSE"

DRAWING HEXAGON AND ROUND BARS . . . at Champion

Here's what top performance with Standard Carboloy Dies means at Champion Spark Plug Company: (1) *Extra long die life!* . . . Drawing hexagon and round bars up to size 1⅛", Standard Carboloy Dies have drawn 2000 tons to date and are still "on size." Less than .0001" wear. (2) *Extra fine finish!* . . . finish so fine that subsequent polishing is unnecessary. (3) *Extra close tolerances!* . . . uniform size from end-to-end of bars saves on chucking adjustments for subsequent automatic machining; greater production at low end of tolerance results in more feet from each bar. (4) *More continuous bench operation!* . . . long intervals between die servicing. (5) *Fewer rejects!* . . . 90% reduction in rejects with Standard Carboloy Dies.

At Champion—as at leading mills throughout the country—the plus values in every Standard Carboloy Die pay extra dividends in quality and economy.



Standard Carboloy—Developed die finishing and servicing equipment at Champion assures rapid servicing whenever required.

CARBOLOY COMPANY, INC.

11141 E. 8 MILE BLVD., DETROIT 32, MICHIGAN

Birmingham • Chicago • Cleveland • Detroit • Los Angeles • Newark • Philadelphia
Pittsburgh • Seattle • Thomaston, Conn.

Authorized Distributors: Hartley Wire Die Co., Thomaston, Conn.; Michigan Wire Die Co., Detroit, Michigan

CARBOLOY CEMENTED CARBIDES

TRADEMARK

COMPLETE DIE SERVICE FOR WIRE, BAR, TUBING AND SHEET METAL

experiments with jet-cooled aluminum pistons in gasoline engines. They said jet cooling is practicable from an engineering standpoint, and merits greater consideration as a means of overcoming the mounting effects of temperature as engine outputs are increased.

Describing the installation of a pipe which directs a jet of lubricating oil from the supply pump at the under side of the piston, they said it is possible to control the temperature of an all-welded steel piston in a diesel engine by using only ½-gallon of oil per minute.

They suggested jet cooling might permit of using all-welded steel alloy instead of aluminum pistons in gasoline engines, assure adequate piston strength at all temperatures, and eliminate traditional difficulties with sticking rings, blow-by, and excessive wear and oil consumption at high speeds.

Trimetric Projections Facilitated by New Tools

Four new drawing instruments and an almost human mechanical draftsman, which promise to revolutionize the entire field of production illustration and assembly drawing, were announced recently by the Glenn L. Martin Co., Baltimore.

Already being used by the aircraft company to prepare production drawings for the big JRM-1 Mars at a 50 to 80 per cent time saving over previous methods, the new devices, invented by W. G. Wilkinson and H. C. Bartholomew of the Martin engineering department, are expected to make an entirely new type of drawing available for the first time to engineers, architects, assembly plants and installation mechanics.

This new type of drawing is known as trimetric projection. It is a form of three-dimensional drawing that presents an object with a minimum of distortion, thus making a complicated part easily understandable to the installation mechanic. While the existence of this type of projection has been a matter of common knowledge for many years, the prohibitive cost of producing trimetric drawings has restricted their use to a few highly specialized operations. Now, however, these restrictions have been removed, and Martin engineers predict that the word trimetric will soon be as familiar to draftsmen and assembly workers as blue print.

The new mechanical draftsman is known as the Axonograph, and consists of a photographic device for transforming an ordinary orthographic projection (the conventional blueprint) into a scale axonometric projection, the first and biggest step in producing a trimetric drawing. The machine, itself, is made up of a moving copy board which holds the drawing to be photographed, and is adjustable in its angle of slant, an electric motor to move the board forward and back, a camera for recording the axonometric projection, a funnel with a narrow slot at the end which moves vertically and restricts the camera's view to a minute section of the drawing being photographed, a 3000-watt light tube to illuminate the drawing, a stand which supports the rolling fulcrum of the funnel, and a movable stand which supports the camera.

In use the positioning of the print, copy board and camera is fixed according to predetermined scales. The camera lens is then opened and the machine set in motion. The axonometric print is recorded on the camera negative mechanically, and the negative or paper print developed as a normal photograph.

After the axonometric prints are made, they are returned to the drafting room where they are positioned in their proper place in the trimetric drawing and traced. All that then remains for the draftsman to do is to fill in the other two dimensions and any parts of the drawing for which prints have not been made, and even this part of the job has been greatly simplified by the four new drawing instruments—a trimetric scale with its three faces calibrated to correspond with the three axes of the trimetric drawing, an ellipse template, an ellipse underlay and a trimetric protractor.

CONESTOGA: Designed as a "flying" box-car, this cargo plane built of welded stainless steel, goes into quantity production for the Navy at the Defense Plant Corp. plant operated by Edward G. Budd Mfg. Co. near Philadelphia. See STEEL, May 22, page 68

Nash Gets Orders for New Propellers, Engines

Large scale production of new four-bladed propellers and an improved 2100-horsepower two-stage, supercharged aircraft engine, which combined will increase the speed and carrying capacity of Navy Corsair and Hellcat fighters, will soon result in a shift of Nash-Kelvinator's war production activities, according to George W. Mason, president.

Mr. Mason said that neither of the new contracts, involving "substantial orders," will interrupt the company's current assembly line production of three-bladed Hamilton Standard hydromatic propellers and two-stage, supercharged Pratt & Whitney 2000-horsepower engines.

Boeing Deliveries Gain 400 Per Cent in Two Years

Gross sales of Boeing Airplane and subsidiary companies increased from $386,567,316 in 1942 to $493,188,161 in 1943, while net profits, after provisions for taxes and reserves, decreased from $5,237,624 in 1942 to $4,482,870 in 1943, according to the company's annual report to stockholders.

Net profit, reflecting substantially lower fees per unit produced, amounted to 0.91 per cent of the company's gross sales. In 1942 net profit was 1.34 per cent of gross sales.

The annual report also claims that Boeing, during 1943, produced an average of 3.23 pounds of airframe per square foot of direct factory area per month as compared with 2.5 pounds for the next highest heavy bomber plant.

The Seattle company led all other heavy bomber plants in the utilization of manpower during 1943. In the Seattle plant 0.9-man-hour was the year's average required to produce one pound of airframe, while 1.1 hours was the record of the next-best heavy bomber plant, 1.9 hours the average for seven leading plants producing heavy bombers and 3.6 hours the average for the aircraft industry.

Monthly delivery rate increased more than 400 per cent during the two year period from March, 1942, to March, 1944, with the same number of direct factory employes at the end of the period as at the beginning.

Heil Refuelers at home.

First Line of Defense for Bearings In All Climates

"PERFECT" Oil Seals

Vehicle bearings in either the Arctic or tropics should be protected adequately against the attack of moisture and airborne dust or grit. Also bearing lubricant must not be allowed to leak out of the housing.

Chicago Rawhide "Perfect" Oil Seals are serving effectively in this capacity in practically every country of the world, in the air, on the sea, and throughout industry.

No matter where it may be or how difficult the operating conditions, Chicago Rawhide "Perfect" Oil Seals offer the most effective bearing protection.

Heil Refuelers abroad.

★

CHICAGO RAWHIDE MANUFACTURING CO.

1308 Elston Ave., Chicago, Illinois

★

PHILADELPHIA • CLEVELAND
NEW YORK • DETROIT • BOSTON
PITTSBURGH • CINCINNATI

★

65 Years Manufacturing Quality Mechanical Leather Goods Exclusively and now Sirvene Synthetic Products

MEN of INDUSTRY

CARL I. COLLINS

C. W. TRUST

ROBERT H. HALEY

Carl I. Collins, who has been executive vice president of Wickwire Spencer Steel Co., New York, since 1942, has been elected executive vice president and director of Superior Steel Corp., Pittsburgh.

—o—

C. W. Trust, since 1940 general traffic manager, United States Steel Corp. subsidiaries, has been appointed vice president in charge of traffic for United States Steel Corp., Pittsburgh, and will continue his duties as general traffic manager of Carnegie-Illinois Steel Corp., National Tube Co., American Bridge Co., H. C. Frick Coke Co. and United States Coal & Coke Co.

—o—

John M. McKibbin, manager of the Application Data and Training department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed assistant to the vice president. His new responsibility will include all product and industry advertising, in addition to his present duties.

—o—

G. L. Revell has been appointed district manager of the Portland, Oreg., office of Lincoln Electric Co., Cleveland, succeeding **E. H. Weil,** who is now a lieutenant in the United States Navy. **J. W. Donnelly** has been named welding engineer for the Portland office.

—o—

G. E. McGrath, proprietor of the McGrath Welding Co., Omaha, Neb., has purchased the interest of **E. T. Lizenby,** president and co-founder of the Sargent Machine Co., Fort Dodge, Iowa, and will become president and treasurer of the latter company.

—o—

Roy L. Salter has been named works manager of the Southern Wheel division, American Brake Shoe Co., New York, succeeding **W. C. Appleby,** who has been made assistant to the president of the Southern Wheel division. **D. E. Hensley** has been appointed assistant works manager of the division.

—o—

C. H. Turnbull has been made district manager of the newly-opened Los Angeles office of Milcor Steel Co., Milwaukee. Mr. Turnbull operates the Turnbull Metal Products Co.

—o—

Robert H. Haley, formerly New England district traffic manager of United States Steel Corp. subsidiaries, has been appointed general traffic manager, American Steel & Wire Co., Cleveland.

—o—

Gordon J. Bell has been elected vice president in charge of production, Briggs & Stratton Corp., Milwaukee, and **Joseph F. Bode** has been elected vice president in charge of purchasing.

—o—

Henry C. Bauer, Revere Copper & Brass Inc., New York, has been elected president of the Purchasing Agents Association of Chicago.

—o—

Maurice N. Trainer, first vice president, American Brake Shoe Co., New York, has been elected a director. **Robert H. Ramage** has been appointed advertising manager for the company's Headquarters division, New York, and **W. J. Mohr** has joined the Export division as foreign representative, and will make his headquarters in Central America.

—o—

Caxton Brown, formerly executive vice president and secretary, Weston Electrical Instrument Corp., Newark, N. J., has been elected president, succeeding **Edward F. Weston,** who has been elected board chairman. **Earl R. Mellon** has been named vice president and treasurer, **H. L. Gerstenberger** was elected vice president in charge of sales, and **Ross Nichols** was made secretary.

—o—

V. D. Sweeney, associated with National Smelting Co., Cleveland, in production and sales work since 1936, has been appointed sales manager. **James F. Donnelly Jr.** has been named eastern representative, and **A. C. Hamilton** is Michigan representative.

—o—

John D. East, who before he became active in government work four years ago was affiliated with United States Steel Corp. as a statistician, has been appointed director of the newly-created Bureau of Relations, Air Reduction Co. Inc., New York, reporting directly to the president and chairman. Mr. East recently resigned as director of research and reports, Foreign Economic Administration.

—o—

Charles A. Benz, manager of the railroad division, Chicago Malleable Castings Co. and the Allied Steel Castings Co., Chicago, has been appointed general sales manager of both companies.

—o—

R. R. Robertson, president, Highway Steel Products Co., Chicago Heights, Ill., has received an individual citation for outstanding engineering achievement from **Maj. Gen. Levin H. Campbell Jr.,** chief of ordnance, United States Army, for devising a new coining method for production of periscope housing plates and a spacer for the bogie wheel on a tank.

—o—

Stanley W. Ostrander, associated with Pontiac Motor division, General Motors Corp., Pontiac, Mich., in various production capacities for the past 11 years, has been appointed general manufacturing manager for all Pontiac plants. **B. E. Starr** has been made general superintendent in charge of all day manufacturing operations, and **David J. Dunlop** becomes general superintendent in charge of second shift.

—o—

O. James Smith has been appointed Detroit branch manager, Clawson & Bals Inc., subsidiary of Bohn Aluminum & Brass Corp., Detroit.

—o—

Herman J. Hofmann has been named director of service and sales research, J. E. Baker Co., York, Pa. For many years Mr. Hofmann was open hearth superintendent, Lukens Steel Co., Coatesville, Pa.

—o—

G. N. Herman, since 1934 vice president of Continental Foundry & Machine Co., Pittsburgh, has been elected president, to succeed **J. T. Osler,** who continues as board chairman and chief executive officer. **M. G. Sternberg,** former vice president, operations, has been elected executive vice president.

—o—

James H. Perry has been appointed technical engineer, Pulpstone division, Norton Co., Worcester, Mass.

—o—

Paul A. Tilley has been appointed manager of the appliance distributing branches of General Electric Co., Schenectady, N. Y., and will make his headquarters in Bridgeport, Conn. He will continue for the present in his position as sales manager of the company's Ship Fittings division.

—o—

Thomas J. Kehane, previously manager of New Jersey sales and assistant manager of the New York district office, Worthington Pump & Machinery Corp., Harrison, N. J., has been appointed commercial vice president in charge of the corporation's Pacific Coast activi-

ties. Mr. Kehane will make his headquarters in new offices to be opened July 1 in San Francisco. He will also supervise the corporation's business in the territory served by the Salt Lake City district office.

—o—

John S. McKee, former works manager of the Electric Controller & Mfg. Co., Cleveland, has resigned as director of the company.

—o—

The newly-opened Cleveland office of Baldwin Locomotive Works, Philadelphia, is staffed by **C. L. Mattsson,** who will handle products sold to industries other than transportation, and **J. D. Loftis,** who will handle sales and engineering service to the railroad field. The office is located at 2405 Terminal Tower, Cleveland.

—o—

George H. Clark, vice president in charge of engineering, Formica Insulation Co., Cincinnati, has been elected a director of the Society of the Plastics Industry.

—o—

Eric Morrell has been appointed assistant to **Noel L. Dahlander,** president of American Chain Ladder Co. Inc., New York.

—o—

Gilbert Morgan has been made representative in the Chicago territory for Perfex Gage & Tool Co., Detroit.

—o—

John E. Rovensky, chairman of the executive committee, American Car & Foundry Co., New York, has been elected a director and member of the executive committee of Brill Corp. and American Car & Foundry Motors Co., subsidiaries of American Car & Foundry Co.

—o—

John H. Chaplin, president of Veeder-Root, Inc., Hartford, Conn., **Lucius F. Robinson Jr.,** of the law firm of Robinson & Cole, and **William A. Purtell,** president of Holo-Krome Screw Corp., a subsidiary of Veeder-Root, have been elected directors of Colt's Patent Fire Arms Mfg. Co., Hartford.

LEOPOLD DeFIORE

H. L. ROBINSON

EDGAR C. THOMAS

—o—

Leopold DeFiore has been appointed plant engineer, South Chester Tube Co., Chester, Pa. Previously, Mr. DeFiore had been division engineer for the Brier Hill plant of Youngstown Sheet & Tube Co., Youngstown, O.

—o—

R. L. Irvin has been appointed application manager, Small Motor division, Westinghouse Electric & Mfg. Co., Lima, O., and **R. C. Brannan** has been named manager of the Transformer Equipment section, Transformer division, Sharon, Pa.

—o—

F. W. Lee has been appointed field engineer in the Philadelphia district for Norton Co., Worcester, Mass. He succeeds **A. W. McCune,** who resigned to join the United States Navy.

—o—

T. D. Montgomery, Cutler Hammer Inc., has been elected president of the Milwaukee Exporters Club. **E. D. Pollock,** Vilter Mfg. Co., is treasurer, and **W. P. Hoban,** Harnischfeger Corp., is secretary.

—o—

H. L. Robinson, formerly on the sales staff of the Cleveland plant, Joseph T. Ryerson & Son Inc., Chicago, has been appointed manager of the company's new Pittsburgh plant.

—o—

Edgar C. Thomas, recently honorably discharged from the United States Army with the rank of major, has been elected vice president, Thomas Machine Mfg. Co., Pittsburgh. Prior to his war service Mr. Thomas was in charge of the company's Philadelphia office.

—o—

E. L. Eveleth has been appointed assistant to the general manager, Sikorsky Aircraft division, United Aircraft Corp., New York.

—o—

Ed Crane has been appointed industrial sales engineer in the Buffalo area for Brown Instrument Co., Philadelphia.

—o—

M. H. Snyder, assistant secretary and controller, All-Steel-Equip Co., Chicago, and **Cornelius Bolen,** secretary and treasurer, Converse Bridge & Steel Co., Chattanooga, Tenn., have been elected to membership in the Controllers Institute of America.

—o—

C. P. Joslyn has been appointed sales manager, Synthetic Sales division, Goodyear Tire & Rubber Co. Inc., Akron, O. Responsible to Mr. Joslyn will be **H. R. Thies,** manager of plastics and chemical sales; **A. F. Landefeld,** manager of Pliofilm sales; **O. C. Pahline,** in charge of flooring sales, and **H. D. Herbert,** manager of airfoam sales.

—o—

William P. Headden has been appointed assistant manager of the sales engineering department, Standard Oil Co. of New Jersey, New York.

—o—

Julian A. Hawks, former vice president, Triangle Conduit & Cable Co., Elmhurst, N. Y., and for the past two years chief of the Electrical Section,

D. E. WHITE

J. B. WARD

Mr. White, vice president, Addressograph-Multigraph Corp., Cleveland, has been assigned broad responsibilities in forming of company policies and plans, and Mr. Word has been named vice president in charge of distribution in United States and Canada, succeeding Mr. White, announced in STEEL, May 22, p. 73.

Wholesale and Retail Trade Division, WPB, will become eastern sales manager for Appleton Electric Co., Chicago, effective June 1. He will have offices at 76 Ninth avenue, New York.

—o—

James T. Greenlee, sales manager, Imperial Brass Mfg. Co., Chicago, has been elected chairman of the Chicago section of the Society of Automotive Engineers.

—o—

Union Carbide & Carbon Corp., New York, has announced the election of the following presidents of subsidiary companies: **Dr. Joseph G. Davidson,** Carbide & Carbon Chemicals Corp. and Carbon Chemicals Ltd.; **James W. McLaughlin,** Bakelite Corp.; **Stanley B. Kirk,** Linde Air Products Co., Prest-O-Lite Co. Inc., Dominion Oxygen Co. Ltd., and Prest-O-Lite Co. of Canada Ltd.; **Arthur V. Wilker,** National Carbon Co. Inc., and Canadian National Carbon Co. Ltd., and **Francis P. Gormely,** Electro Metallurgical Co., Electro Metallurgical Co. of Canada Ltd., Haynes Stellite Co., Michigan Northern Power Co. and Union Carbide Co. of Canada Ltd.

H. V. ERBEN

Who has been elected a commercial vice president, General Electric Co., Schenectady, N. Y., noted in STEEL, May 8, p. 90.

—o—

Leonard W. Ross, for 15 years manager of the reinforcing steel department, Blue Diamond Corp., Los Angeles, has been appointed general manager of the company.

—o—

W. D. Bailey Jr., Westlectric Castings Inc., Los Angeles, was elected president of the Southern California chapter of the American Foundrymen's Association at a meeting May 19. **E. M. Hagener,** General Metals Corp., was elected vice president, **Harry E. Russill,** Eld Metals Co., secretary, and **Robert R. Haley,** Advance Aluminum & Brass Co., treasurer.

OBITUARIES . . .

Henry C. Thompson, 81, president of Tanner & Co., steel distributors in Indianapolis, Ind., died recently in Indianapolis. Mr. Thompson was a member of the board of the Indiana Trust Co.

—o—

Henry S. Gregg, chairman of the board, Gregg Mfg. Co., St. Paul, Minn., and Winnipeg, Canada, died in Minneapolis recently.

—o—

Walton Hubbard Jr., 36, president, Hubbard South Coast Co., Newport Beach, Calif., died recently.

—o—

George M. Hunter, 69, for eight years vice president in charge of manufacturing operations of American Bridge Co., Pittsburgh, died May 21 in Youngstown, O. Mr. Hunter, a member of the American Iron and Steel Institute, had retired in 1940 after having received the 50-year gold service medal of the United States Steel Corp.

—o—

Donald Symington, 63, president, McConway & Torley Corp., Pittsburgh, died May 22 at his home in Hartford County, Md.

—o—

Harold L. Maring, 46, assistant secretary and treasurer, Titeflex Metal Hose Co., Newark, N. J., died May 21 in Maplewood, N. J.

—o—

Henning H. Nygren, 54, president of the Ottawa Steel Products Co., Grand Haven, Mich., died there recently. Before joining that company in 1927, Mr. Nygren was an executive of the Detroit Piston Pin & Mfg. Co., Detroit.

—o—

Charles M. Smillie Sr., 82, one of Detroit's first tool manufacturers, who in 1889 established the C. M. Smillie & Co., now located in Ferndale, Mich., died recently in Detroit. Mr. Smillie's company specialized in brass finishers' tools and experimental work, and the latter brought him in close contact with Henry M. Leland, Horace and John Dodge, John B. Trix, Henry Ford and other pioneers in the automotive industry. He had retired about a year ago.

—o—

F. W. Miller, 69, former vice president, Rogers Brown & Crocker Bros. Inc., Philadelphia, and also a former vice president of Swann Chemical Co., died May 17. For the past six years Mr. Miller had been a manufacturers' agent in Cincinnati, representing producers of northern foundry and high silicon iron and fluorspar. He was a member of the American Iron and Steel Institute.

—o—

Louis Meyers, vice president, Superior Carbon Products Inc., Cleveland, died there May 16. He had been affiliated with Superior Carbon Products Inc. since the company was organized in Poughkeepsie, N. Y., 25 years ago.

—o—

James Oliver II, 58, director of the Oliver Farm Equipment Co., South Bend, Ind., died recently in Indianapolis. He was the grandson of James Oliver, founder in 1855 of a predecessor company, Oliver Steel Plow Co.

—o—

Seth S. Shunk, 53, manager of the bicycle department, Cleveland Welding Co., Cleveland, died May 17 in that city.

—o—

Matthew F. Keese, 58, manager of dredge sales for Bucyrus-Erie Co., Milwaukee, died May 18 in Milwaukee.

—o—

James R. Swan, 78, former vice president, Cleveland Hardware Co., Cleveland, died May 18 in that city. Mr. Swan, who was associated with Cleveland Hardware Co. 40 years, had been elected a director and vice president in 1925 and had retired in 1932.

—o—

Phil M. Ford, 54, sales manager, Steel Improvement & Forge Co., Cleveland, died May 17. Before joining Steel Improvement & Forge Co. in 1931, Mr. Ford had been associated with Carnegie-Illinois Steel Corp., Pittsburgh, and with Youngstown Sheet & Tube Co., Youngstown, O.

—o—

Mrs. Mary G. Lodge, president, Lodge & Shipley Machine Tool Co., Cincinnati, from 1917 to 1940, died May 22 in Cincinnati. She was the widow of William Lodge, founder of the company, and had taken over his office after his death.

—o—

Thomas H. Libbey, 55, foundry manager, Wilson Foundry & Machine Co., Pontiac, Mich., died there May 19. Prior to joining Wilson Foundry about seven years ago, Mr. Libbey had been associated with Studebaker Corp., South Bend, Ind.

—o—

Norman L. Myers, 49, eastern sales manager, Appliance department, Westinghouse Electric & Mfg. Co., New York, died May 21 in White Plains, N. Y.

—o—

Harry C. Watrous, 71, retired engineer and former executive of the engineering firm of Robert W. Hunt Co., New York, died recently in Bound Brook, N. J.

—o—

Carl W. Owsley, 64, head of the industrial relations department, Paint division, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died May 18 in Forest Hills, N. Y.

—o—

Merton L. Cunningham, who for 12 years was affiliated with the Dunham Foundry Co., Berea, O., of which he was secretary-treasurer, died recently in that city. At the time of his death he was serving as an auditor for the Army Ordnance Depot, Cleveland.

—o—

John D. Bogle, 55, electrical engineer, Udylite Corp., Detroit, died May 9 in that city. Mr. Bogle was a member of the Detroit Engineering Society and the American Institute of Electrical Engineers.

Postwar Business Expansion Held Dependent On Sound Tax Program

Ralph E. Flanders tells National Industrial Conference Board, without sound taxation it will be impossible to attain degree of personal enterprise essential for maintaining employment, production and consumption at prosperous levels

LARGEST single factor needed in assuring adequate postwar business expansion is a sound tax program, without which it will be impossible to attain the degree of personal enterprise essential for maintaining employment, production and consumption at a prosperous level, emphasized Ralph E. Flanders, speaking at the twenty-eighth annual meeting of the National Industrial Conference Board at the Waldorf-Astoria, New York, recently.

Mr. Flanders, who is president, Jones & Lamson Machine Co., Springfield, Vt., stressed a better internal balance between industry and agriculture; pointed to the desirability of building up foreign trade based primarily on manufactured or processed goods; and believed that "it will be impossible and perhaps undesirable to go back to the degree of freedom from federal control which we enjoyed a generation ago."

S. Clay Williams, chairman, R. J. Reynolds Tobacco Co., Winston-Salem, N. C.; Virgil Jordan, of the Conference Board, New York; and Neal Dow Becker, president, Intertype Corp., Brooklyn, were re-elected chairman and president of the board and chairman of the trustees, respectively.

Mr. Becker was also re-elected a vice-chairman, as were Col. J. F. Drake, president, Gulf Oil Corp.; Edgar Monsanto Queeny, chairman, Monsanto Chemical Co., St. Louis; and Langbourne M. Williams Jr., president, Freeport Sulphur Co., New York. James L. Madden, third vice president, Metropolitan Life Insurance Co., New York, was re-elected treasurer, and Harold F. Browne, of the board, secretary.

Trustees re-elected were: Clifford S. Anderson, general counsel, Norton Co., Worcester, Mass.; Louis S. Cates, president, Phelps Dodge Corp., New York; Arthur M. Collens, president, Phoenix Mutual Life Insurance Co., Hartford, Conn.; David A. Crawford, president, Pullman Inc., Chicago; John F. Deasy, vice president, Pennsylvania railroad, Philadelphia; F. W. Lovejoy, chairman, Eastman Kodak Co., Rochester, N. Y.; James L. Madden, third vice president, Metropolitan Life Insurance Co., New York; John Wyckoff Mettler, president, Interwoven Stocking Co., New Brunswick, N. J.; Harry E. Ward, chairman, Irving Trust Co., New York; and Albert N. Williams, president, Western Union Telegraph Co., New York.

In addition to the general session, held in the evening, were a series of off-the-record roundtable conferences in the afternoon, at which were discussed pricing in war contracts, disposition of surplus war plants and materials, national and regional aspects of postwar re-employment, financing postwar readjustments in employment and re-employment of war veterans.

Declaring that the capacity of business to think or act about postwar problems "with candor, intelligence and integrity has been seriously damaged by 10 years of exposure or surrender to the political word-changers, the academic cake-eaters and public-opinion poll-catchers of our time," Mr. Jordan insisted nevertheless that an effort be made to explain frankly to the men overseas what they may expect when they get back.

"Let us not tell these sons and brothers of ours that we, or labor, or government, are going to guarantee them economic security in any sense and still leave them their civil liberty and personal freedom, if they still want it. It is not true.

"Cannot Fix Income Figure"

"Tell them rather that no one can pledge them full employment as workers or permanent purchasing power as consumers without depriving them one by one of every individual freedom they have. Let us tell them frankly that no one can fix a national income figure for a people or enforce a statistical standard for employment or payrolls or consumption and still leave everything, or anything, about the life, labor or thought of everybody or anybody as it was before. They should be told that nobody, business or government, can plan tomorrow's employment for anyone without planning his occupation, spending, saving and consumption for him."

Preparations of the government for meeting problems after the war were in general favorably commented upon by W. Gibson Carey Jr., president, Yale & Towne Mfg. Co., Philadelphia. However, he thought there should be decided changes in some of its labor policies and believed that a sound tariff policy must be set up.

Discussing employment after the war, Mr. Flanders said that it should not be assumed that industry ought to or can carry the whole burden. The service occupations in any prosperous nation will become of ever growing importance. Much of this country's great expansion of employment will be found in this field, and much of the desired consumption of the people will be in the form of services.

As to foreign trade the solidly based elements will lie in the exports of mass

VIRGIL JORDAN

Re-elected president, National Industrial Conference Board

produced durable goods for personal, household and business use, and highly developed manufacturing equipment.

He believed that the exports in which this country is fitted to compete will be ample to pay for all needed imports. Some of these imports, may at times have the appearance of displacing American workmen, but that issue, he believed, will not be raised if this country's internal economy provides its proper share of productive employment.

A large percentage of the monetary return from the high production anticipated after the war will have to be diverted through governmental channels. "The federal budget in time to come, under whatever party administered and with whatever strictness of control and expenditure, cannnot escape being far higher than the postwar citizen would have deemed it possible for our economy to endure," he said.

"There will be new requirements for an expanded peacetime army and navy; unknown requirements for bonuses, re-establishment, etc., of returned soldiers; and there will be in particular six billion odd dollars of interest on the national debt. Some statisticians have decided on $23 to $25 billion dollars as the annual budget; others with more carefully sharpened pencils believe we can squeeze by with $18 billion."

Commenting on government regulations, the speaker said that it was probable the same fundamental changes would have to be made in government. The balance contemplated by the Constitution between legislative, administrative and judicial powers may not be fitted to form the highly technical operations which the present and future require, he said.

"The Congress and administration must themselves gain the self-discipline to allow technical competence freedom for carrying out broad policies which they themselves determine. Blocs of self-interest must likewise develop self-discipline for their own larger interests. This is a large order, but it is the price of progress and stability."

Mine Agreement Is Terminated By the Dominion

Slackened metal demand reflected in suspension of arrangements with Metals Reserve Corp.

TORONTO, ONT.

DEPARTMENT of Munitions and Supply has terminated arrangements under which certain base metal mining operations in Canada were carried on under contract with Metals Reserve Co., the United States metal procurement agency. Four zinc-lead and two copper mines have been operated in Canada for Metals Reserve but demand has decreased and it has been decided to suspend operations.

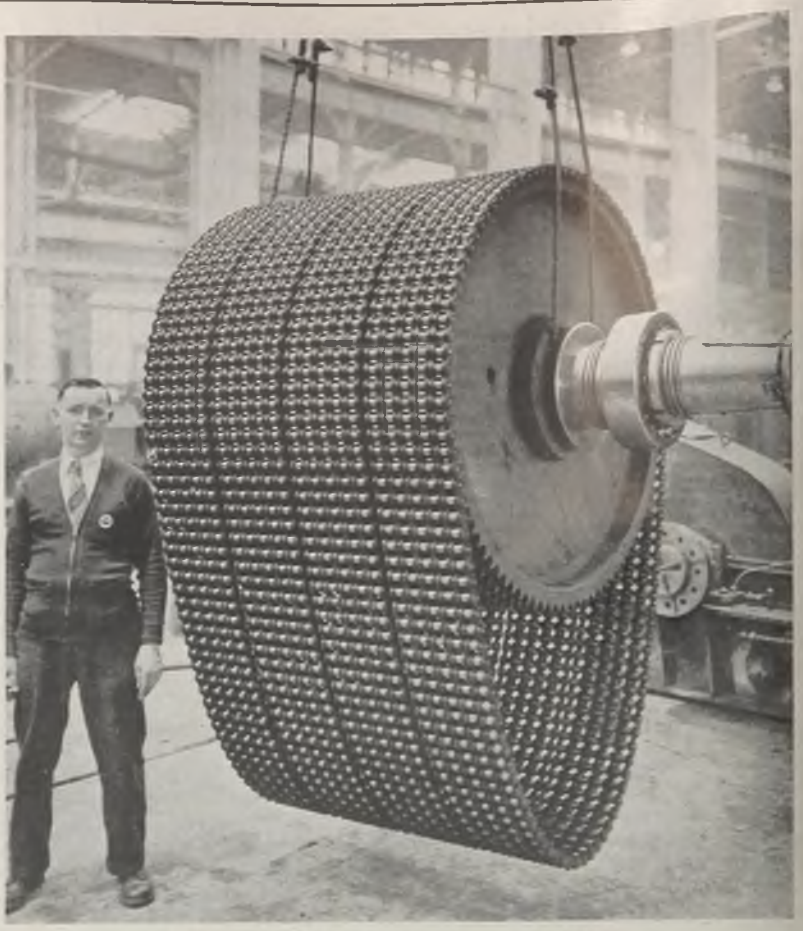
The department officials stated the two copper mines will remain in production for the present. The four zinc-lead properties affected are the Twin "J" Mines at Duncan, B. C.; Kootenay-Florence Mine at Ainsworth, B. C.; Lake Geneva Mine at Benny Siding, Ont., and the Tetreault Mines at Notre Dame des Anges, Que.

Announcement was made in London that copper from British empire producers or from other sources in excess of United Kingdom needs will be made available to the United States and Russia. Northern Rhodesian production will be maintained at a level that will not involve the British government in abnormal capital expenditures on replacements or plants. It was intimated that 1944 copper production would be below that of 1943.

While nothing definite has been determined regarding reopening of the Nobel plant for manufacture of explosives, C. D. Howe, minister of munitions and supply stated "there may be some small production required from there, but it is not certain at the moment." Increasing use of explosives on the various battlefronts is calling for increased production, and if the Nobel plant reopens it is estimated that some 2000 workers will be required. Up to this time it was believed that other explosives plants in Canada had sufficient capacity to meet the stepped-up demand.

Canadian Locomotive Co., Kingston, has almost completed its order for 45 locomotives for delivery to India, and this will clear the way for work on a Canadian Pacific order for 45 locomotives as well as for six engines for Jamaica.

Canada's external trade continues to gain in volume and exports for the first four months this year attained the all time high record of $1,035,000,000 compared with $778,000,000 for the like period last year.



PARTS UPON PARTS: More than 10,000 parts are assembled into this marine propeller drive for the Navy's 110-foot harbor tugs. In the largest application of its kind, this drive couples two direct-reversing diesel engines to a single propeller with 3 to 1 reduction, and provides outstanding advantages in efficiency, economy and flexibility of engine room layout. It was built by the Morse Chain Co., Ithaca, N. Y.

BRIEFS . . . .

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

Ironton Fire Brick Co., Ironton, O., has appointed Firegan Sales Co., Chicago, as its sales representatives in the states of Illinois, Indiana, Iowa, Minnesota and Missouri.

—o—

Robbins & Myers Inc., Springfield, O., has appointed the Geo. M. Prescott Co. to handle the distribution of its products in the Los Angeles district.

—o—

Continental Can Co., Inc., New York, has acquired the Reynolds Molded Plastics division of Reynolds Spring Co., Cambridge, O., which provides the company with complete facilities for production of all forms of molded plastics.

—o—

Bristol Co., Waterbury, Conn., has opened a branch office in the Citizens State Bank building, Houston, Tex., to serve the states of Louisiana and Texas with the exception of the Panhandle section.

—o—

Detrex Corp., Detroit, has enlarged two eastern sales service offices and added another in Indianapolis at 11 South Meridian street. The enlarged New York offices are in the Empire State building and the Philadelphia branch office has been moved to 12 South Twelfth street.

—o—

Kinmont Mfg. Co., Los Angeles, has erected a plant at 5555 E. Slauson avenue, containing 20,000 square feet, to facilitate the manufacture of dredging machinery, construction equipment, dies, and supplies.

—o—

Wilkens-Anderson Co., Chicago, has issued a new booklet on methods for determining the analyses of materials, in-

cluding colorimetric determination of elements in ores and iron and steel.

—o—

North American Aviation Inc., Inglewood, Calif., recently appointed the Pheoll Mfg. Co., Chicago, prime licensee for the manufacture of the new Hi-Shear rivets developed by the company.

—o—

National Electrical Manufacturers Association, New York, at its meeting in Chicago recently recommended the name "Home Freezer" to designate sub-freezing refrigerators for home storage of frozen foods.

—o—

Pacific Valve & Pump Exchange, Long Beach, Calif., recently received the Maritime Award of Merit for an attendance record of 99.51 per cent during 1943.

—o—

Oakite Products Inc., New York, held war production conferences on cleaning, de-scaling, de-rusting, de-greasing and related production and maintenance operations in New York, Chicago, and Los Angeles.

—o—

Pittsburgh Plate Glass Co., Columbia Chemical division, Barberton, O., announces selection of the trade name "Allymer" for the complete line of allyl resin monomers.

—o—

Carnegie-Illinois Steel Corp., Pittsburgh, reports that 40,000 of its employes are in military service.

—o—

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., reports net sales billed during the first quarter of 1944 totaled $190,091,461, an increase of 22 per cent over the like quarter in 1943.

—o—

Abrasive Co., Philadelphia, announces that its Los Angeles distributor, Almquist Bros. & Viets, is expanding with the addition of a warehouse consisting of 2000 square feet.

—o—

Newman Bros., Cincinnati, recently purchased an additional plant with 15,000 square feet of space at Fifth and Cutter streets.

—o—

Wailes Dove-Hermiston Corp., Westfield, N. J., is building a new plant in Houston, Tex.

Yale & Towne Buys Scale Business of Kron Co.

Yale & Towne Mfg. Co., New York, recently announced the purchase of the scale business of the Kron Co., Bridgeport, Conn. No changes in the line of scales are contemplated, except for such natural developments which grow out of industry's needs. The facilities and personnel of the Kron company will be maintained in Bridgeport as heretofore, together with the sales and service organization, but all will be under the general direction of the Philadelphia division, Yale & Towne Mfg. Co.

AWARDS . . . .

Additional war plants honored with Army-Navy-Maritime emblems for outstanding achievement in the production of war materials

Fidelity Machine Co., Philadelphia, adds second star.

Sprague Electric Co., North Adams, Mass., receives third award.

Wheeling Corrugating Co., Wheeling, W. Va., receives third award.

Link-Belt Co., San Francisco.

Mack Trucks Inc., plants at Plainfield and New Brunswick, N. J., and Allentown, Pa., receive awards.

Victor Equipment Co., San Francisco, receives second star.

Allied Chemical & Dye Corp., General Chemical Co., Newell, Pa.

Atlas Powder Co., Webb City, Mo.

Crowe Name Plate & Mfg. Co., Chicago.

Gaso Pump & Burner Mfg. Co., Tulsa, Okla.

General Chemical Defense Corp., Point Pleasant, W. Va.

Gould & Eberhardt Inc., Irvington, N. J.

Hamlin Metal Products Co., Akron O.

Iowa Mfg. Co., Cedar Rapids, Iowa.

Lewyt Corp., Brooklyn, N. Y.

Lockheed Aircraft Corp., Burbank, Calif.

Milwaukee Forge & Machine Co., Milwaukee.

Nashua Mfg. Co., Cordova, Ala., and Nashua, N. H.

Pacific Screw Products Corp., South Gate, Calif.

Phister Mfg. Co., Cincinnati.

Solvay Process Co., Atmospheric Nitrogen Corp., South Point, O.

S. B. Whistler & Sons Inc., Buffalo, N. Y.

Aro Equipment Corp., Bryan, O., receives second white star.

Aluminum Industries Inc., Cincinnati, receives second white star.

Storage Battery division, Philco Corp., Trenton, N. J., receives fourth award.

Buda Co., Harvey, Ill.

Norton Co., Worcester, Mass., awarded fourth star.

Sprague Electric Co., North Adams, Mass., adds second star.

James B. Clow & Sons, National Cast Iron Pipe Co., Tarrant, Ala.

General Motors Corp., General Motors Truck & Coach division, Pontiac, Mich.

Gorham Mfg. Co., Providence, R. I.

John W. Hobbs Corp., Springfield, Ill.

International Chain & Mfg. Co., York, Pa.

International Steel Co., Evansville, Ind.

Lovejoy Tool Co. Inc., Springfield, Vt.

Metals Disintegrating Co. Inc., Verona, N. J.

Nice Ball Bearing Co., Philadelphia.

Parker Rust Proof Co., Morenci, Mich.

Republic Aviation Corp., Evansville, Ind.

Signode Steel Strapping Co., Chicago.

Studebaker Corp., South Bend, Ind.

Torrington Co., Westfield Mfg. Co., Westfield, Mass.

United Specialties Co., Chicago.

United States Finishing Co., Norwich, Conn.

George D. Roper Corp., Rockford, Ill., adds second star.

Wilson Snyder Mfg. division, Oil Well Supply Co., Braddock, Pa., awarded third gold star.

Douglas Aircraft Co., Santa Monica, Calif.

Electric Sprayit Co., Sheboygan, Wis.

Canfield Mfg. Co., Grand Haven, Mich.

Emerson Radio & Phonograph Corp., New York.

C. E. Erickson Co. Inc., Des Moines, Iowa.

Standard Tool Co., Leominster, Mass.

Voss Bros. Mfg. Co., Davenport, Iowa.

Alloy Steel Gear & Pinion Co., Chicago, awarded second star.

Jones & Laughlin Steel Corp., Pittsburgh, adds gold star.

General Electric Co., Lynn, Mass., awarded "M" pennant.

Industrial Gear Mfg. Co., Chicago.

Farrel-Birmingham Co., Ansonia, Conn., fourth renewal.

Inland Steel Co., Chicago, awarded first gold star for "M" pennant.

American Car & Foundry Co., Chicago.

OFFICERS AND DIRECTORS: These are the new officers and directors of the Metal Powder Association. Left to right, are B. T. DuPont, director; R. E. Ferry, secretary and treasurer; D. M. Buruss, chairman of the board of directors; H. Roger Coleman, member of the board; Paul Weingart, member of board; Frank J. Farrell, member of board, and H. E. Hall, president of the association

Many War Lines Report Rising Order Backlogs

PRODUCTION schedules in major war industries are bolstered by a steady flow of new orders, extending delivery dates and enlarging order backlogs in some instances. Rate of output has been hampered somewhat by inability of industry to replace men entering the armed services. However, this problem must be overcome if projected overall production gain of 10 per cent for 1944 is to be achieved.

Increased steel demands in recent weeks appear to be the best general indicator of the prospective trend in war production. WPB is finding it extremely difficult locating openings in third quarter finishing mill schedules for such rush war programs as the sharply augmented shell program and for shell steel containers, tin mill products and increased requirements of the Maritime Commission.

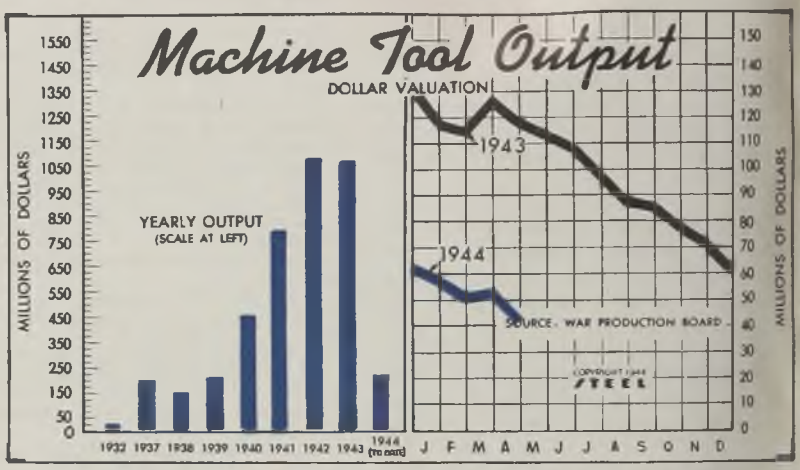
RAW MATERIALS—Combined Raw Materials Board's report for the year ended Jan. 26, 1944, states the raw materials battle has been largely won; and while no general relaxing in supplies is yet possible, more lenient consumption policies may be justified by easier position of some raw materials, provided no other limiting factor arises.

The report showed the dependence of both Great Britain and United States on foreign sources of raw materials, stating that neither country could have maintained its enormous war program without supplies on an impressive scale from other countries. No serious injury to the war effort in 1943 had resulted from material shortages.

MACHINE TOOLS — Shipments must maintain or exceed present rate if needs of new heavy artillery and other military programs are to be met. War Production Board officials recently informed tool industry representatives that 1944 requirements may exceed $600 million. Industry Committee members believe their ability to meet the new programs largely depends on manpower, stating that unless the present downward trend is halted machine tool output will continue to decline despite indicated steady increase in new orders.

Reports from 60 per cent of the companies queried by WPB Tools Division as to the number of idle government-owned machine tools, show 9207 tools available for transfer. This is less than one month's shipments at the April rate. An Inter-Agency Machine Tool Utilization Committee has been created and is making a check of more than a dozen representative war plants to obtain more complete data on the availability of idle machine tools.

New machine tool orders placed during April exceeded monthly shipments for the first time since August, 1942. Orders last month totaled $51,780,000, or 33.9 per cent over that recorded during March. April shipments were valued at $42,149,000, off 18.6 per cent. Order backlogs April 30 were $166,867,000.



Machine Tool Output
(000 omitted)

	1944	1943	1942	1941
January	$56,349	$117,384	$83,547	$50,700
February	50,098	114,593	84,432	54,000
March	51,780	125,445	98,358	57,400
April	42,149	118,031	103,364	60,300
Four months	200,376	475,453	369,701	222,400
May	.....	113,710	107,297	69,700
June	.....	108,689	111,090	69,070
July	.....	97,428	113,596	68,019
August	.....	87,405	117,342	70,069
September	.....	85,842	119,883	74,906
October	.....	78,300	130,008	84,178
November	.....	71,811	120,871	81,320
December	.....	60,861	131,960	81,435

Year		Year	
1943	$1,179,318	1941	$812,462
1942	1,321,862	1940	450,000

FIGURES THIS WEEK

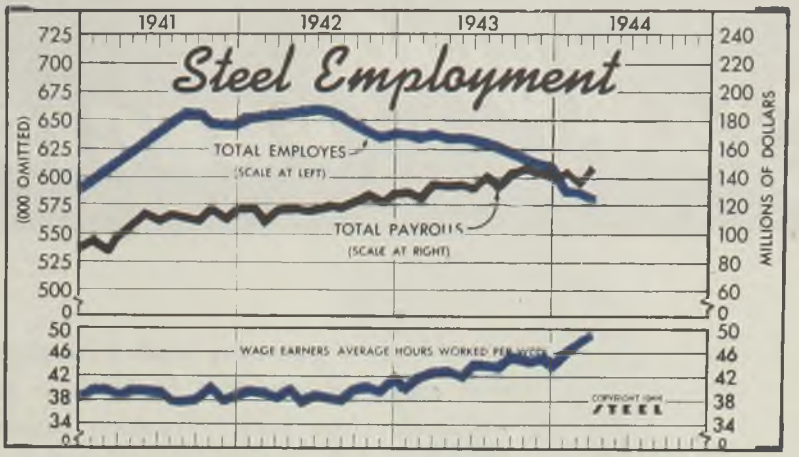
INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.5	99.0	98.5	99
Electric Power Distributed (million kilowatt hours)	4,246	4,238	4,344	3,992
Bituminous Coal Production (daily av.—1000 tons)	2,095	2,020	1,955	2,016
Petroleum Production (daily av.—1000 bbls.)	4,526	4,502	4,415	4,006
Construction Volume (ENR—unit $1,000,000)	$26.9	$42.2	$51.4	$63.9
Automobile and Truck Output (Ward's—number units)	17,770	17,080	16,905	19,175
TRADE				
Freight Carloadings (unit—1000 cars)	860†	868	840	849
Business Failures (Dun & Bradstreet, number)	28	32	20	47
Money in Circulation (in millions of dollars)‡	$21,846	$21,725	$21,334	$16,795
Department Store Sales (change from like week a year ago)‡	+8%	+18%	+23%	+12%

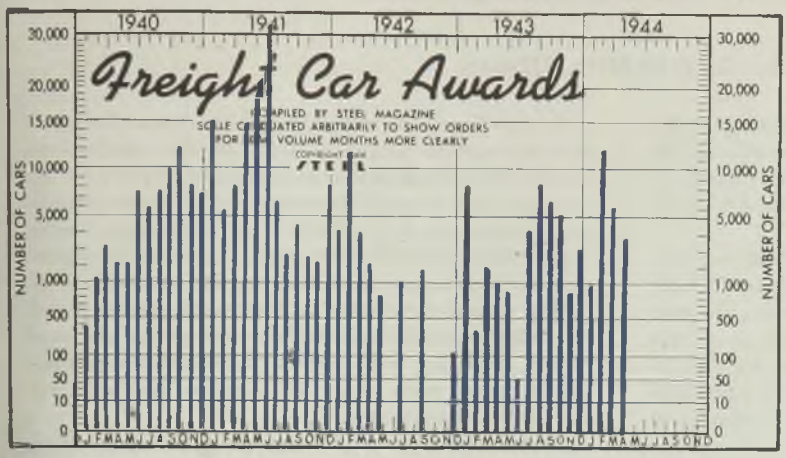
*Dates on request.
†Preliminary. ‡Federal Reserve Board.

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.	583	635	651	137.6	122.8	108.5
March	578	637	653	145.3	136.8	117.0
April	...	634	654	...	133.3	118.5
May	...	632	656	...	137.4	117.4
June	...	631	659	...	136.2	118.0
July	...	627	655	...	142.8	120.7
Aug.	...	625	647	...	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	633	...	140.2	129.3

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





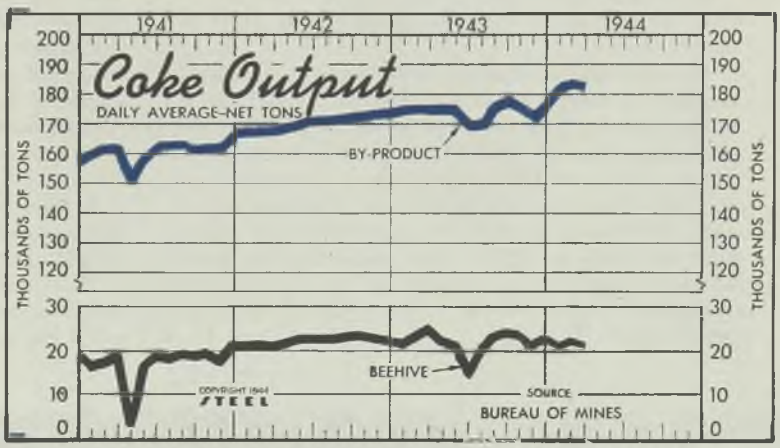
Freight Car Awards

	1944	1943*	1942	1941
Jan.	920	8,365	4,253	15,169
Feb.	12,340	350	11,725	5,508
March	6,010	1,935	4,080	8,074
April	3,819	1,000	2,125	14,645
May	...	870	822	18,630
June	...	50	0	32,749
July	...	4,190	1,025	6,459
Aug.	...	8,747	0	2,668
Sept.	...	6,820	1,868	4,470
Oct.	...	5,258	0	2,499
Nov.	...	870	0	2,222
Dec.	...	2,919	135	8,406
Total	...	41,355	26,028	121,499

*Including reinstatements.

Coke Output
Bureau of Mines
(Daily Average—Net Tons)

	—By-Product—		—Beehive—	
	1944	1943	1944	1943
Jan.	182,226	174,044	21,933	21,440
Feb.	184,317	175,099	22,210	23,987
Mar.	183,123	175,051	21,559	24,369
Apr.	...	175,857	...	22,932
May	...	174,240	...	21,270
June	...	168,735	...	14,055
July	...	169,936	...	20,009
Aug.	...	176,396	...	23,102
Sept.	...	178,090	...	23,637
Oct.	...	175,492	...	23,495
Nov.	...	171,594	...	20,421
Dec.	...	179,042	...	22,935
Average	...	174,465	...	21,795



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$8,869	$8,235	$9,135	$9,117
Federal Gross Debt (billions)	$187.4	$187.4	$187.0	$138.8
Bond Volume, NYSE (millions)	$50.5	$39.1	$51.4	$62.3
Stocks Sales, NYSE (thousands)	3,786	3,438	3,909	5,926
Loans and Investments (millions)†	$50,611	$50,674	$51,596	$47,289
United States Government Obligations Held (millions)†	$37,635	$37,603	$38,089	$33,799

†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)†	250.1	249.5	249.7	245.8
Industrial Raw Materials (Bureau of Labor index)‡	112.8	113.3	113.9	113.7
Manufactured Products (Bureau of Labor index)‡	101.0	101.0	100.9	101.0

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

Stamping PRECISION GEARS

Many kinds of gears are made by improved stamping methods with such accuracy that backlash in gear trains is held to extremely close limits. Precision shaving and careful press "make ready" prove key to successful production

By G. ELDRIDGE STEDMAN

WHEN W. E. Aeschbach, plant superintendent of the Measuregraph Co., St. Louis, became 7 years old, his Swiss parents put him and other of their children to work on contract production of gears for watch movements at Burg, Switzerland.

As the years passed, he felt that the slow process employed could be improved upon and he did considerable work developing a process for stamping gears, the success of which he describes thus: "Watch gears can be punched and have been for some years in many countries with enough accuracy to mesh well and for precision which at 0.00025-inch expresses itself in 2 minutes of inaccuracy in a 5-year period."

As he goes on to explain, the accuracy of any set of gears can be measured by the amount of backlash in the gear train.

Accompanying illustrations show processing methods employed in making the Measuregraph, a familiar device utilized in many department stores for the quick and accurate measuring of cloth. The device itself is shown in Fig. 4. The United States Department of Weights and Measures limits backlash in this unit to a total allowance of 3/16-inch in 12 yards (equivalent to an allowance of 1 inch in 2197). This means that the gears which are blanked, rough toothed and shaved in a series of operations must be held to tell a plus or minus of 0.0005-inch.

Stamped gears of many kinds have been developed for the machine including bevel, wobble and motion gears. One wobble gear instantaneously transfers the 12 to 1 ratio on a 12-yard Measuregraph to decrease motion and increase effect on a 30 to 1 ratio. In other words, rather than arithmetic projection, a geometric progression has been achieved in almost perfect accuracy.

It is believed that the application of stamping and dies which maintain such a close accuracy in manufacture of gears has wide postwar significance in production of various items such as counters, business machines and analytical equipment.

At the Measuregraph Co., gears are being punched from cold rolled steel with from 10 to 88 teeth, and in diameters ranging from ⅜ to 2½ inches.

Company engineers point out that the principle of success of the blanking, roughing and shaving technique employed here in stamping out the gears is to "leave enough metal around the entire periphery to shave for proper finishing tolerance". To do this, of course, involves some very careful die design and building.

In making these dies, measurements of pitch and diameter are very carefully checked with a comparator at a high level of magnification.

The successful design and operation of the shaving dies requires similar fine workmanship to get the end result desired.

Another factor highly important in the success of the gear punching operations is press "make ready" or set up. Extremely careful alignment of dies in the press is necessary when working to such close tolerances.

Of course, there are limits to the process, the maximum thickness of metal that can be handled being about 1/16-inch or 16 gage. Beyond that thickness, broaching instead of shaving would probably be indicated for finishing.

Normal business of the Measuregraph Co. is divided about equally between manufacture of the Measuregraph and production of outside tooling for other manufacturers in the St. Louis district on jobs which require extreme accuracy and precision.

In addition, this company is handling several war production jobs including the fin assembly for the 81-millimeter bomb. On this job, the welding fixtures which locate the fins on the final fin assembly hold tolerances within plus or minus 0.002 inch.

Fig. 1 (Left, opposite page)—Typical press, dies and some of gears stamped on them

Fig. 2 (Below)—Portion of the press room at Measuregraph Co.

Fig. 3 (Right, below)—Final inspection of bomb fin assemblies—one of the war items produced at the Measuregraph plant

Fig. 4 (Right) — Measuregraph employs stamped gears yet has backlash of gear train controlled for less than one part in 2197

Fig. 5 (Right, above)—Closeup of some of the different types of gears stamped, including bevel gears in the center

Flame-Spinning Process

for closing tube ends now being used extensively in manufacture of war goods appears to be established as permanent and economical fabrication method

By THOMAS McELRATH JR.
Development Engineer
The Linde Air Products Co.
Newark, N. J.

THE NECESSITY for turning out war materials at high speed has resulted in the development of many time saving processes which undoubtedly will carry over into the peace to come.

Among the more outstanding of these developments is the flame-spinning process for closing and forming tube ends which has grown out of the extensive use of tubular members in the fabrication of many items required for refrigerating systems, automotive shock absorbers, flame-throwers, chemical bombs, hand grenades, bomb fuses, projectiles and the like.

Essentially, the process involves heating the tubes' ends with oxyacetylene flames and forming them to the shape desired while the tube is being spun. It now is being employed by a number of companies engaged on war work and has reduced fabricating time appreciably.

Flame-spinning now is being applied to tubing ranging in diameter from ½ to 2¾ inches, but there appears to be no limit either to the maximum or minimum diameter of tubing which may be spun. However, experience to date indicates that the ratio of tube diameter to wall thickness should be limited to a maximum of about 50 to 1. Tubes with a greater diameter-thickness ratio tend to deform when subjected to the forces involved in the operation.

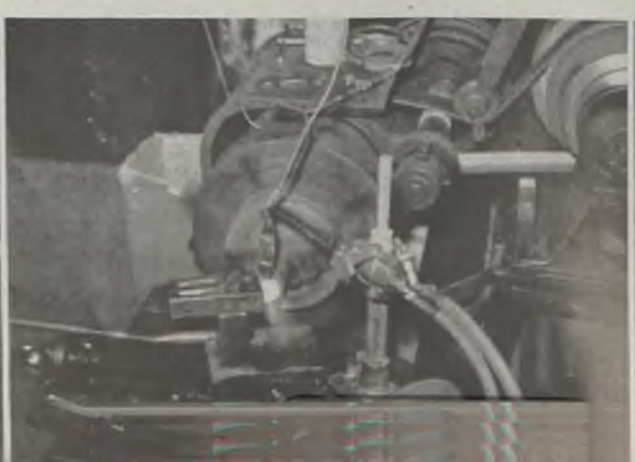
Machine requirements for a spinning setup include a lathe or other heavy-base machine which incorporates the following features:

1—Rotative member with attached universal or collet type chuck.
2—Sturdy tool support or pivot point.
3—Forming tools such as flat-plate and cam tools and shaped rollers.
4—Adjustable supports for oxyacetylene equipment.
5—An electric or mechanical timer.

Oxyacetylene equipment items required include the usual hose, valves, and fittings along with multiple-tipped flame heads. For most applications, it has been found that a flame head with seven 56-drill size tips works well. For spinning tubes in the range of 2 inches outside diameter, about 3 horsepower is required and for larger tubes, 2¾ to 4 inches in diameter, about 10 horsepower.

A number of typical applications will

(*Please turn to Page* 119)



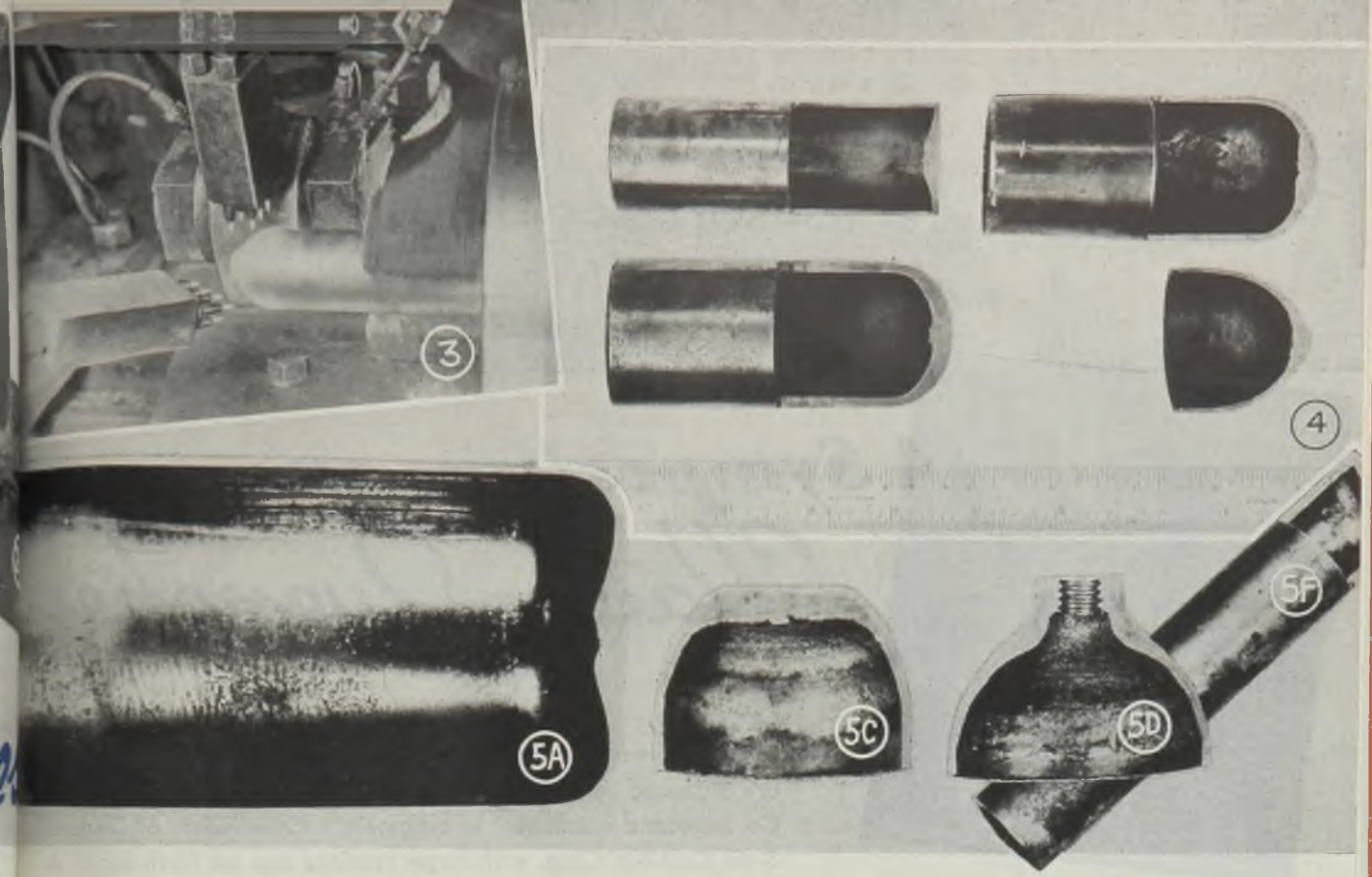


Fig. 1—Forcer body units for refrigerators are fabricated by flame-spinning section of 1¾-inch tubing to 1-1/16 inches as indicated at "A" and the other end to only ⅜-inch as illustrated at "B"

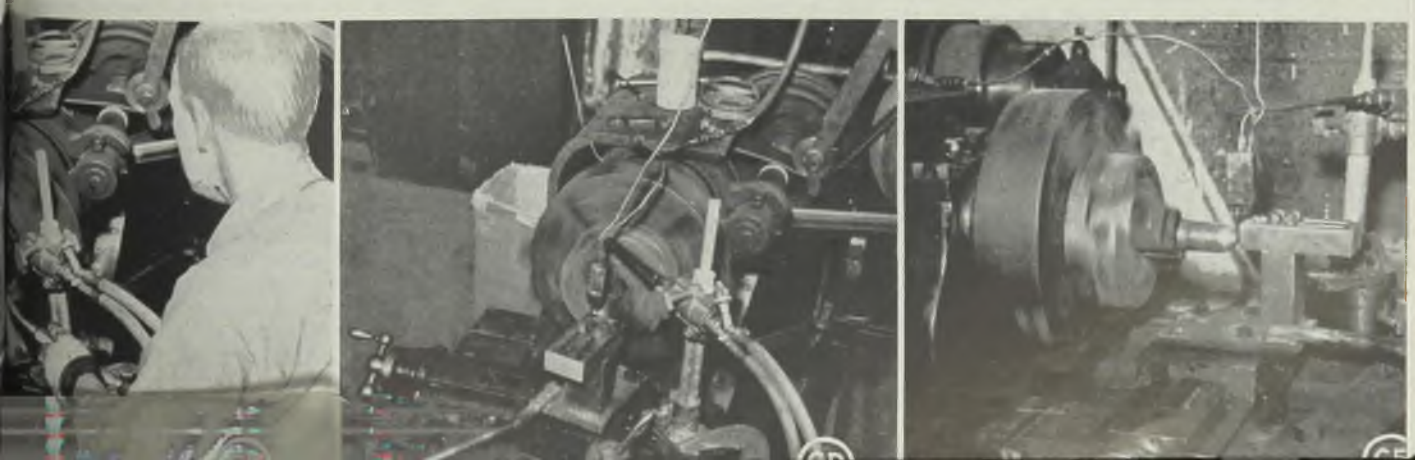
Fig. 2—Forming tools used on lathe in flame-spinning process. "A" and "B" are used in forming the unit shown in Fig. 1. "C" is a flat-plate tool which is especially adapted for making hemispherical closures

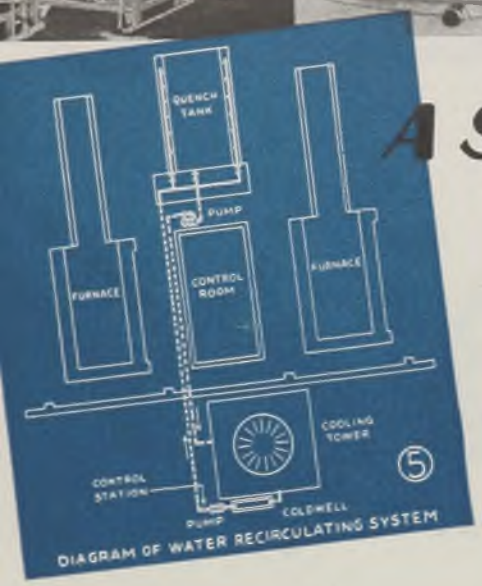
Fig. 3—When the end of this refrigerator forcer body unit is completed in a few seconds, it will have the cross section shown in Fig. 1B. As shown, it is about 90 per cent completed

Fig. 4—Typical flame-spun parts formed with a flat-plate tool. Top left is a burster well tube; top right, vehicle shock absorber tube; bottom left, booster charge tube and, bottom right, 2-inch flame-thrower unit

Fig. 5—Development work indicates ends may be thickened and threaded as shown in "C" and "D", thus eliminating necessity for fittings. "A" is a hand grenade case with both ends flame-spun and "F" a bomb fuse unit

Fig. 6—Progressive steps in flame-spinning the end of a 1¾-inch tube with 0.049-inch wall: In "A", the tube is being heated and the forming operation is about to begin; "B", tool has been rotated 20 degrees with flame still burning, leaving small hole at end of tube; "C", auxiliary flame is in position to heat edge of small hole; "D", flames are shut off and end of tube has been completely sealed; "E", tube now has smooth hemispherical end





A Symposium on Water-Quenched Steel

Problems involving quenching of castings of miscellaneous size are discussed by W. B. Libert of Continental Foundry & Machine Co. in second installment of symposium. Experiences of General Steel Castings Corp. with large castings are set forth by R. A. Gezelius. Importance of design and equipment requirements will be covered in the June 5 issue of STEEL

By W. B. LIBERT
Metallurgical Engineer
Continental Foundry & Machine Co.
East Chicago, Ind.

PRIOR to 1931 only 3 per cent of this company's casting production was water quenched and drawn. In 1932, the company started quenching large castings and by 1939, 60 per cent were being water quenched and drawn. In the No. 2 foundry at East Chicago, Ind., where medium sized castings ranging up to 2500 to 3000 pounds are poured, about 80 per cent are water quenched and drawn and of these, 50 per cent of the smaller castings of about 100 to 300 pounds are given a preferential heat treatment.

The above figures are for 1939. Due to the fact that this company is now producing an appreciable amount of armor castings, present figures would be out of balance with normal.

The furnaces used for heat treating are all car-type, side gas fired furnaces, the design being such that the same furnaces can be used for the quenching and the draw treatments. There are two banks of burners, one toward the top and pointing up toward the contour of the roof, and others located above the car hearth so that it is necessary to load castings or racks of castings on blocks or stools of approximately 12 inches in height. These stools are made of a high carbon-chrome metal, the life of which is about 6 months. Refractory stools have been tried, but were found to be unsatisfactory.

These furnaces are gas fired, burning a 980 B.t.u. gas, and for control purposes are divided into six zones, three on the top and three on the bottom, each zone being controlled by one control couple. With these furnaces is obtained a control of approximately plus or minus 10 degrees at 1000 degrees Fahr., 5 degrees at 1300 degrees Fahr., 5 degrees at 1600 degrees Fahr., and 8 degrees at 1850 degrees Fahr.

There are two roamer couples on each side in order to facilitate checking all areas of all zones. These are used extensively for operating temperatures below 1300 degrees Fahr.

One of the main problems in the heat treatment of miscellaneous sized steel castings is that of maintaining a uniform temperature throughout the furnace. Most of the medium or medium-large sized castings, up to approximately 2000 pounds, are quenched on racks, and due to the design of many of these castings it is impossible to get ideal uniformity of loading. Therefore, the heating control must be flexible. In order to control the uniformity of heating and holding, there are smaller spuds on the lower burners, and there are four burners for each side of each zone. The by-pass valves on these burners can be set as low as 1-pound pressure.

As stated above, in order to prevent the flame from hitting high loads, the top burners are slanted upward to follow the contour of the roof. Of course, the type of load governs the adjustment of the burners, but on most draw loads the bottom burners only are used.

In addition to the burner controls there are two flues at the bottom of each zone on each side of the furnace. These flues are located flush with the stool height above the car top. The dampers on these flues are regulated according to the characteristics of the load. All burners have Minneapolis-Honeywell gas control valves, controlled by Foxboro instruments. The thermocouples are 48 to 60 inches long, so that they reach into the load.

In order to have a check on the mechanical and electrical controls, there are observation ports at various locations in the furnace. The operators are instructed to run the furnace not only with the electrical and mechanical controls, but to observe the actual temperature and, if necessary, make control adjustments. This is very necessary in the case of odd-shaped loads.

Quite a number of different car type furnaces are used, but the average is between 6 to 8 feet from the top of the car to the spring of the arch, with door opening widths of from 7 to 11 feet, and the lengths varying from 17 to 24 feet.

The castings are removed from the car by means of either sling chains or 4-hook or 3-hook cables, depending on the design of the castings being quenched. For the racks of castings, 4-hook or 3-hook cables have been used; but at the present time a lifting bale is being used which has been a great help in the speed

Fig. 1—As shown here, Continental Foundry & Machine Co. requires several types of equipment for heat treating castings of miscellaneous size

Fig. 2—Equipment used by Continental includes these car-type furnaces. Quench tank may be seen at the right

Fig. 3 — Intricately designed or large castings must be blocked up carefully to prevent warpage

Steel Castings

Fig. 4—This large casting is being blocked up properly to provide uniform heating

Fig. 5—This diagram shows the method employed for maintaining the quenching medium at proper temperature

of removing the load from the car and has also cut down the manpower necessary for the quenching operation.

The car is run out of the furnace by a motor driven pinion in front of the furnace, just a few inches above the floor level, which operates on a rack on the bottom of the car. This enables the car to be run out just far enough to clear the furnace and allow the door to be dropped down. The speed of the car is approximately 90 feet per minute.

Where there are more than one casting on the car, or in the case of racks where there are from three to four racks on each car, the car is run out only far enough to allow hooking on to the front rack; and the car is then run back into the furnace and the door closed in order to equalize the temperature of the balance of the load. The total time is not over 2 minutes from the time the door is opened until the quench load is immersed in the water.

In order to prevent warpage of intricately designed, or large, castings, it is necessary to use considerable care in blocking up the casting on either the car or the rack, as the case may be. The particular design being quenched is studied so that it may be loaded in such a manner as not to pocket any steam during the quenching and not to pocket any water upon lifting it out of the quenching media. In addition to the agitation caused by the circulation, it is also the practice, whenever possible to keep the quench load continually moving back and forth in the quench tank in order to break up the steam film on the casting surface.

Various sized quenching tanks are at hand, ranging from 10,000 gallons to 40,000 gallons capacity. These tanks are designed so as to be wider just below the floor level. This allows a greater capacity with a minimum of floor space required; and as the tanks are located in front of and between the heat-treating furnaces, it is necessary to keep as much clearance between the car and the tank as possible, both as a safety measure and to facilitate hooking onto the quench load.

The temperature of the water is controlled by circulating it through cooling towers. Hot water from the tank is pumped into the top of the tower and is sprayed down over a series of splash pans. As an added control there is also a fan in the top which pulls air up through the tower.

Assuming a water temperature of 90 degrees at the start of the quench, the usual rise with a normal load is approximately 25 degrees maximum, a normal load being approximately 35,000 pounds maximum in the case of miscellaneous castings quenched on racks. It is impossible to give figures on the average weight handled in one heat-treating furnace, due to the large variations in size and design. In some cases of extreme design the weight per volume is very small.

Timed and intermittent quenching are used to a great extent on most of the normal quenching operations, due to the fact that most of the quenched designs are such that they have both heavy and light sections, and also usually have quite abrupt changes in the sections. In order to utilize this procedure to the fullest extent it is necessary to control the type of loads, in that if quenching on racks is to be done, it is necessary to have similarly designed castings on the rack.

In intermittent quenching the load is quenched overall for a predetermined number of seconds, after which it is lifted out of the quench, thus allowing the hotter sections to transmit heat to the cooler, thinner sections, thereby more nearly equalizing the temperature gradient in the casting. It is then again

Fig. 6—Some castings are quenched on racks and must be piled so that the quench reaches all surfaces

Fig. 7—Castings from the furnace at the right are being quenched in the tank in the left foreground. Operators are required to wear safety equipment

quenched down to the proper temperature.

Castings of simpler design are merely given a single timed quench which, as known from experience, will cool the castings down to the proper quenched temperature.

The main difficulty encountered with either timed or intermittent quenching of complex castings is to get maximum properties from the alloy being used without causing excessive quench cracking. One method found very successful —in addition to the timed or intermittent quenching—is that of blocking off various critical sections. If the design is such that there are thin sections that persist in cracking, even with timed or intermittent quenching, it is the practice to block these sections off in two ways. In some cases the position of the casting as loaded and quenched will allow the critical sections to be blocked off with fire clay, or fire clay and asbestos.

In other cases it is necessary to make fixtures that fit around or on the critical areas. It has been found that in order to get effective results from blocking off, it is necessary to have perfect contact between the fixture and the casting section, and wherever possible these joints are sealed up with fire clay o. ... and asbestos.

One very important consideration in the quenching of miscellaneous steel castings is that the quench loads must be of such a size and character that the quenching media will contact all the castings involved in the load.

If the castings are piled too close together on the rack, one has the equivalent of a much heavier section and the outside castings will not get the proper quench and the castings on the inside of the load will not get any quench.

After quenching the casting, or the rack of castings, it is placed on the floor until the entire furnace load has been quenched. The car is then run out and the car and furnace allowed to air cool until they are below approximately 600 degrees Fahr., in the case of higher alloy castings; or below 1100 to 1000 degrees Fahr. in the case of lower alloy castings. Where the alloy of castings is such that there is danger of retained austenite the castings are allowed to cool down to 250 degrees Fahr., or under, either by air cooling or by subsequent quenching before reloading into the draw furnace.

The castings are then loaded back on the car and properly blocked or, in the case of the racks, the castings are before loading for the quench ... come loose or shifted. If so, it is reblocked.

It should be emphasized again that much can be done in keeping water quenched castings from warping by carefully loading and blocking both for the quench and for the draw treatments.

The daily heat-treating production usually includes castings up to 18,000 pounds. However, castings as large as 80,000 pounds are quenched regularly, and the largest casting handled weighed approximately 88,000 pounds.

The problems of water quenching of miscellaneous steel castings can be listed as follows:

(1) Care in loading to get uniformity of loads; (2) positioning of the castings so as to eliminate steam or water pocketing; (3) spacing of the castings to get maximum effect from the quenching media; (4) adequate blocking to prevent warpage; (5) blocking off of sections critical from the standpoint of quench cracking; (6) uniformity of heating and holding temperatures; (7) speed of getting quench load from furnace into the quenching media; and (8) proper quenching practice to get maximum properties from the steel used.

Quenching Large Steel Castings

By R. A. GEZELIUS
Chief Metallurgist
General Steel Castings Corp.
Eddystone, Pa.

LIQUID quenching of large steel castings has not been common practice until the past few years, probably due to two factors: (1) the popular opinion among consumers that liquid quenching of castings is a dangerous practice which will not produce satisfactory results, and (2) the common viewpoint that parts with varying thicknesses must be oil quenched.

The latter viewpoint retarded the use of liquid quenching on large castings for economical reasons. The capital expenditures required for the oil supply and the circulation and cooling systems which would be required to prevent fires were not warranted for the few castings which might be produced.

The experience gained in the past few years has proven that satisfactory results can be obtained by liquid quenching and that properly controlled water quenching can be employed on large steel castings.

The demand for liquid-quenched castings has increased rapidly in recent years. The sizes of castings requiring this treatment have also increased and it was thus possible for producers to acquire the experience and equipment necessary for treating the larger castings. As water quenching was found satisfactory for some of the smaller castings, this practice was also employed on the larger ones.

Most of the castings which have been liquid quenched in the past few years have been produced in quantity. The specification restrictions have been such

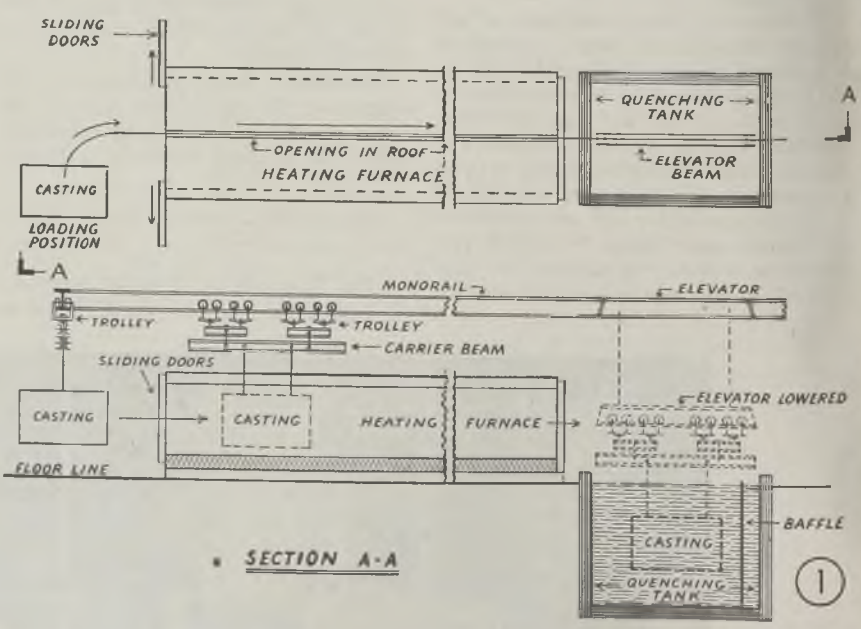


Fig. 1—Schematic drawing of a continuous heat-treating furnace used by the General Steel Castings Corp. through which the castings are carried on a monorail conveyor

How Matched Tool Steels

Reduce "downtime" and cut unit costs . . .

TOOL: Special Punch

OPERATION: Punching small washer

THE PROBLEM:

Stepping up production of a washer punched from an abrasive rubberized asbestos sheet -- still maintaining close dimensional tolerances. Shutdown for regrinding necessary after only 17,000 pieces.

THE MATCHED SET SOLUTION:

By use of Carpenter Hampden (Oil-Wear) in place of a high carbon water-hardening tool steel, production time between regrinds tripled; production increased from 17,000 pieces to over 60,000 pieces per grind. Three hours tool regrind time saved daily.

● Whenever a machine or press must be stopped—output stops—and unit costs go up. The more "downtime" the higher those unit costs go.

Excessive "downtime" is often directly traceable to tools that require too frequent maintenance attention—regrinding, repairing or replacement. The example cited above indicates the benefits when "downtime" is reduced.

Many a man responsible for tools has made the discovery that much tool-caused "downtime" is unnecessary and can be eliminated—with the help of Carpenter Matched Tool Steels.

1. Because these 9 Tool Steels simplify selection—and help you get the right tool steel for maximum service on each job.
2. Because complete and easy to use heat treating instructions are furnished for each steel to safeguard hardening results and step up tool performance.

These advantages make Carpenter Matched Tool Steels easier to use in the tool rooms—and assure tools and dies that stay on the job—work more consecutive hours with less maintenance. The result is higher machine output and lower unit costs.

Carpenter Matched Tool Steels are available from conveniently located warehouse stocks. A 168-page manual provides a handy, convenient way to find the right steel for each job and supplies full and complete information on analysis, physicals, working properties and heat treatment. This manual is available from your Carpenter representative. Ask him for a copy—or write us on your company letterhead, giving position or title, please.

The Carpenter Steel Co., 139 W. Bern St., Reading, Pa.

Carpenter MATCHED TOOL STEELS

that a uniform product has been essential. In order to insure this uniformity of product with the manpower available, it has been necessary to rely almost entirely upon automatic controllers or automatic recorders of quenching practice.

The factors which must be controlled and repeated time after time in as nearly the same manner as possible are:

1—The temperature of the casting as quenched.

2—The severity of the quench: (a) water temperature, (b) water circulation.

3—Time of immersion in water.

4—The temperature and time of tempering after quenching.

The sizes of the castings made individual handling desirable [illegible] The equipment and processes described permit individual handling and yet assure comparable heat treatment of each casting of the same design.

Two semicontinuous, gas-fired furnaces, 73 feet long and 8 x 5 feet in cross section, are employed for the heating prior to quench and for the tempering of castings up to 6500 pounds in weight.

These furnaces are divided into five zones. The first zone contains two castings. This zone has no burners, the castings being heated only by the waste heat from the hotter zones ahead of them. The second and third zones, which also contain two castings, are heating zones in which the castings are slowly brought up to temperature. The fourth zone is at the quenching temperature and provides a portion of the "soaking period" required. This zone also contains two castings. The last zone contains only one casting and is used to adjust any slight variations in temperature which may occur in the fourth zone.

Fuel Is Propane and Air

The fuel for these units is propane mixed with a predetermined amount of air in a special mixing unit. This explosive mixture is piped to "radiant heat" burners distributed along the furnace wall. The amount of gas distributed to the burners in each zone is controlled by an automatic flow valve which, in turn, is controlled by a controlling-recording potentiometer. With such a premixed gas the gas-air ratio is the same, whether the burners are being used at their maximum or minimum capacity.

The castings are carried through this furnace on hangers suspended from monorail conveyors. After the furnaces are filled, and up to temperature, a casting is removed for quenching on a uniform time cycle which is adjusted to give a proper "soaking period" for the maximum section being treated. After a casting has been removed for quenching, a cold casting is introduced at the other end of the furnace and the entire string of castings is moved forward one space.

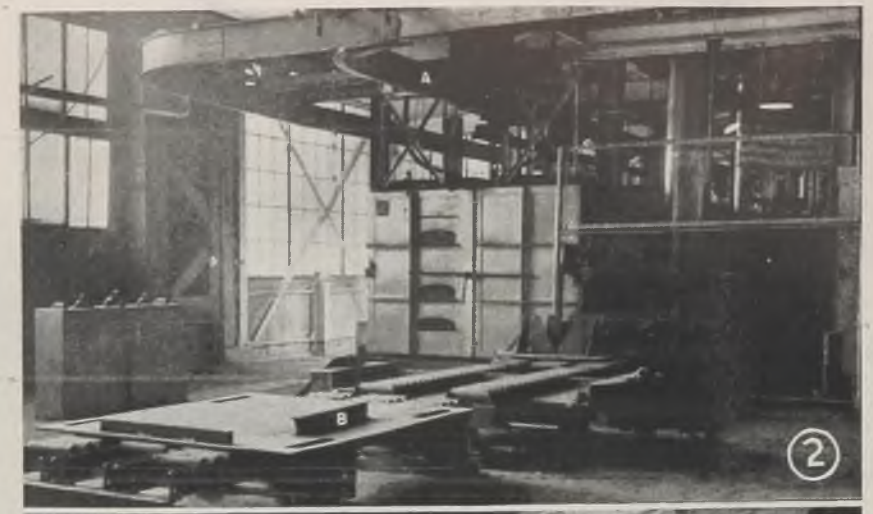


Fig. 2—Entrance end of the heat-treating furnace. Castings are lifted by the hydraulic elevator at "B" to the proper level for hooking onto the monorail carriers at "A"

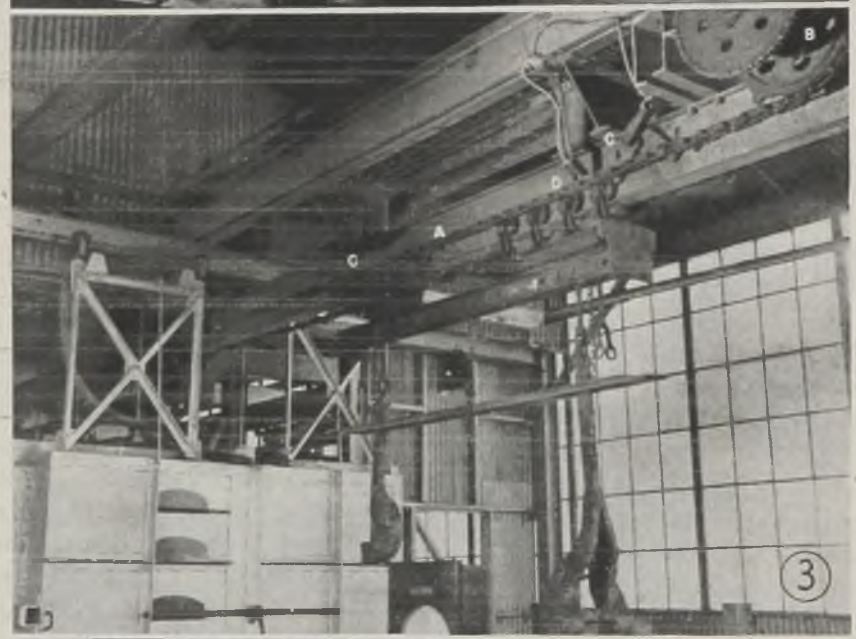


Fig. 3—Quenching is facilitated by the monorail conveyor which carries the castings out over the quench tank, chain "A" being driven by sprocket "B". Restraining lugs "C" trip switch "D" which causes the beam to lower the casting. An electric timer is started at the same time

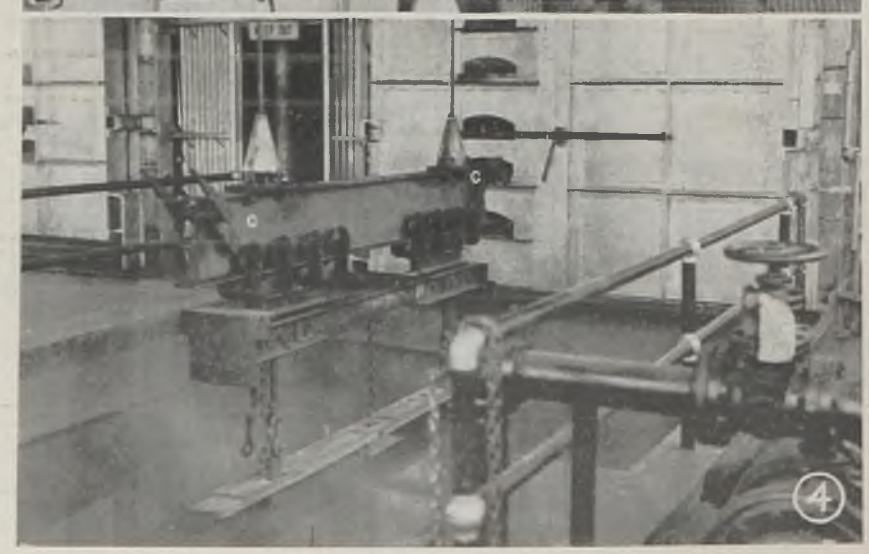


Fig. 4—Quenching mechanism is shown in position during the quenching operation

Time– 2 MIN. 46 SEC.

From buyer to burner, it's two minutes and forty-six seconds via telephone and teletype... proof of our organization's time-reducing methods and better ways of doing things.

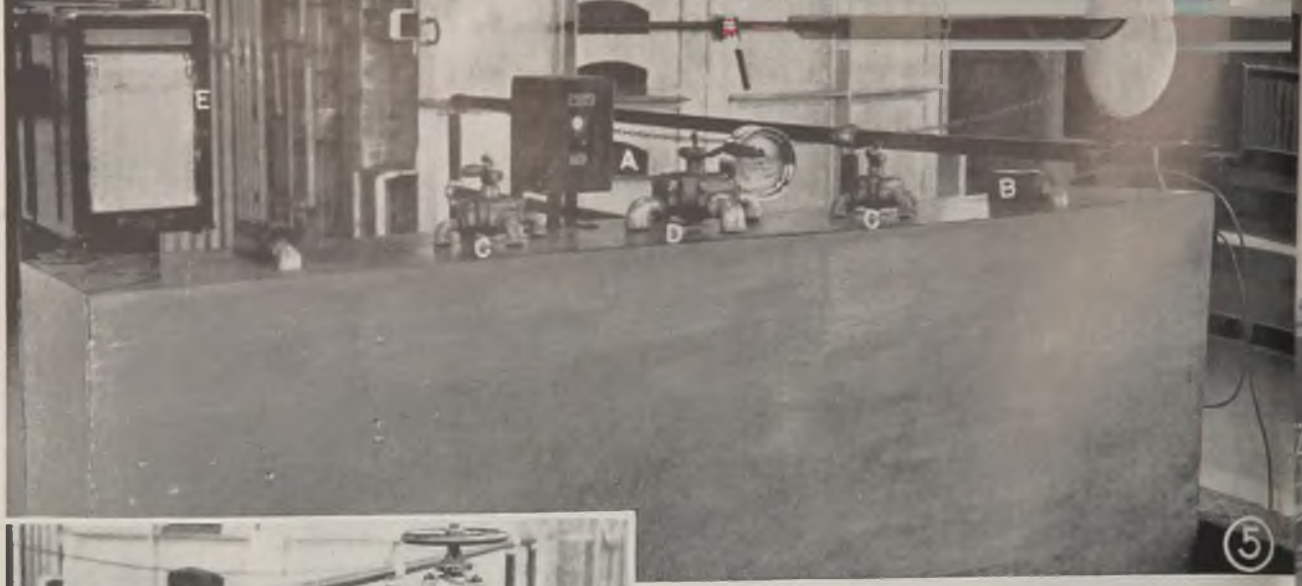
Why not avail yourself of this quick, efficient, friendly service?

LEVINSON STEEL SALES CO.

33 PRIDE STREET · PITTSBURGH 19, PA.

LEVINSON STEEL

Warehouse and Specialty Steel Products



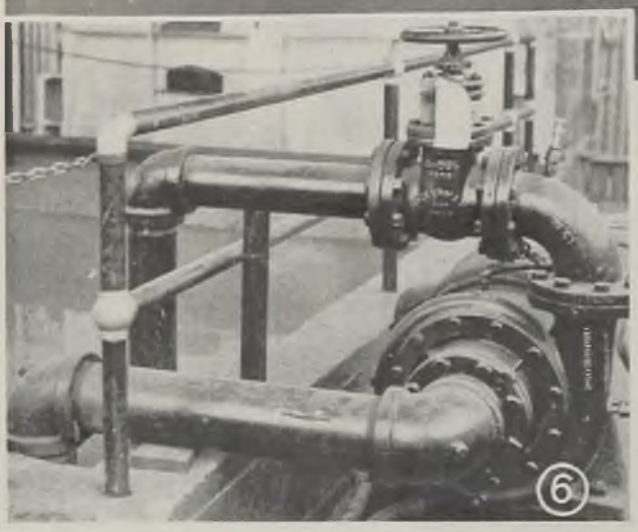


Fig. 5—Centralized control panel includes "A" timer, "B" manual motor switch, "C" furnace door control levers, "D" manual quench control lever, "E" time recorder and "F" water temperature recorder

Fig. 6—Two pumps like the one shown here circulate 2500 gallons of water per minute through the quench tank

Fig. 7—Time recorder chart shows at "A" time required to pull casting out of furnace, "B" quenching time and "C" time required to place casting in tempering furnace

A schematic drawing of the furnace is shown in Fig. 1.

Fig. 2 shows the cold end of the furnace. The monorail from which the castings are suspended is shown at "A". A small hydraulic elevator "B" is used to lift the castings in order that they may be hooked onto the monorail carriers extending from above furnace area.

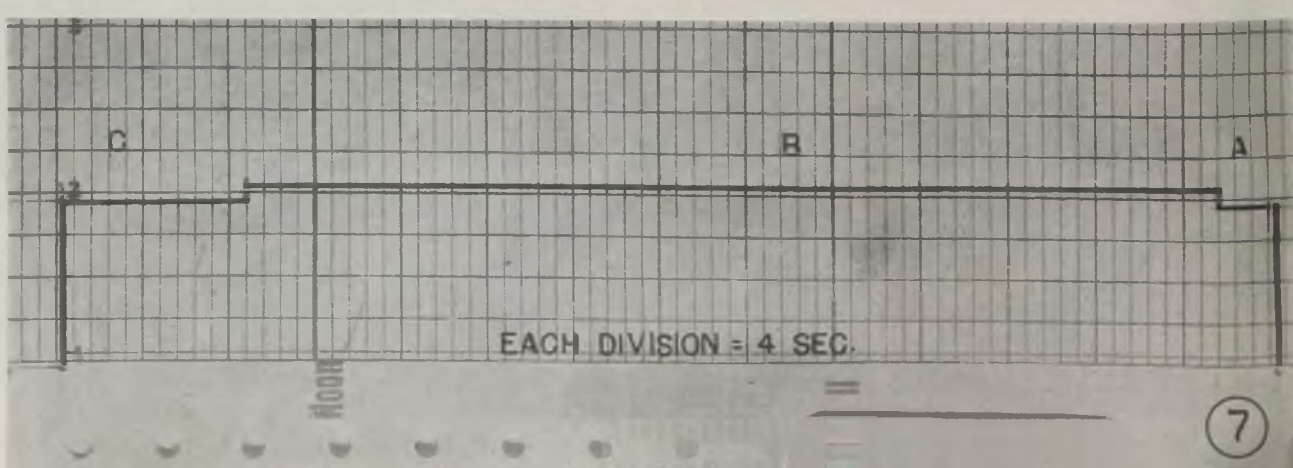
The quenching operation is carried out on the section of monorail immediately above the quenching tank, as shown in Fig. 3. The casting is removed from the furnace by lugs on chain "A" driven by sprocket "B". The motor driving this unit is manually controlled. The carrier is held on the short section of the monorail which is lowered by the restraining lugs "C". As the carrier is pulled onto this section of the beam, the lugs on the chain engage the trip switch "D" which causes the beam to lower and automatically starts an electric timing device.

Fig. 4 shows the beam in the lowered position with the hangers immersed in water. The restraining lugs "C" mentioned previously are shown at the ends of the beam.

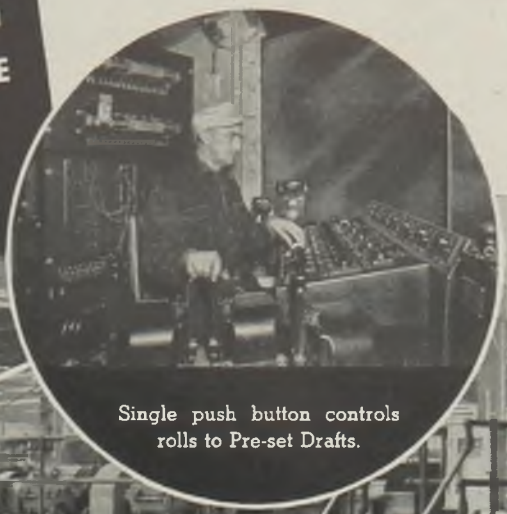
The control panel and the timing and recording equipment employed for the quenching operation are shown in Fig. 5. The electric timing device mentioned above is shown at "A". This clock can be set to control the time of immersion accurately in steps of 7.5 seconds for any time interval up to 15 minutes. After the prescribed time has elapsed, the casting is automatically removed from the water.

The manual switch "B" controls the motor which removes the casting from the furnace. The levers "C" control the air cylinders which open and close the sliding doors at this end of the quenching and the tempering furnaces. The lever "D" may be used to control the quenching operation manually.

The time-recorder "E" keeps an accurate record of the elapsed time between the moment the doors of the quenching furnace start to open, the time the casting lowers into the water, the time the casting leaves the water and the time the doors of the tempering furnace are opened. The temperature-recorder "F" keeps a continuous record of the water temperature. Each quenching operation is started at a water temperature of 100 degrees plus 5 degrees. No attempt is made to maintain this tem-



EC&M LINE-ARC
CONTACTOR CONTROLLERS IN THE
8th Year of Successful Operation
ON THIS PLATE MILL



Single push button controls rolls to Pre-set Drafts.

Partial view of TIME-CURRENT Controllers serving this mill.

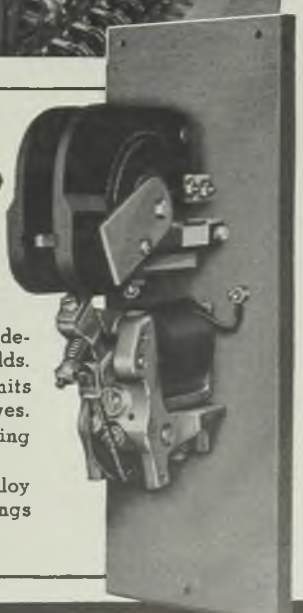
WITH this mill operating on an accelerated schedule—possibly two to three times that of normal years, due to war-time demands—these EC&M LINE-ARC Contactor Controllers have established new records in low maintenance costs and time-outs.

Selected in 1936 for the operation of hard-worked drives on this 100" Plate mill such as screwdowns, side guides, etc., this EC&M Control installation is operated automatically through Pre-set Drafts and has resulted in high production of accurately finished products.

Our nearby office will be glad to explain the merits of LINE-ARC Contactor Controllers and Automatic Pre-set Control.

OUTSTANDING FEATURES OF LINE-ARC

1. Cool operation insures long contact-life.
2. Control of the arc prevents destructive burning of arc shields.
3. High-speed operation permits quick response—accurate moves.
4. Continuous capacity operating coils.
5. Long bearing life with nitralloy pins and self-lubricating bearings throughout.



THE ELECTRIC CONTROLLER & MFG. COMPANY

2698 E. 79th STREET — CLEVELAND 4, OHIO

Fig. 8—Overall view of the quench tank with the control panel in the foreground

Fig. 9—Quenching end of batch type furnace used by General Steel Castings with "A" showing one end of skid projecting under furnace door and "B" the cable attached to a winch for pulling the skid onto the roller conveyor

perature during the quenching operation.

Sufficient water and circulation are provided to prevent large changes in the water temperature. The tank for this furnace holds 10,000 gallons. The two pumps, one of which is shown in Fig. 6, circulate 2500 gallons of water per minute. With this amount of water and circulation, a 6500-pound casting will be quenched in water which varies from 100 degrees to 125 degrees Fahr.

After each quenching operation, the water in the tank is brought to a temperature of 100 degrees plus 5 degrees by the addition of cold water.

A copy of a chart obtained on the time recorder is shown in Fig. 7. Each division on this chart represents 4 seconds. Section "A" shows the time required to pull the casting out of the furnace and start the lowering operation, in this case 14 seconds. Section "B" records the time of the actual quenching operation, 3¾ minutes. Section "C" shows the time required to place the casting in the tempering furnace, 43 seconds.

A general view of the quenching end of the furnace is shown in Fig. 8.

The tempering furnace of this unit is similar to that employed for heating for quenching. It also is divided into five zones. In this case, however, the two first zones are used for the heating operation and the last three zones are maintained at the tempering temperature.

A similar, larger unit is used for larger castings with overall dimensions of approximately 16½ x 8½ x 2½ feet and a weight of approximately 11,000 pounds. The principal difference between this unit and that just described is the manner in which the castings are carried through the furnace. In the latter case, the castings are placed on a rack which is supported and carried through the furnace on alloy iron rollers on the furnace floor.

The quenching operation is carried out by pulling the rack and casting onto a suspended roller conveyor which is then lowered into the water. The operation in this case takes approximately 25 seconds from the time the doors of the furnace are opened until the casting is lowered into the water.

Larger Castings Next Step

The controlling-recording potentiometers, timing device, time and temperature recorders are identical to those employed on the smaller unit.

The satisfactory results obtained on the castings of this size resulted in the consideration of two larger castings. The first of these had overall dimensions of approximately 21½ x 10 x 5½ feet and weighed about 21,000 pounds. The second was approximately 16 x 12 x 8¾ feet and weighed about 85,000 pounds.

The size and weight of these castings and the comparatively slow rate at which they would be produced indicated that a batch furnace might be preferred. Fig. 10 is a schematic sketch of the equipment which was installed. The furnace is a car-type, gas-fired, pyrometrically controlled unit 34 x 15 x 10 feet. The car varies from that usually used in that three water cooled 5-inch pipes are built into the bottom of the car. A large skid rests upon these pipes. This skid is built up to support the casting during the heating and quenching operation.

The casting is loaded onto the skid and car in front of the furnace. The car is then pulled into the furnace for the heating operation. After casting has been properly soaked at the quenching temperature, the skid is pulled out of the furnace onto a suspended roller conveyor which is then lowered into the water. The water-cooled pipes, which

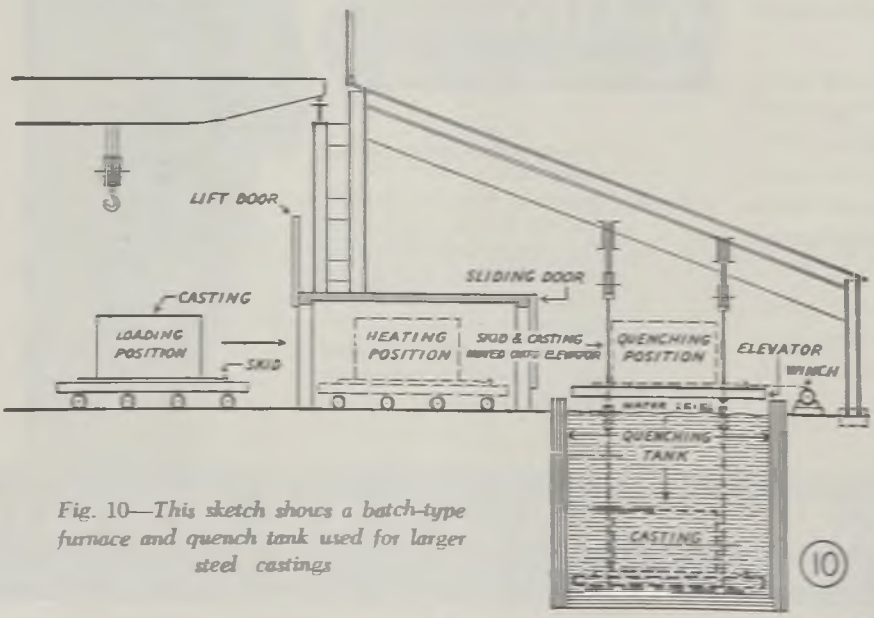


Fig. 10—This sketch shows a batch-type furnace and quench tank used for larger steel castings

STERLING

S OF INDUSTRY

Speeding UP Our Wheels And Your *Production*

Your workmen turn out better work faster when they know their tools are safe. That is why we test all Sterling Grinding Wheels beyond their recommended speeds—to be certain you have long, trouble-free operation. This takes time and extra workers, but is well worth it in the resulting increased confidence foremen and operators have in the "Wheels of Industry".

Running your Sterling Grinding Wheel at its recommended speed is a certain way to obtain longer, more efficient grinding service. Then, the wheel's special bond, grain, and structure have a chance to get in their best work on your jobs.

The problem of finding the correct wheel for your work need not be difficult . . a consultation with a Sterling engineer will often create new opportunities for increasing production, sometimes at much lower cost. Sterling investigation is as thorough as our wheel testing . . write today . . a Sterling engineer will gladly call and work with you on grinding problems of wartime or post-war production.

Sterling Catalog No. 43 is recommended reading for anyone desiring full information on all types of grinding. Sent free upon request.

• STERLING ABRASIVES •

THE

STERLING GRINDING WHEEL DIVISION

OF THE CLEVELAND QUARRIES COMPANY

TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Fig. 11—Quench tank with block and tackle at "A", quenching rack at "B" and control house at "C"

have previously been coated with graphite, and the lower portion of the skid remain comparatively cool. The upper portion of the skid attains the quenching temperature.

The quenching end of the furnace is shown in Fig. 9. One end of the skid projecting under the furnace door is shown at "A". The cable from the winch "B" is used to pull the skid onto the roller conveyor.

Fig. 11 provides a view of the quenching tank, the block and tackle at one end of the quenching rack "A", the quenching rack "B" and the control house "C".

The interior of the control house is shown in Fig. 12. The winch "B" is controlled by "A". The lever "C" controls the pneumatically operated sliding doors at the quenching end of the furnace. The two controllers "D" operate the two hoists required to lower and raise the roller conveyor and casting in the quenching operation. The switches "E" control the two pumps which circulate the water. The water temperature recorder "F" is similar to those used in quenching smaller castings.

An electric timing device similar to that mentioned previously is also employed on this unit. The weight and size of the castings quenched with this equipment are too great to handle automatically, and in this case the clock is connected to warning lights which indicate the end of the quenching operation.

With this equipment, approximately 45 seconds are required to remove the casting from the furnace and immerse it in water.

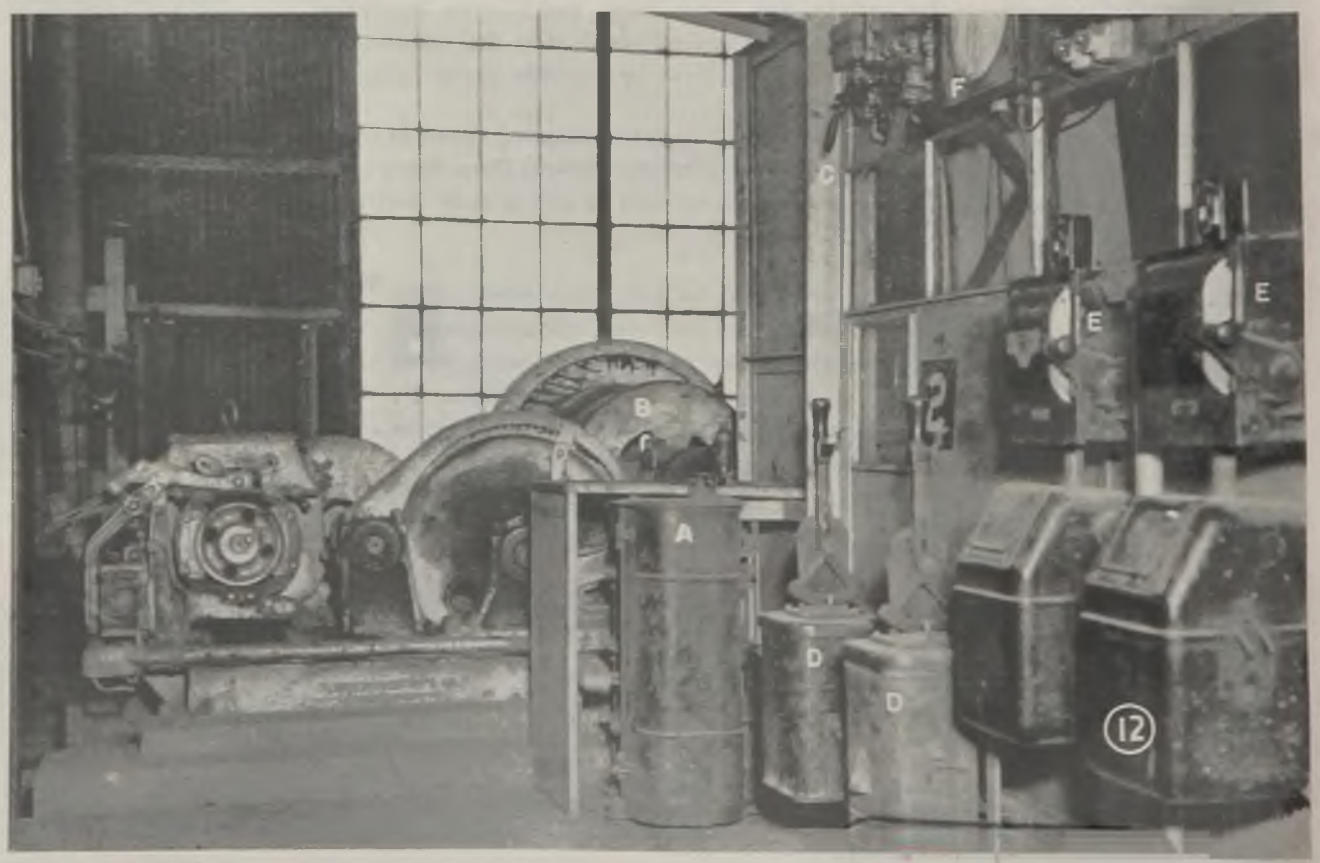
Average Rise 20 Degrees Fahr.

The initial temperature of the water is 100 degrees Fahr. plus 5 degrees. No attempt is made to maintain this temperature. The capacity of the quenching tank and overflow tank is 66,000 gallons which is recirculated at the rate of 6000 gallons per minute. With this amount of water and rate of circulation, the temperature rise [illegible] with the 85,000-pound casting is approximately 20 degrees Fahr.

The furnace employed for the heating operation is lined with a low heat-content brick. During the quenching operation, both ends of the furnace are opened and furnace is permitted to cool. After the quenching operation, the casting is again pulled into the furnace. (The cable is again attached to the front of the skid, but is passed over a sheave wheel at the front of the furnace.) Both doors of the furnace are then closed and the furnace and casting are permitted to attain equilibrium. The temperatures of the casting and furnace will reach equilibrium at 600 to 800 degrees Fahr., depending upon the length of time of the quenching operation. The temperature is then slowly raised to the proper tempering temperature.

In all of these quenching operations, the length of time the casting is immersed in water is determined experimentally. All of the castings are immersed for a length of time sufficient to decrease the temperature of the heaviest section to less than 500 degrees Fahr. The time is adjusted so that the temperature of the heaviest section is as low as possible without bringing the temperature of the thinnest section below 300 degrees Fahr., thus reducing cracking to a minimum. Once the proper quenching time has been determined for a particular casting, each casting of that design will be treated in the same manner.

Fig. 12—Interior of control house. Winch "B" is controlled by "A". Lever "C" controls the furnace doors. Controllers "D" operate the hoists. Switches "E" operate the pumps and "F" is a water temperature recorder



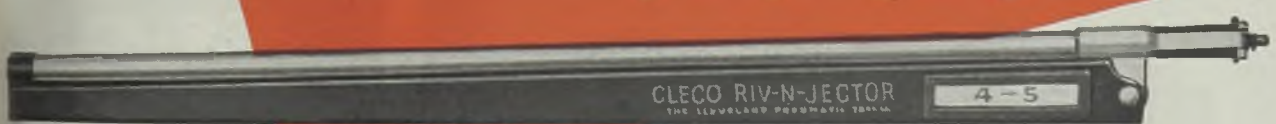
LICK YOUR RIVET SALVAGE PROBLEM

RIV-N-JECTORS are feather-light, easily handled

Riveting hand can be steadied while holding the RIV-N-JECTOR

with

CLECO RIV-N-JECTORS



Three sizes: 1—for 1/16" and 3/32" rivets; 2—for 1/8" and some types of 3/32"; 3—for 5/32" rivets

Electrically operated hopper fills 4 or 5 RIV-N-JECTORS per minute

Question 1: What is the RIV-N-JECTOR? *Answer:* A magazine holding about 50 rivets, combined with a mechanism for releasing the rivets one at a time into the rivet holes.

Question 2: How much are rivet losses reduced with the RIV-N-JECTOR? *Answer:* Operator drops only 2 or 3 rivets out of 50, compared with a loss of over half when handled by hand—*a 90% saving!*

Question 3: How fast can riveting be done, using the RIV-N-JECTOR? *Answer:* Operators often insert and drive 30 rivets per minute.

Question 4: Do operators learn quickly? *Answer:* Almost at a glance; in a day they are 'Jector experts

Write for 16-page Bulletin 89

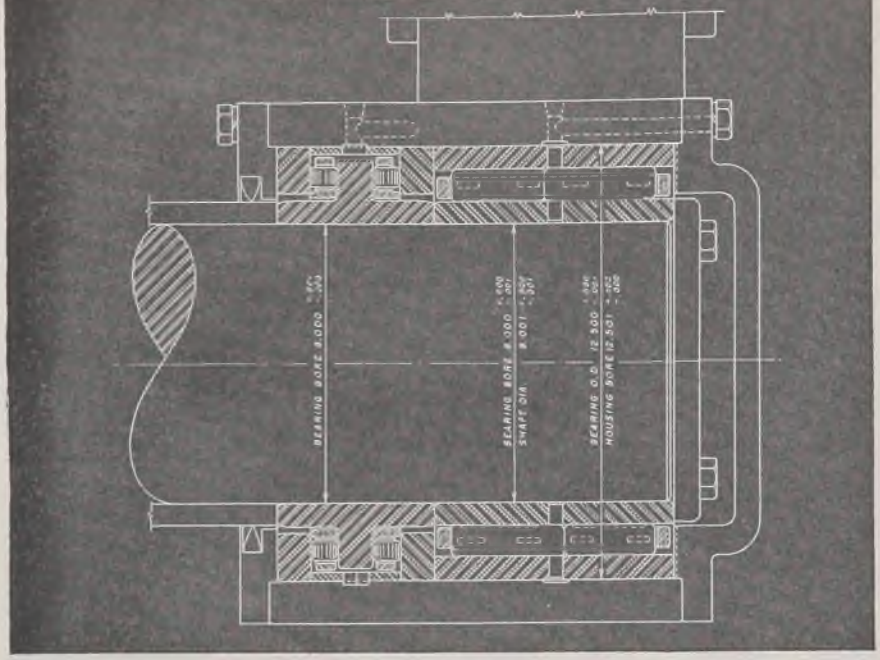
THE CLEVELAND PNEUMATIC TOOL CO.

3781 EAST 77th STREET • CLEVELAND 5, OHIO

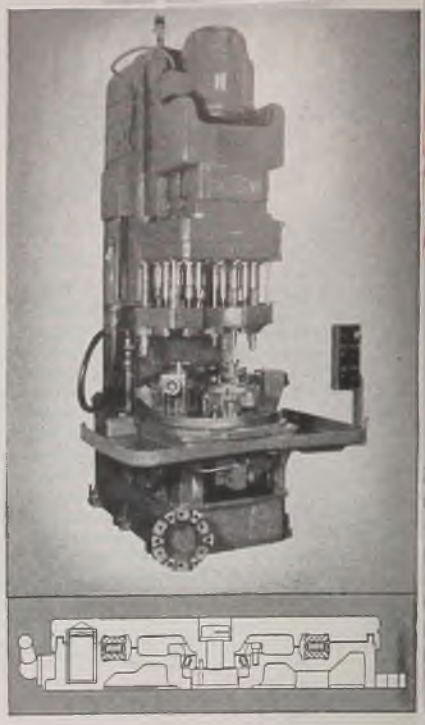
BRANCH OFFICES IN ALL PRINCIPAL CITIES

IN THE NEWS

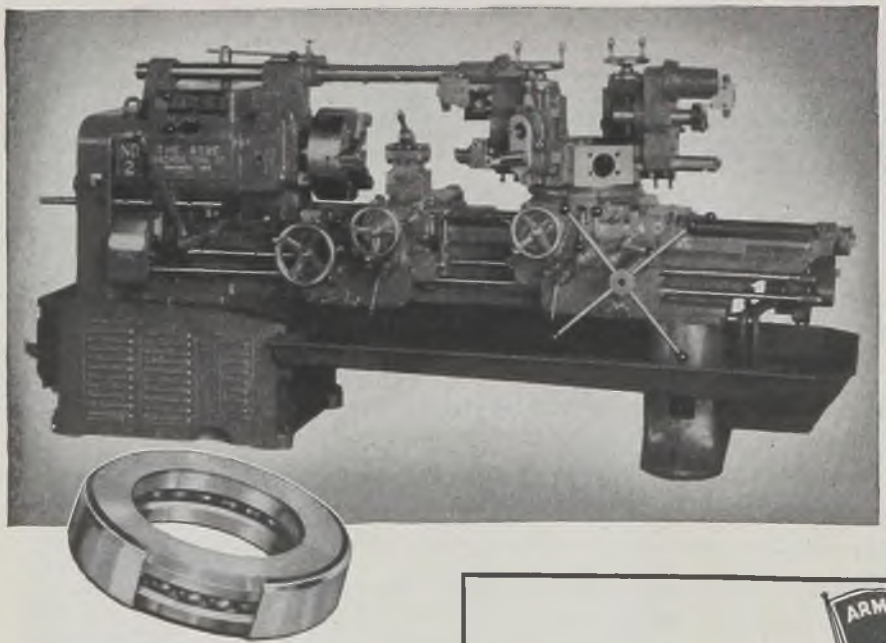
WITH TORRINGTON BEARINGS



270,000 POUNDS RADIAL LOAD and 168,000 pounds thrust load is the capacity of this compact, 12.5" O.D. Torrington Mill Type Bearing designed by the Company's Bantam Bearings Division to carry the work rolls of a new design axle-type rolling mill in the steel industry. This is another interesting example of the ability of Torrington engineers to design and build anti-friction bearings to meet new and specialized requirements.



MULTIPLE STATION DRILL PRESS, built by Snyder Tool & Engineering Company, uses large Torrington Roller Thrust Bearings to provide anti-friction operation for the rotary table and insure sturdy support to the "work." Bearing, as shown in cross-section, is supplied in three sizes to meet the requirements for both hand and power indexed tables.



FOR ANTI-FRICTION OPERATION on the long and cross feed shafts of this Universal "Cincinnati Acme" Turret Lathe, built by The Acme Machine Tool Company, four Torrington banded Ball Thrust Bearings are employed in each apron. This type of Ball Thrust Bearing as shown in inset is supplied by Torrington's Bantam Bearings Division in a standard range of sizes from ½" to 3½" I.D.

THE COMPLETE TORRINGTON-BANTAM LINE includes every major type of anti-friction bearing—straight roller, tapered roller, Needle and Ball. You will find the experienced assistance of Torrington engineers helpful in selecting the *right* bearing for any anti-friction bearing problem. For today's requirements or assistance in laying out your postwar designs—TURN TO TORRINGTON!

ARMY ★★ (E) ★★ NAVY

TORRINGTON BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

THE TORRINGTON COMPANY · BANTAM BEARINGS DIVISION

SOUTH BEND 21, INDIANA

Large Cemented Carbide Parts

. . . weighing up to 100 pounds or more now may be produced by new hot press method

Fig. 1—This 100-ton press-welder can turn out cemented carbide dies and other parts with cross sections as large as 100 inches

CEMENTED carbide parts too large to be sintered in available furnaces—as well as special, thin-walled parts that tend to go out of round when pressed and then sintered in the regular way—now are being made by the Carboloy Co. Inc., Detroit, by a "hot press" method which incorporates in one single operation the three distinct processes of pressing, semisintering, and sintering.

The company reports that the hot pressing method of producing large carbide parts—some of which weigh up to 100 pounds or more for the carbide alone—is proving extremely successful. So much so, in fact, that it is now believed that after the war, carbide forming dies for turning out such deep drawn articles as kitchen ware, headlamp shells, etc., can be manufactured economically by hot pressing.

Carbide Tools Used Throughout

The procedure, which employs electrical resistance heating to obtain the necessary sintering temperature, makes use of a hydraulic press capable of exerting a forming pressure of 100 tons (see Fig. 1). This press is equipped with water-cooled platens and is very similar to a "press-welder." Heat is supplied through a 750 kilovolt-ampere transformer and is controlled by electronic contactors. The press now in regular operation at Carboloy handles jobs up to 100 square inches in cross section, although limited at present to diameters of 18 inches. Maximum height of work which can now be handled is 8 inches.

The molds in which the parts are pressed and sintered are of a graphite-base composition. The molds for dies, for instance, are composed of an outer case, an inner core, and a ring to squeeze down the carbide powder between them (see Fig. 2). A flange at the bottom retains the metallic powder. The volume must be carefully calculated since the density of the finished piece depends upon how much material there is in the carbide part when the squeeze-ring has been brought flush with the mold-top at the end of the operation.

In machining these graphite-base molds, carbide tools are used throughout since the bonding material is highly abrasive and dulls most tools at the very outset of any machining operation.

When fabricating the larger die nibs, the mold with its content of metal powder is often preheated in a "portable" furnace. This auxiliary heating unit has a controlled hydrogen atmosphere to protect both the graphite mold and the molybdenum heating wires. When the preheating is finished, the furnace—together with the mold containing the metal powder—is pulled from its position to a location directly underneath the press platen by means of a steel cable. Usually, the preheating furnace is left running during the entire process of hot-pressing so that the heating operation is actually continuous.

Hot pressing of large die nibs is, of course, necessarily a relatively slow process to assure even heating throughout, and so as not to require impractically high current densities. During the process, two pressures are used—a "normal" pressure and the superimposed final pressure. This latter is effective at approximately the final sintering temperature. At the beginning of the operation, the pressure head travels fairly fast but slows down considerably as the compression increases. For this reason, the final ⅛-inch of movement is under the higher pressure.

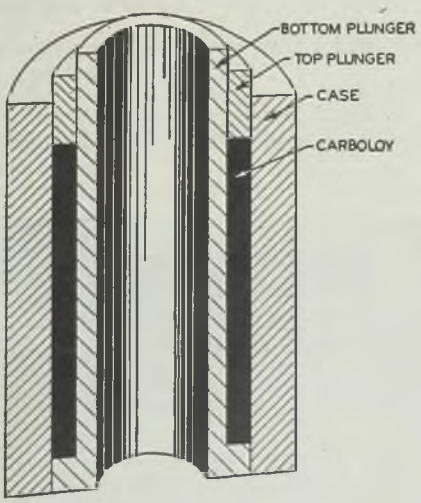


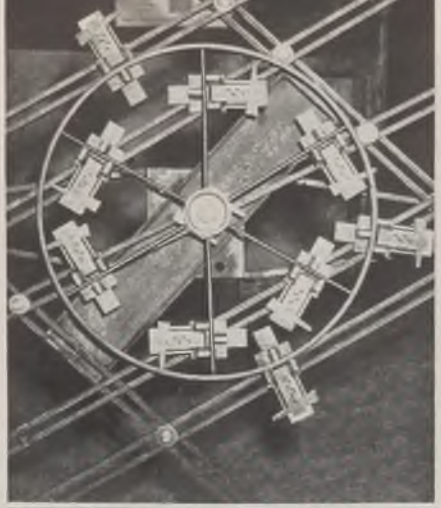
Fig. 2—Molds for cemented carbide parts comprise an outer case, an inner core and a ring or plunger to squeeze down the carbide powder into dense mass

When sintering is completed, the part is removed from its mold. Each finished piece is checked thoroughly for density and hardness. Included among the parts which are now being produced by this method are long, thin hollow pieces such as shell nosing dies for 90 millimeter and 105 millimeter shell; tapering and casing dies for the same caliber ammunition; and broaching rings for finishing aircraft engine silver lined bearings. The rings for these branches must be extremely thin and entirely free from porosity.

Handbook of Wire Ropes Ready for Distribution

The 1944 edition of "Industrial Wire Ropes Handbook", prepared from information assembled by Broderick & Bascom Rope Co., 4203 North Union boulevard, St. Louis, is being mailed to wire rope users and customers. It covers, aided by data and illustrations, such subjects as selection of the right rope for the job, rope constructions, working loads, stresses, sheave and drum sizes, as well as a catalog section of wire ropes which are used in various industrial fields.

It tells in 96 pages, how to apply clips, the correct method of uncoiling rope, how to attach a socket and many other useful facts. A copy may be had by sending the request on company letterhead to Broderick & Bascom at the above address.



Universal Jig and Clamp

. . . . found widely adaptable for many welded constructions

THERE ARE many welding jobs on which the quantities involved in production are not sufficient to warrant a special jig and fixture setup. On the other hand, there are many jobs on which a jig or fixture would be practicable if there were some quick holding device which could be positioned at various points on the jig according to the particular requirements of the work at hand.

Most jigs or fixtures are generally thought of as single purpose devices designed to handle one job with little if any variation. If it were possible to provide means in the fixtures for handling various jobs, they would be much more usable and thus could effectively reduce welding cost on many items.

Herein is described a jig design that is extremely flexible and can be utilized on a wide number of jobs. It was designed to fill the need in the difficult range of jobs between the continuous or highly repetitive production and the "job order" where the quantities were ordinarily too small to warrant the building of any jig at all.

Its features include a wide adaptability to varying requirements, quick adjustment or setup of the jig itself, quick setup of work in the jig, low cost of construction, absence of any screw threads or other parts which might be injured by weld spatter.

The jig consists of a tilting and rotating table with specially designed clamps for holding the parts to be welded. This special design of clamp is detailed in Fig. 4.

In Fig. 3 the table is shown tilted with parts for a frame for a steel window sash in position for arc welding. In this view, 14 of the universal jig clamps will be seen holding the seven members in position for welding. This window sash is to accommodate four 12 x 18-inch glasses. Note that provision is made in the table for tilting, inverting and rotating.

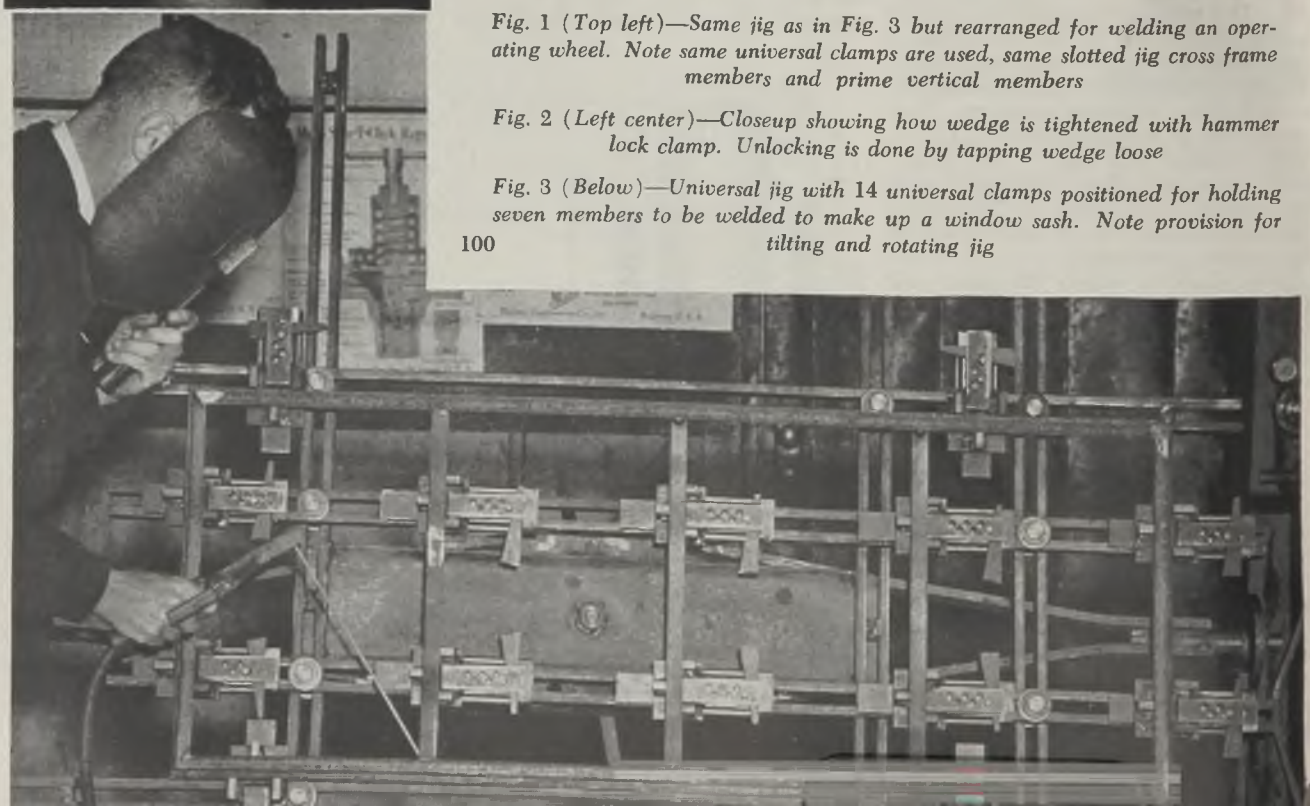
The table carrying the universal jig clamps has bars of flat steel in pairs which furnish the slot in which the clamp bolt is placed to hold the clamp in an adjustable position. The universal clamp can be positioned at any point along the bars. In Fig. 3 the two vertical pairs of ½ x 1½-inch bars are the only ones welded to the table. The other bars (½ x 1-inch) are bolted in position to these two vertical ones. They

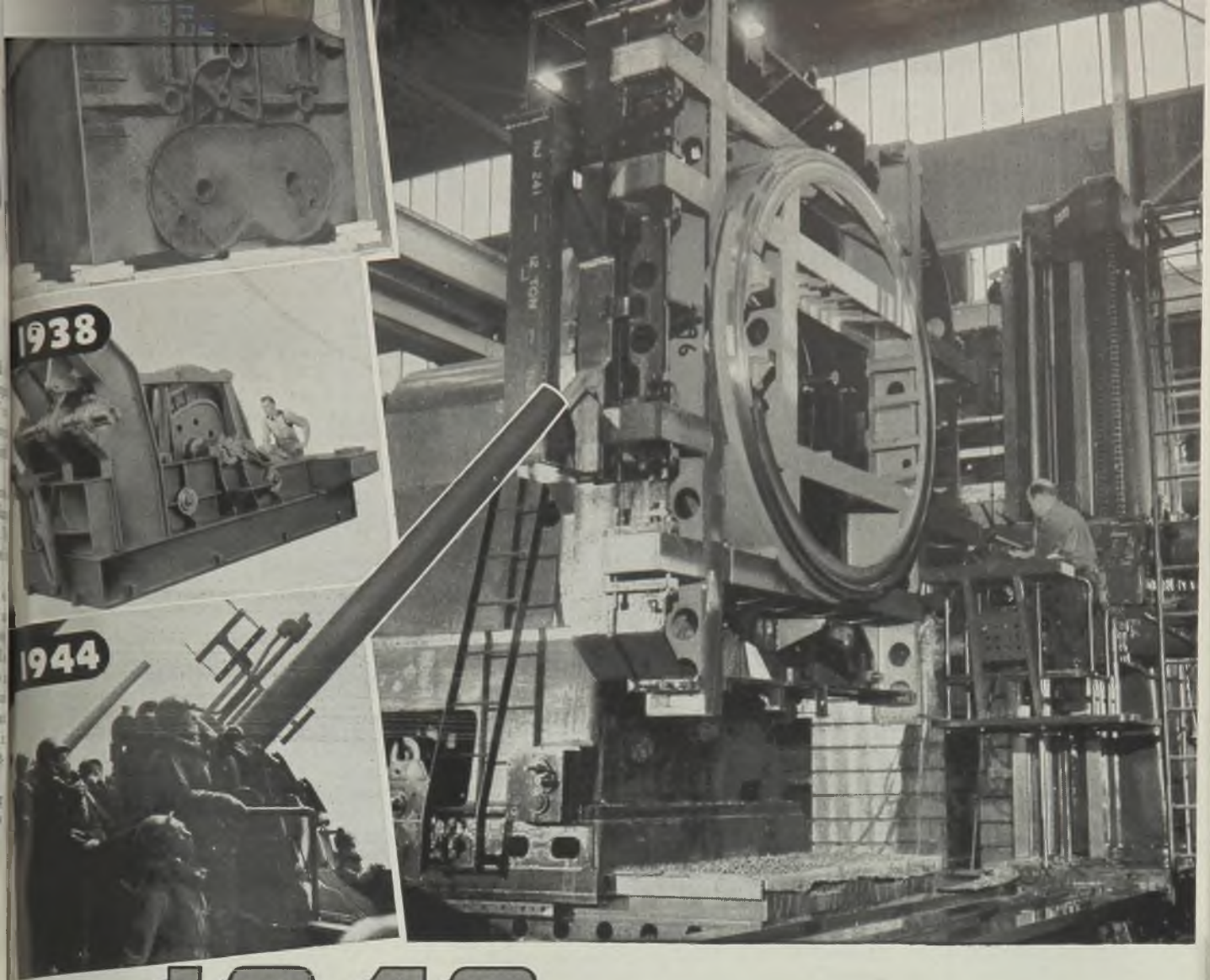
From a paper by E. J. Freeman, Clemson, So. Carolina, entered in the $200,000 Award Contest sponsored by the James F. Lincoln Arc Welding Foundation, Cleveland.

Fig. 1 (Top left)—Same jig as in Fig. 3 but rearranged for welding an operating wheel. Note same universal clamps are used, same slotted jig cross frame members and prime vertical members

Fig. 2 (Left center)—Closeup showing how wedge is tightened with hammer lock clamp. Unlocking is done by tapping wedge loose

Fig. 3 (Below)—Universal jig with 14 universal clamps positioned for holding seven members to be welded to make up a window sash. Note provision for tilting and rotating jig





1947 WHATEVER THE DATE

Welding facilities will provide for the production of welded steel structures beyond the scope of most weld shops in size and precision—after the war.

Machine tool facilities will exceed in size and capacity the usual equipment found in the larger tool rooms —after the war.

We will be glad to get in touch with you or your representatives as to the nature and scope of these facilities—at any time.

DANLY MACHINE SPECIALTIES, INC.

2100 SO. 52nd AVE. *CHICAGO 50, ILLINOIS*

DANLYWELD

Makers' Supplies • Welded Steel Fabrication

can be of any length to suit the particular setup required and can be rotated or fastened at an angle as desired across these two main bars.

Fig. 1 shows how the same jig is adapted to making a large spoked handwheel by rearrangement of the table and clamping members.

This type of setup is extremely flexible. It is a simple matter to use four of the jig clamps and one bar to clamp pipe ends in position for butt weld or miter joints. The jig shown has been used for welding parts for windows, door frames, grills, shelf brackets, bed plates, sign frames and various other items where accurate alignment was necessary.

Where it is desired to copy a previously made item, this type of jig greatly facilitates the work, for it is a simple matter to place the slot bars approximately in position on the table and the clamps in the approximate position in the slots. The master job then is placed in the clamps and the jaws tightened. Then the nuts bolting the clamps to the slot bars are tightened, fastening the clamps in position. Then clamp jaws are released and the master removed and the jig is ready to hold new parts in exactly correct position for welding.

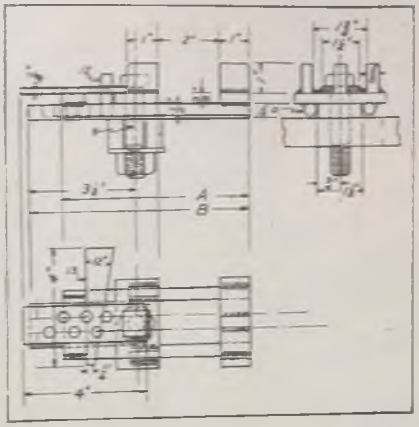


Fig. 4—Details of the special universal jig clamp described here for use with the universal jig shown in other illustrations

The universal jig clamp is an easily made item. The one illustrated in Fig. 4 opens up to 2 inches. It consists of two main units, the base and movable jaw. The work to be held is placed between the two jaws, and then the movable jaw closed in. The pin is placed in the proper hole and the wedge tapped with a hammer, tightening the jaw. To remove the work, the wedge is tapped back but the pin and wedge remain in position for the next job. A $\frac{3}{8}$-inch bolt goes completely through the base to fasten the clamp to the slot bars.

Cost estimates indicate these universal jig clamps of 2-inch capacity can be made in lots of 100 for about 72 cents each.

It is an easy matter to modify the dimensions of the clamp so that it will take parts 6 inches or wider. Any shape of jaw can be made by cutting a profile out of flat steel and welding it on the jaw faces.

Cost of handling various jobs in this type of jig and fixture setup with a universal clamp compared with common method of using clamping or bolting blocks with C-clamps or by tack welding the locating blocks on a jig indicate that the universal jig and universal clamp cut the time about 57 per cent due to faster setup and removal possible with this type of improved universal jig and clamp.

A typical example for setting up with blocks and C-clamps requires 7.57 hours compared with 3.97 hours.

Cuts Man Hours 60%

EXPERIENCE of the Consolidated Vultee Aircraft Corp. suggests some of the results obtainable whenever the pressure of increasing production schedules makes it advisable to reconsider the overall problem of materials handling through a plant. To meet growing schedules, production departments of Consolidated Vultee were expanded. Most expansions had to be made without disruption of current production schedules. As a consequence, congestion frequently occurred because of the over-crowding of machines, employes, and materials in a given area. Aisles became so narrow that it was increasingly difficult to truck materials to and from points of operation.

Long tractor-trailer trains transported work between departments. This work was manually unloaded and loaded with each movement. Materials frequently had to be unloaded quite a distance from the work stations. Consequently, operators had to carry and lift them to the machines, according to a report in *Exide Ironclad Topics*. The report continues:

Moreover, as a hedge against stock shortages, foremen often piled excess stock in their work area. Racks, bins, cabinets, and other furniture gradually accumulated.

After a careful consideration of all plant operations, Consolidated Vultee engineers decided to rearrange all departments feeding the main assembly lines so that materials from storage could be delivered by power trucks *directly* to workers at the machines and benches. To obtain this maximum use of men, materials, and machines, all equipment which did not directly bring together these three elements was eliminated, wherever possible. Just the elimination of nonproductive facilities produced noticeable improvements. However, the first real step in this rearrangement of plant facilities was a *master plan* of department locations in terms of the most efficient flow of materials from raw materials to finished units ready for assembly.

During the course of rapid expansion, many departments had just grown into their present locations without any particular reason. This caused considerable backtracking in the handling of materials. However, under the new plan for materials flow, these same parts rarely travel more than 50 feet along direct lines of assembly; and the number of handling operations was considerably reduced.

Departments were opened up so that materials-handling trucks could go directly to machines or benches. This opening up did not require more floor space; it was obtained mainly by elimination of nonessential storage racks and furniture.

In place of departmental storage spaces, accumulation areas were established. These areas serve as banks, accounting for all raw materials and supplies before entering production and collecting and counting them before passage to assembly lines.

Electric lift trucks are now used which pick up skids and deposit them at either accumulation points or directly beside machine operators. This eliminated numerous manual handling operations. Floor areas are painted yellow so that *exact spots* for incoming and outgoing skids are fixed.

Skids are standardized. One type has a flat top to carry tote boxes, or unit loads of parts; another has a tub to handle larger parts and scrap. Dollies carry materials which are too long to be handled on skids. In departments where more than one operation is carried on, motorized hand trucks are used to move skids within department areas. This frees larger power trucks for longer moves.

The rearrangement of Consolidated Vultee plant facilities, together with the integration of electric materials-handling trucks in the basic plan for the flow of materials throughout the plant, resulted in an accumulation of time (man-hour) savings which *brought about a 60 per cent reduction in the total number of man-hours required to build a bomber.* More important, this reduction was accomplished without interrupting current schedules, and without elaborate additions of plant or new equipment.

Unwired planning will cost you a whole lot more than planned wiring

Lack of adequate electrical wiring will be expensive in a lot of postwar directions . . . in decreased production efficiency . . . in higher power costs . . . in eventual expense of catching up with competition.

No matter what your postwar plans for conversion, new equipment, plant improvements or new products—you can't take full advantage of any of them without adequate power . . . and that means *adequate wiring.*

Right now is the time to start thinking about the wiring *in your plant.* Bring your consulting engineer and the electrical contractor into your advance planning. Remember . . . electrical power is dead sure to play a constantly increasing role in future production—and wire is the harness. Horsepower—on farm or in factory—is useless without adequate harness.

Let's All Back the Attack
. . . BUY MORE WAR BONDS

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices in Principal Cities

Electrical Wires and Cables of Copper are the Life Lines of our Nation

MAGIC with an Engineering Degree

Electric FURNACE BRAZING *

— the ultra modern metal joining technique, beautifully simple—yet magical in its results.

Bring into intimate contact with one another, two—or *two thousand*—steel parts made on screw machine, punch press or draw bench.

Place copper — the commercial variety—at predetermined points in the structure.

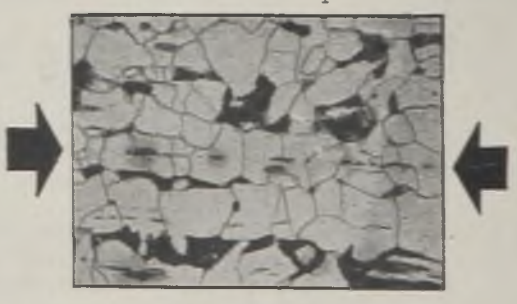
Pass the assembly through the brazing furnace with proper control of temperature, time and atmosphere.

The RESULT is no longer an assembly. In effect it becomes one piece of steel—metallurgically free from joints—pressure-tight — chemically clean—silvery white. Strength and toughness frequently surpass actual one-piece construction. *Subsequent heat treatment* is permissible—is in fact *standard practice* on innumerable parts.

*Also known as Copper Brazing and Hydrogen Brazing.

Our specialized business is Commercial Electric Furnace Brazing. Two modern plants: one in Chicago, Ill., the other in Long Island City, N.Y., are ready to help you develop brazed products or sub-assemblies for war or peace, and to braze them for you when they are perfected.

Please contact our nearer plant.



Arrows indicate joint

This is a Photomicrograph (500 Diameters) of a perfect copper brazed steel to steel joint. Note individual crystals formed half on one side of the joint, half on the other. Metallurgically, the joint no longer exists. (*Brazing done in Salkover Metal Processing Co. Chicago plant*).

THE SALKOVER METAL PROCESSING CO., Inc.

COMMERCIAL ELECTRIC FURNACE BRAZING

4209 W. LAKE ST., CHICAGO 24, ILL. **34-16 BORDEN AVE., LONG ISLAND CITY 1, N. Y.**

Industrial Fluoroscopy

. . . . believed due for tremendous postwar expansion

By R. W. MAYER
Kelley-Koett Mfg. Co.
Covington, Ky.

[illegible] dawn of civilization has been to fly through the air like a bird. Today that dream is realized, man *can* fly.

Second only to the desire to fly has been that of wishing to see what is hidden from the normal eye—to see at great distances, or around the corner, or to see the inside of a solid, opaque body. And that dream also is being fulfilled with television, X-ray and fluoroscopy.

X-rays are used to obtain a picture on a film—or they can be focused on a screen and made visible by use of some salt which radiates visible light when excited by X-rays, called "fluorescing." The screen is a "fluoroscope."

However, many industrial X-ray users who started using the equipment originally because of government requirements, have learned the value of inspection beneath the surface for the information it has given them, enabling them to improve quality, reduce costs and save labor. These users are not likely to discard their X-ray equipment, for it has proven its value. Quite probably they will pass along what they have learned and establish acceptance standards of their own on purchases of castings, welded parts and various assembled units and require X-ray inspection on the part of their suppliers.

Industrial X-ray and fluoroscopy is still in its early stages of progress and is due for a large postwar expansion. One of the elements that will contribute to that expansion is the improvement of presently available types of X-ray machines and the creation of new machines and accessory devices. Progress thus far, has been much greater along the lines of straight radiography than on fluoroscopy, because X-ray has been, for years, fundamentally a tool for the medical profession.

Medical X-ray equipment for radiography required only minor modification for industry, but the medical fluoroscope is another matter. The principal reason for the slow development of the fluoroscope in medicine is the limit of X-ray that a patient can stand with safety. Medical machines are made to automatically cut back to 5 milliamperes when used for fluoroscopy, and the radiologist is extremely careful to restrict the time that a patient is exposed.

However, you can't hurt a casting with X-ray, and the realization of this was the first step in the development of a fluoroscope with a sensitivity usable for common industrial applications. Of course, for some time the fluoroscope has been used to spot the presence of foreign bodies in packaged food, tobacco, soap, cereals, etc. The only problems on such inspection are those of a mechanical nature for the convenient handling of the sample.

Fluoroscopic inspection has a very strong popular appeal. It is very attractive to speculate on the possibilities of having the work pass across a screen and instantly separate the good from the bad—no waiting for films to be developed and dried, no films at all, no dark room, no delay. Savings mount, costs go down, and for these reasons there have been many attempts to widen the field of application of the fluoroscope, *but the stumbling block has always been lack of sensitivity for until very recently, a sensitivity of* 15 *per cent was considered normal,* 10 *per cent good, and under very unusual circumstances* 8 *per cent might be seen.*

Today, we know that these limits can be just about cut in half. In other words, a *sensitivity of* 5 *per cent or better can be counted on as a regular day in and day out production standard.*

It is well to recognize some of the inherent limitations of fluoroscopy. In the first place, radiographic technique charts on a penetration do not apply. Considerably higher voltages are required on a fluoroscope than on a film. The time factor permits the effect of the X-rays to accumulate on film. Only those striking the fluoroscopic screen at any instant are visible. The screen shows only the instantaneous image. There is no cumulative effect as with a film.

This limitation immediately translates itself into a limit of thickness that can be fluoroscoped because it is not practical to use a unit of more than 220 or 250-kilowatt capacity for fluoroscopy. The reason for this limit is principally a matter of safety. As the voltage is increased over these limits, there must be more than a proportionate increase in the thickness of lead and lead glass of the viewing cabinet. Moreover, with fluoroscopy, the X-ray is left turned on for a much longer period of time than is the case with radiography, which increases the importance of providing adequate protection to the operators. Our industrial laboratory has found the practical limits to be approximately 2 inches of aluminum and approximately ½-inch of steel.

A second limitation is sensitivity. Radiographic penetrameters are based on 2 per cent sensitivity, although on good radiographic work, flaws on the order of 1 per cent can be shown. While some excellent sensitivity claims have been made on the part of reliable observers, we prefer to state that the fluoroscope is practical for sensitivities of 5 per cent and a little better, at this time.

Thirdly, the fluoroscopic screen provides no permanent record. The results obtained are in what the observer sees and if a check is required, other means must be used.

Fourthly, *the degree of success with fluoroscopy depends on personal factors to a greater degree than is the case with radiography.*

These limitations have been listed to make it clear that fluoroscopy must not be considered a complete substitution for radiography. In the final analysis, it must also be kept in mind that the fluoroscope has definite advantages of time and cost, as mentioned previously, and also has certain exclusive advantages of its own.

For example, a radiograph provides a picture in one plane only, but in a fluoroscope the part can be rotated to provide a third dimension to definitely fix the location of the defects.

Also, certain types of defects, such as cracks and fissures will only appear on a film if the part is so placed that the plane of the crack lines up with the direction of a X-ray beam. The chances are very slim indeed of being able to place a part on film in exactly such a position, but in a fluoroscope the part can be twisted and turned until—suddenly—there it is.

Now, considering these several factors, it becomes evident that on most applications fluoroscopy will find its greatest value as a supplement to radiography rather than to be used alone. That is, the ultimate in an inspection setup that lends itself to fluoroscopy at all is a combination layout arranged to provide ready changeover from one to the other without sacrificing any of the advantages of either.

Let us consider what this involves. A fluoroscopic screen is observed through lead glass and the only practical arrangement involves the use of some sort of lead-lined cabinet with lead-glass viewing window. Since such a cabinet must have all the elements of protection required for radiography, and since the same X-ray generating equipment can be used for both fluoroscopy and radiography, it becomes unnecessary to construct a separate lead-lined radiographic room provided, first, that we can so design the cabinet as to make it adaptable for either radiography or fluoroscopy; and, second, that we arrange the control so

From a report to the American Industrial Radium & X-Ray Society.

Husky Jack Cook
First helper

FIRST LINE OF FIGHTING STEEL

Batteries of open-hearth furnaces in the steel mills of America produce most of the steel for the attack. For the open-hearths are the first line of steel production — and steel is the spearhead of invasion.

New skills and new methods in open-hearth operation contribute to the record-breaking steel production that arms our men and our allies and affords protection to their lives as well.

This greater open-hearth tonnage of new carbon steels, with properties approaching the alloys, holds high promise for peace-time application in great abundance that will enrich life and enlarge daily living.

JONES & LAUGHLIN STEEL CORPORATION

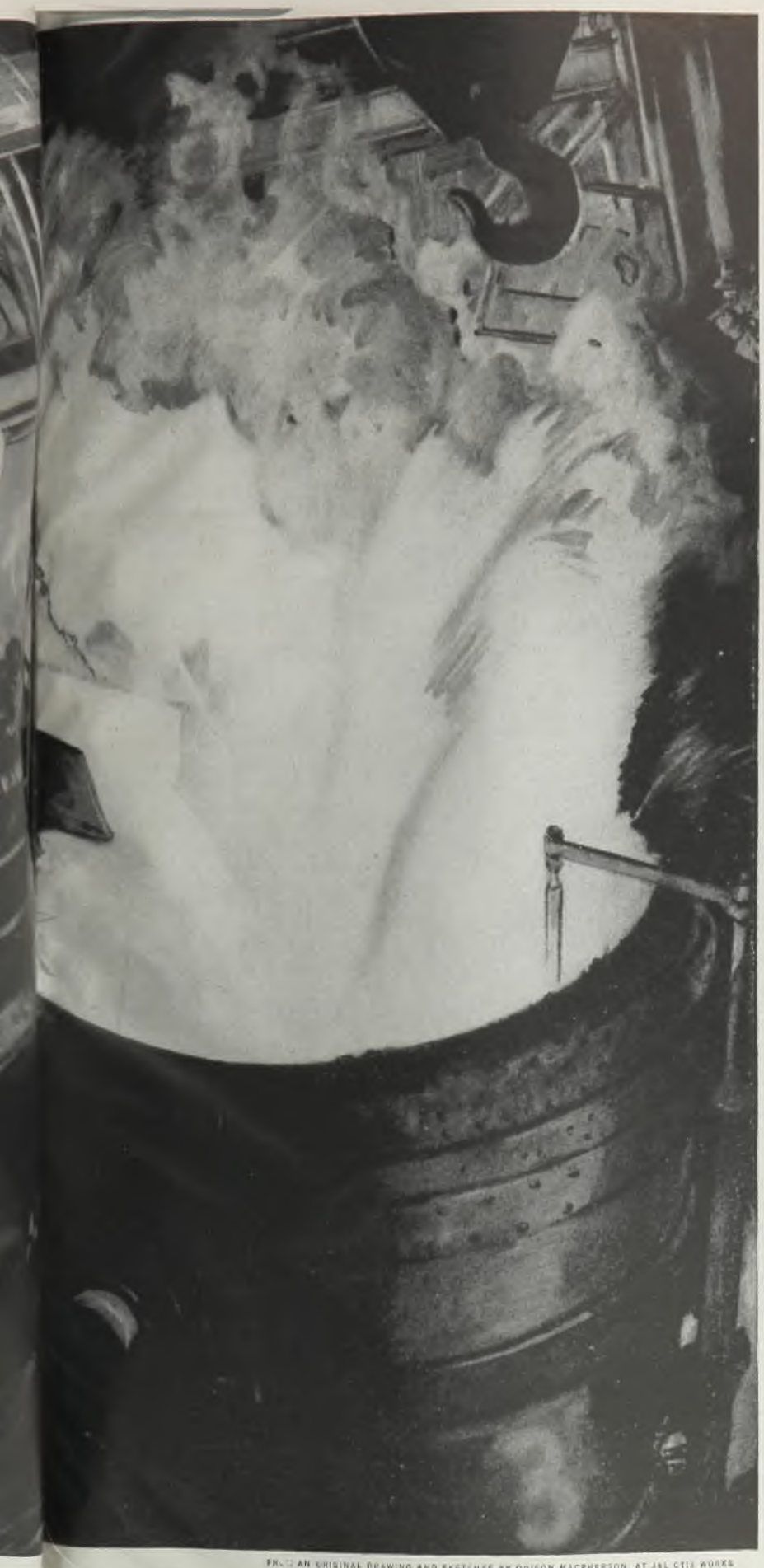
J&L STEEL

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR

Coffee on the job,
Bill Hasson - Emil F. Vidich

John F. Stempien
First helper
21 years with
Otis



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

THE OPEN HEARTHS

Bigger than 8-room house, a modern open hearth steel furnace, enclosed in silica brick, produces 150 to 200 tons of molten steel every 10 to 12 hours. The furnace is first charged with limestone, then scrap iron, eventually pig iron or molten iron, and other ingredients. For hours the "bath" melts, bubbling and boiling at temperatures up to 3,000°F., is worked, watched and tested by skilled crews, vigilant to maintain control of quality.

Samples of the steel bath are taken at intervals and laboratory tested to make sure analysis of the steel is correct for the job it is to perform—perhaps on a far away battle front. Experienced open-hearth melters and helpers, by merely looking at a fractured steel sample, can judge carbon content to within 2/100 of 1%. In this they are now assisted by a magnetic device in a small box which reveals carbon content on a dial. This is the "Carbanalyzer," a J&L invention.

Through tap hole in rear wall the "heat" of molten metal is drawn off into great ladles in pits below. As these are filled, protectively garbed skilled workmen on the tapping platforms amidst heat and sparks, throw in measured quantities of manganese, silicon and other final modifying ingredients (see illustration) to obtain exact analysis of steel desired.

Wispy vapors tinted lavender, chartreuse, pink, blue, yellow, arise as the fiery stream of steel gurgles and splashes until ladle is full, and steel sparks shower about, popping and bouncing as they hit the ground. Overhead crane now picks up the sputtering brimful ladle and bears it away to fill the rows of ingot molds standing close by on low-built buggies (small flatcars).

Greatest steel producers of all time, open hearth furnaces, from which streamed last year in the U. S. 78,625,857 tons of steel ingots, were invented by Charles William Siemens, of Hanover, Germany, who became citizen of England to obtain protection of its patent laws. He patented his furnace in 1861 and perfected it in 1867, a dozen years after Henry Bessemer's process had revolutionized steel making.

Two brothers in France, Emil and Pierre Martin, experimenting in the 60's to further improve steel-making methods, utilized a Siemens furnace to produce steel by melting scrap iron in bath of molten pig iron. This became known as the Siemens-Martin process; is substantially the process used today.

A Cleveland ironmaster, Charles A. Otis, founder of Otis Steel Co., in association with Samuel F. Wellman, engineer, of New York, in 1873 built first complete steel works in U. S. planned exclusively for production of steel by the acid open hearth process. In 1880 Wellman built for Otis first basic open hearth steel furnace in U. S. (Basic differs from acid process.) Otis Works, Cleveland is now one of Jones & Laughlin's big steel plants—others are in Pittsburgh and Aliquippa, Pa.

as to make it, also, do double service.

For the control unit two things are involved. The first is a foot switch control for the fluoroscopic observer, a very simple addition to any X-ray control unit; and the second is to provide stepless control of kilovoltage to permit the observer to "tune in" so to speak, to whatever value is required to penetrate the particular section under observation. At present there is no such control on the market, but an experimental model has been built and it will soon be available for general use.

Regarding the cabinet, the actual development has been from the radiographic side. For some time, it has been recognized that a cabinet has certain advantages in cost, convenience and flexibility over the construction of a lead-lined room.

Personal Factors—Vision: *Choice of observer:* The prime requisite for a fluoroscopic observer is good vision. Ordinarily young people have the best vision and their eyes can be accommodated to various levels of brightness with less strain. It is considered that the best observers should be about 20 to 25 years old, either male or female.

There is much still to be learned concerning quality of vision, particularly with respect to the fluoroscope. For example, some people have better vision in one color than in another, and there are relative variations at different brightness levels. Therefore, a person with good vision in the ordinary sense may not be able to discern small flaws on a fluoroscopic screen. So far as we [illegible] has been no serious investigation of these factors with a view to setting up standards that can be used in choosing a fluoroscope observer. The suggestion has been made that the U. S. Army Air Force vision tests might serve, at least, as a starting point on which fluoroscopic standards might be based.

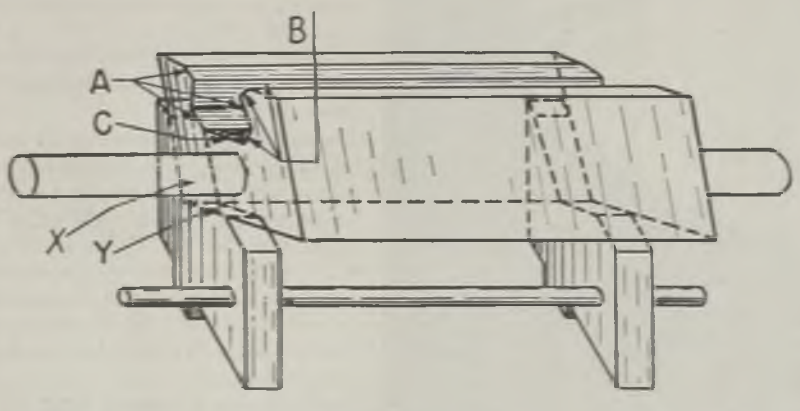
Eye Accommodation: Accommodation of the observer's eyes to darkness is probably the most important precaution for successful fluoroscopy. The most complete investigation of this subject that is available is a paper read before the Radiological Society of North America in December, 1941 by Dr. W. Edward Chamberlain of the Temple University Medical School of Philadelphia, entitled "Fluoroscopes and Fluoroscopy."

This paper goes into considerable detail on a physiology of the eye and the nerves comprising the retina, and explains that eye accommodation to darkness is considerably more than mere pupil dilation. According to Dr. Chamberlain, at least 30 minutes and preferably 45 minutes should be spent in total darkness before attempting critical fluoroscopic work.

Training and Experience: A fluoroscope is such a simple device that there is a very natural tendency to believe that anyone can look at a screen and analyze what appears there. In the case of gross imperfections, this is probably true, but seeking flaws on the order of 5 per cent or less and attempting to analyze such flaws requires the same type [illegible] in studying film. Some companies have worked out a course of training for their fluoroscopic operators and one of the early steps in this training is a study of radiographic films.

Comfort and Future: It must be recognized that a fluoroscope operator responsible for detecting small flaws is under a serious physical strain. The greatest strain is, of course, on the eyes, but a high degree of concentration is required which is a strain on the entire system. It is important to prevent fatigue which would result in impaired vision.

Therefore, the operator should be permitted to sit rather than stand, and the chair should be comfortable and with good support for the back. It is also recommended that the shifts be of short duration, that is, not more than two hours at a stretch (perhaps only one hour) with a rest period of at least 15 minutes before going on duty again. During the rest period it is advisable that the observer wear dark goggles in order to retain his eye accommodation.



Holding Device an Aid in Groove Milling Operation

Prior to development of the holding device for groove milling with a staggered-tooth side-and-face cutter, shown in accompanying sketch, form cutters used for the work were required to take a very heavy cut. This entailed frequent regrinding, as the amount of material removed quickly dulled the cutter. Such regrinding naturally changed dimensions of the cutter and careful readjustment of the miller then became necessary.

Present practice at General Electric Co.'s Schenectady Works, where the holding device originated, is first to mill out a slot the width of "C" and surface of same is then milled to desired dimensions. Surface "X" of the locating device is finished to be parallel to proposed surface "A" when the piece is in position. Surface "Y" is at 90 degrees to "X". The V in locating device is cut so that when the piece is in position, the "B" surfaces are vertical and are machined as an end milling operation. Piece is then turned end for end and surfaces "A" are machined in similar manner.

Price Making by Industry In A Democracy

Price Making in a Democracy, by Edwin G. Nourse; cloth, 539 pages, 5¾ x 8 inches; published by the Brookings Institution, Washington, for $3.50.

The first chapter of this book appeared as a pamphlet in January, 1942, and between then and July, 1943, 11 other chapters and three appendixes were preprinted in pamphlet form. These chapters have been revised and some extensively rewritten and three additional chapters and four additional appendixes have been included.

In the interval since the first pamphlet, much discussion has been possible and has led to a broader presentation. The work is divided into three parts, dealing with principles, problems and prospects in price making. Discussion covers broad ground in consideration of benefits and disadvantages of free enterprise and government control, and considers the factors of low and high prices and influence of wages and purchasing power.

Single-Milled Die Used To Press-Mark Shell

A simple precision marking die made by New Method Steel Stamps Inc., 147 Jos. Campau street, Detroit 7, permits the automatic machine marking in production of parts with a single milled die incorporating all the lettering and figures or designs required. The die is employed in a punch press and is used for marking drill cartridge cases for 75-millimeter shell. The more than 50 figures and letters engraved on the stamping die were cut by the New Method pantographic milling process and later hand-finished by engravers.

For *dependable* deep-groove welds

Use RACO 5 *Electrodes*

RACO 5 Electrodes are outstandingly superior for deep-groove welding, in the flat position, A.C. and D.C., straight polarity, on medium and heavy mild steel plates, especially Class 1 pressure vessels, A.S.M.E. and A.P.I. codes.

The chief features of RACO 5—ease of manipulation, minimum spatter, high physical properties, easily removed slag and smooth contour of deposit—are your positive assurance that RACO 5 meets your demand for the highest quality type E 6030 electrode obtainable.

The exhaustive research, precise control throughout manufacture, and long experience that lie behind all RACO products show up in the splendid performance of these products on the job. Should you wish to test RACO 5, and so convince yourself of their top-flight qualities, we shall be glad to send samples.

Other Reid-Avery Electrodes for A.C. or D.C. Welding

RACO 6 • RACO 8 • RACO 11 • RACO 20 • RACO 82 • RACO 64

The REID-AVERY COMPANY

DUNDALK BALTIMORE 22 MARYLAND

ORDER SCHEDULING

in a Specialty Tube Mill

Controlled materials plan employed by tubemaker to expedite numerous orders through various phases of treatment is responsible for delivering 85 per cent of all commitments scheduled for manufacture in a given month as promised. Each step of the procedure is explained in detail

By NORMAN F. REARIC
National Tube Co.
Ellwood City, Pa.

THOUSANDS of different kinds of special seamless tubing are manufactured at the Ellwood Works of the National Tube Co., Ellwood City, Pa. As this business grew, the complexities of manufacturing so many thousands of small lots made scheduling extremely difficult and commitments as to delivery became more vague. Before the establishment of the system of order scheduling to be described, as much as 50 per cent of the orders promised for a given month might fail to be delivered. The use of the order-scheduling system has so greatly improved this situation that at the present time, under the Controlled Materials Plan, over 85 per cent of all orders expected to be manufactured in a given month are delivered as promised, and the 15 per cent not produced are shipped early in the subsequent month.

At this mill between 50,000 and 75,000 orders are handled annually, with a present average of 5 tons per order, covering in normal times approximately 5000 different sizes and wall thicknesses of seamless tubing ranging from $\frac{5}{16}$-inch outside diameter by 22 gage to 10¾-inch diameter by 1.875-inch wall. Nearly 150 steel grades, covering all known seamless tube specifications, are involved.

Scheduling and processing of such a variety of orders is complex. With the advent of priorities and the later institution of the Controlled Materials Plan it became paramount that material be produced in accordance with the sequence laid down by the Controlled Materials Plan. Without the established order-checking and scheduling system in use at this plant, the compliance with Controlled Materials Plan would have been extremely difficult. The feature of the Controlled Materials Plan which designates the time of order completion for three months ahead, has fitted in nicely with the order-scheduling system to be described, and has enabled the scheduling of orders for at least three months ahead of production, permitting an accurate promise as to when new orders may be produced and shipped. Since the Controlled Materials Plan only allots the total capacity of a given plant, without much reference to the type of product, the order-scheduling system has enabled

Top, (opposite page) Example 1—Order for hot rolled and cold drawn tubes (Bottom, opposite page) Example 2—Master hectograph form for hot and cold drawn order

(Below)—Order procedure begins in bloom yard where semifinished steel is segregated according to analysis. Pickling tanks in foreground are used for surface preparation of billets before rolled into rounds

COLD DRAW AND COLD FINISH RECORD CARD

DATE CARDED- 11/5/43 df

BALE NO.	SOURCE DT.	SOURCE PCS.	SOURCE WT.	CHM DT.	POINT DT.	POINT PCS.	GRIND DT.	GRIND DIA PCS	GRIND SCR PCS	ANNEAL DT.	ANNEAL PCS.	1ST PASS DT	1ST PASS PCS.	1ST PASS WT.	1ST PASS TO.	2ND PASS DT.	2ND PASS PCS	2ND PASS WT.	2ND PASS TO.	3RD PASS DT.	3RD PASS PCS.	3RD PASS WT.	3RD PASS TO.	4TH PASS DT.	4TH PASS PCS.	4TH PASS WT.	4TH PASS TO.	FINISH PASS DT.	FINISH PASS PCS.	FINISH PASS WT.	FIN. ANNEAL DT.	FIN. ANNEAL PCS.	FIN. ANNEAL WT.	PKL. WIRE DT.	PKL. WIRE PCS.	PKL. WIRE DT.
1715	Cut in the middle				11/11	240	11/11	240				11/12	240	8070														11/13	238	7920 2 Scrap	11/13	238	7900			
	EXAMPLE 1																																			
	Hot Rolled and Cold Drawn Order																																			
1716	Cut in the middle				11/11	240	11/11	240				11/12	238	8000	2 Scrap													11/16	234	7760	11/17	234	7760			

BALE NO.	REC'D DT	REC'D PCS.	FINISH STR. DT.	FINISH STR. PCS.	FINISH STR. SENT TO	FIRST INSPECTION DT	FIRST INSPECTION CHG. PCS	FIRST INSPECTION O.K. PCS	FIRST INSPECTION O.K. WT.	FIRST INSPECTION SCRAP PCS.	FIRST INSPECTION SCRAP WT.	FIRST INSPECTION REMKS	CUTTING DT	CUTTING CHG. PCS.	CUTTING MIN PCS.	CUTTING MIN LGT.	CUTTING SCR PCS.	POLISH DT.	POLISH PCS.	S/BLST. DT.	S/BLST. PCS.	HYDRO. TEST DT.	HYDRO. TEST PCS.	HYDRO. TEST PRESSURE	FINAL INSPECTION DT.	FINAL INSPECTION CHG. PCS.	FINAL INSPECTION O.K. PCS.	FINAL INSPECTION SCRAP PCS	FINAL INSPECTION SCRAP FTGE.	FINAL INSPECTION RMKS.	RESTRAIGHTEN DT.	RESTRAIGHTEN PCS.	RESTRAIGHTEN SENT TO
1715	11/13	238											11/17	238	476	120"						11/19	476	1000	11/19	476	462	14	168	Redraw			
	EXAMPLE NO. 1																																		
1716	11/17	234											11/17	234	456	120"						11/18	453	1000	11/18	453	453						
															12 Rand.								3	Scrap Leakers										

BALE NO.	RECUTTING DT.	RECUTTING CHG. PCS.	RECUTTING PIN. PCS.	RECUTTING LGT.	RECUTTING SCR	RECUT-INSPECTION DT.	RECUT-INSPECTION CHG. PCS.	RECUT-INSPECTION O.K. PCS.	RECUT-INSPECTION SCRAP PCS.	RECUT-INSPECTION SCRAP FTGE.	RECUT-INSPECTION REMKS	GOVT. INSPECTION DT.	GOVT. INSPECTION CHG. PCS.	GOVT. INSPECTION O.K. PCS.	GOVT. INSPECTION SCRAP PCS.	GOVT. INSPECTION SCRAP FTGE.	GOVT. INSPECTION REMKS.	REPORT R.R. DT.	REPORT R.R. PCS.	REPORT R.R. LGT.	RELEASE R.R. DT.	RELEASE R.R. PCS.	RELEASE R.R. LGT.	PACKING DT.	PACKING PCS.	PACKING FTGE.	PACKING WT.	SEN-REC-STK. DT.	SEN-REC-STK. PCS.	SEN-REC-STK. WT.	PCS. ON OR	LGTHS.
1715																								11/19	462	12'0"	6985					
	EXAMPLE NO. 1																																
1716																								11/18	453	12'0"	6849					
	Progress of other bales shown rolled on Ex. 3 this order posted on additional cards of this form																																

ROLL SIZE — PASSES	ROLL PROMISE	MAKE PROMISE	MADE BY	FINISHED STOCK — O. K. TO APPLY	TESTS
roll 1-1/2 x 8 2 passes roll #1 mill 11/15 mke 12/13 DW prom. Dec. CF				CMP MRO-24 AA-1	Flatten. Flang. Chem. Rockwell
REQUIRED FROM STOCK — TO:		SEND IN	PASSES		

HOUSE ORDER #	J. O. NO.	J. O. FROM SE	HYDRO. TEST	WT. ON ORDER	CLASSIFICATION	DATE DUE
Det/1504			1000# after Insp. & oiling.	75780#	CD Condenser Tubes	Demand Dec. CF

WORK ORDER	CUSTOMER	SIZE (.1207-.146)	AMOUNT	LENGTH	CLASS	ALLOY	WORK ORDER NO.
226958	The Doe Chem. Co.	1" x 11 ga.	5000 pcs	12'0"	U-4	1380-F Bright	226958

BMC-37 REV. N. Y. CO. WHITE ☐ GOLD'D ☐ GREEN ☐

W. O. 226958

BAR MILL AND HOT MILL CARD

DATE WRITTEN 11/3/43

TUBING ORDERED PCS.	O.D.		LENGTH	BAR MILL PCS.	SIZE	WT.		HOT MILL PCS.	O.D.		LENGTH	
5000	.994 1.006	.120 .146	12'0"	1375	2-1/2	69		1375	1-1/2	8 ga.		

Hot Rolled and Cold Drawn Order

EXAMPLE 2 - MASTER HECTOGRAPH FORM

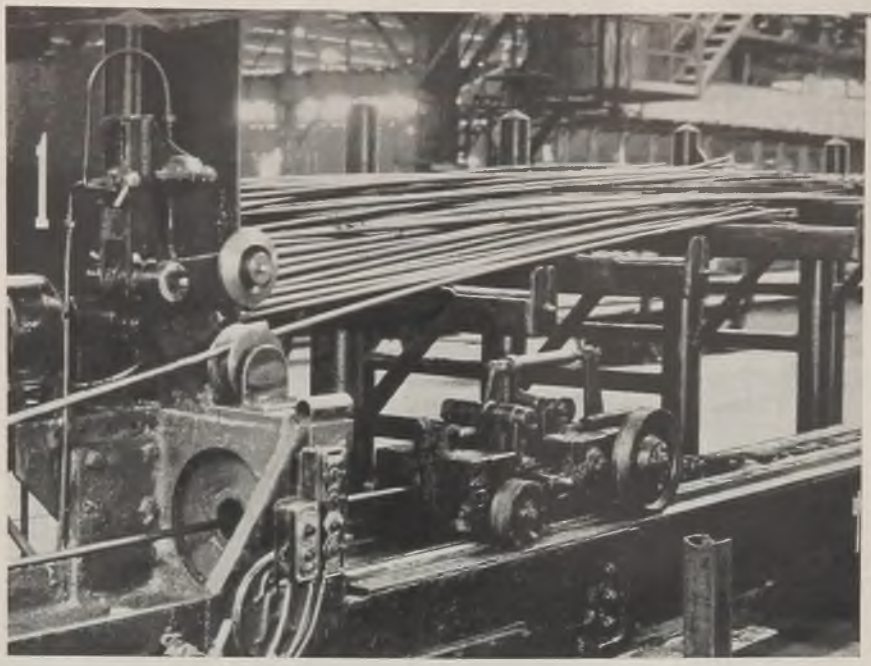
(All of the pertinent information (illustrated by typewritten figures) on this Master)
(Hectograph Form (Example 2) is superimposed on Rolling Card (Example 3) by means of)
(the duplicating machine; the printed lower section of Rolling Card (Example 3) being)
(left open for posting (illustrated by ink figures) by means of "blocking out" the)
(section indicated on Hectograph Form (Example 2) when running on the duplicating machine.)

PASSES	2	PRIORITY RATING	CMP MRO-24
SHIP. WT.	75780	CLASS OF STEEL	U-4
ROLL. WT.	93450	ORDERED ON REQ'N.	
		PROMISED	
		LAB. TO SELECT STEEL	
		GROUP NO.	
		CONDITION ROUNDS	
		TOP CUTS	
		OTHER BAR MILL DATA:	

WT. PER FT.	1.24
WORK TO	
AVE. WALL	
SPEC.	ASTM A-179-42
ANNEAL	
TYPE OF PRODUCT	
STAMP	
PLUG GAUGE	
RING GAUGE	
CHEMICALS	
TENSILE	
WT. PER FT. REQUIREMENTS MAX.	MIN.
OTHER HOT MILL DATA:	
INSPECTION	
DELIVERY REQUIRED	

ROUTING

MILL	ROLL PROM.	HOUSE ORDER	JOB ORDER	FIN. DEPT.	WORK ORDER
	11/15	Det/1504		1	226958



Orders are split into segments conv... venient for handling through mill. Each segment is made into a bale, held together with chain or rope slings, and through all operations such as cold drawing process shown here, the bale is processed as a unit to prevent any pieces going astray

this mill to obtain an accurate picture of the sizes of tubing on order, and enables the booking of additional tonnage in sizes which can be produced in the required quarter.

An idea of the work handled may be imparted by listing some of the more important types of tubing produced. This includes all types of pressure tubes such as boiler, superheater, condenser, cracking still, and other chemical plant tubing; airplane structural tubing for such parts as spar chords, bearings, air frames, landing gear struts; innumerable types of mechanical tubing for carburizing, heat treating, machine parts, ball and roller bearing tube, and other structural uses; range finder tubing and other *materiel* for ordnance purposes; and many types of special alloy tubing for corrosion resistance. These materials must be manufactured in accordance with Limitation Order L-211 and other War Production Board regulations.

During normal times considerable stock of boiler tubes and carbon mechanical tubing is maintained to enable quick deliveries. At the present time, however, due to extreme demand for seamless tubing, it is impossible to maintain any stock, which makes it necessary that all orders be started from the bloom or solid round form of steel, and, in many cases special steel must be melted.

When an order is received at the Entry Division in the Order Department the first operation is to assign a work order number to each size and gage on the order, and reproduce from the original copy a work order copy for development purposes. By means of series the work order numbers are indicative of the different types of orders. The work order numbers begin with numbers higher than the highest bale numbers in the interest of avoiding confusion. For example, order numbers used for experimental purposes start with 14,000 and continue to 16,999; all orders requiring Navy inspection at the mill are assigned series 18,000 to 21,-999. All regular work orders use series starting with 25,000 and continue for a cycle of two years. The other series rotate when the last number of the series has been used. This work order setup has been effective, and little if any confusion has occurred during its usage.

The order is next cross-indexed by district sales office order number, work order number, and date received. Any order for other than straight-carbon tubing is again cross-indexed under steel grade by district sales office number, after which the work copy passes through the following steps in development:

Specification Group: This important group, composed of four men, two each from the metallurgical and the inspection departments, is responsible for properly setting up the orders for manufacture with regard to chemical composition, class of steel, proper size, tolerances, specifications, customers' requirements, and verification of mill's ability to manufacture. Any questions regarding the foregoing specifications, if not agreed to, are referred to the sales department located at the plant, which in turn clears with the customer. After all matters have been cleared to customer's satisfaction, a specification (or work sheet) containing all manufacturing procedures (such as selection and application of steel, heat treatment, amount of reduction between passes, surface treatment, shot-blasting, ring gaging, drifting, physical tests, brinell, tensile, torsion, and hydrostatic test) is attached to the order and it is then sent to the Stockhouse Group. The Specification Group is also responsible for the checking of shipping papers prior to shipment of material to verify that all operations, tests, etc., as specified on the work sheet, have been performed and that the material meets the specification on the order.

Stockhouse Group: The order is checked for finished stock which, if available, is applied. If the order can be

BM-C-37 (Rev. 11-1-42) WHITE ☐ GOLD'D ☐ GREEN ☐

W. O. 226958 — BAR MILL AND HOT MILL CARD — DATE WRITTEN 11/3/43

TUBING ORDERED				BAR MILL				HOT MILL				
PCS.	O.D.		LENGTH	PCS.	SIZE	WT.		PCS.	O.D.		LENGTH	
5000	.994 / 1.006	.120 / .146	12'0"	100	2-½	69		100	1-1/2	8 ga		
						EXAMPLE 3						
						HOT ROLLED AND COLD DRAWN ORDER						
				PRIORITY RATING		CTP ERO-24						
	PASSES	2		CLASS OF STEL				WT. PER FT.	1.24		WORK TO	AVE. WALL
	SHIP. WT.	7750		ORDERED ON REQ'M.				SPEC.	ASTM A-179-42			
	ROLL. WT.	94875		PROMISED				ANNEAL				
				LAB. TO SELECT STEEL				TYPE OF PRODUCT				

Blooms & Rounds					Steel Cut Cradled		Heat Chaser										Tubes Rolled				Sent To		
DATE	PCS	WEIGHT	CLASS	PCS	WEIGHT	CRADLE NO.	PCS	DATE FIN'D															
												Lorain 7504	0469#	1715	1/1	170	8230						
														1716		130	8209						
														1717		98	6470						
												1522		1718		124	8560						
												9537		1719		122	8290						
														1766	1/4	100	6750						
												5553		1768		82	6780						
												1522		1769		114	4300						
														1770		100	8100						
												2551		1771		43	6800						
														1772		100	7430						
														1773		64	6630						
												7548		1774		47	4100						
																	93350#						

CUSTOMER	MILL	ROLL PROM.	HOUSE ORDER	JOB ORDER	FIN. DEPT.	WORK ORDER
Doe Chemical Co.	1	11/5	Det/1504		71	22058

Example 3 — Specially designed rolling card

EVERYTHING FOR PIPING SYSTEMS-- YOU CAN GET IT FROM CRANE

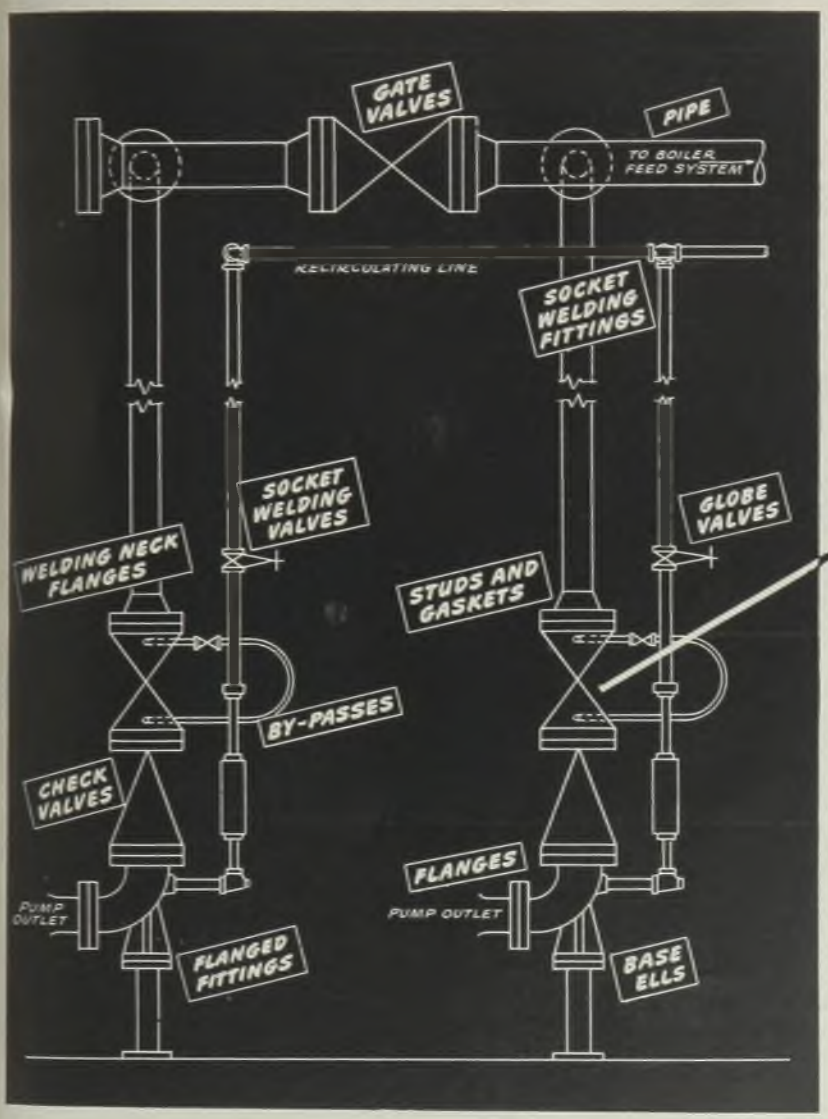
One Source of Supply...One Responsibility for all Materials

NEED a single pipe fitting . . . a pipe line extension . . . or a complete piping system for any service? You stand a better chance of getting exactly what you need from Crane—the world's greatest line of piping equipment! This boiler feed hook-up illustrates this point. Not only the valves and fittings, but the pipe, pipe bends, and all other materials come from Crane.

A single dependable source of supply also means simplified ordering and maintenance procedures, easier control of parts stocks. One responsibility for the quality and craftsmanship of all materials assures the best installation. You get all these advantages—backed by 89 years of leadership in the piping field—when you specify CRANE.

CRANE CO., General Offices: 836 S. Michigan Ave., Chicago 5, Illinois.

Hook-up for Boiler Feed Pump Discharge Lines



CAST STEEL GATE VALVES

One standard of quality

In the system shown—in any 100% Crane equipped system—maximum efficiency is assured because there's adequate quality in every part. For example, in Crane Cast Steel Gate Valves: Straight-through ports minimize turbulence, erosion, resistance to flow. Strong tee-head disc-stem connection, ball-bearing yoke, and non-corrosive stem bearings assure smoothest operation. Extra long guide ribs make seating positive.

CRANE

VALVES • FITTINGS • PIPE
PLUMBING • HEATING • PUMPS

Each bale maintains its identity through numerous testing operations Bale shown here is undergoing hydrostatic testing. After test, all pieces passing inspection move simultaneously to next operation

completely filled from stock it is marked "From Stock" and sent back to the Order Entry Group. If the order cannot be completed from stock it is then, if to be cold drawn, sent to the Cold Draw Group for further development; if straight hot rolled is required, the order is sent back to the Entry Group since rolling orders are prepared by that group.

Cold Draw Group: The order is checked for the number of tubes required, starting size, weight, and number of passes to make the order. This group then contacts the Stockhouse Group for process material in stock from which the order could be made without rolling. If no material is available, order is sent to the Entry Group to have rolling order made, after which it is sent to the Bar Mill and Hot Mill Scheduling Group where they indicate pieces, weight, and mill number on which the material is to be produced. It is then referred to the Controlled Materials Plan Group for complete check of operations indicated against established capacities.

Controlled Materials Plan Group: This group maintains a running backlog of all orders scheduled on the hot mills, cold draw benches, annealing furnaces, shot-blasters, specialty, and other operations on which monthly capacities by weight have been established, and it is their function to reduce all orders to a pound-hour time element and tabulate the time required for each of these operations. Before tabulating, the estimated time required is checked against the backlog of hours at each of these operations, and if the order cannot be accomplished on all operations in time to meet Controlled Materials Plan specified delivery it is refused and a new Controlled Materials Plan date requested. If, however, the order can be manufactured within the required time it is passed to the Bar Mill and Hot Mill Schedule Group.

Bar Mill and Hot Mill Schedule Group: Here, all orders are reduced to number of pieces, piece weight, and steel required, whether hot rolled or eventually to be cold drawn. If special steel must be obtained in bloom or round form, this group makes the requisition and sends it to the purchasing department; if the steel is on hand in bloom form, the order is scheduled on the bar mill for rounds which are then pierced and rolled into tubes; if the steel is in round form, hot mill scheduling only is necessary. This group is entirely responsible for both bar mill and hot mill schedules, and keeps a running backlog of all orders scheduled against these units. When they have scheduled orders they so indicate on the work sheet, showing mill number and rolling promise, after which the order is returned to the Order Entry Group for final checking and duplicating.

Order Entry Setup—Step 2

After the order has cleared these groups it is ready for final review to insure that all manufacturing and scheduling requirements are clear. A master copy is then typed with all the necessary information such as manufacturing procedure, rolling promise, cold draw promise, number of passes, etc. About 30 or 40 copies of the master copy are reproduced and sent to all stations in the mill where work will be performed on the order. The master copy is then given to the Kardex typist.

Kardex Typist: Here, all pertinent information including work order, house order, size, quantity, lengths, weight, specification, tests, anneals, sizes to be rolled, cold drawn sizes, Controlled Materials Plan rating, and shipping promise, is typed on the card (See Example 1), after which the master copy is filed. The Kardex card is attached to a rolling card which previously has been made by superimposing the master rolling order (See Example 2) on a specially-designed rolling card (See Example 3), and both are sent to the Order Scheduling Group to be checked and placed in the Kardex file.

Cold Drawing and Finishing Schedule Unit: The order has now reached the unit responsible for expediting and completion of material to meet delivery commitment to customer. The schedule men check every incoming card for correct information, immediate schedule where material is to originate, whether stock is to be ordered out to finish, or any immediate action necessary, after which the card is placed in the active file for future scheduling.

Outline of Equipment and Personnel

The equipment in the department consists of visible Kardex files made up of 18 sixteen-drawer units, each drawer holding 35 order cards 8 x 11 inches (See Examples 1 and 2) which are specially designed so that complete transcription of production records can be made on them as the operations are performed in the mill.

The personnel of this department is composed of one supervisor, eight schedule men, 12 posters, one typist, one file clerk, and two CMP clerks. The schedule men schedule all operations each Friday for the succeeding week through the cold draw, finishing, stockhouses, annealing furnaces, pickle house, shot-blasting, specialty forming, and shipping departments. This is accomplished by analyzing each of the 15,000 to 20,000 cards in the active file, and, although the majority of the cards bear promises of future dates and are not included on the Friday schedule for the next week, this weekly analyzing of all the cards is an assurance that no items on which operations should be performed are overloked. Nine schedule men working 12 hours (108 man-hours)

Where CHAIN has been made for 75 YEARS

The City of Cleveland—great industrial center, has been an excellent if severe proving ground for CLEVELAND CHAIN. To satisfactorily supply the Chain requirements of such important industries as steel production, Great Lakes Shipping, truck and motor car manufacturing, CLEVELAND CHAIN has always had to be good. Chain specifications of the Army and Navy are even more rigid and exacting. CLEVELAND CHAIN is meeting them—it will meet your post-war Chain requirements equally as well.

CLEVELAND CHAIN

WELDED AND WELDLESS

for Every Purpose

CATALOG No. 40 AVAILABLE UPON REQUEST

Since DR ***1869***

The Cleveland Chain & Mfg. Co. Cleveland, Ohio

are required to analyze and schedule the operations previously stated, and each man is responsible for the correct scheduling of all orders he analyzes.

Schedules are made on specially-designed hectograph forms to suit the operations, and material in progress is indicated by the number of bales scheduled against the operations to be performed. These schedules are sent to all departments in the mill where any operations are to be performed, and, since they are made up during one 24-hour period, only a small amount of work has been accomplished on orders on the schedule during this period. When the schedules are received in the mill they are immediately corrected to the actual condition of the material, and the balance of the work performed as indicated.

Twelve posters (three to a group) working 8-hour turns for 24 hours a day, seven days a week (except 7:00 a.m. to 3:00 p.m. Sunday) are required to make transcriptions of the performed operations. They also supply information to the mill and correspondence clerks who are constantly checking material and the progress of orders. There are four telephones on which as many as 200 incoming and outgoing calls are handled daily. Transcribing the performed operations is accomplished by matching the work orders and bale numbers (which will be discussed later), pieces and weight shown on the production report with the bale numbers shown on the order cards which were assigned when the material was started in operation (See Examples 1 and 2 for significance of bale numbers).

When operations have progressed to the point where the order has been packed, and the amount packed coincides, or is greater than the amount called for on the order, the poster marks the card "complete" and places a red "X" in the lower right-hand corner, which can readily be seen upon opening the drawer of the file. This reduces the time re clear files of completed orders, which is done weekly to make room for new orders. After an order has been completely packed, the Order Correspondents (of which there are nine) are informed that material is ready for shipment. It is then their duty to see that material is combined with other orders, if necessary, or that the shipping instructions are carried out by shippers who are located in the different finishing departments.

Follow-Up on Extended Promises

Previous to the inception of C.M.P. Regulations which specify monthly shipments, orders were promised weekly, and the condition of the unshipped orders was compiled into a weekly report. However, this has now become a monthly duty in accordance with the shipping specifications (C.M.P. Regulation). This report is a compilation of all orders which were not processed according to schedule and are charged to the department responsible for nonperformance, regardless of the reason. The orders are listed by district sales office order numbers, customers' names, work order numbers, sizes, quantities, and the extended promises are shown. The report is sent to the general superintendent, all operating department superintendents, and the nine order correspondents, who relay the extended promise date to the district sales offices which then inform the customers. Superintendents have regular meetings regarding lack of performance on extended orders, and special efforts are made to complete them as soon as possible by giving them special preference over the regularly scheduled orders.

SHEEP FEEDING TROUGHS: Steel feeding troughs are being fabricated by the Bernstein Bros. Lumber & Supply Co., Pueblo, Colo., by cutting 18-inch pipe lengthwise in half so that each length of pipe will make two troughs. The ends are closed by welding in steel half circles and a few strips across the top provide rigid support. An unusually good market is reported for the troughs which sell at $1 per running foot

Bale Numbers: Mill procedures are closely controlled by this scheduling system, and, as stated before, operations are recorded on production reports according to bale numbers, which, with the exception of the work order, are the most The use of bale numbers makes it possible to transcribe operations to the running inventory record and to follow definite amounts of material through all operations. The origin and use of bale numbers will be explained in the following paragraphs.

To keep material intact and maintain positive identification, crane lifts of material assume a production unit number called a "bale number," which is assigned as the starting point of the material, each unit actually being kept intact by wrapping with rope slings, cables and chains. There are eight sources where material may originate; namely, five hot mills, two stockhouses, and the cold draw department. Each point of origin is allotted a series of numbers; for example, Hot Mills Nos. 1, 3, 5, 7 and 8 are given four digit numbers—No. 1 Hot Mill using numbers 1000 to 1999, No. 3 Hot Mill 3000 to 3999, etc., the first digit of each number indicating the producing mill number. Stockhouse No. 1 is assigned Nos. 100 to 499 and Stockhouse No. 2—500 to 999; Cold Draw, 6000 to 6999. When the last number in the series is used, the practice is to revert back to the first number in the series and start over. Although duplication in numbers may occur, the work orders, tube size, grade of steel and heat numbers are additional positive means of identification.

Procedure for Split Bales

When it is necessary to take some material out of a bale to be reconditioned, recut, or restraightened, the bale splitting system is used, as follows: The original number assigned to the bale remains constant, but letters are added to indicate that the bale has been split; for example, bale 1000 containing 200 pieces is split into two parts—100 pieces are tagged 1000-A and 100 pieces are tagged 1000-B. If bale 1000-A were split again equally the bale number would become 1000-AA for 50 pieces and 1000-AB for the other 50 pieces, etc. This positive identification is carried through even to the point of scrapping material in case it is found unsuitable for application on the order, and makes it possible to know the identity of all material at all times and to post all movements of the bale to the running inventory account. There is no material in the entire mill without a bale number identification. With the thousands of bales in constant operation, the material from one bale is never permitted to become mixed with the contents of another. On some types of tubing where operations are extremely involved, the material is spark tested as often as three times during manufacture at different operations to insure that no mixing has occurred, and as a final precaution all material is spark tested before loading in cars.

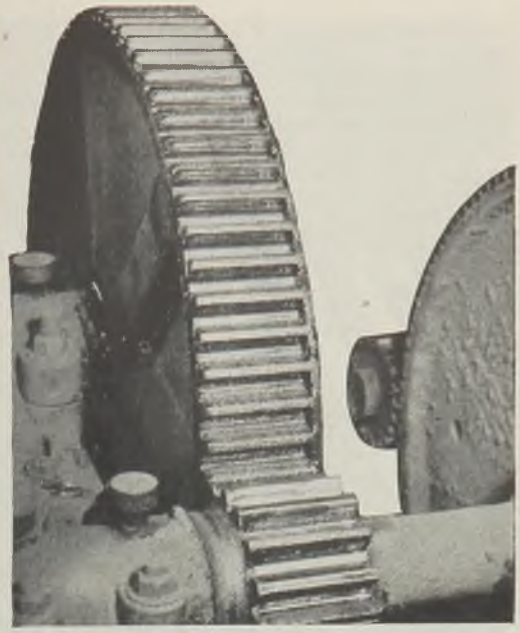
Rolling: In the bar mill, steel is rolled into rounds from blooms, or, if it has been purchased in round form the material is placed in cradles and tags showing work orders, cradle number, class of steel, billet size, weight, and mill on which it is to be

(*Please turn to Page* 130)

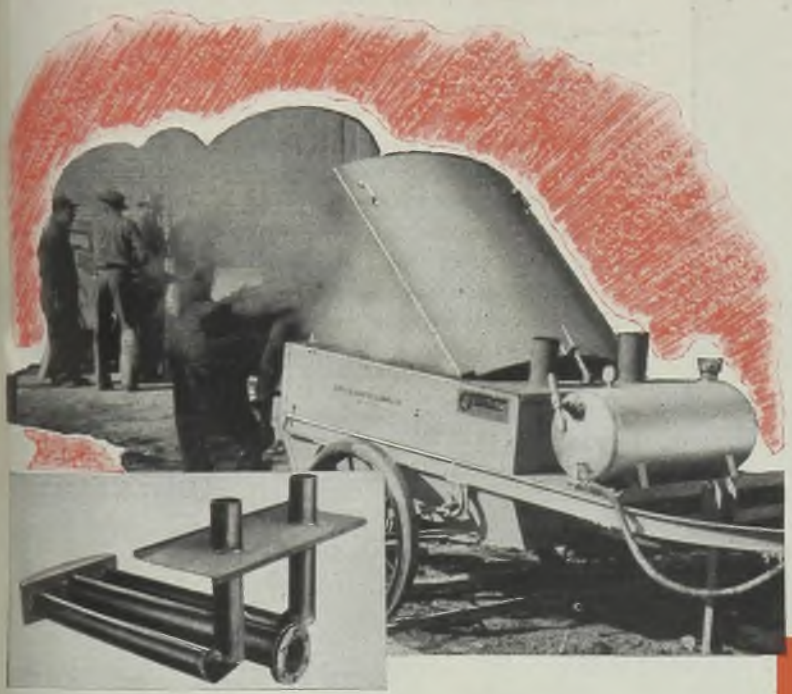
ARC WELDING HIGHLIGHTS

WE ANNOUNCE the addition to the Murex line of Type MA—the first true Grade E-7011 electrode. A general purpose rod, which handles easily in all positions, Type MA is designed primarily for A.C., but may also be used with D.C., reverse polarity. It deposits weld metal of high tensile strength and can be used on Carbon-Moly. and other 70,000 P.S.I. steels.

Further information on request.



OPERATING INCHES deep in coal dust, these spur gears have been driving the mechanism for conveyor and cleaner cones since 1932. The gears are cut from Murex welded gear blanks, fabricated by Lukenweld, Inc. from rolled steel plate, which is free from blow holes, sand pockets or other internal defects sometimes found in poured blanks.



IN THE MELTING OF ASPHALT, temperatures up to 2,000°F. are generated by the heat flue system, which is welded with Murex Electrodes by Littleford Bros., Inc. The melting kettles are also fabricated with Murex and, according to the manufacturer, the welds stand up under the terrific heat "exceedingly well."

ELECTRODE RESEARCH and development work is carried on at the Metal & Thermit laboratory at Woodbridge, N. J. Raw materials, including the core wire and flux ingredients, are carefully analyzed in order to produce electrodes of certain pre-determined characteristics. Electrodes are tested for their operating and deposition characteristics and the quality of the weld metal.

THE MACHINE TOOL INDUSTRY speeds vital production through the use of arc welding. Other advantages of welded construction are ample rigidity with less weight than obtained with castings, and lower cost. The base illustrated was welded from flame-cut plates by The Dayton Fabricated Steel Co., with Murex Type FHP electrodes—"hot" downhand rods which produce sound, X-ray clean welds of high tensile strength and good appearance.

Yoloy Pipe

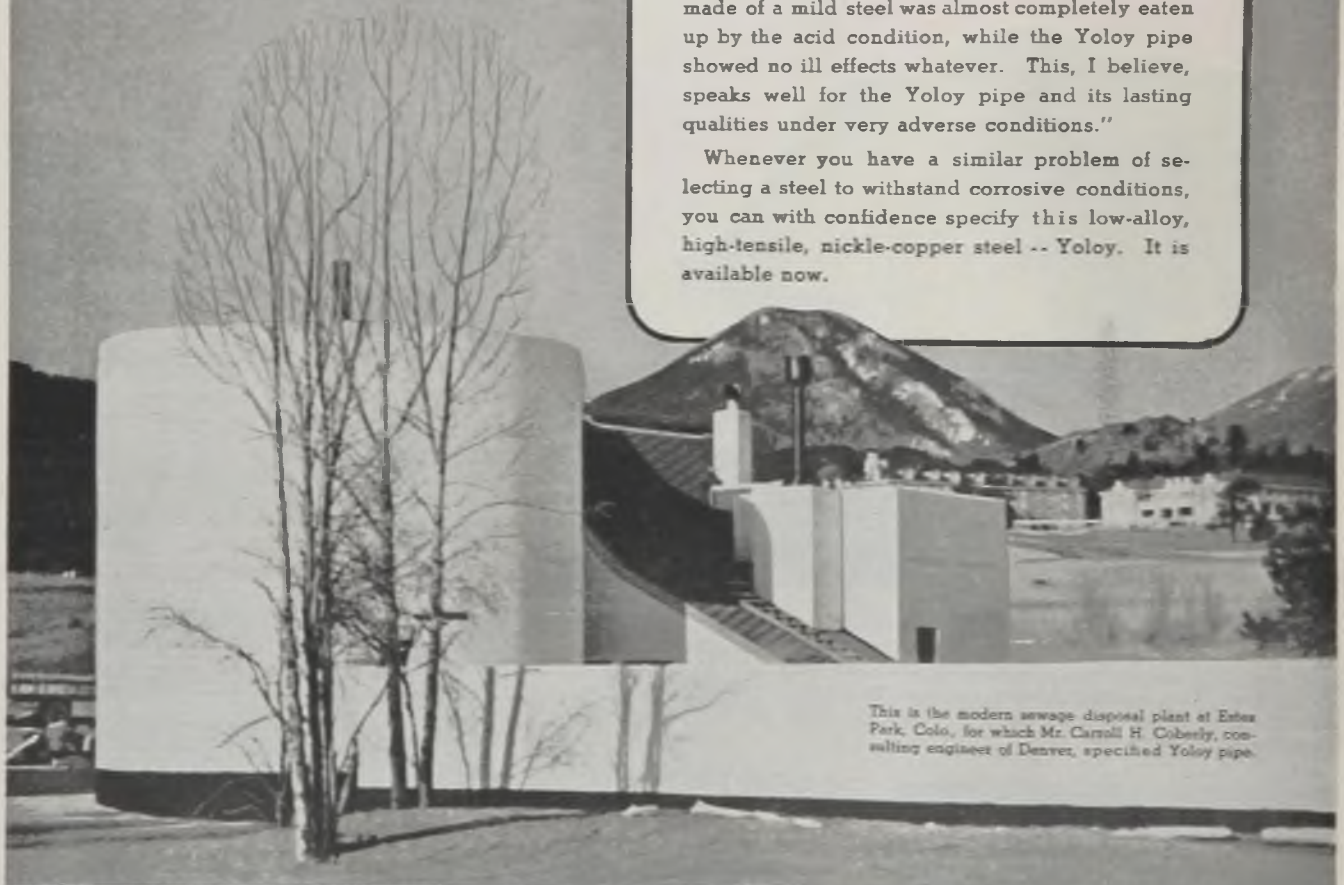
RESISTS CORROSION

WHEN the Estes Park, Colorado, sewage disposal plant was built, Yoloy pipe was installed to carry the sludge gas from the digestor. Yoloy was selected for this application because of its proven ability to resist corrosion--and it has lived up to its reputation.

Recently it became necessary to make a repair due to a mechanical break in one of the fittings, and the interior of the sludge digestor could conveniently be inspected. The engineer in charge of the project makes this report:

"The Yoloy pipe was supported on a tripod resting on the bottom of the digestor. The city manager reported to me that the tripod which is made of a mild steel was almost completely eaten up by the acid condition, while the Yoloy pipe showed no ill effects whatever. This, I believe, speaks well for the Yoloy pipe and its lasting qualities under very adverse conditions."

Whenever you have a similar problem of selecting a steel to withstand corrosive conditions, you can with confidence specify this low-alloy, high-tensile, nickle-copper steel -- Yoloy. It is available now.



This is the modern sewage disposal plant at Estes Park, Colo., for which Mr. Carroll H. Cobeely, consulting engineer of Denver, specified Yoloy pipe.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

YOLOY YOUNGSTOWN STEEL

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Coke Tin Plate - Electrolytic Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes.

Flame Spinning

(*Continued from Page* 85)

be described to demonstrate the practical use of the process in production work, the first being a refrigerator unit cover body. The 1¾-inch outside diameter tube is easily reduced to 1 1/16-inch outside diameter on the end as shown in Fig. 1A by use of cam tool "A", Fig. 2. The procedure is to heat the tube to a hot-forming temperature of about 2200 degrees Fahr. by a fixed cycle.

A deeper forming operation, where the opposite end of the tube is reduced to an outside diameter of ⅜-inch, Fig. 1B, cannot be accomplished with the cam tool since the hard-faced surface picks up particles of oxide because of the high sliding friction involved, and becomes too rough for use after a few cycles. For this deeper forming operation, therefore, the formed roller, Fig. 2B, is employed.

This roller is made of tool steel and machined to the contour required on the outside of the tube and mounted in anti-friction bearings. It is moved against the tube only in an axial direction. The tool support is of heavy construction and water is supplied for cooling the bearings. The tube is held against a rigid stop and fastened in the chuck to prevent axial slippage.

Heating and forming are performed simultaneously. Should the tube be brought up fully to forming temperature, it would twist out of shape during the first stages of the operation. Therefore, the flame heads, the lubricant feeder, and the forming tool must be mounted on the lathe carriage and moved at a constant rate against the tube by engagement of the power feed. A timer, actuated by a limit switch lights the heating heads and admits compressed air to the lubricant hopper. After the operation is completed, a second limit switch stops the carriage and shuts off the flame and lubricant.

Fig. 3 shows this operation about 90 per cent completed. The neck has started to take shape and in a few seconds will acquire the form shown by Fig. 1B.

Flat-Plate Tools

All of the tube closures shown in Figs. 4, 5 and 7 were formed with a flat-plate tool, a universal model which is identified as "C" in Fig. 2. The base plate for the assembly is mounted on the lathe carriage and has a circular T-slot. Three bolts mounted in the T-slot hold the tool assembly. This permits 180-degree rotation of the assembly around a center bolt by means of a long handle, part of which is shown in the illustration. The base plate, positioned by the lathe cross-feed, is adjustable in relation to the axis of the tube. The slots, which may be observed at the top of the tool, permit adjustment of the hard-faced forming surface with respect to the center of rotation.

The flexibility provided makes the tool satisfactory for forming all shapes and sizes depicted in Figs. 4, 5, and 7.

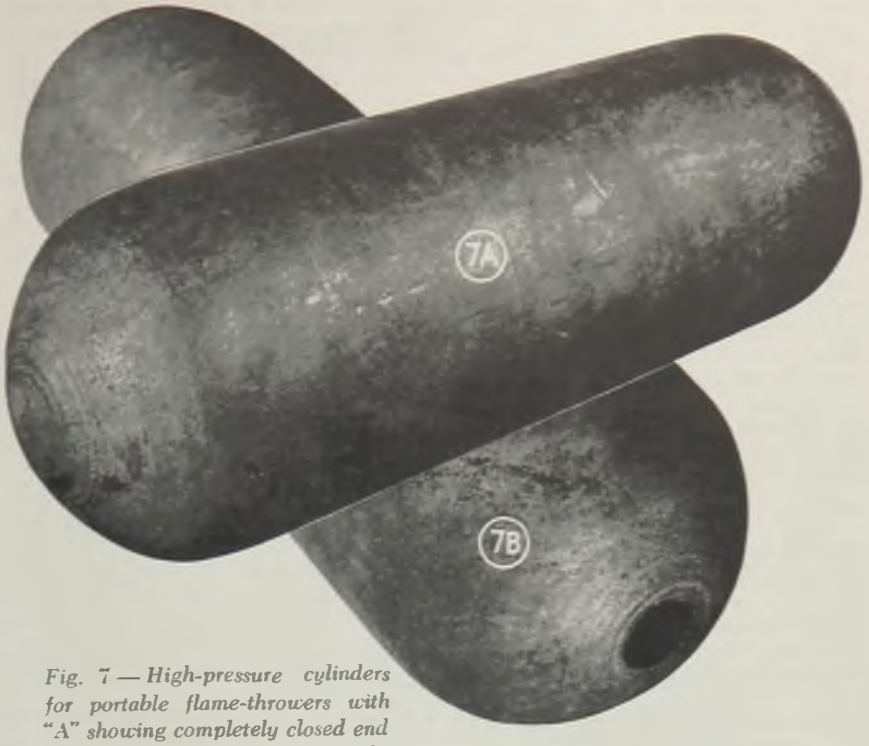


Fig. 7 — High-pressure cylinders for portable flame-throwers with "A" showing completely closed end and "B" partial closure for attaching fitting

For spinning hemispherical closures, the tool is arranged so that the forming surface is located at a distance equal to the tube radius, from the pivot point. The pivot is set on the center line of the tube at a distance from the end equal to 1.4 times the tube radius. Thus, tubes spun in this manner will be shortened an amount equal to 0.4 times the radius.

Auxiliary Flame

The spinning of a closure at the end of a tube involves the possibility of trapping slag and oxide inclusions at the very center where the metal is forced together, even though the joint may be gas-tight. This possibility is prevented through the use of an auxiliary flame either of the internal or external type. This flame assures proper heating of the converging edges of the tube so that the forming tool will form a solid section throughout the end section. Application of an internal flame consists simply of feeding mixed gas to a welding tip through the headstock of the lathe, the tip being set slightly off-center to create a ring of molten metal. This type of heating, however, should be used only when the tool or other objects prevent proper positioning of an external flame.

Progressive Steps

Progressive steps in the formation of a typical hemispherical closure with a flat-plate tool is shown in Figs. 6A, B, C, D, and E. In Fig. 6A, the spinning tube, with 1¾-inch outside diameter and 0.059-inch wall, is being heated and the forming about to proceed. The tool has been set with the center pivot on the center line of the tube about 1¼ inches from the end with the forming surface ⅞-inch from the pivot.

In Fig. 6B, the tool has been rotated about 20 degrees with the flames still burning. A small opening remains at the very end of the tube. In 6C, an external auxiliary flame has been brought into position to melt the edges of this opening. After the edges are properly heated, the flames are shut off and the forming completed as shown in Fig. 6D. The finished contours of the piece are shown in Fig. 6E.

Burster-Well Tube: First item, Fig. 4, shows the flat-end closure required for a burster-well tube. It is formed with the flat-plate tool pivoted at the edge of the tube about ⅝-inch from the end. An auxiliary flame head is mounted on the tool post so as to be in position at the proper time. It is lighted and shut off automatically as the tool is moved around the pivot.

To insure a square corner and to prevent any bulge from forming on the end of the tube, a horizontal surface is added as an integral part of the tool. This surface, set at the proper height, is brought to bear on the end of the tube from the underside during the last stages of the forming operation. This piece previously was stamped from a steel blank.

Vehicle Shock Absorber Tube: The hemispherical closure required for the shock absorber tube shown in Fig. 4 also was formed with a flat-plate tool. This operation now has been set up on a completely automatic basis with cut lengths fed into a hopper and spun tubes ejected at the rate of 6 to 7 per minute. No auxiliary flame is used as a solid end structure is not essential.

Booster-Charge Tube: The booster-charge tube, Fig. 4, is spun with the usual flat-plate tool and an external flame is used to produce a homogeneous structure throughout the end section. The tube has an ⅛-inch wall and requires somewhat longer forming time

than is necessary with a lighter material.

Flame-Thrower Units: The flame-thrower unit, Fig. 4 is formed from a 2-inch outside diameter tube of SAE X4130 steel with a flat-plate tool adjusted to a distance of 1 inch between the pivot point and the forming surface. An internal auxiliary flame is used to obtain a pressure-tight seal.

Larger high-pressure cylinders for portable flame-throwers are fabricated from X4130 steel by hot-spinning both ends. These cylinders are 3¾ inches in diameter with 0.095-inch wall thickness. The closed end, Fig. 7A, is formed with a flat-plate tool set 1⅞ inches from the pivot which is set on the axis of the tube about 2⅝ inches from the end. An external auxiliary flame is used to assure a tight closure.

Fig. 7B shows a hemispherical shape for the flame-thrower cylinder which is formed with a ¾-inch diameter opening. In this case, the pivot of the forming tool is moved to a point 1⅞ inches from the end of the tube. A reaming operation prepares the opening for a threaded adaptor which is welded in place. Development work under way indicates that it will be possible to thicken the end of the closure sufficiently so that it may be threaded and thus eliminate the only remaining weld on the cylinder. The thickened end and threaded section shown as "C" and "D" in Fig. 5 indicate the possibilities.

In developing these threaded ends, a hemispherical closure first is formed by using a flat-plate tool but without an auxiliary flame. The end of the tube then is thickened by several additional passes with the forming tool but with the pivot point set closer to the chuck and with additional heat applied on each pass. A cross section of the end after this operation is shown by Fig. 5C. From this intermediate stage, a solid neck was formed with cam tool "A" in Fig. 2 which could be readily drilled and tapped.

Hand Grenade: A metal case for a special type of hand grenade, Fig. 5A, is formed by spinning both ends of a tube 2⅜ inches in outside diameter and with wall thickness of 0.049-inch. A ½-inch corner radius is obtained by the pivot flat-plate tool ½-inch from the pivot point. When the pivot is set 15/16-inch from the tube end and ½-inch from the tube edge, the closure at the left (Fig 5A) is formed. By moving the pivot to a point 1 11/16 inches from the tube end and employing an external auxiliary flame, the tube is closed as shown at the right.

Bomb Fuse: Fig. 5F is a tube for a bomb fuse spun from tubing with ½-inch outside diameter and 1/16-inch wall. The spinning machine used in performing this operation is equipped with a draw collet and internal mandrel with a hard-faced surface. A stop is provided in the chuck which allows the proper amount of tube to extend beyond the mandrel so that a closure will have 1/16-inch of metal on the end.

A three-head heating head and a flat tool with hard surface are mounted on the lathe carriage and are positioned by the lathe cross-feed. When the heating is completed, the flame heads are moved away and the tool forces the end of the tube against the mandrel.

DEBURRING TOOL Slashes "Clean-Up" Time on Airframes

BURR removal and the generating of radii on the inside diameter of lightening holes in structural members for aircraft has for some time added its share to the burdensome aggregation of "lesser" but necessary jobs in plane building.

In every instance, the rough, uneven surface left by the router or stamping machine must be smoothed out and a slight radius produced around the edges of the hole before the piece may become part of a skyship. This operation has been performed by various hand methods utilizing coated abrasives and hand scrapers. Since holes are irregular in shape and diameters range from 2 to 7 inches, these methods have been unsatisfactory.

A deburring method which employs a special-shaped, unjoined Lightning Metalite cloth cone mounted on a special adapter has been devised by Messrs. Mannette and Trezise, working in conjunction with the product engineering department of Behr-Manning Division of Norton Co. After considerable testing, this new method has met with the approval of several of the larger plane manufacturers in the East and is in operation in their plants.

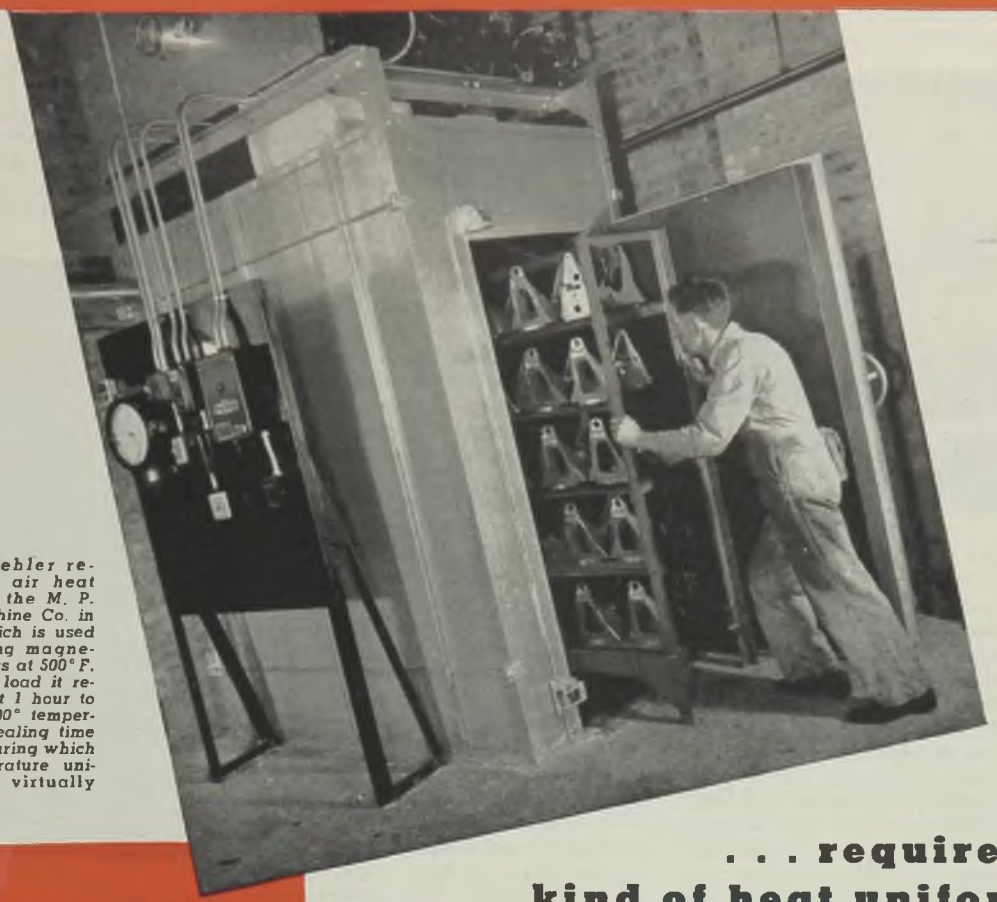
From the accompanying illustrations, it may be seen that the unit consists of a machine steel spindle approximately 5¾ inches long; the extreme end, measuring 1½ inches in length, has diameter of ¼-inch, while diameter of the balance of the shaft is ⅜-inch. Nose section is threaded back 1¼ inches to a slight shoulder against which base of conical metal adapter rests when screwed up tight. The adapter head, ¾-inch long, is tapered to the threaded portion of the spindle at a 45-degree angle; this head serves as a mold or form block to give proper shape and pitch to the cone of sandpaper and Metalite cloth wrapped about it.

The abrasive cloth which performs the deburring operation is cut to a special shape as shown and fastened at the flaring edge with a ½-inch overlap, an ordinary paper stapler being used to attach the ends. To insure that the approved 45-degree angle of the cone is rigidly maintained when the deburring equipment is in use, a knurled nut 1⅜ inches in diameter, with a flared shoulder which fits snugly over the adapter cone, is screwed up tight to hold the abrasive material firmly in place.

Although several methods of mounting the deburring tool are possible, its most efficient use appears to be when mounted on the shaft of a standard 1/3 to ½-horsepower motor of 1800 revolutions per minute, depending on the size hole and gage of stock. The motor may be attached to the bench with the shaft at right angles to the front edge so the cone will overhang, allowing the operator to bring the sheet being sanded to the cone. Optional mountings on drill presses and the like are of course possible, provided the cone is not operated in excess of 2000 revolutions per minute. Speeds greater than this cause the cone to flare to a degree that makes its use impractical. A standard 3-jaw chuck or special adapter would be required if used in conjunction with bench-mounted motor.

Grit No. 80 Lightning Metalite cloth cones are used to deburr holes cut with routers in heavier gage stock; grit No. 120 is recommended for deburring holes stamped out of lighter weight material. In operation, the duralumin stringer or bulkhead lightening holes are sanded to a fine, rounded edge by forcing the lightening hole over the revolving cone to a point where the cone is slightly larger in diameter than the hole being sanded. The pressure thus exerted on the cone causes it to conform to the hole, thus removing the burr and producing a radius on the aperture.

Heat Treating today's metals



● *The Maehler re-circulating air heat furnace at the M. P. Heinze Machine Co. in Chicago which is used for annealing magnesium castings at 500° F. With a full load it requires about 1 hour to reach the 500° temperature. Annealing time is 2 hours during which time temperature uniformity is virtually perfect!*

. . . requires the kind of heat uniformity provided by MAEHLER Furnaces

Maximum efficiency in the heat treating of magnesium and aluminum calls for *virtually perfect* uniformity of temperature. Maehler re-circulating air heat furnaces provide this kind of heat uniformity to give you increased output, a better job and lower operating costs on all types of heat treating. Maehler furnaces for aging, normalizing, stress relieving, annealing, bluing, drawing, tempering, etc. are available in units which will handle temperatures up to 1300° F. . . . gas fired, oil fired or electrically heated!

Bring your heat treating problem to Maehler — write today!

Temperature Variations of not over 5°!

A west coast plant stress-relieving 105 mm. shell cases in a Maehler oven found that with a full load at 500° F. temperature, there was a variation of temperature of only 5°! At 525° the temperature variation was less than the specified 10°.

Maehler air-heat furnaces are providing this type of efficiency for hundreds of top-flight companies.

93.6%

OF MAEHLER'S PRODUCTION IS DEVOTED TO REPEAT ORDER!

. . . There is no better proof of the superiority of Maehler Ovens and Furnaces.

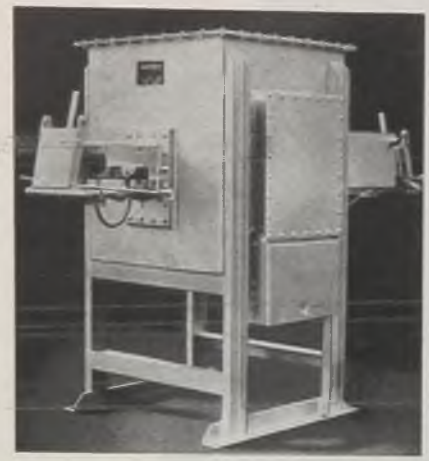
MAEHLER

Industrial Ovens and Furnaces for Normalizing, Stress-relieving, Bluing, Aging, Tempering, Annealing, Drawing, etc.

THE PAUL MAEHLER COMPANY
2208 W. Lake Street, Chicago 22, Illinois

Electric Furnace

A line of high-temperature electric furnaces for sintering powdered metal at temperatures between 1800 and 2750 degrees Fahr., is announced by Harper Electric Furnace Corp., Niagara Falls, N. Y. These furnaces facilitate production of powdered metal products on a



mass basis. They are equipped with a preheat tunnel leading to the high temperature chamber and a water-jacketed cooling chamber. The entrance to the preheat tunnel and the exit on the cooling tunnel are equipped with automatic flame curtains.

Gas-tight construction permits the use of protective atmospheres, such as hydrogen, dissociated ammonia and mixtures of carbon monoxide, hydrogen and nitrogen. Applications include high temperature cementing of tungsten carbide dies and sintering of powdered ferrous and nonferrous metal parts, heating of electronic tube parts, etc. In addition, these furnaces provide correct temperature and atmosphere conditions for high-temperature hydrogen brazing.

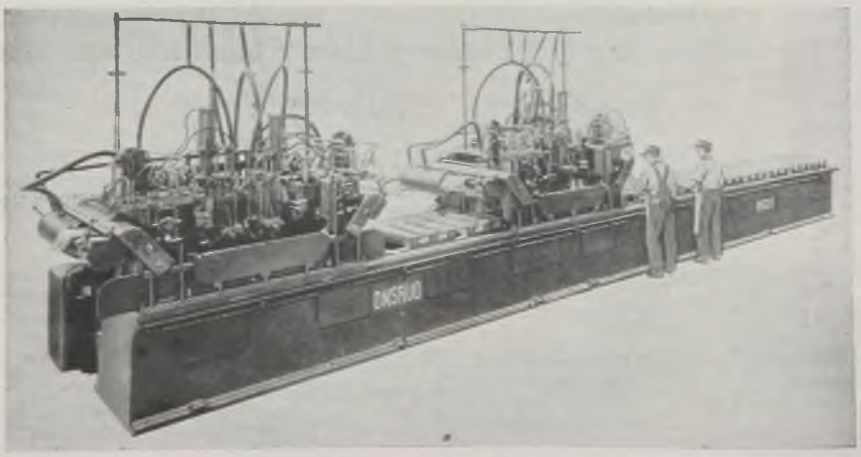
Contour Miller

The newest automatic contour miller, the A80-A, announced by Onsrud Machine Works Inc., 3942 Palmer street, Chicago 47, has retained many features of the original machine. It has eight cutter heads mounted on two carriages to automatically mill long, nonferrous aircraft parts, such as spar channel beams and cap strips. Each carriage mounts two vertical and two horizontal cutters and all eight cutters may be used at one time if necessary. This merely involves a 2-station setup, the work being moved from one station to the next as the cutters on each carriage finish their respective operations.

Carriages ride on the bed of the machine and work is held to the table by air-operated clamps which permit speedy loading and unloading. Carriage speed ranges from 4 inches to 18 feet 6 inches per minute, permitting exact selection of cutter feed to accommodate the work being done. Cutter motor speeds on the machine are as high as 10,800 revolutions per minute providing lineal cutter velocities of from 5000 to 8000 feet per minute. The eight cutter motors are rated at 180 horsepower normal. These motors are capable of 100 per cent overload because of a special water cooling system, thus making available a total of 360 horsepower.

Cutter travel is controlled by a template contoured so as to produce the desired shape or contour in the finished work. Cutters under pneumatic pressure are guided by template followers. Each cutter and its template follower are part of a single motor assembly and remain in fixed relationship to one another. The feed is automatically controlled. Rollers moving over a cam bar contoured in relation to the work, exercise rheostat control over carriage drive motors. Thus the machine slows down on heavy "hogging" cuts and speeds up again as the nature of the work permits. This speed-up goes all the way to "skip" feed between cuts. A General Electric Thy-Mo-Trol system is used on the machine to convert alternating current to direct current and so provide the stepless wide range drive of a direct-current motor.

Overall length of this new spar miller is 60 feet and the bed may be made still longer if necessary by adding sections which can be supplied in 7½ or 15-foot sections.



Extrusion Press

A combination laboratory-type 12-ton hydraulic extrusion press and an automatic wire feed unit in one machine has beeen announced by Moslo Machinery Co., Cleveland. While designed primarily for extrusion of welding rods, the press may be had with dies for extruding powdered metals, carbon and certain plastics.

It offers a wide range of speeds on the oil cylinder. Pressure of 10,000 pounds per square inch on the material is achieved, which, combined with the automatic wire feeding, makes the ma-

chine suitable for small scale production of welding electrodes. A separate cylinder is used for slugging, so that slugs can be performed in quantity if desired. The extrusion die head is of a new design, at 45-degree angle. Deflection in the wire guide is minimized by this design due to the fact that the flux is forced in a direction more in line with the wire guide.

Of welded steel construction throughout, the unit is built for shipping complete, including an extrusion die head. Hydraulic and electrical controls are located in a panel at the operating end, with a pressure gage, reading in direct pressure on the extrusion cylinder, always in view of the operator. The combination unit is so designed that the press can be sold without the wire feeding unit.

Double Ratio Scale

Designated as type 1133-C, a new double ratio scale is offered by Howe Scale Co., Rutland, Vt. Because of high sensitivity provided by a third pan attached to the lower beam lever, it is especially adapted for quick, accurate counting and weighing of materials in shipping, re-

(All claims are those of the manufacturer of the equipment being described.)