

Stamping chromium-molybdenum blanks on a 500-ton single-action double-crank press. Page 90

STEEL

The Magazine of Metalworking and Metalproducing

NOVEMBER 1, 1943

Volume 113—Number 18

EDITORIAL STAFF

E. L. SHANER
Editor-in-Chief

E. C. KREUTZBERG
Editor

WM. M. ROONEY
News Editor

G. W. BIRDSALL
Engineering Editor

J. D. KNOX
Steel Plant Editor

GUY HUBBARD
Machine Tool Editor

ARTHUR F. MACONOCHE
Contributing Editor

D. S. CADOT
Art Editor

Associate Editors

G. H. MANLOVE

W. J. CAMPBELL

IRWIN H. SUCH, Eastern Editor

New York, B. K. PRICE, L. E. BROWNE

Pittsburgh, R. L. HARTFORD Chicago, E. F. ROSS

Detroit, A. H. ALLEN Washington, L. M. LAMM
London, VINCENT DELPOT

Assistant Editors

J. C. SULLIVAN, JAY DEEULIS, F. R. BRIGGS
D. B. WILKIN J. M. KURTZ

BUSINESS STAFF

G. O. HAYS
Business Manager

R. C. JAENKE
Advertising Manager

C. H. BAILEY
Advertising Service

New York, E. W. KREUTZBERG, K. A. ZOLLNER

Pittsburgh, S. H. JASPER, B. C. SNELL

Chicago, L. C. PELOTT, V. W. VOLK

Cleveland, D. C. KIEFER, C. H. CROSS

Los Angeles, F. J. FULLER

J. W. ZUBER
Circulation Manager

Main Office

Penton Building, Cleveland 13, Ohio

Branch Offices

- New York 17..... 110 East 42nd St.
- Chicago 11..... 520 North Michigan Ave.
- Pittsburgh 19..... 2800 Koppers Building
- Detroit 2..... 6560 Cass Ave.
- Washington 4..... 956 National Press Building
- Cincinnati 2..... 2030 Carew Tower
- Los Angeles 4, 130 North New Hampshire Ave.
- London..... 2 Caxton Street, Westminster, S.W. 1

Published by THE PENTON PUBLISHING CO.,
Penton Bldg., Cleveland 13, Ohio. E. L. SHANER,
President and Treasurer; G. O. HAYS, Vice
President; F. C. STEINEBACH, Secretary.

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

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

Entered as second class matter at the postoffice
at Cleveland, under the Act of March 3, 1879.
Copyright 1943 by the Penton Publishing Co.



NEWS

Light Metals and Plastics vs. Steel	57	War Demobilization	72
<i>Company official believes potential competition for steel over-emphasized</i>		Canada	73
Munitions	60	Men of Industry	74
Foundry Equipment	61	Obituaries	75
Financial	62	Activities	84
Gear Makers	63	Awards	85
Stabilization	64	Wartime Expansion	86
Contract Terminations	65	Meetings	87
Taxes	68		
WPB-OPA	70		

TECHNICAL

Improved Method for Drawing Chromium-Molybdenum Steel	90
<i>Costs are cut and output is boosted ten times</i>	
Special Handling Devices and Machines Aid Shell Production	92
<i>"Limits within limits" cut scrap to total of 2 per cent</i>	
Chemical Blackening Process Finds New Favor in Production	100
<i>Modern methods greatly expand range of applications</i>	
Jigs and Fixtures Cut Costs, Up Production of Arc Welded Units	102
<i>Correctly designed positioners for mass production work</i>	
Removing Scale and Sludge from Steel Plant Heat Exchangers	106
<i>Improved chemical treatments assure capacity operation</i>	
Postwar Outlook for Industrial Electronics Appears Excellent	109
<i>Many valuable contributions already find wide acceptance</i>	

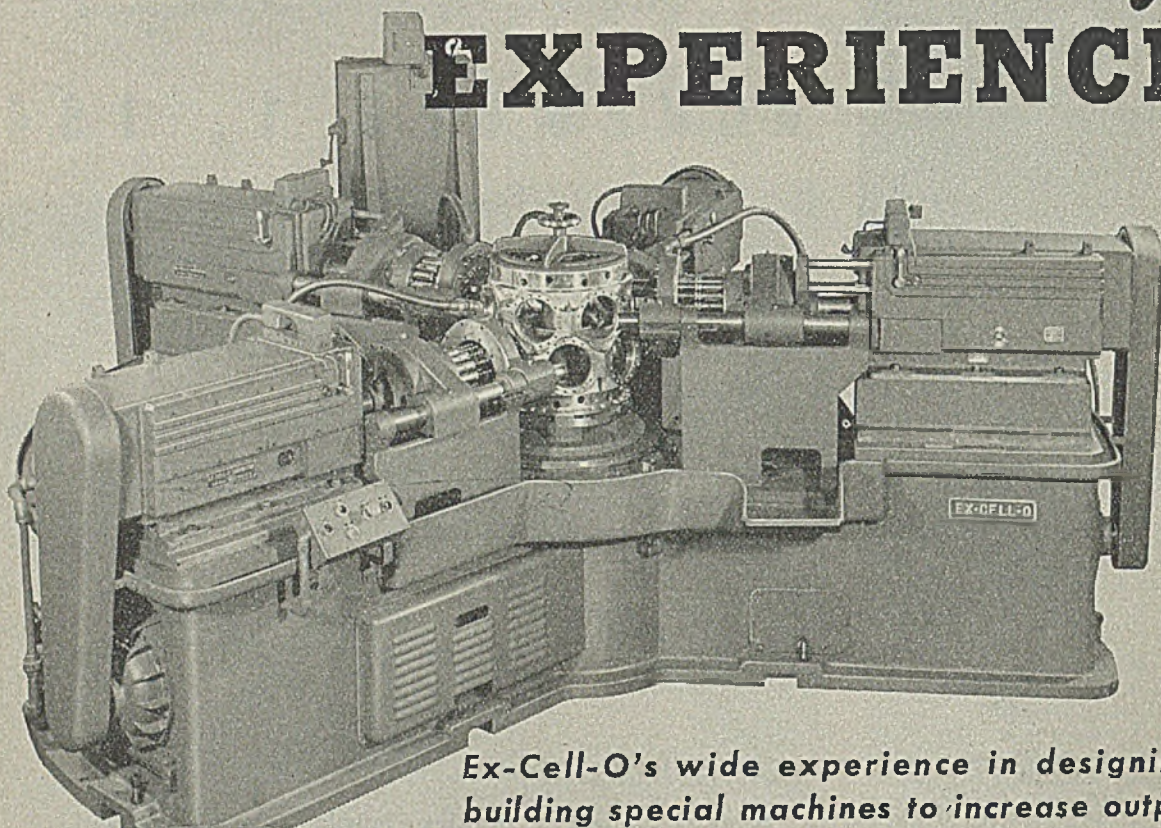
FEATURES

As the Editor Views the News	53	Wing Tips	80
Postwar Previews	59	The Business Trend	88
Windows of Washington	66	Industrial Equipment	110
Mirrors of Motordom	77	Construction and Enterprise	162

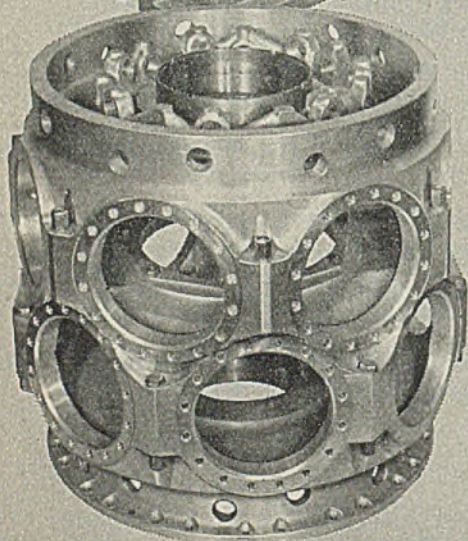
MARKETS

Remote Deliveries Dull Edge of Eagerness to Buy Steel	141
Market Prices and Composites	142
Northwest Firms Obtain Large Contracts; Drop Army Project	158
Loss of Key Men Is Adversely Affecting Machine Tool Output	160
Index to Advertisers	171
<i>Where-To-Buy Products Index carried quarterly</i>	

There's no substitute for
EXPERIENCE!



Ex-Cell-O's wide experience in designing and building special machines to increase output and lower costs assures you practical advantages in your immediate or near future production



Increased production attained in precision machining of this aircraft crankcase on the above Ex-Cell-O special-purpose machine.

You have a substantial background of experience to draw from when you bring to Ex-Cell-O your problem in the precision machining of metal parts on a high production basis . . . whether it concerns an immediate war production job or a future product you are now planning. The more economical production of accurate metal parts necessitates single-purpose machines of improved efficiency, capable of giving greater output and reducing unit cost. For years Ex-Cell-O has been an acknowledged leader in the field of special-purpose machines . . . precision machines with exclusive features that represent the utmost in accuracy, production, operating ease, rigidity, and durability. This is why you should utilize Ex-Cell-O's experienced engineering and manufacturing facilities. Ex-Cell-O has representatives in all of the nation's principal manufacturing centers. Consult the one nearest you, or write to Ex-Cell-O Corporation Head Office in Detroit.

EX-CELL-O CORPORATION • DETROIT 6, MICH.

Precision THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CONTINENTAL CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT
 PURE-PAK CONTAINER MACHINES • R. R. PINS AND BUSHINGS • PRECISION PARTS



EX-CELL-O for PRECISION

Heading Back to Realism?

Last Wednesday was Navy day. Throughout the nation, parades and banquets were staged to pay tribute to the sea-going arm of our military forces. The honors conferred were richly deserved.

But if one were inclined to peek behind the scenes, he could detect a quiet movement which has implications reaching far beyond the scope of the traditional annual salute to the Navy.

In Washington, the President met a group of industrialists and business leaders in what was heralded as the first of a series of conferences on problems of industry's role in war production and in postwar readjustments. In Cleveland, Vice President Wallace, who has been beating the drums for the coalition of labor and farm blocs on a visionary program of social reform, came out with a postwar plan for employment which might have been lifted bodily from Paul Hoffman's Committee of Economic Development or from a plank of the National Association of Manufacturers or the United States Chamber of Commerce.

Why this studied effort on the part of high-ranking government officials to give the impression that the administration is leaning toward the right? Is it 100 per cent a political maneuver designed to garner votes in 1944 or does it have other significance?

The answer is not clear. Undoubtedly politics is a big factor. But it cannot be the sole factor. There are other considerations.

One of them may be a realization that we are in a dangerous trend. Since 1933 this nation has been in a false economic situation. We have been persuaded to spend freely without counting the cost. First it was reckless spending to offset the withering effects of a severe depression. Next it was reckless spending to get war production moving quickly. Now we have renegotiation which rewards inefficiency and penalizes efficiency. In our thinking about postwar readjustments we place heavy emphasis upon providing employment, but we give only limited thought to the efficiency required to meet the exacting specifications of the postwar economy.

In short, the nation for a decade has been fed a soothing-syrup doctrine of artificial wastefulness. We still are soft and vulnerable. Is it possible that the higher-ups, chastened by the experience of war, see the need of relying more heavily upon tried and true business precepts?

If so, the era of chasing economic rainbows may be approaching a welcome end.

DEMOBILIZATION PLANS: Lurking in the mind of every industrialist is the question of how the disposal after the war of government-owned plants, equipment, materials and supplies will affect his business. Last week Under-Secretary of War Robert P. Patterson, appearing before the Patman Committee on Small Business, outlined a tentative government attitude on these problems that is somewhat reassuring.

He said that the War and Navy departments have

been co-operating in a study of the whole subject of demobilization and that so far the conclusions reached are (1) that demobilization must be accomplished "in a rapid but orderly manner," (2) that the military establishment must be kept sound and capable of being expanded instantly in any time of future emergency, (3) that studies now are in process to determine peacetime uses of government-owned plants and equipment, and (4) that studies are under way to prepare a program for scrapping items

not usable in peacetime economy and which should not be held in reserve for future wars.

The tone of the under-secretary's statement was one of consideration for the problems of private industry. The difficulty will lie in organizing the machinery of demobilization so that performance will conform to intent. —p. 72

DIFFICULT DEEP DRAWING: Hot-rolled chromium-molybdenum steel is not very well adapted to deep drawing operations. Nevertheless, under the pressure of war, an eastern manufacturer not only has mastered the technique of deep drawing this difficult material but also has placed the operation on a large-scale production basis which has saved time, money and material on important war contracts.

In perfecting a manufacturing procedure for deep drawing chromium-molybdenum steel for high-pressure gas cylinders, the company had to solve certain special problems in connection with drawing, cleaning, annealing, heat treating and machining. As it turned out, one of the most difficult aspects of the job was to find the right steel for punches and dies and to develop the proper methods for utilizing them.

The story of how these various difficulties were overcome is indicative of the ingenuity, skill and resourcefulness with which many contractors have met the challenge of war. —p. 90

RIVALRY IN MATERIALS: One hears much talk about the competition between materials after the war. Particularly insistent is the speculation indulged in by numerous persons that the light metals and plastics will make serious inroads upon some of the markets served in the past by the steel industry.

No one doubts that there will be a more diversified use of aluminum, magnesium and plastics in the postwar period. The pertinent question is the extent to which gains by these materials will cut into markets traditionally held by steel. Some people seem to overlook the fact that the light metals and plastics could expand far beyond their prewar market boundaries without denting steel markets seriously.

L. S. Hamaker, assistant general manager of sales, Republic Steel Corp., went into this subject with unusual frankness at a recent meeting of the Robert Morris Associates. We believe the realism of his analysis of the impact of light metals and plastics upon the steel industry will appeal strongly to every-

one who has a stake in the postwar rivalry of these materials. —p. 57

SEPTEMBER WAR OUTPUT: Production of munitions in September was up only one point to 614 on WPB's index. This almost negligible improvement prompted Acting Chairman Wilson to remark that "the failure of the overall munitions program to show a percentage gain, while it cannot be regarded as anything but disappointing, indicates more than anything else that we are approaching our production ceiling and that overall gains are not so important as are gains in specific items."

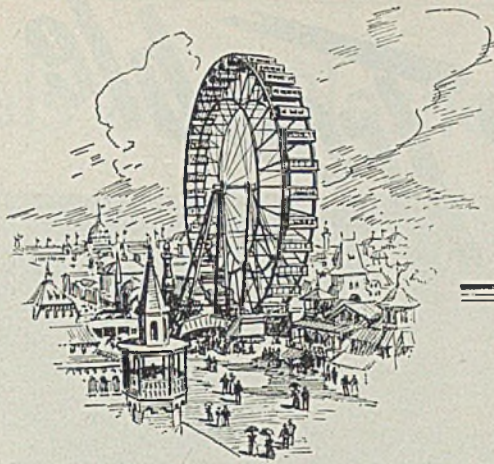
This last mentioned point deserves emphasis. The important thing from now on is to increase the output of the items most urgently needed in accordance with the changing aspects of the war. The munitions index is based upon the money value of all of the items produced. Cutbacks and other factors conceivably could cause an actual decline in the index, yet if we were producing more of the items most needed, our performance could belie the implications of a decline in the index. —p. 60

84% IRON AND STEEL: Figures furnished by the Automotive Council for War Production and appearing in Automobile Facts and Figures show the weights of materials used in a typical, original 1942 model passenger car with accessories, before the program of substitution and conservation of materials became effective.

The typical car with accessories weighed 3497 pounds. The principal materials, in order of rank in pounds, are steel, 2398; iron, 500; rubber, 161; cotton, 63; glass, 62; paper products, 50; copper, 46; lead, 34; paint and thinner, 26; asphalt, 26; zinc, 23; jute, 17; wool, 8; sulphuric acid, 5; plastics, 5; chromium, 4; wood, 4; aluminum, 3; asbestos, 3; leather, 2; tin, 2; nickel, 2; and antimony, 1. Among the other materials, use of which averaged less than a pound per car, are cadmium, magnesium, molybdenum, silver, tungsten, cork, mica, hair and vanadium.

It will be interesting to compare this list with the poundage of materials in the typical car manufactured about two years after the war ends. —p. 78

E. L. Shaner
EDITOR-IN-CHIEF



Inland Steel Completes Fifty Years of Service Founded in 1893

Eight men gathered around a table in Chicago on the afternoon of October 30, 1893—fifty years ago. They were men who saw and understood the needs of the rapidly growing Prairie Empire.

They had come together to found the Inland Steel Company, to purchase a dismantled rolling mill, to place it in operation during a period of war panic and business stagnation. After months of effort the mill was started and in the first year 5,600 tons were rolled into many useful forms for steel-hungry industry and agriculture.

Years passed—some in peace and plenty, others in war or depression. Steadily the little company forged ahead in the quality and the acceptance of its products. Land soon was acquired at Indiana Harbor, where Inland constructed its first

open hearth furnaces and rolling mills. Expansion continued—blast furnaces, coke ovens, continuous mills, ore mines, coal mines, a limestone quarry, a fleet of freighters, a thoroughly equipped metallurgical laboratory—until Inland Steel Company was in full control of essential basic materials and the quality of all its many steel products. Production had climbed to 3,300,000 tons annually. Then came World War II.

Almost over night Inland, with modern mills and thousands of skilled steelmakers, turned to provide the steel to defend our country—to win against aggression. Today, fifty years after its founding, Inland is sending its entire output to men who fight. When peace comes Inland again will send steel to men who build.

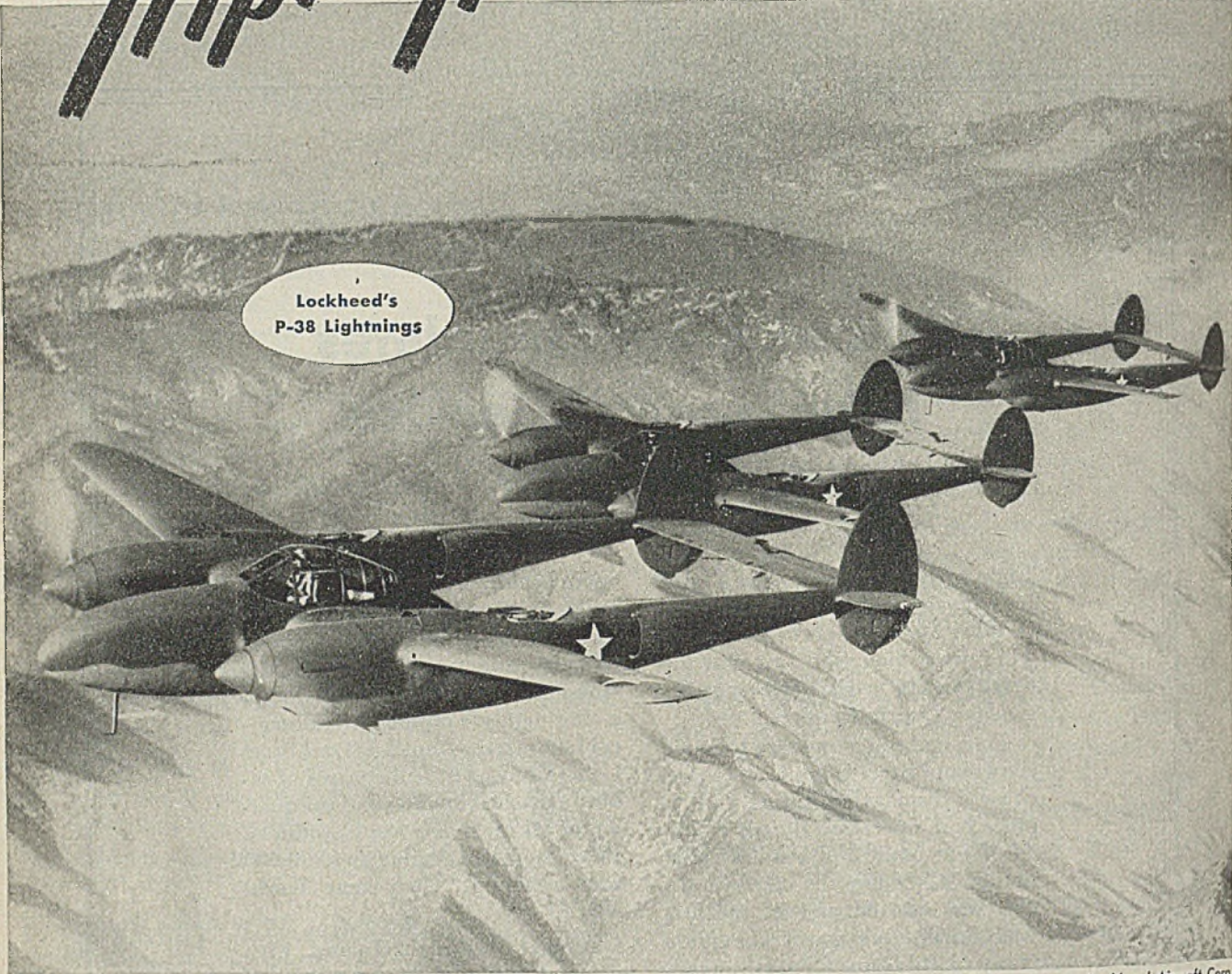
INLAND STEEL COMPANY

38 South Dearborn Street

Chicago 3, Illinois

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

Triple Trouble ON THE WAY!



Photo, courtesy Lockheed Aircraft Corp.

Lockheed P-38 Lightnings spelled such trouble that the enemy aptly renamed them "Fork-tailed Devils." Primarily fighters, they raise additional hell as bombers, escorts, tank-busters and reconnaissance planes. Swaths of smashed Axis planes with a suitable garnish of blasted ground installations testify to the P-38's battle-ability.

Weighing seven tons, heavily armored and whooping along at 400 m.p.h. plus, these Lightnings might seem too much for one pilot to handle. But, handle it he does, and to tremendous advantage. The designers saw to that. Not the least of aids to maneuverability they included are Fafnir Aircraft Ball Bearings on the controls!

Combat equipment . . . planes, ships, tanks, gun mounts, all types of mechanical equipment . . . is taking Fafnir Ball Bearings by the millions. Others are going into the machines that turn out this fighting equipment. "On duty" twenty-four hours a day,

both at home and abroad, Fafnirs are setting performance records which promise much for the troublefree, frictionless operation of future peace time products. The Fafnir Bearing Company, New Britain, Connecticut.



STEEL

Light Metals and Plastics vs. Steel

Republic official believes potential competition over-emphasized. . . Ferrous industry has tremendous advantage in capacity

LIGHT metals will be a greater factor in steelmakers' future calculations than they have been in the past, but their comparatively small capacity for such metals precludes their becoming a too serious competitor of steel.

Aluminum and magnesium will have much more impact on the markets for some other nonferrous markets than on steel markets.

Plastics will sell as much steel as they replace. They will be complementary rather than competitive.

We will have remarkably little disturbance of the major steel markets. Some of them should be exceptionally good for several years.

Export markets will absorb a far higher proportion of our steel output than they have done in the past.

The steel industry has no problem of reconversion to peacetime production and can swing immediately into its normal lines.

These are the opinions expressed by Lawrence S. Hamaker, assistant general manager of sales, Republic Steel Corp., Cleveland, before the Robert Morris Associates in Buffalo recently.

Mr. Hamaker emphasized that the steel industry is not oblivious to the probable postwar competition of the light metals and plastics—tremendously expanded during the war. If steelmakers are somewhat less than panicky about the potential damage to their markets, it is not due to complacency, but to a knowledge of the tremendous steel capacity advantage.

"Aluminum capacity, when completed," he pointed out, "will be 1½ million tons a year. On a two-for-one weight basis, this might displace 3 million tons of steel, which would be a serious but not exactly staggering blow to an industry with 100 million tons annual capacity. We could equal this year's aluminum output in four days' operations. It is well to keep in mind that more than half of the United States aluminum facilities are government-owned and 90 per cent of the industry's wartime output is going into aircraft production.

"We are confident that economic factors, which is a polite term we use meaning 'prices', will carry just as much weight after the war as they did before. Aluminum in the ingot is 15 cents a pound. In fabricated form, it



LAWRENCE S. HAMAKER

is from 35 cents to \$1.00 a pound, depending on the degree of fabrication. This is easily ten times the cost of steel.

"There has been considerable speculation as to the aluminum industry's raw material resources. The visible supply of high grade bauxite in this country can only last two or three more years at the current rate of consumption. It is true that the earth's crust contains more aluminum than any other metal and clays from which aluminum may be extracted are almost inexhaustible, yet it is usually in combination with other elements that defy commercial extraction. It is like gold from sea-water, fully possible, but not commercially feasible.

Much Bauxite Being Imported

"Vast quantities of bauxite are available in Dutch Guiana in South America and large tonnages are being imported from there now. In Brazil, also, very large deposits have been explored. Some future war might, however, shut off this supply and then our situation might be serious indeed. This is one example, and there are others, of the fact that many of our richest mineral resources in this country are nearing exhaustion. We are close to becoming a have-not nation in several categories, and we shall almost certainly be importing much of our copper, petroleum and perhaps high-grade iron ore in the not far distant future, if ocean shipping is as cheap as I think it will be.

"Aluminum is not a strong metal by

Little disturbance in major markets expected for several years. . . Export demand will be greater than during pre-war years

the steel man's standards. When aluminum adherents point out that their metal is only one-third the specific weight of steel, the obvious answer is that steel is five times as strong. Such generalizing is misleading because aluminum can be alloyed with other elements to increase its strength, as has been done with steel for a great many years. In ball-bearing steels, of which Republic is the largest producer, we are able to achieve through proper alloying and heat treatment a tensile strength of 300,000 pounds per square inch. The most exacting application of aluminum I know of from a structural strength standpoint is forged aluminum propeller blades and they have been able to develop only 80,000 pounds per square inch tensile strength. The trend is now toward hollow steel blades instead of solid aluminum forgings, thus achieving the desired strength with no weight penalty.

"Another example is the crank case for radial aircraft engines. These were made almost entirely of aluminum, but alloy steel crank-cases are now in commercial production which not only weigh less than aluminum, but are so much stronger that they have permitted horsepower of the engine to be increased. Today's aircraft engine is a marvel of mass-production precision manufacture. A standard diesel engine may weigh as much as 80 pounds per horsepower. Our aircraft engines now weigh less than one pound per horsepower.

"C. F. Kettering of General Motors says we will have steel airplanes long before we have aluminum automobiles, and he is right. The steel airplane, as a matter of fact, is far beyond the laboratory stage and one type will shortly be in production. Aluminum's only real advantage is saving in weight and such saving is not important in automobiles unless 500 pounds or more is saved.

"Even before the war steel was successfully counter-attacking in certain fields invaded by aluminum. The first stream-lined passenger trains were made of aluminum back in 1933, but since that time, a great many stainless steel streamliners have been built. Stainless possesses such vastly superior strength that there is no great difference in weight of the finished equipment, and the resistance to corrosion of stainless steel is substantially greater."

The second light metal to receive wide

public attention is magnesium, according to Mr. Hamaker.

"Its production has increased 70 times since 1939. Magnesium is stiffer and more brittle than aluminum and is largely used in the form of castings. It can be flat rolled but cannot be forged.

"Magnesium is one metal that can be produced from sea-water and such a plant is now operating at Freeport, Tex. Much of it, however, is extracted from brine wells in Michigan. There are other processes involving reduction of the metal from magnesite ore, some of which have not been conspicuously successful. In any event, there is no shortage of raw material from which magnesium can be made.

"Due to the limited forms in which magnesium can be fabricated, as well as its brittleness, and poor resistance to corrosion, it does not seem likely that it will achieve wide use as a structural metal in the foreseeable future. It costs 20½ cents a pound in the ingot, 25 per cent more than aluminum. The annual production will reach 265,000 tons. Please recall again the steel figures of 100 million tons. There are, however, many uses for it, such as handles and casings for hand tools, such as electric drills and many similar applications where light weight is an advantage and high strength is not required. The outer shell of suction sweepers is another example. One of the leading makers used magnesium in this manner before the war.

"In addition to the limited physical properties of magnesium, the major headache in fabrication is its flashy burning qualities. The material in a photographer's flash bulb is magnesium foil and what happens in the bulb is exactly what happens when a spark touches magnesium dust or shavings in the shop. Water on burning magnesium makes the metal burn more violently. Magnesium burning on a concrete floor combines with the oxygen in the water of crystallization always present in concrete and may explode, showering the fire over a wide area. As a result, cutting tools working on magnesium must be kept very sharp to avoid over-heating the work; scrap must be swept up constantly and kept in covered containers in small lots. Magnesium dust from grinding must be carried away in water and the resulting sludge taken outside and buried.

"There is another light metal, beryllium, concerning which many exaggerated claims have been published. The ore is in such short supply that beryllium can have no major influence in the light metal field. Its chief use is as a hardening agent for copper. It is also the most important adapter of electrical radiation to light waves and is widely used in the production of fluorescent lamps, x-ray screens and television.

"Speaking generally, it seems to us that the light metals will have much more impact on the markets for some of the nonferrous metals than on steel markets. It seems reasonable to assume that they will make inroads on building

hardware and gadgets, as well as transportation equipment fixtures now largely made of zinc die-castings, copper or brass. Copper's major market, the electrical industry, should remain relatively undisturbed, but in a multitude of small applications, the light metals will make themselves felt, if costs can be brought into line."

Plastics Complementary to Steel

Plastics, which have had a spectacular development in recent years, will sell as much steel as they displace; and will be complementary to steel rather than competitive, Mr. Hamaker believes. This is because where strength is required, many so-called plastic products are being molded around a steel core.

"It is significant, however, that almost without exception the use of plastics has represented the displacement of some other material, but these other materials have suffered a great deal more through the introduction of plastics than steel has suffered or will suffer. The rapidly increasing application of plastics to small consumer items having style or

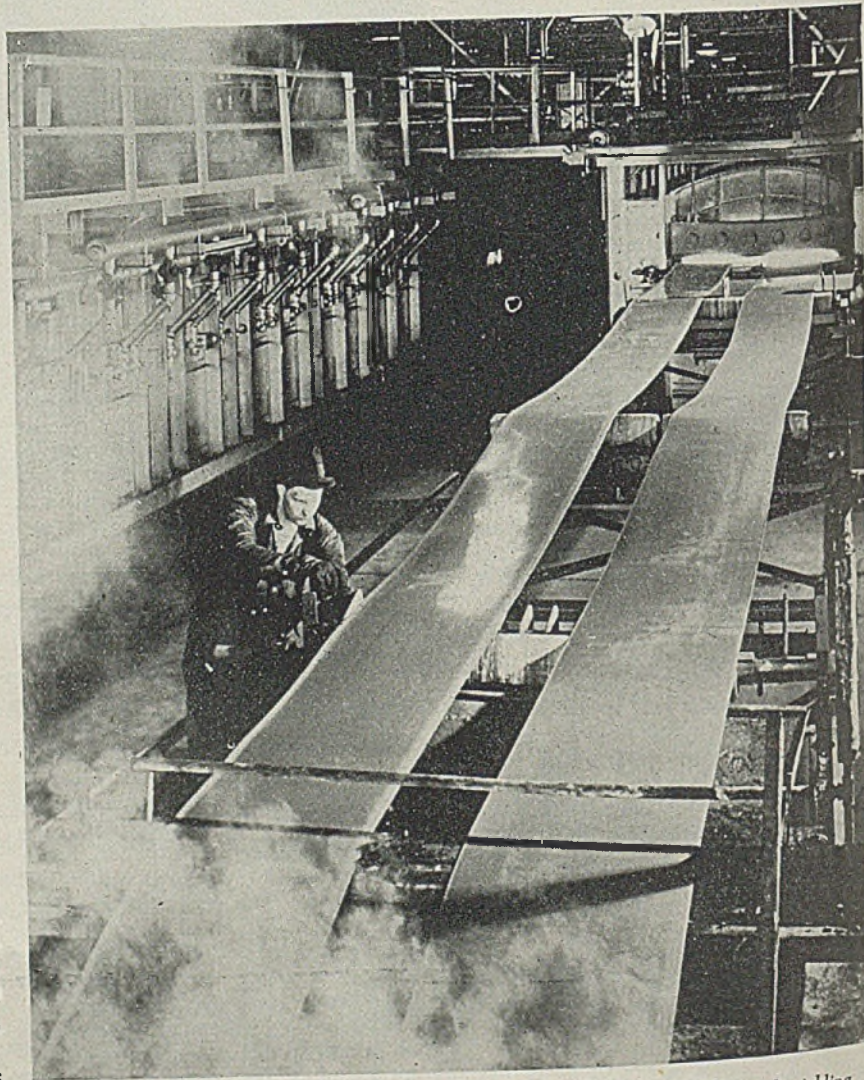
color appeal has led to the popular impression that the use of plastics is becoming almost universal, but this is not the case.

"The industry has grown greatly during the war, due to wide use of plastic parts to replace critical materials, though the raw materials required in plastics production are pretty critical themselves.

"In the case of plastics, the economic factors may again be expected to function. No one has yet developed a plastic molding powder to sell for less than 15¢ a pound and the transparent and translucent types are much higher.

"This year's output of plastics is estimated at 350,000 tons, 1/3 of 1 per cent of the steel industry's capacity. There are so many types of plastics it is difficult to generalize. Some have good dimensional stability, others good color stability and so on.

"The plastics have some major physical shortcomings which make it improbable that they will be used for any kind of structural applications. They are brittle. They lack surface hardness,



Wide coils of stainless steel come off one of five normalizing and pickling lines of Republic Steel Corp.'s cold rolling and stainless finishing plant at Massillon, O. Quality of this steel will make it a postwar competitor of aluminum in many fields

hence have poor resistance to abrasion. Automobile windows of plastic material have been tried, but they soon took on the appearance of frosted glass from the action of dust particles in the air. The greatest difficulty from the standpoint of low cost manufacturing is the impossibility of making satisfactory joints and connections, unless bolts or screws are used.

"In view of the tremendous power required to mold the plastics in large sections, and the slowness of the operation, I think it will be a long time before we see plastic automobile tops, one of the fondest dreams of the air brush engineers."

As to the general postwar outlook for steel, Mr. Hamaker said Republic officials are optimistic, though with some reservations.

"A detailed survey seems to indicate that we will have remarkably little disturbance of the major markets we enjoyed before the war.

"We expect all kinds of consumer's durable goods to move in very large volume and this means huge tonnages of steel. The automotive industry will enter the peace with the largest backlog of unfilled demand in its history and will be several years catching up with it.

"We anticipate the largest residential building boom the country has ever seen. There is about a ton of steel in even a small home.

"The railroads will be almost literally worn out and their deferred maintenance alone will account for steel in large volume.

"The American farmer will come out of this war in the best financial condition in his history. Mortgage debt is being retired before it is due. He will buy implements, machinery, buildings, fence and many other products made of steel.

"The postwar highway program has made headlines in recent weeks. Highways are reinforced and guarded with steel.

"A rosy picture of the outlook can be painted and truthfully so, yet it is not all roses. I think there is little possibility that our 100 million tons of capacity can be fully employed for a good many years after the war, no matter how good business is. This year we will produce about 93 million tons. In the boom year of 1929, we produced 63 million tons.

"Most postwar additions to steelmaking capacity have been extensions to existing plants because balancing out these establishments with a relatively few new facilities was the quickest method of increasing production with the least expenditure of money and material. There has, therefore, been no major change in the geographical distribution of the nation's steel capacity. If, as is very likely, steel production drops to something approaching prewar levels, many problems will arise in determining which plants are to produce the steel. An even decrease in operating rates throughout the industry cannot be ex-

pected. For one thing, obsolescent plants which have been revived to meet wartime needs probably will be abandoned. In addition, it is possible that some of the new capacity, which in postwar will represent extreme over-capacity, such as plates for shipbuilding, will not operate at all. Some of the new plants built in the Far West, vital to the war program, will be seriously handicapped by high costs.

"Fortunately, the steel industry has no problem of reconversion to peacetime production and can swing immediately

into its normal lines. As a matter of fact, it is now estimated that only 20 per cent of our industries will have serious reconversion problems and there probably has been too much alarm on this subject."

Referring to the export market for steel after the war, Mr. Hamaker said Republic's export manager believes that markets will be opened which have been almost completely dormant, and that German, Japanese, Belgian and French steel industries will be eliminated from world markets for a generation.

POSTWAR PREVIEWS

LIGHT METALS vs. STEEL—Aluminum and magnesium will have more impact on the markets for other nonferrous metals than steel. Plastics will sell as much steel as they replace. Relatively little disturbance of major steel markets indicated in years immediately following war. See page 57.

STRUCTURAL MARKET—More than 400,000 tons of structural steel and 250,000 tons of reinforcing steel to be required for New York city's postwar construction program. See page 68.

WAR DEMOBILIZATION—Problem of disposing of government-owned plants and material surpluses must be controlled carefully as it holds vast significance from the standpoint of shocks to the postwar economy states Under Secretary of War Patterson. See page 72.

VOCATIONAL SCHOOLS—Canadian vocational schools likely to be equipped with machinery and supplies provided by the national government when peace comes. See page 73.

POSTWAR AUTOMOBILE—Economic considerations outweigh fancy designing in postwar automobiles in opinion of Studebaker executive. See page 77. First General Motors postwar car to look like 1942 model, states C. E. Wilson, president. See page 78.

AIRPLANE OF FUTURE—Representative thinking in aviation engineering circles is that largest postwar plane will be a 150,000-pound, 4-engine craft carrying about 100 passengers. See page 80.

PROPELLER BLADES—Experimental aluminum airplane propeller blade developed, rough forging for which weighs approximately 800 pounds. Blade is to be used in test cell operations leading to development of new and more powerful aircraft engines. See page 82.

WEST'S PROSPECTS—Rapid industrialization of the area west of Mississippi cause for speculation with respect to postwar disposition of new plant including military establishments which hold peacetime industrial significance. See page 86.

DEEP DRAWING—Hot-rolled chromium-molybdenum steel, never considered well adapted for drawing, is being made into high-pressure cylinders for carbon dioxide and oxygen by an improved method that reduces costs and boosts output ten times. See page 90.

CHEMICAL BLACKENING—Originally used only for coloring and finishing gun barrels and gun parts, finishing metal surfaces by manipulation of heat and chemicals promises increased application in the postwar era. See page 100.

ELECTRONICS—Already occupying an important place in industry, use of electronic equipment for converting alternating to direct current (and vice versa), for electric induction heating, in welding control equipment, in variable speed motor controls, air conditioning, fluorescent lighting and the like is finding increased acceptance. Important expansion of many of these applications is expected, new uses visaged. See page 109.

September's Production 'Disappoints'

Bomber output advances 6 per cent. Most other items fail to show appreciable gains. Index levels off at 614

MUNITIONS production in September held at substantially the August level with the War Production Board's index advancing a single point to 614.

September's performance re-emphasizes the difficulty of achieving successive month-to-month increases, according to C. E. Wilson, acting chairman of the WPB.

"The slack, which permitted sharp gains during 1942, now has been taken up. The failure of the overall munitions program to show a percentage gain, while it cannot be regarded as anything but disappointing, indicates more than anything else that we are approaching our production ceiling and that overall gains are not so important as are gains in specific items.

"Poor performance of several items is traceable to prospective or recent cut-backs in programs, and this reacts against month-to-month gains in the total munitions program. On the other hand, continued increases have been registered in most of the important groups and, while gains have been smaller the consistency of these gains has been encouraging."

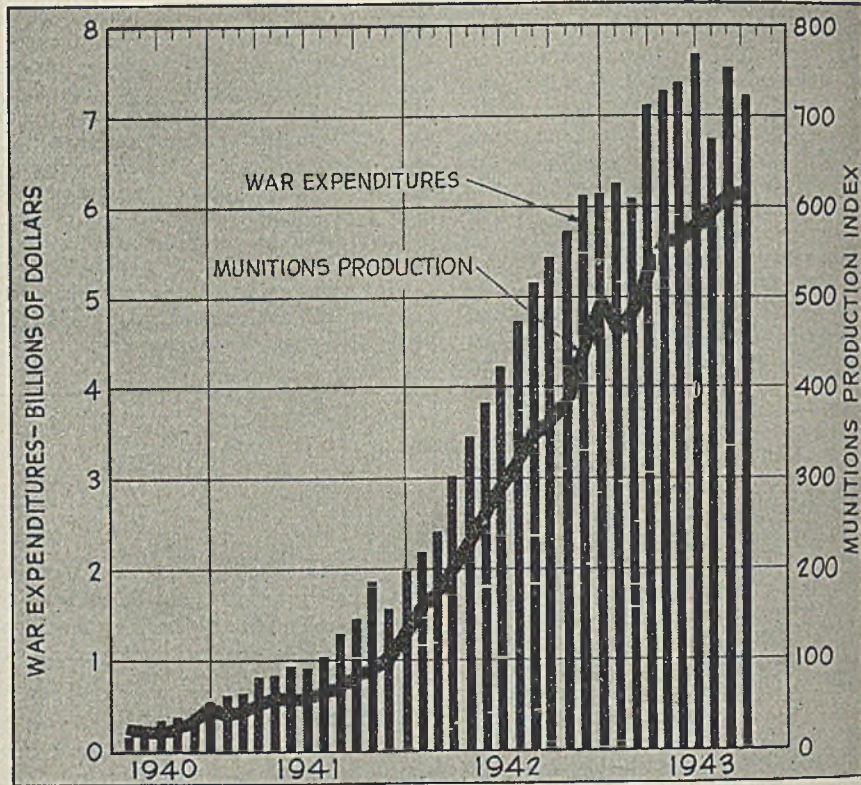
Most difficult production problems at present are aircraft and airborne signal equipment. Both of these showed increases in September over August. Dollar value of aircraft produced was up 4 per cent and airborne signal equipment gained 6 per cent.

During the month, 7598 planes were produced, compared with 7612 in August; a larger number of these were heavy bombers, output of which showed a 6 per cent gain in September.

MUNITIONS INDEX

(November 1941 = 100)

Month	1940	1941	1942	1943
Jan.	41	166	460	
Feb.	45	182	486	
Mar.	52	213	530	
Apr.	60	247	563	
May	57	276	564	
June	59	309	573	
July	23	64	339	593
Aug.	22	72	372	613
Sept.	22	83	387	614
Oct.	27	91	403	...
Nov.	34	100	448	...
Dec.	50	133	497	...



Ammunition, which had a poor August showing, came back in September to register a 3 per cent gain. In artillery and tank gun ammunition, the gain was 11 per cent. Small arms and infantry ammunition, although on schedule, remained for the second successive month below the level attained in July.

Work done on naval vessels increased 3 per cent over August and on merchant vessels 1 per cent. Value of work on naval vessels was well in the billion-dollar class; almost one-fourth of all September tonnage was accounted for by destroyer escorts.

Through September, deliveries of major-type merchant vessels totaled 13,200,000 deadweight tons, or 69 per cent

of the 1943 schedule of 19,162,000 deadweight tons. Liberty ship completions totaled 106, four below the August total. Tanker production hit a new high with delivery of 22 vessels.

In the stable and declining programs, where the problems are not as great as those mentioned above, combat vehicles were down 19 per cent; self-propelled artillery gained 1 per cent; antiaircraft guns and equipment advanced 2 per cent; small arms and infantry weapons gained 13 per cent; and motor vehicles were down 5 per cent.

Rate of construction continued to decline according to plan, dropping 9 per cent in September. Most construction facilities are nearing completion.

Inventories Comfortable—But!

Stockpiles of iron ore, coal and scrap being built up as winter approaches. . . Serious supply troubles not expected if prolonged work stoppages and traffic tieups are avoided

RAW material inventory position as the cold weather approaches appears fairly comfortable in most lines. Iron ore miners and shippers, coal mine operators, and scrap dealers are exerting determined efforts to accumulate sufficient stockpiles to tide over the iron and steel and related industries through the winter months.

As the situation now stands, serious supply difficulties will be avoided if—there are no prolonged work stoppages in the mines and on the railroads; winter traffic tieups are held to a minimum; scrap stocks accumulated in the current

collection drive are substantially close to the tonnage considered necessary to keep the mills going.

Threatened labor trouble on the railroads and in the coal fields serve to discolor the inventory picture. Further, transportation difficulties are certain to mount with winter weather, slowing down traffic to the extent that normally would be considered fair stockpiles would prove inadequate to meet consuming demands.

Lake ore shipment already is slowing down. Increased vessel movement of coal and grain, continued fogs and re-

cent heavy storms, have forced a further reduction in the scheduled 1943 lake shipment of iron ore.

Latest available figures on the movement of iron ore show that for the season through Oct. 25, 74,011,570 gross tons were shipped, about 7.4 million tons below that moved in the like 1942 peak season. Shipments in October are estimated at about 12 million tons in contrast with the October 1942 total of 11,417,167.

Based on an estimated ore movement of 12 million gross tons in October, and consumption of about 8 million, stocks at lower lake ports and furnaces Nov. 1 amounted to about 43,839,000 gross tons. This represents a decline of 8.8 million from the 52,668,000 tons on hand Nov. 1, 1942.

With respect to coal supply, the outlook is clouded by the threat of strikes and the fact that considerable production has been lost over past months by work stoppages and labor shortages. At a meeting in Cleveland of regional War Production Board officials it was stated last week that the coal situation is desperate and that a crisis may develop soon. It was pointed out that there is a 30 million ton shortage at present and that weekly output has been falling about 500,000 tons behind requirements.

On the other hand, the Bituminous Coal Institute reports soft coal stockpiles are now about the largest on record, totaling 100 million tons.

Seriousness of coal supply in the steel industry was confirmed last week at the regular quarterly meetings of two large steel producing interests.

There has been little opportunity to build up inventories since the coal strikes earlier this year forced a sharp depletion in inventories, Irving S. Olds, chairman, United States Steel Corp., stated. The corporation faces real difficulty should the current coal strikes continue at its mines in Alabama and Kentucky.

While Bethlehem Steel Co. has not been effected by the present coal situation, a coal strike would be felt immediately as the corporation has only about 11 days' supply in stock, Eugene G. Grace, president, stated. He expressed the opinion that this was true of the industry generally.

Domestic stocks of iron and steel scrap at consumers', suppliers', and producers' plants at the end of August approximated 6,778,000 gross tons, representing a decrease of 1 per cent from the 6,860,000 tons reported on July 31, according to the Bureau of Mines.

Labor Problems Retarding Production of War Goods

Supply of labor has become increasingly critical since April while, at the same time, relationship between supply and requirements of some minerals has

(Please turn to Page 156)

Manufacturers Told Demand Lags

Speakers at twenty-fifth annual convention discuss immediate and prospective problems confronting the industry. . . Ralph W. Hisey re-elected president of association

OPENING the twenty-fifth annual meeting of the Foundry Equipment Manufacturers Association Inc. at the Homestead, Hot Springs, Va., Oct. 22 and 23, Ralph W. Hisey, vice president in charge of the machine division, Osborn Mfg. Co., Cleveland, and president of the association, outlined the progress made by the organization during the past twenty-five years, and discussed some of the immediate problems arising from war production.

Thomas Kaveny Jr., chief, Foundry Equipment and Supplies Section, Tools Division, WPB, Washington, then told of the problems connected with the functioning of this section. He indicated the general trend in demand for equipment is down, but that substantial expansion is taking place in facilities for producing malleable castings.

John F. Fennelly, executive director, Committee for Economic Development, Washington, talked on "Preparation for the Post War Period," in which he took issue with those who refer to full unemployment after the war, and stated the thinking and conversation should be along the lines of a high level of employment. In his opinion it will be possible to shut-off 80 per cent of munitions production when the war in Europe ends.

At the close of the opening session, the following were elected directors of the group: H. S. Hersey, C. O. Bartlett & Snow Co., Cleveland; O. A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind., and B. L. Simpson, National Engineering Co., Chicago.

The 1944 convention and exhibition of the American Foundrymen's Association to be held in Buffalo in April was discussed by William M. Maloney of the A.F.A.

Bruce L. Simpson, chairman, statistical committee, said indications are that while the foundry equipment industry still is extremely busy, backlogs are contracting and it is expected they will continue in that direction.

At a round table discussion on a number of subjects confronting manufacturers in this period, Mr. Hersey presented the different situations which must be taken into account in the postwar period.

F. W. Klatt, W. W. Sly Mfg. Co., Cleveland, speaking on "Maximum Price Regulation," said that when Maximum Price Regulation 136, under which the foundry equipment industry operates, was first issued, it was ample protection. With the changes now rapidly taking place this situation is changing.

"Renegotiation" was discussed by P. J. Pctter, Pangborn Corp., Hagerstown, Md. and "Subcontracting" by E. F.

Nell, Milwaukee Foundry Equipment Co., Milwaukee, who brought out this activity was quite helpful to his company.

"Taxes" were discussed by W. L. Dean, Mathews Conveyer Co., Ellwood City, Pa., who drew attention to the growing types of what can be described as "illogical" taxes, the kind used to set up unnecessary bureaus.

Ralph W. Hisey, Osborn Mfg. Co., Cleveland, was re-elected president of the association, O. A. Pfaff, American Foundry Equipment Co., Mishawaka, Ind., vice president, and Arthur J. Tuscany, Cleveland, executive secretary and treasurer.

Postwar Export Trade Boom Forecast at Convention

Exports by the United States totaling about \$7,000,000,000 annually and imports of \$6,300,000,000 in the postwar era are considered very strong potentialities, based on the broad assumptions which project past relationships into the hypothetical postwar year of 1948.

This was revealed in a report entitled, "Foreign Trade After the War," released by the Department of Commerce at the National Foreign Trade convention in New York. The potential large export market would be more than double exports in 1937 and 36 per cent greater than the \$5,200,000,000 of the peak year 1929.

Proponents of the theory that the United States will need foreign markets to absorb its postwar industrial surplus often overlook two practical considerations, Joseph C. Rovensky, vice president, Chase National Bank, New York city, told the convention.

"First, there is the enormous pentup demand from our own people for a vast amount of goods after the war; secondly, it would be bad business for the United States to export great quantities of American products which foreign buyers cannot pay for."

Declaring that reconstruction was the chief theme of the convention, Eugene P. Thomas, chairman, National Foreign Trade Council, said that "reconstruction after this war means a rebuilding and restoration over vast areas of the world of all of the facilities and essentials of modern civilization, laid waste by flames of an incendiary war."

Frederick C. Crawford, president, National Association of Manufacturers, warned that lasting peace depended upon international trade and urged the inclusion of business men and business judgment at the peace table to write a peace founded on "international economic justice."

Steelmakers' Earnings in First Nine Months Show Mixed Trend

Only five of ten large interests to report for period so far record moderate improvement in income. . . Higher payroll and material costs continue important factors limiting returns

MIXED trend in earnings for the first nine months this year is reported by those steel producers who have so far released figures for the period. Only five of the ten companies reporting to date recorded moderate improvement in profits.

Higher payroll costs and to a lesser extent material costs continue the chief factors limiting earnings.

Five of the group reported a gain in September quarter net earnings over the like period a year ago. Comparison with the June quarter shows only two companies recording gains.

Reflecting lower net earnings before taxes in most instances, only two of the group set aside larger tax provisions for the nine months period than a year ago.

U. S. Steel Corp.

United States Steel Corp., New York, reports nine months net profit of \$50,252,649, equal to \$3.60 per common share, compared with \$46,495,743, or \$3.16 a share, in like 1942 period. September quarter net profit was \$19,166,596, compared with \$15,679,456 in the preceding period and \$12,628,836 in the like 1942 quarter. Estimated federal tax provision for the first nine months totaled \$79,500,000, in sharp contrast with \$161,600,000 in comparable 1942 period.

Directors declared a common dividend of \$1 a share, payable Dec. 20 to record Nov. 19. Company paid same amount in preceding quarters.

Bethlehem Steel Corp.

Bethlehem Steel Corp., Bethlehem, Pa., reports nine months net profit of \$19,416,795, equal to \$4.86 a common share, against \$19,656,471, or \$4.94 a share, in comparable 1942 period. September quarter net totaled \$6,573,892, compared with \$6,614,210 in preceding period and \$7,444,870 for like quarter a year ago.

Directors declared a common dividend of \$1.50 a share, payable Dec. 1 to record Nov. 8.

Republic Steel Corp.

Nine months net profit of Republic Steel Corp., Cleveland, amounted to \$8,456,601, equal to \$1.23 a common share, compared with \$10,653,221, or \$1.61 a share, in like period a year ago. Tax provisions totaled \$38,050,000, against \$54,200,000 in same month of 1942. Corpor-

ation earned \$2,452,869 in the September quarter, compared with \$2,337,175 in the preceding period and \$2,581,100 in like 1942 quarter.

Keystone Steel & Wire Co.

Keystone Steel & Wire Co., Peoria, Ill., reports September quarter net profit of \$236,152, equal to 31 cents a share on capital stock. In comparable period last year net income totaled \$191,576, or 25 cents a share.

Sharon Steel Corp.

Net profit of Sharon Steel Corp., Sharon, Pa., totaled \$1,209,347, equal to \$2.51 a common share, for the first nine months this year. In like 1942 period company earned \$948,589, or \$1.85 a share. Profit for latest period is after \$450,000 for postwar contingencies. Taxes totaled \$4,515,000, after deducting postwar credit, for the first nine months, compared with \$2,442,000 in like 1942 period. Third quarter net totaled \$273,911, compared with \$489,971 in the June quarter and \$311,387 in September 1942 quarter.

Jones & Laughlin Steel Corp.

September quarter net profit of Jones & Laughlin Steel Corp., Pittsburgh, totaled \$2,249,964, compared with \$2,539,716 in the corresponding 1942 quarter. Nine months profit amounted to \$7,060,581, equal to \$3.03 a common share, against \$7,470,186, or \$4.35 a share, in same nine months last year. Tax provisions for the nine months period totaled \$15,953,000, compared with \$17,000,000 in 1942 period.

Youngstown Sheet & Tube Co.

Net profit reported by Youngstown Sheet & Tube Co., Youngstown, O., totaled \$2,098,786 for the September quarter, compared with \$2,257,425 in the preceding period and \$2,459,652 in like quarter a year ago. Net profit for the nine months amounted to \$6,503,234, against \$7,327,950 in same months of 1942, based on first half and third quarter reports.

Inland Steel Co.

Inland Steel Co., Chicago, had net profit of \$2,930,777 for the September quarter, compared with \$3,011,333 in

the preceding period and revised net of \$2,608,409 for the like 1942 quarter. Nine months earnings totaled \$8,738,431, equal to \$5.35 a share on capital stock, compared with \$8,079,890, or \$4.95 a share, in corresponding period last year. Tax provisions for the nine months totaled \$11,047,000, against \$13,638,000 a year ago.

Continental Steel Corp.

Nine months net income of Continental Steel Corp., Kokomo, Ind., totaled \$481,618, or \$2.14 a common share, compared with \$621,999, or \$2.63 a share, for same 1942 period. September quarter profit amounted to \$147,280, against \$218,251 for the preceding quarter and \$481,618 in like quarter a year ago.

Wheeling Steel Corp.

Wheeling Steel Corp., Wheeling, W. Va., reports September quarter net profit of \$843,165, compared with \$1,329,010 in the June period and \$839,659 for the corresponding quarter last year. Nine months profit aggregated \$3,133,566, equal to \$3.11 a common share, compared with \$2,835,307, or \$2.59 a share, in like months last year. Taxes for the first three quarters amounted to \$3,155,000, against \$6,701,000 in like 1942 period.

Allegheny Ludlum Steel Corp.

Nine months net income of Allegheny Ludlum Steel Corp., Pittsburgh, amounted to \$3,634,771, equal to \$2.76 a common share. In like 1942 period company earned \$2,874,626, or \$2.17 a share. Federal income taxes for the first nine months this year were \$902,900 and excess profits taxes \$13,805,800, compared with \$876,500 and \$10,832,900 respectively in like 1942 period. Third quarter net amounted to \$1,051,452, compared with \$1,164,079 in preceding quarter and \$904,370 in like quarter last year.

Superior Steel Corp.

Net profit of Superior Steel Corp., Pittsburgh, for the first nine months totaled \$488,882, equal to \$4.32 a share on capital stock. In like 1942 period company earned \$455,094, or \$4.02 a share. Taxes and contingencies for respective nine months period totaled \$4,820,275, against \$1,810,000. September quarter net totaled \$134,410, against \$203,458 in preceding period and \$211,237 in like 1942 quarter.

Interlake Iron Corp.

Interlake Iron Corp., Chicago, reports third quarter net profit of \$126,278, compared with \$230,397 in preceding period and \$311,521 for corresponding quarter last year. Based on first half report, net income for the nine months totaled \$617,105, compared with \$1,004,123 in like 1942 period.

Gears Rival Bearings as Critical Components, Convention Told

Although war production in many vital phases is basically dependent on gear mechanisms, manpower drain from industry now menaces continued effective functioning of highly specialized plants producing them

By GUY HUBBARD
Machine Tool Editor, STEEL

WITH wartime conditions affecting travel and hotel efficiency, and business and engineering executives weighed down with problems beyond any stretch of any imagination of a few years back, wonder frequently is expressed by the "man-in-the-street" as to why certain conventions now are rolling up all-time highs in attendance.

Such was the case, for example, of the twenty-sixth semiannual meeting of the American Gear Manufacturer's Association at Edgewater Beach hotel, Chicago, Oct. 24-27, at which more than 200 key men of the industry were present.

The gear men got together to map campaigns which are fully as important along the industrial front as any being mapped in Washington for action on the political and military fronts.

Of the many problems up for consideration after President Russell C. Ball, Philadelphia Gear Works, opened the first general meeting Oct. 25, that of manpower was the most stark of all. Gear design, gear production and gear testing have developed to such a degree training and experience to carry it on cannot be developed over night. Only now—in what may be the eleventh hour of the war—has this fact become recognized in Washington. Local draft boards still do not recognize it. As a result, skilled men were drawn and still are being drawn from the gear industry for combat duty.

Shortages are developing in governmental gear programs comparable to those which were recognized some months ago in the antifriction bearing programs. The War Production Board has become cognizant of this and through its Manpower division, is taking drastic steps to halt the draft of gear experts and even to have recalled for industrial service some already in the armed services. While the convention was encouraged by this report from the War Production Board, there was a feeling that much harm already had been done and that fully as strenuous measures are going to be necessary to cope with gear shortages as have had to be resorted to in meeting bearing shortages. As Vice President Louis R. Botsai, Westinghouse Electric & Mfg. Co., and Elmer Sawtelle, Tool Steel Gear & Pinion Co., expressed it: "We used to fight to get orders, then we had to fight to get machines and materials, now we

have to fight to get—and keep—our men!"

A unique feature of the convention was inclusion of panel discussions in the open meetings. Subjects considered included: Industrial relations, labor and manpower problems; manpower replacement; new employes; training courses; absenteeism; unionism in the gear industry; labor supply problems; pension plans; and women in industry.

Several speakers bore down on the point that one place to look for potential difficulties in labor relations is in the zone of first line supervision. Foremen hastily recruited from the ranks of the older workmen are apt to be intolerant of those less skilled and less productive than themselves. If untrained in handling people, they are apt to fail to "treat labor like people."

Reports on Absenteeism

Howard Dingle, Cleveland Worm & Gear Co., presented some points on absenteeism. The average—he personally found—was running 6.8 per cent overall, but when excusable cases were subtracted, the level stood only at 3.8 per cent.

The union situation in the gear industry seems to be about on a par with that of other skilled industries such as machine tool building—according to responses to a recent questionnaire. As to how to deal with unions, two valuable suggestions were made. One was: "Remember that unionism is a business—same as the gear business—conducted by hard headed businessmen who have at their elbows labor lawyers of extraordinary ability." Therefore it behooves top flight businessmen in the gear industry to be entirely business-like and to have at their elbows labor lawyers of equal ability when union negotiations are under way.

The other point was: "If you have a union, encourage your older workers to take active part in its affairs." Otherwise they will hold aloof from it—thinking to please management by so doing—and so the young, irresponsible element will then dominate the situation to the sorrow both of conservative workers and management.

Guests of the association from the War Production Board in Washington were R. G. Sollenberger of the General Industries division and P. R. Chase of the Manpower division. Mr. Sollenberger stated decentralization of WPB rapidly

is becoming a fact. Mr. Chase made it clear that WPB recognizes the critical nature of the gear industry and that in every soundly presented case, involving retention of really important personnel, the Manpower division can be counted upon to "go to bat" vigorously in behalf of the industry.

No speaker held out any hope for any early or sudden ending of the war on any front. Those familiar with the Mediterranean situation emphasized the unexpected costliness in men and machines of the Sicilian and Italian campaigns. All were optimistic as to ultimate victory, but none as to early victory.

Renegotiation did not come up for public discussion. However, contract termination did get constructive consideration by A. J. Jennings, Cleveland Worm & Gear Co., and W. L. Schneider, Falk Corp. Both recognize necessity for prompt liquidation of assets which will be frozen by contract cancellations when the war ends—if postwar activities are to get under way promptly. Under present laws it will take more than 50 years to effect this liquidation. Therefore some such simplification as is being advocated by A. J. May and J. D. Murray must be hastened. Appearance of representatives of the gear industry as witnesses in behalf of such legislation, before congressional committees in Washington, was urged.

As the recognized "engineering body of the gear industry," A.G.M.A. on this occasion presented its usual quota of highly important technical papers and discussions. These were: "Gear Motors—Their Design and Application by A.G.M.A. Standards," by C. B. Connell, Westinghouse Electric & Mfg. Co.; "Hobs, and Factors Influencing Their Standardization," by George P. Maurer, Falk Corp., and "Cutting and Hobbing Worms and Gears," by Dr. H. Poritsky and D. W. Dudley, General Electric Co.

Specifies Alloy Steels To Be Made in Electric Furnaces

To release needed open-hearth capacity for carbon steel production, the War Production Board has notified steel producers and customers that hereafter seven specified types of alloy steel are to be produced only in electric furnaces unless unusual circumstances permit exception. The types of alloy steel contained in the direction:

Airborne aircraft steel where aircraft quality is specified; airborne aircraft tubing; armor-piercing shot body and cap steel 20 mm. and larger; steel for integral parts of small arm rifles and machine guns up to and including 60 calibre, excluding mounts and tripods; steel for integral parts of guns, cannons, rifles and howitzers 20 mm. and larger, excluding mounts and carriages; bearing steel including carburizing grades; gear steel excluding gears made from plate.

Rail, Coal Wage Demands Spearhead Attack on Anti-inflation Front

Nation believed at economic crossroads where next several months will determine whether inflationary trends continue or can be held in check

SPEARHEADED by higher wage demands by the railroad workers' and coal miners' unions, new thrusts against the anti-inflation line are in the making.

Living costs, which held steady during the summer months, again are starting to edge upward.

Stocks of consumers durable goods on hand at the beginning of the war are wearing out with increasing rapidity and creating pressure for replacements at any cost.

The United States is at an economic crossroads where the next several months may determine whether inflationary trends continue upward or can be held in check, according to Judge Fred M. Vinson, economic stabilizer director.

Irrespective of the merits of the workers' demands, the higher wages asked by the rail and coal unions constitute the greatest immediate threat to the "hold-the-line" policy. It is among these two groups that the greatest dissatisfaction with the administration's price and wage policies exists—discontent that is being reflected in strikes and threatened strikes.

The five operating unions of the railroads now are polling their 350,000 members on calling a general strike, following the unions' rejection of the 4-cent hourly increase granted them in September. They had asked for a 30 per cent increase, with a minimum hike of \$3 a day.

Although the strike vote was authorized unanimously by union heads, it is doubted that there will be a general strike, which, of course, would immediately paralyze the war effort. Union spokesmen point out that the brotherhoods actually have not struck in more than 50 years, although there was an "outlaw" walkout in 1920 and a walkout by rail shopmen in 1922 and 1923.

The 15 unions representing the non-operating employees, with about 1,000,000 members, also have decided to take a strike ballot. Nonoperating employees were voted an 8-cent hourly increase by an emergency board last May, but this was vetoed by Economic Stabilizer Vinson.

One of the chief grievances of the railroad employes is that their wage problems have been shunted around. They charge that the normal machinery

of the Railway Labor act has been disregarded and that final authority to make wage adjustments has been given to Mr. Vinson.

Average hourly earnings of all railroad wage earners at present are about 86 cents an hour. They range from 56 cents for unskilled labor to about \$2.07 for passenger engineers.

Operating employes were granted a 9½-cent hourly increase in December, 1941, and nonoperating employes were given a 10-cent hourly raise at the same time. Other than these increases, the only benefits they have received since the war started have been in longer work weeks, due to the greatly increased traffic burden and the manpower shortage.

Currently, the total payrolls of class I carriers is \$2,800,000,000 annually.

While the rail workers were balloting on the strike issue, sporadic stoppages by coal miners were causing grave



ECONOMIC STABILIZER FRED M. VINSON
"We are at an economic crossroads"

concern among war production officials. C. E. Wilson, acting chairman of the War Production Board, termed the wild-cat strikes even more serious than the walkouts early in the summer.

Last week the War Labor Board denied the mine workers' bid for a daily wage increase of \$1.50 but countered with a proposal which it said would add about \$1.12½ a day to the miners' pay for a work-week of 40 hours or less. If the miners work a 6-day week at 8½ hours a day the board said its offer would increase miners' earnings about \$10 weekly or around \$1.66 a day.

Holds Quick, Final Settlement Of Terminated Contracts Urgent

QUICK and final settlement of terminated war contracts is an imperative matter affecting the national interest, and holding the key to millions of postwar jobs, James H. Marks, vice president, Packard Motor Car, and chairman of the automotive industry's contract termination committee, said last week before the House Military Affairs Committee.

Clearance of cluttered war plants, moving out of machine tools, removal of work in process and partially completed parts and materials—all must be effected before the automotive industry can get its peacetime productive wheels moving to provide and generate 7,000,000 jobs again.

Mr. Marks said the automotive industry has accepted \$26,000,000,000 in war contracts, or approximately 20 per cent of the national total placed with metal-

working industries. This volume of automotive war work is spread over 44 states and 1375 cities.

Termination of war contracts for the automotive industry started over a year ago as conditions in the theaters of war changed the demand for materials.

If a general termination resulted at one time in the Detroit area, there would be a minimum of 450,000 people out of work. This would cost \$180,000,000 for unemployment compensation payments in 20 weeks' time.

Mr. Marks pointed out a few factors which would be involved in a detailed audit of war contracts by citing the following example from the Murray Corp. of America, Detroit.

Murray has an order for just the wings of a certain airplane. In those wings there are 4900 parts and 60,000 manu-

facturing operations. Another contract for another airplane involves only the outer wings, wing tips and nacelles, involving 3000 parts and 42,000 manufacturing operations. In another case inner wings alone require 4000 different parts and 100,000 manufacturing operations. So that a contract settlement made by accounting methods would involve listing every one of those parts in every stage of operation, determining the cost of each stage, piling those parts up after they had been audited and a so-called claim filed—waiting until they had been checked over and then proceeding with negotiations with respect to the amount Murray would get for the work in process, when the contract was terminated. Many months would be required to complete such detailed accounting and paper work during which the plants would be idle.

As another example of the tremendous size of the auditing job, a recent survey of 245 plants showed 37,683 contractual relations between the government and these plants. Value of these contracts was approximately fourteen billion dollars. The number of suppliers in connection with these contracts was 457,548, and this for only 245 plants.

To emphasize the possible danger of delay involved in a duplicate review of negotiated settlements, Mr. Marks cited his own company's experience.

The general accounting office established a field force at the Packard plant in Sept. 1942, a group which now has grown to ten men. The company has expended to date on cost-plus-fixed-fee contracts \$190,000,000. In one year the general accounting office force has audited only \$63,000,000 or one-third of the total. Out of the \$63,000,000 thus reviewed, there has been questioned only a total of approximately \$600,000. Of the latter figure, the total of disallowances finally made was \$571,211.

Industrialists Discuss War Problems with President

President Roosevelt last Wednesday for the first time met with a new, informal board of business men and industrialists. He has been going over war problems periodically with heads of major farm organizations and labor leaders and now will hold similar conferences with business spokesmen.

At his invitation to talk over from time to time "all matters concerning the participation of business and industry in the war", the following called at the White House: F. C. Crawford, president, National Association of Manufacturers; K. T. Norris, Norris Stamping Co., Los Angeles; Eric A. Johnson, president, Chamber of Commerce of the United States; Benjamin F. Fairless, president, United States Steel Corp.; Richard R. Deupree, president, Procter & Gamble Co.; George H. Mead, president, Radio Corp. of America; Cason Calloway, cotton textile manufacturer, Hamilton, Ga.

Advances 5-Point Contract Termination Program

Presenting a five-point program for congressional consideration, the Illinois Manufacturers' Association last week asked the House Committee on Military Affairs to consider a plan whereby war contractors would be paid 75 per cent of the amount of their claims upon the termination of contracts.

The association sub-committee headed by John F. P. Farrar, president, Chicago Metal Hose Corp., recommended Congress enact legislation that will be specific in detailing the conditions and methods of settling war contracts.

Second point in the program was that claims of contractors and/or sub-contractors, presented after termination of

contracts, be honored within thirty days. In the event of overpaying any contractor, the overage would be regarded as a loan, subject to the usual rates of interest. Remaining 25 per cent due on contracts would be paid within thirty days after government auditing.

Fourth suggestion embodied in the proposal was that the president and all officials and agencies empowered to sign contracts for war production be further empowered after the period of national emergency to correct any defects or deficiencies in contracts consummated during the war.

All claims arising from the termination of contracts would be handled through the agencies originally validating the agreements, according to the fifth provision of the bill submitted by the association.

Present, Past and Pending

■ DALLAS SWITCHED TO GROUP 2 LABOR AREA

DALLAS, TEX.—North American Aviation Corp.'s estimate of labor requirements at fighter and bomber plants near here has been cut from 48,000 to 30,000, C. E. Wilson, executive vice chairman, War Production Board, informed the Truman Committee last week. As a result War Manpower Commissioner McNutt stated Dallas will be switched into the group 2 labor shortage area.

■ BALDWIN LOCOMOTIVE DEVELOPS VEGETABLE COMPRESSOR

PHILADELPHIA—Baldwin Southwark locomotive plant has developed a hydraulic compression unit for commercial production of compressed dehydrated vegetables. In a War Department test two-pound bricks of dehydrated carrot were turned out at a rate of four a minute.

■ REPUBLIC STEEL GIVEN "M" AS NEW FURNACE IS LIGHTED

CLEVELAND—New No. 5 blast furnace of Republic Steel Corp. here was lighted today at Maritime "M" award ceremonies. Construction of the new furnace was started in February, 1942. It has daily capacity of 1300 tons of pig iron.

■ ATLAS CORP. BUYS ROTARY ELECTRIC STEEL

DETROIT—Controlling interest in Rotary Electric Steel Co., this city, has been purchased by the Atlas Corp., New York, from W. H. Colvin Sr., Chicago. No change in management or operating personnel is contemplated.

■ SCATTERED OFFICES TO AID SALE OF FEDERAL SURPLUSES

WASHINGTON—Arrangements are being made to establish several offices throughout the country to facilitate the merchandising on the open market of all salvage and surplus property no longer of use to any naval activity or other government agency.

■ WPB CLARIFIES USE OF AA-1 RATING BY STEEL PRODUCERS

WASHINGTON—Producers of steel in controlled material form should use the AA-1 rating assigned to CMP regulation No. 8 to obtain use of facilities as well as for acquisition of material, the War Production Board announced last week.

■ ELECTRIC, BLAST FURNACE PROGRAMS NEAR COMPLETION

WASHINGTON—War Production Board's figures as of Nov. 1 show 79 per cent of electric furnace expansion program has been completed, with all furnaces to be finished by February. Blast furnace program is 59 per cent complete.

■ OVER 100,000 TONS OF ALLOY SCRAP A MONTH AVAILABLE

WASHINGTON—Representatives of all alloy steel producers, meeting with WPB officials to discuss the alloy scrap situation, were told that over 100,000 tons of alloy scrap per month are available in excess of needs.

WINDOWS of WASHINGTON

Soviet's Answer

A SALES tax is the chief reliance of the Russians, not only in getting ready for this war but in fighting it, according to testimony of Russian-born Paul Haensel, professor emeritus, Northwestern University, in a statement to the House Ways and Means Committee. "In Soviet Russia the sales tax before the war with Hitler yielded \$25,000,000,000 a year. That means \$145 per capita, and the average rate of pay in Russia is \$68 a month. The average cost of living there is even higher than in our big cities but, nevertheless, the Russians believed that it was the best means of collecting revenue. The rate of the tax ranges from 50 to 65 per cent. The Soviet government decided that laborers must bear this burden."

Another Probe?

The new Senate Appropriations subcommittee, organized to make a sweeping investigation of American expenditures abroad, is composed of three of the toughest and best-known investigators in Congress. Sen. Gerald P. Nye (Rep., N. D.) is chairman and the other members are Senators Harry S. Truman (Dem., Mo.) and Millard E. Tydings (Dem., Md.). They are to look into charges made by the five senators who made a globe-girdling trip during the summer recess that under Lend-Lease the United States is distributing its wealth throughout the world and getting very little in return.

Redistribution Drive

Manufacturers in need of critical materials and equipment, which they otherwise have difficulty in obtaining, should get in touch with the Redistribution Division representatives in the regional offices of the War Production Board. The Army has launched an all-out "redistribution" drive aimed at preventing any useful equipment or materials from remaining idle. It has organized a redistribution setup in its Ordnance, Signal, Engineer and other branches and as a result already has been able to report idle materials and equipment with value in excess of \$600,000,000.

Unique Setup

By improvisation, the Army Quartermaster Corps has organized a unique manufacturing operation at Brazzaville, French Equatorial Africa, as a part of the undertaking to train and equip native troops for the French army. Two small turret lathes of ancient vintage turn out thousands of wooden buttons. Some 300 electric and 25 treadle-operated sewing machines have been assembled for producing uniforms. Hospital alcohol is made in an improvised distillery utilizing a system of vats made from discarded pipes and old gasoline drums.

Local or salvaged materials are used here to make buckles, tent poles, tents, tarpaulins, shelter halves, gun covers, leather pistol holsters, beds and many other supplies.

Recommend Loans

Facilities Bureau of the War Production Board has recommended a Defense Plant Corp. loan of \$2,100,000 to the Ozark Ore Co., M. A. Hanna & Co. subsidiary, for development of an iron ore property at Iron Mountain, Mo. The

SHARP CRITICISM

Naval officers, under sharp criticism by members of the Drewry subcommittee of the House Naval Affairs Committee for being too accommodating to the CIO union operating on a closed shop basis in plants of the Brewster Aeronautical Corp., did not start fighting back until tough Rear Admiral S. M. Kraus took the stand.

Under the Smith-Connally act, he declared, the Navy, even though it were to take over the Brewster plants, would have to operate them under existing labor agreement. The Navy, he said, has no means whatever to enable it to make arbitrary use of labor. The questioners kept on coming back with the Navy's failure to use its power of contract cancellation as a lever in the case of Brewster.

"The fulcrum of that lever is the neck of our country, gentlemen," declared Admiral Kraus. "The impact on the war effort itself must control the use of that lever—and we need the planes."

product is to be concentrate containing about 55 per cent iron, and annual output is to be about 300,000 tons.

Limestone's Case

A plea that the same depletion treatment now accorded iron ore and coal be extended to limestone was made recently before the House Ways and Means Committee by Rep. Clarence Cannon (Dem., Mo.), chairman, House Committee on Appropriations. Iron ore and coal, he said, "are protected against the ravages of depletion . . . with reference to which you allow a depletion of a small percentage upon the total product of the plant from which produced. After the war we are going to find all of our natural resources greatly depleted. And those for whom provision has not been made, as in the case of limestone, when the postwar period comes, you will find without any accumulated reserves with which to meet the problems of development and of rehabilitation."

Acquiring Experience

Trade association executives in Washington are watching the manner in which contract termination is handled by procurement agencies. A while back they were worried by the numerous delays on the part of contractors in submitting claims and delays on the part of the procurement agencies in acting on those claims. Now they feel more encouraged. The procurement agencies have been acquiring experience and have worked out a procedure so that the pattern of termination has been pretty well established. The termination problem will be a huge one when the great day is at hand. Total termination will involve at least \$75,000,000,000, and 45,000 prime contracts and 150,000 to 160,000 subcontractors.

Survival Threatened

Planning now for immediate rehabilitation of the railroad system, by the industry itself, also by its suppliers, by railroad labor and by the government, is vital if the industry is to survive. At the same time, if the railroad industry's problems are seriously faced now, the nation can look forward to "a transport service superior to anything we have ever experienced and at lower costs." These conclusions are the main ones in a 22-page brochure by E. W. Williams Jr., WPB transportation analyst, entitled *The Outlook for the Railroad Industry*. Copies may be had from the National Planning Association, 800 Twenty-first street, N. W., Washington.

Pressing Shortage

Due to heavy demands of the armed forces for industrial safety equipment there is not enough of such equipment to go around, according to spokesmen for the Safety Equipment Section of the WPB Safety and Technical Equipment Division. A survey shows that all industries on the average spent \$3.80 in 1942, per capita employment, for safety equipment. Those industries that spent the most had the lowest accident frequency rates. Expenditures for safety equipment in 1942, per employe, were: Chemicals \$6.00, merchant shipbuilding \$5.75, aircraft manufacturing \$5.22, iron and steel \$5.11, mining \$4.53. The lumber industry had the highest accident rate.

Overlooking Some Cash

Chairman Robert L. Doughton (Dem., N. C.) of the House Ways and Means Committee, in studying the Treasury recommendation that tax increases bring an additional \$10,500,000,000 repeatedly has mentioned the fact Treasury tables of projected federal tax income fail to provide for the 12½ per cent payments, on 1942 or 1943 income, due in March of 1944 and 1945. He indicated this factor will have a bearing on the size of the tax increase Congress decides on.

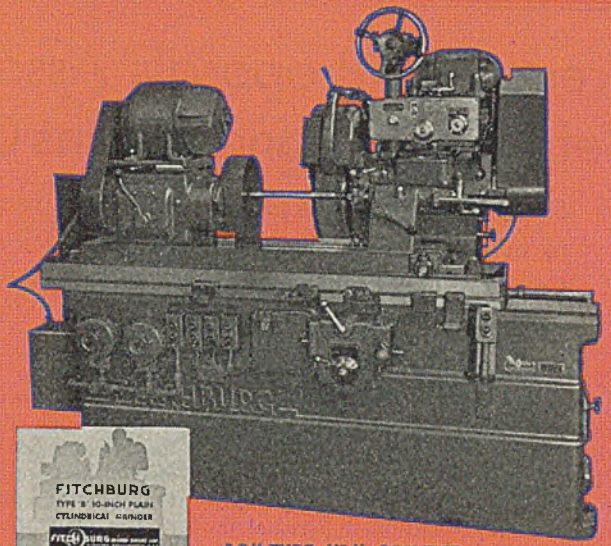
**FOR GENERAL PURPOSE
PLAIN CYLINDRICAL GRINDING
... FITCHBURG**
*shows the way to increase
production and cut costs*

6-inch Type "B"—The Fitchburg Type "B" 6-inch automatic precision grinder features new engineering principles that result in more economical and faster production of plain cylindrical parts. Made with 18" and 32" maximum capacity between centers.

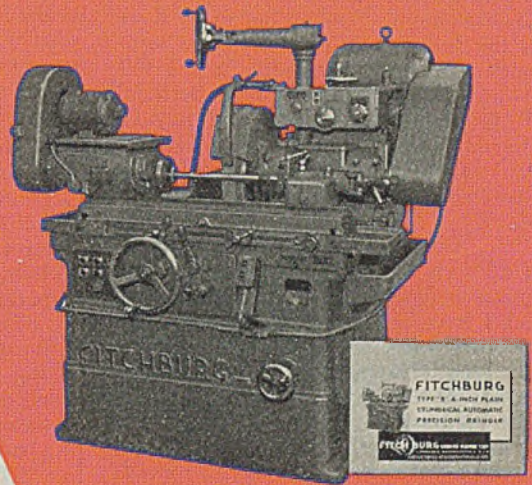
10-inch Type "B"—The Fitchburg Type "B" 10-inch plain cylindrical automatic precision grinder also incorporates engineering features that result in more economical and increased work production, greater accuracy, and finer finish. Made with 18", 48" and 72" maximum capacity between centers.

Type "C" Adjustable Angular Head Grinder

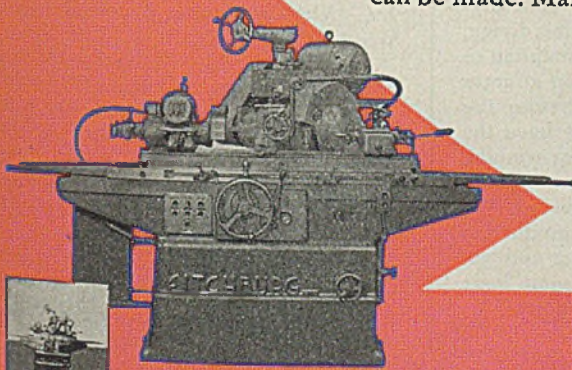
—The Fitchburg Type "C" Angular Head grinding machine is a single application of the Fitchburg Standard Bowgage Wheel-head Unit. It is designed to handle a wide range and a number of types of jobs. The Bowgage Unit is mounted so that it may be located to grind 0 degrees up to a 45-degree included angle. Prompt deliveries can be made. Mail coupon today.



10" TYPE "B" GRINDER



6" TYPE "B" GRINDER



TYPE "C" ANGULAR
HEAD GRINDER

Please mail the catalog checked.

6" Type B 10" Type B Angular Head

NAME _____ TITLE _____

COMPANY _____

STREET _____ STATE _____

CITY _____ STATE _____ S.

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.

Treasury's Proposals Assailed Before Ways and Means Committee

Sharp increase in personal income rates repudiated. . . Levies to achieve social reorganization draw ire of businessmen. . . Confiscatory taxes that prevent capital accumulations likened to killing goose that lays the golden eggs

TREASURY department's new tax recommendations are meeting strong opposition by both congressmen and businessmen.

The House Ways and Means Committee has repudiated the Treasury's proposal for steeply increased personal income taxes by a vote of 16 to 8.

Businessmen appearing before the same committee pointed out many flaws in the proposals. Typical of the testimony before the committee is the following colloquy between Rep. Bertrand W. Gearhart (Rep., Calif.) and Roy C. Osgood, vice president, First National Bank of Chicago, and spokesman for the Chamber of Commerce of the United States.

Mr. Gearhart: "We have witnesses of all sorts of political persuasions who appear before us in the course of time, and I have noticed in my examinations of other witnesses that these so-called advanced thinkers, liberals, who advocate the use of the taxing power for the purpose of serving political objectives and social reorganizations are almost entirely, almost to a man, advocating exceedingly high estate taxes, confiscatory taxes, I would call them. Of course, you do not approve of the use of the taxing power for the purpose of accomplishing social reorganization, do you?"

Mr. Osgood: "No, sir."

Mr. Gearhart: "It is your conception, is it not, that the taxing power was vested in the Congress for the purpose of raising revenue and revenue alone?"

Mr. Osgood: "Yes, that is my conception."

Mr. Gearhart: "Revenue for the operation of the day-to-day costs of the government?"

Mr. Osgood: "Right, and I might add it has always been, it seems to me, false economics to use a capital tax to take accumulations of capital and use them to pay the current running expenses of the government. What would a man in business do if he did that?"

Mr. Gearhart: "That is a perfect example of killing the goose that lays the golden eggs. I do not know of any better way of decreasing tax opportunities in the future than to destroy the source of taxes today."

Mr. Osgood: "That is my view."

Mr. Gearhart: "These people who sometimes come in here to advocate confiscatory death taxes, I am afraid, do so without any thought or consideration being given to the question of revenue. Their purpose is to throw the American system of free enterprise into

such confusion that out of it a new system may arise. But, as a matter of fact, through this system of taxation, they do not really serve their own objective because if you force an estate to dispose of a large portion of its capital assets, those capital assets are offered to the public for purchase, necessarily, in order to raise the money to pay the taxes, so the control of that industry to the

BIG STEEL MARKET

More than 400,000 tons of structural steel and 250,000 tons of reinforcing steel will be required for New York city's postwar construction program, according to Robert Moses, commissioner of parks.

The co-operation of the steel industry with the city on its postwar program shows that there need be no conflict between business and government in postwar planning.

"The important thing now," said Mr. Moses, "is to stop vamping about the great new world of inventions, mechanization of everything in sight, and effortless living, and concentrate on a resumption of hard, competitive work on a larger and better scale than before the war. Steel has probably been the greatest single product in winning of the war. It has an equally great role to play in peace. We began to get real war production when we stopped talking and got down to business. The same logic must apply to postwar plans."

extent of the tax does not pass into the hands of Communists. It does not pass into the hands of the state—it is purchased by other capitalists."

Mr. Osgood: "At a knock-down price."

Mr. Gearhart: "At a knock-down price, so the only effect is to take it from the family of the man who created it to give it to other capitalists who did not have anything to do with the building up of it."

Significant were two questions by Chairman Robert L. Doughton (Dem., N. C.) in which the latter declared his inability to reconcile the Treasury claim that the proposed increase in income taxes would work against inflation whereas heavy increase in a sales tax would

encourage inflation. He also thought heavy inheritance taxes would result in breaking up estates and "destroying incentive."

Responding to another questioner Mr. Osgood said: "When the 1941 income-tax law was proposed I made up some tables and went back to 1919 and took a period and applied the ordinary income-tax rates right straight through for a given small family, starting with \$200,000 of capital and assuming that it had no earning power but had to live on the income from that capital during the period. At the end of the 20-year period from 1919 to 1940, the estate came out just a little bit ahead. In other words, it came out with just a little accumulation after paying the then-in-force-during-that-period income-tax rates and estate-tax rates, and state inheritance-tax rates.

"I applied the 1941 act, carried it back through that same period, and the estate came out substantially in the hole. In other words, for the first time in American history, our federal taxing power is prohibiting accumulation, there is no doubt about that."

A number of committee members recalled that the Treasury did not always regard a sales tax as an encouragement to inflation.

"We were told during the depths of the depression that the imposition of a sales tax would slow up business and retard spending and that it was, therefore, deflationary," said Rep. Harold Knutson (Rep., Minn.). "I am just wondering when we changed it from being deflationary."

Another interesting exchange was that between Representative Knutson and Arch B. Taylor, secretary, Taylor Bros. Inc. (chewing tobacco manufacturer), Winston-Salem, N. C.:

Mr. Knutson: "Do you not think, Mr. Taylor, or suspect, that there is an insidious movement on foot in this country to liquidate the smaller fellows on the theory that once you get them out of the way nobody has any sympathy with the big fellow and they will just cut his head off and dump it in the basket?"

Mr. Taylor: "Are you trying to put me on the spot?"

Mr. Knutson: "No, I am just trying to give you some food for thought."

Mr. Taylor: "Mr. Knutson, I have been thinking that way for so long that I have a private feeling that there is a group within every governmental department that would like to see all business liquidated and nationalized. I believe that is a very insidious group—it does not belong either to the Republican party or to the Democratic party—and I believe that once we get into another tailspin, they want industry in such shape that industry cannot wiggle and they can step forward and say that the only thing to start the wheels going again will be the government, and the veil will be drawn a little bit further and we will see that they are the government."

Mr. Knutson also drew out some snappy comments from Richard H. Long,

STEEL

Long Motor Sales Co., Framingham, Mass., as follows:

Mr. Knutson: "You have mentioned waste. Of course we are all aware of the fact that there is a tremendous amount of waste in the war effort, all over—waste in wages, waste in materials, waste in time, waste in everything."

Mr. Long: "Why don't you do something about it, if I may say so?"

Mr. Knutson: "Well, I presume the reason why we cannot do anything is that we foolishly surrendered to the President many of the prerogatives that belonged to Congress."

Mr. Long: "Why don't you get them back? You have the ability to remedy the situation. I listened this morning and yesterday to the distinguished gentleman (Economic Stabilizer Fred M. Vinson) representing our government, and I saw how he parried your questions and did not tell you very much, excepting what he wanted to."

Mr. Long was on hand to protest against waste in war production.

"I have a grandson who went to work in one of the war production plants—a smart young fellow, I think. He is 17 years of age. After he worked there a couple of days the boss came around and said, 'Look here, young fellow, do you know you are doing more than twice as much work as you should? Put a wrench on your shoulder and walk around for half a day, and you will still be doing enough.'"

Following are a few excerpts which

set forth typical views of manufacturers on the subject of taxes:

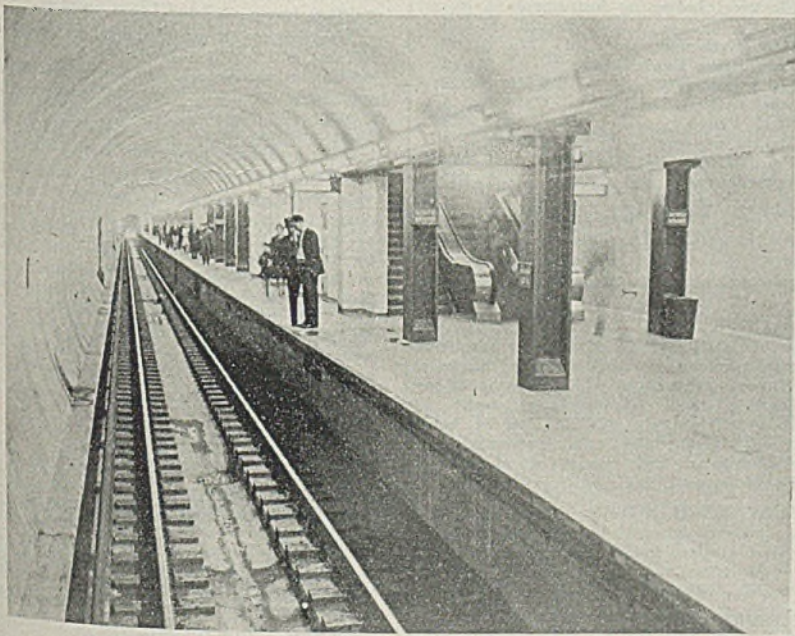
By Paulsen Spence, president, Spence Engineering Co. Inc., Walden, N. Y.—"Our company anticipated total sales in 1942 of \$464,341.32, with net profit of \$50,000. Actually we delivered \$502,519.17, but, due to the fact that the excess profits tax removed all incentive for efficiency our net profit was only \$29,602.07. We paid federal taxes of \$13,129.23. We have the necessary plant facilities, technical staffs, and manpower available to easily turn out \$1,000,000 a year, but inasmuch as the excess-profits law would take 90 per cent of all earnings above the \$29,000 figure mentioned, we would not have the working capital necessary to finance this increased volume. The invested capital method is not equitable as it makes no allowance for a corporation that knows how to turn out a large volume of work with a small invested capital. It puts a premium on inefficiency. The average earnings method is not equitable as it makes no allowance for thousands of small corporations connected with the capital goods industry."

By F. J. Hartman, assistant treasurer, Harnischfeger Corp., Milwaukee—"In the revenue act of 1942 Congress did provide certain relief (to provide funds for business to carry on after the war and possibly during the war). However, I believe that this is not adequate. The relief in the form of a 10 per cent credit on excess-profits tax, of course, applied only to excess profits. There are many

business concerns that are not subject to the excess-profits tax, or to a very small amount of excess-profits tax, and therefore they would get no relief. Also, that credit is more or less a matter of condition; that is, in our case, for example, the original excess-profits credit which we would have received on the basis of the returns which we filed would have been quite adequate to provide for a number of expenses which we anticipate. However, we are now subject to renegotiation, and if we were to accept the original proposal of the department our credit would be very materially reduced. It would then become very small in comparison with what we think we may need. I do not like the term postwar reserves or credits, as it has been used, for this reason. This is a war that may last a long time with some of the countries with which we are engaged, and I believe that any return contingent on the ending of the war is not going to provide sufficient relief for many businesses. I think the relief should be in the form of when the need therefore arises, even though it may be to plants that are now going to be closed down . . . In 1942, after having paid in excess-profits tax, based on the maximum of 80 per cent, our surplus had been brought up to only \$882,000. The renegotiation, if we were to accept that, would again give us a deficit."

By Benjamin Botwinik, chairman of the Tax Committee, American Business Congress—"The history of the development of the present excess-profits tax law rates and exemption clearly shows less and less consideration for the problems of small business. To a certain degree small business is to blame because it has never been organized in a qualified manner so that its collective voice was heard . . . We strongly recommend that the following simple relief provision be adopted by Congress as part of the contemplated new tax legislation program. If a corporation cannot or does not establish an excess-profits credit of at least \$20,000—through any of the present methods of computation or through any other relief provision—such company may take a credit of \$20,000. Such a relief provision will in no way affect or increase the credit of any corporation that can establish a credit of \$20,000 or more through the present provisions of the law. It is a much more scientific and equitable approach to the problem of small business than a straight increase in the \$5000 exemption."

By R. V. Fletcher, vice president, Association of American Railroads—"Our proposition is that the law should be so written as to permit the railroads to deduct the proper amount of deferred maintenance from their taxable income at the present time. They are going to have to spend this money some time when the war is over and peace comes and traffic falls off and their earnings are not by any means as satisfactory as they are now. They will have to spend a large amount of money to rehabilitate their property."



CHICAGO SUBWAY: After wrestling with its transit problem for more than 75 years, the city of Chicago has completed the first section of 4.9 miles of its underground tube. So far, the cost is nearly \$57,000,000 and is expected to reach \$217,000,000 when completed. Fluorescent lighting, air conditioning and reversible escalators are feature of the system. Acme photo

PRIORITIES-ALLOCATIONS-PRICES

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

INSTRUCTIONS

STEEL PRODUCERS: Steel producers no longer are required to notify the WPB division when they have accepted orders up to 110 per cent of the production directive or 105 per cent of expected production (if there is no production directive), except as follows: When they have accepted orders for any month up to the above percentages for sheets, strip or structural shapes; all producers of tin mill products operate under production directives which set a maximum limit on order acceptance and when a producer has accepted orders for any month up to such maximum, he must notify the Steel Division. (CMP No. 1)

STEEL PLATES: Because of increased demand for steel plates by the armed services during the current quarter and the first quarter of 1944, WPB has reduced deliveries of prime quality plate to warehouses. (M-21-b-1)

CLASS A FACILITIES: Application for authority to purchase class A facilities not related to construction under direction No. 34 to CMP regulation No. 1 must be filed with the local WPB offices rather than with the WPB, Washington. (CMP No. 1)

MRO RATINGS: Pleasure vessels operating under the flags of friendly foreign nations are not eligible to use the AA-1 preference rating assigned under CMP regulation No. 5 to obtain maintenance, repair and operating supplies. (CMP No. 5)

CMP REGULATIONS

SMALL STEEL ORDERS: Small order provisions for steel, contained in CMP regulation No. 4, have been liberalized with respect to wire (other than wire rope and music wire), pipe, galvanized sheets, tin and terne plate, and fence posts. A distributor now may fill orders, without receiving allotments, calling for delivery to one customer during any one quarter of not more than 10 tons of carbon steel and 1000 pounds of stainless steel in the above indicated groups. Small orders placed under these provisions must carry a special form of certification. Time within which persons placing telephone orders on warehouses must confirm such orders has been extended from 7 to 15 days. (CMP No. 4)

L ORDERS

CAST IRON WARE: Manufacturers may use an increased amount of cast iron in the production of specified articles. Each manufacturer calculates his quarterly quota allowance by taking the percentage shown in the table below for an article and multiplying it by one-fourth of the amount of iron and steel he used for that article during the July 1, 1940, to June 30, 1941, period. The specific quotas are: 160 per cent for sadirons or flatirons; 150 per cent for skillets; 100 per cent for sugar or wash kettles (16 gallon capacity), butchering kettles (30 gallon capacity), and Dutch ovens; 75 per cent for household kettles. Quota allowance for muffin pans and corn or bread stick pans was lowered to 25 per cent. Each manufacturer must submit reports concerning his production during the base period, and his shipments and inventory of cast iron ware during each quarter. (L-30-c)

GOGGLES: Restrictions have been removed on the use of nickel silver in spectacle type goggles. Under terms of the amended order, 10 per cent nickel silver may be used for any part of spectacle type goggles, except side shields, until Oct. 22, 1944. At least

90 per cent of the nickel content of the nickel silver must be obtained from scrap. (L-114)

VAULT DOORS: Control over sale as well as manufacture of vault doors has been provided in an amendment to the metal door limitation order. Vault doors may be sold only to fill Army and Navy orders for specified uses or to fill civilian contracts approved by WPB. For the latter, application is made by letter giving full details showing the essentiality of vault doors, why metal clad wood doors cannot be used, etc. (L-142)

WHEELBARROWS: Number of models of wheelbarrows which may be produced has been cut to only 10 from 80, effective Dec. 21, 1943. Manufacture of wheelbarrows with two wheels is prohibited while manufacture of other models is limited to certain specifications. Steel wheelbarrows must conform with maximum capacities and weights, and the designations and gages of trays specified. Wood wheelbarrows may be of any design or

INDEX OF ORDER REVISIONS

Subject	Designations
Bituminous Distributors	L-217
Boilers, Fire-Tube Steam	M-293
Busways	L-273
Cast Iron Ware	L-30-c
Class A Facilities	CMP No. 1
Conveying Machinery	L-193, M-293
Copper Scrap	M-9-b
Crucibles, Graphite	M-61-a
Goggles	L-114
Electrical Indicating Instruments	L-203, M-293
Heat Exchangers	L-172, M-293
Lubrication Equipment	L-314
MRO Ratings	CMP No. 5
Steel Orders, Small	CMP No. 4
Steel Plates	M-21-b-1
Steel Producers	CMP No. 1
Vault Doors	L-142
Wheelbarrows	L-157

Price Regulations

Car Castings No. 41

shape; all parts must be of wood or other non-metallic material, except joining hardware, tray braces and wheels, which may be of iron or carbon steel. Manufacturers must file WPB-1902 (formerly PD-754) on or before Dec. 21, giving the catalog number and specifications of each model of wheelbarrow to be produced. (L-157)

HEAT EXCHANGERS: Scheduling provisions formerly imposed by the heat-exchanger limitation order L-172 have been deleted. These provisions now are contained in general scheduling order M-293. (L-172, M-293)

CONVEYING MACHINERY: Provisions requiring authorization of engineering services, bids and estimates, and placement of purchase orders have been removed from order L-193 (Conveying Machinery and Mechanical Power Transmission Equipment). This equipment now is being scheduled under order M-293. Prospective purchasers no longer are required to file form WPB-1593 (formerly PD-681). (L-193, M-293)

ELECTRICAL INDICATING INSTRUMENTS: Order L-203, covering electrical indicating instruments, has been amended to conform the order with general scheduling

order M-293. As result of the recent amendment of order M-293, electrical instrument scheduling now is being done under two orders, and this amendment will provide the proper correlation and cross reference. (L-203, M-293)

BITUMINOUS DISTRIBUTORS: Bituminous distributors, bituminous distributor pumps and bituminous heating kettles manufactured for use by the armed services and by military forces under Lend-Lease are exempted from conservation and standardization provisions of order L-217. Limitations on models of distributors are removed while restrictions on sizes are retained. Restriction on rubber tires, barrel warming hoods, barrel hoists, and mud guards in heating kettles have been eliminated. Permitted sizes of heating kettles have been extended to include 500 gallon capacity kettles manufactured for use in the petroleum industry as defined in P-98-b. (L-217)

BUSWAYS: Wherever form PD-834 formerly was required under provisions of L-273, a letter in triplicate must be used now. (L-273)

LUBRICATION EQUIPMENT: Production of lubrication equipment now is limited to some 500 specified models, styles, and sizes. The new order, L-314, prohibits use of aluminum, cadmium, chromium, bismuth, tin, copper, zinc or nickel or their alloys in parts, finishes or plating, except for specified exemptions; prohibits use of metal for tool boxes or structural frames for portable grease service stations, except in small hardware; prohibits use of metal other than rerolled rail or Bessemer steel in individual grease and oil containers or hose reels; prohibits the polishing or buffing of the surface of any part except when essential for fit or sealing or when necessary for and followed by plating. Electric motors and switches, gas engines and pressure gages or component parts of such equipment are exempt from restrictions on the use of critical materials.

Distribution controls require AA-5 or higher ratings on sales to users, except for equipment with retail value of \$25 or less; and also require AA-5 or higher ratings on sales to jobbers and other wholesalers, except for automotive type fittings when used for replacement on automotive vehicles. Deliveries of certain kinds of equipment are permitted only for direct use by the armed services or by the military forces of Lend-Lease countries.

Manufacture of maintenance or repair parts in any quarter is limited to 150 per cent (dollar resale value) of the value of parts sold by a producer during the corresponding quarter in the year ended June 30, 1941. Parts manufactured for direct military use are exempt from this quota restriction.

Effective dates of distribution controls are: Sales to users, Oct. 31; acceptance of purchase orders from jobbers, Oct. 31; delivery of equipment to jobbers, Nov. 20; deliveries for military use, Nov. 20. Effective dates of production provisions are: Initiation of manufacture, Oct. 31; continuation of manufacture, Dec. 20. Effective date for production quota for repair parts is Jan. 1, 1944; for critical materials fabrication, Nov. 20; for critical materials assembly, Jan. 20, 1944. (L-314)

M ORDERS

COPPER SCRAP: Only generators of copper scrap amounting to 5000 pounds or more per month now are required to report on form WPB-452. Heretofore, those generating 500 pounds or more were required to file. No one is permitted to keep on hand more than 30-day accumulation unless such accumulation aggregates less than 1 ton. (M-9-b)

GRAPHITE CRUCIBLES: Manufacture of special graphite crucibles of sizes and shapes manufactured before July 27, 1943, by any crucible manufacturer is now permitted. (M-61-a)

FIRE-TUBE STEAM BOILERS: Fire-tube steam boilers designed to withstand a safe working pressure in excess of 15 pounds per square inch, which are not otherwise included in table 8 of order M-293, have been designated class X products by an amendment to the table. (M-293)

PRICE REGULATIONS

CAR CASTINGS: Adjustable pricing provisions on miscellaneous freight car castings have been extended to Nov. 15. The extension order provides that producers can collect only the maximum in effect at delivery date, pending decision by OPA on the industry's claim that such castings cannot be produced at old maximum prices. Any balance on such deliveries is collectible if and when OPA grants a price increase. Adjustable pricing provisions on locomotive and tender steel castings and railroad specialties have been allowed to expire, since they were provided for recently in amendment 8. (No. 41)

Army Orders New Coating For Steel Drums

All steel drums supplied to the army service forces and army air forces in olive drab color will be painted with one coat of material conforming to Army specification 3-181, type 2 or 3 for composition, and conforming to color number 108 of color card supplement to U. S. Army specification 3-1, revised April 21, 1943, the War Production Board announced last week.

Use of present stocks of protective coatings, conforming to ordnance specification AXS-904 as previously designated by the Army Service Forces or Army Air Forces specification 14120, required by either agency will be permitted. It is requested that prime contractors advise military contracting offices of the dates on which their present stocks of protective coatings will become exhausted.

Construction Machinery Parts Urgently Needed

War Production Board has requested manufacturers of construction machinery to increase production of parts. At present output of parts is at a rate of 50 per cent of total production by dollar value. Despite this there are still not enough parts being produced to meet requirements. Further, 1944 demand is expected to be even greater with parts for power shovels and cranes being among those most urgently needed.

In an effort to increase production the industry is subcontracting to an ever greater extent with available facilities of the machine tool industry being used in particular.

Correction Made in Change Of Controlled Material List

Beginning with the first quarter of 1944, the following products will no longer be classified as controlled materials: Frogs, crossings, switches, switch stands, rail anchors, rail braces, guard rails and guard rail clamps. They will be classified as class "B" products if they contain controlled materials or component parts manufactured from controlled materials.

The effective date was erroneously published as the "fourth quarter" in the Oct. 18 issue of STEEL.

Allotments of CMP Materials to Small Users Put on Annual Basis

Certain manufacturers who have filed CMP-4B's for first quarter of 1944 will be allotted their full 1944 quotas in line with WPB's policy to decentralize operations and to reduce paper work. . . Regional offices to handle interim allotments

ALLOTMENTS of steel, copper and aluminum to smaller manufacturers are to be handled on an annual instead of quarterly basis, it was announced last week by J. A. Krug, program vice chairman, and H. G. Batcheller, operations vice chairman of the War Production Board.

This move is in line with the board's policy to decentralize operations and to eliminate paper work as far as possible. Under the new program, about 15,000 smaller manufacturers will deal with the WPB field officers, instead of Washington, and an overall reduction of about 62 per cent in number of applications which manufacturers must file.

Of approximately 55,000 applications which now come into Washington each quarter for controlled materials going into "B" products (CMP-4B), approximately 35,000 to 37,500 will be eliminated by handling them on a long term basis, about 10,000 will be eliminated through other methods, and only 7500 to 10,000 will come into Washington each quarter.

It was emphasized by the WPB vice chairmen that the new procedures do not mean a relaxation of controls or an increase in total allotments of steel, copper, and aluminum. Some materials, notably carbon steel, are still in short supply.

Materials "banks" (assigned quotas of controlled materials) will be established in the thirteen regional offices so that they can make interim allotments. A simple accounting system will enable each regional office to "balance" its allotments with the quotas assigned to it.

This change in procedure regarding CMP-4B applications was taken after a survey showed that about 85 per cent of the applications submitted each quarter accounted for only 10 per cent of the total material allocated.

The "cut-off-point" to determine whether or not an application is to be handled in the simplified manner outlined above is an allotment of carbon steel exceeding 150 tons, and comparable amounts of other controlled materials. The other tentative cut-off-points are: Alloy steel, 40 tons; copper base alloy sheet and strip, 8000 lb.; copper-base alloy rod, bar, and wire, 10,000 lb.; copper-base alloy tubing and pipe, 5000 lb.; brass mill unalloyed copper products, 10,000 lb.; wire mill copper products, 15,000 lb.; copper and copper-base alloy foundry products, 30,000 lb.; aluminum in all shapes, 7000 lb.

The "small cases", those where the

allotment in all categories is less than the amounts shown above, are to be handled in the following manner:

1. On the basis of the first quarter 1944 CMP-4B's and other available information, the industry divisions will make allotments for each of the four quarters of 1944.

2. Before the first of the year, the industry divisions will send to the regional offices copies of the first quarter CMP-4B's, the record of the action taken, and other information that may be helpful to the regional offices in connection with the application.

3. After Jan. 1, the processing of most interim applications on small cases will be the responsibility of the regional offices. It is expected that the regional offices will delegate this responsibility to the district offices, unless some reason exists for not doing so.

4. When the "small cases" are initially processed in Washington, the applicant will be informed that any interim applications will be handled in the field. The applicant will also receive a confirming notice from the field office with which he will maintain contact.

5. New applications, regardless of size, will continue to come to Washington. This includes applications to produce a new product, even though the material requirements are below the "cut-off" points listed above.

6. When new programs are established, the industry divisions will transmit to the field offices information relating to allotments made to affected manufacturers.

7. Criteria will be established to determine when a "small case" becomes a "large case" as a result of additional material allotted on interim applications.

8. Before Jan. 1, assigned quotas of materials will be established for the regions. Manufacturers will be instructed to submit form CMP-32 (return of unused allotments) to the regional or district office from which they would request interim allotments. Additional amounts of controlled materials will be "deposited" when necessary.

9. Field analysts processing applications will take into account all pertinent WPB regulations and, in addition, will be guided by specific instructions when special handling is necessary.

10. CMP regulations are being revised to eliminate the necessity for about 10,000 CMP-4B applications quarterly. Other such revisions are contemplated.

Program Being Developed Aimed at Rapid, Orderly Adjustment to Peacetime

Under Secretary of War Patterson tells Patman Committee disposal of government-owned plants and surpluses only one aspect of problem. . . . Holds close control necessary to prevent shocks to postwar economy

"THE War Department is not at all proud of its record in making quick cash settlements of terminated contracts," Under secretary of War Robert P. Patterson told the Patman Committee on Small Business at a hearing on the subject of disposition of government-owned plants and surpluses.

"Out of some 10,000 terminated contracts, 3000, roughly, remain to be settled. We have our procedure set up in Procurement Regulation No. 7. It now is a matter of training our officers in the technique of making termination settlements with dispatch. That takes time. I believe that when the great day comes when contracts begin to be canceled on a wholesale scale our organization will be ready to settle all claims quickly and fairly—that we will be able to move fast in paying out cash, making or guaranteeing loans and moving government-owned equipment out of plants so as to permit them to be converted for peacetime production with a minimum of delay.

"In the War Department we regard this as a matter of utmost importance. The problem of disposing of government-owned plants and surpluses is one that will have to be controlled carefully as it will be of vast significance from the standpoint of shocks to the postwar economy."

The War Department and the Navy are co-operating in a study, he said, of the whole subject of demobilization—of which disposal of government-owned plants and property is only one aspect. The conclusions so far reached are as follows:

1—The demobilization must be accomplished in a rapid but orderly manner so as to permit employers to offer peacetime jobs with the least delay.

2—The military establishment must be kept sound and capable of being expanded instantly in any time of future emergency. This means that certain key munitions plants, as well as key machine tools and other equipment, would be kept intact and held in reserve for future production of war materiel. At the

same time, the program of research work aimed at developing new and improved weapons would continue unabated.

3—Studies now are in process to determine peacetime uses of government-owned plants which are not earmarked to be held in reserve for future war production.

4—Studies are in process to determine peacetime uses for machine tools and other equipment owned by the government but located in privately owned plants. A vast amount of this equipment will have to be cleared out of these plants to enable them to resume normal work; the desire is to be ready to move as much of it as possible to places where it will be useful from the standpoint of civilian production.

5—Studies also are under way to prepare a program for scrapping items in the ownership of the armed services which will not be usable in the peacetime economy and which should not be held in reserve for future wars.

Preparing Program Now

"We expect the first major demobilization stage when the war in Europe comes to an end," said Judge Patterson. The War Department, with the Navy and the War Production Board, is preparing a program to be put in effect at that time. Companies with terminated contracts, he said, should be given first reconversion priorities. They will be given every possible consideration and help so that they can provide employment to war workers and returning soldiers with minimum delay.

"The War Department," he said, "wants to sell to private industry all government-owned plants not included in our permanent system of arsenals.

"There certainly must be a single, central agency to formulate policies that will govern the reconversion process. Whether this agency is to be the Office



UNDER SECRETARY OF WAR ROBERT P. PATTERSON

of War Mobilization to which President Roosevelt has delegated this responsibility, or whether it is an agency to be created by Congress, a central agency is necessary to eliminate the confusion which otherwise could not be avoided."

Rep. J. W. Robertson (Dem., Utah) read a story from an Arkansas newspaper which stated that a Pine Bluff dealer had bought at salvage prices a lot of material left over from construction of cantonments. This included large quantities of standard length steel tubing, concrete reinforcing bars, kegs of nails and many other items, including 600,000 board feet of lumber in particularly desirable sizes which now are difficult to obtain. He wanted to know how it happens that the Army sells such scarce materials at scrap prices while at the same time it continues to buy these same products at ceiling prices. Judge Patterson did not know about this case. He described the system under which the Army now is disposing of surplus materials through the War Production Board regional offices all over the country. Under this system critical materials are disposed of for war or other essential purposes through the priorities system and at ceiling prices.

Rear Admiral Emory S. Land, chairman of the Maritime Commission and War Shipping Administrator, foresaw full utilization of our entire merchant fleet for at least three years after the war.

"Movement of our troops and rehabilitation of war-torn countries will make it necessary to use everything we have," he declared.

The Merchant Marine act, said Admiral Land, should be amended to permit

the Maritime Commission to dispose of ships in accordance with the terms of such international agreements as are entered into by the United States. The commission should have authority to decide what shipbuilding and repair facilities can be disposed of and to establish policies of disposition.

"This country cannot afford to get out of the shipping business," said Admiral Land. "We now for the first time have the largest merchant marine in the world and we must at all times in the future have a big merchant fleet. That means that we must have ample shipyards and ship repair yards. We want to get government-owned plants into the hands of private industry—and it will be quite a problem to dispose of these plants in such a way as to be fair to everybody in the business. We will have to dispose of facilities on a reasonable basis but we will have to be careful not to give new shipbuilders the advantage of substantially lower overhead costs which would enable them to drive the established shipbuilders out of business.

"The Maritime Commission should have adequate authority to store machine tools, cranes and other equipment for the future. Had we taken such action after the last war, we would have made much greater speed with our shipbuilding campaign in this war."

A central body, to be established by Congress, should have overall responsibility for the proper disposition of government-owned plants and surpluses, Admiral Land stated.

"One of the things that Congress should have in mind," he said, "is that our huge merchant fleet will be an ace-in-the-hole at the peace table. It will put us in a good trading position."

The Liberty ship is not entirely satisfactory to meet competition in the post-war era, said Admiral Land, although it will be useful in carrying bulk shipments. On the other hand, the Victory ship will be ideal. Production in 1944 will be in the ratio of 11 Victory ships for each 8 Liberty ships.

Dominion's War Program Tapering

Cargo shipbuilding program being sliced. . . Changing requirements force cancellation of contracts in various directions . . . Government to equip vocational schools

TORONTO, ONT.

TOTAL value of contracts awarded and commitments by the Department of Munitions and Supply on Canadian, United Kingdom and other account from July 14, 1939, to the end of September this year exceeded \$10,000,000,000. Preliminary figures released by the Department of Munitions and Supply show the grand total was \$9,464,136,402, a figure which would be increased by hundreds of millions by the inclusion of letters of intention and unvalued acceptance of tender.

Contracts placed on Canadian account totalled \$4,572,338,266, and included contracts executed for plants and plant extensions and general purchases. In addition contracts amounting to \$48,448,008 were awarded by the Civil Aviation division, Department of Transport, for airport construction and land purchase under the combined training organization.

The aggregate of orders placed on United Kingdom accounts, together with United Kingdom commitments for plants and plant extensions and orders for the output of some of these plants, amounted to \$3,888,037,826, an estimated figure which includes the United Kingdom's share in joint projects. Contracts awarded on other accounts totalled \$955,312,302.

Canada's war production program now appears to be tapering. Earlier announcements were to the effect upwards of \$50,000,000 would be sliced off the cargo shipbuilding program. A number of contracts on other war production account have been completed and not renewed and several important contracts have been canceled. Changing war re-

quirements have forced cancellation of contracts for manufacture of 100-round Bren gun magazines. It will involve the closing of part of the ordnance division of Kelvinator Co. of Canada Ltd.

Officials of the Department of Munitions and Supply state equipment of vocational schools in Canadian municipalities is likely to be replaced when peace comes from supplies of the department.

U. S. Steel Nears End of National Expansion Program

United States Steel Corp. is nearing the end of an expansion program begun in 1940. All phases of operations have been expanded, from the opening of new mines through construction of new plants.

Greatest part of the program has been confined to the Pittsburgh area, site of the "Monongahela project," built for the Defense Plant Corp. This facility is expected to increase national annual output of steel ingots by some 1,280,000 net tons.

Largest single project completed under the U. S. Steel program is the Geneva works in Utah.

New rolling mills were constructed in the Pittsburgh and Chicago districts in addition to those in Utah, California and at Birmingham. Armor plate capacity was increased in the Pittsburgh, South Charleston, W. Va., and Mingo, O., districts, and tank armor plants established at Farrell, Pa., and Gary, Ind. Shipyards were constructed for the Navy in New Jersey and on the Ohio river.

They Say:

"If America produces no more in goods or services after the war than it did in 1940 we will find ourselves with 15,000,000 unemployed. To provide jobs for these 15,000,000, America must step up its postwar production so that the national income will amount to from \$135,000,000,000 to \$140,000,000,000 annually."—William Benton, vice chairman, Committee for Economic Development.

"The 3,000,000 people employed by the federal government represent a misuse of manpower, a brake upon production, and an intolerable waste."—Fred I. Kent, chairman, postwar planning committee of the Commerce and Industry Association.

"The production record of American business during the past two or three years should be a complete answer to

those critics, or advocates of a new economic order, who not so long ago advanced the notion that our industrial system is moribund and incapable of meeting the needs of the nation. As events have amply demonstrated, private industry is a very live and potent force, which today is making a mighty contribution to the country's war effort."—Irving S. Olds, chairman of the board, United States Steel Corp.

"To rebuild the world stockpile of natural rubber is a postwar task of several years, very likely. Because this point seems almost beyond challenge, I cannot see that discussions at this time bearing on the abandonment of our synthetic rubber investment have any place in our national thinking."—William P. Witherow, Blaw-Knox Co., Pittsburgh.

MEN of INDUSTRY

John W. Ladd, first vice president, Cherry-Burrell Corp., Chicago since its formation in 1928, has been elected president to succeed W. L. Cherry, who was elected chairman of the executive committee. H. H. Cherry, now general manager of the company's manufacturing plant, Cedar Rapids, Iowa, will succeed Mr. Ladd as first vice president.

Davitt S. Bell, president, Edgewater Steel Co., Pittsburgh, has been elected a director of the Farmers Deposit National Bank of Pittsburgh.

J. G. Kellogg, former executive vice president, Kellogg Switchboard & Supply Co., Chicago, has been elected president, succeeding Maj. Maurice K. McGrath, who has resigned but will continue on the board. James H. Kellogg has become executive vice president and continues as secretary.

Frederick Walker, previously assistant general manager, Federated Metals division, American Smelting & Refining Co., New York, has been named Pacific Coast general manager, succeeding Jack Schwartz, resigned. Aubrey M. Collis, formerly Federated Metals manager at Portland, Oreg., returns to the Pacific Coast as assistant general manager. For the past two years he has been operating manager of the company's Pittsburgh plant.

A. Roy Pafenbach has been appointed surveyor of testing standards, research and technology department, Carnegie-Illinois Steel Corp., Pittsburgh, and Joseph Luchansky has been named supervisor of assorting standards, tin plate, on the staff of the chief metallurgical engineer.

James R. Weaver, former manager of the Naval Ordnance plant, Louisville, Ky., which is operated by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed manager of the Naval Ordnance plant in Center Line,



PEER D. NIELSEN

Who has been appointed general superintendent, Geneva Steel Co., Geneva, Utah, as reported in STEEL, Oct. 4, p. 63.



L. H. ATKINSON

Mich., which has recently been transferred to Westinghouse management. Succeeding Mr. Weaver as manager in Louisville is C. E. Shiplet, formerly superintendent there.

Luther H. Atkinson, previously vice president in charge of marketing, Weyerhaeuser Sales Co., St. Paul, has been appointed vice president in charge of sales, Elastic Stop Nut Corp., Union, N. J.

William H. Eisenman, secretary, American Society for Metals, Cleveland, has been made a founder member of the society in recognition of his having completed 25 years of service with the organization. This honor, held by only four men previously, was conferred upon Mr. Eisenman at the society's annual dinner in Chicago, Oct. 21, during the twenty-fifth National Metal Congress.

M. G. McGregor has been named manager of replacement sales, Ahlberg Bearing Co., Chicago.

John H. McElhinney has been elected vice president in charge of operations, Wheeling Steel Corp., Wheeling, W. Va., succeeding Henry D. Scott, resigned. Mr. Scott continues as a director of the corporation.

Harry K. Stone has been elected chairman of the board, York Safe & Lock Co., York, Pa.

Harvey A. Craig, for many years vice president, Rhcem Mfg. Co., Richmond, Calif., has been appointed Los Angeles district sales manager, Republic Steel Corp., Cleveland.

Clayton Grandy, former chairman of the planning committee and trade association director, Industrial Salvage Branch, WPB Salvage Division, has been named executive secretary, Steel Products Warehouse Association, Cleveland.

W. W. Galbreath, president, Alliance Porcelain Products Co., Alliance, O., has



W. H. EISENMAN

been appointed executive vice president, Pressed Metal Institute, Cleveland.

John Hauerwaas recently was elected president, United States Steel Products Co., a United States Steel Corp. subsidiary. Mr. Hauerwaas was vice president and general manager of the Boyle Mfg. Co., Los Angeles, now a division of the United States Steel Products Co.

T. O. Eaton has been appointed manager of sales, power transformer section, Pittsfield (Mass.) works, General Electric Co., Schenectady, N. Y. E. D. Monk, Mr. Eaton's predecessor, continues as a consultant for the power transformer section, Pittsfield works.

Morgan C. Monroe has been appointed director of industrial relations, Farmingdale division, Republic Aviation Corp., Farmingdale, N. Y., succeeding William L. Wilson, who has resigned to join Kellett Aircraft Corp., Philadelphia, as assistant to the president.

Edward O. Jones, previously in charge of engineering applications of industrial equipment, General Electric Co., New York, has joined Cook Electric Co., Chicago, and will head the company's new Eastern division office in Greenwich, Conn.

E. A. Murray has been appointed assistant manager, manufacturers sales department, Chicago sales office, American Steel & Wire Co., Cleveland.

R. P. Tyler and C. R. Deam have been appointed general manager of sales and assistant manager of sales, respectively, A. Leschen & Sons Rope Co., St. Louis.

R. H. Rodolph has been appointed manager, Pump and Compressor division, Gardner-Denver Co., Quincy, Ill.

Fred H. Pinkerton, former manager of sales promotion and advertising, industrial division, United States Rubber Co.,

are located at 1409 Central Life Insurance building.

John M. Dolan has been appointed general sales manager, Le Roi Co., Milwaukee.

Paul E. Floyd has returned from his post in the Iron and Steel Branch, WPB, Washington, to his former position as district manager of the Chicago branch office, Allegheny Ludlum Steel Corp., Pittsburgh.

George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., Chicago, will receive the 1944 William Lawrence Saunders Gold Medal, given by the American Institute of Mining and Metallurgical Engineers. The Institute also has announced that the 1944 Anthony F. Lucas Gold Medal will be awarded to Charles V. Millikan, chief petroleum engineer, Amerada Petroleum Corp., Tulsa, Okla.

Thomas O'Malley has joined Aro Equipment Corp., Bryan, O., as division manager, New England territory, with headquarters in Hartford, Conn., and James Littleton has joined the company as division manager, southern Ohio territory, with headquarters in Dayton, O.

A. A. Handler, chief forging engineer, Aluminum Co. of America, Cleveland, was honored recently at a testimonial dinner for completion of 25 years with his company.

R. F. Pearson has been appointed Eastern district manager of sales, Granite City Steel Co., Granite City, Ill., succeeding Charles R. Wallander Jr., who has joined the armed forces.



FRED L. WOLF



PHILIP HOOKER



C. V. TOPLIFFE

New York, has been appointed director of public relations, Reeves Sound Laboratories Inc., New York.

Fred L. Wolf, deputy director, Mica-Graphite division, Minerals Bureau, WPB, is resigning Nov. 2 and has been appointed executive vice president, Ross-Tacony Crucible Co., Tacony, Philadelphia. Prior to his connection with WPB, Mr. Wolf was technical director in charge of laboratories, research and plant control work, Ohio Brass Co., Mansfield, O. In 1941 Mr. Wolf received the John A. Penton Gold Medal of the American Foundrymen's Association for his outstanding contribution to the nonferrous and malleable iron industry.

Kenneth Hall, former process engineer, Plymouth plant, Chrysler Corp.,

Detroit, has been appointed factory representative in Indiana, Illinois and Wisconsin for Snyder Tool & Engineering Co., Detroit.

Philip Hooker, formerly executive assistant manager of the contracts department, Bell Aircraft Corp., Buffalo, has joined Arens Controls Inc., Chicago, as sales and advertising manager. Bert Borchardt has been appointed manager of the company's West Coast branch.

C. V. Topliffe has been appointed manager, Boston district office, Cutler-Hammer Inc., Milwaukee.

E. W. Brock has been named service-sales manager of the newly-opened Cincinnati branch office of Genesee Tool Co., Fenton, Mich. The new offices

OBITUARIES . . .

J. R. Lenist, 85, formerly general sales agent in southern California for Colorado Fuel & Iron Corp., Denver, died recently in Glendale, Calif.

George R. Shenberger, secretary, purchasing agent and general manager, J. E. Baker Co., York, Pa., died recently.

James Wisely, 52, purchasing agent, United States Metals Refining Corp., Carteret, N. J., died Oct. 22 in Rahway, N. J.

Enrique A. Touceda, 81, for 30 years professor of metallurgy, Rensselaer Polytechnic Institute, Albany, N. Y., and an authority on malleable iron, died Oct. 20 in Albany.

Anthony J. Gonter, coreroom superintendent at the foundry of Dodge division, Chrysler Corp., Detroit, and long active in affairs of the Detroit Chapter,

American Foundrymen's Association, died there Oct. 23.

Jay Fletcher Slee, 63, superintendent of blast furnace and coke plants, Steel Co. of Canada Ltd., Hamilton, Ont., died Oct. 20.

Thomas E. Kilby, 78, president, Kilby Steel Co., and a former governor of Alabama, died Oct. 22 in Anniston, Ala.

August Bellon, 73, president, August Bellon Inc., Queens, N. Y., died recently in Rockaway Beach, N. Y.

Edgar Lyon, 71, president, Lyon, Conklin & Co. Inc., Baltimore, died Oct. 14 in Millboro Springs, Va.

James Dickinson Rhodes, 74, former president, National Car Wheel Co., and a former director of Blaw-Knox Co., Pittsburgh, died Oct. 22 in Utica, N. Y.

John D. Crawbuck, pioneer in the electrical equipment field and head of John

D. Crawbuck Co., Pittsburgh, died Oct. 16.

George F. Morrison, 76, honorary vice president and a director, General Electric Co., Schenectady, N. Y., died Oct. 21 in East Orange, N. J.

Dr. Leonard L. Elden, 75, inventor and retired head of the electrical engineering department, Boston Edison Co., Boston, died Oct. 21 in Wareham, Mass.

George P. Pilling III, 51, director of George P. Pilling & Son Co. and Atlantic Elevator Co., Philadelphia, died Oct. 21 in that city.

Charles B. Davis, 82, retired assistant to the president, International General Electric Co., New York, died Oct. 22 in Newton, Mass.

Clarence H. Howard Jr., 44, a director, General Steel Castings Co., Philadelphia, died in St. Louis recently.



In 1953 You'll Smile . . .

Yes—you'll smile when you think that out of so dreadful a war as this there could come so much good! We, of Weatherhead, know of dozens of wartime devices which have peacetime applications that will prolong your life and make it pleasanter in many ways. And just as we have helped build your refrigerator and your car in the past, we will again one day be building these many surprising new products you'll use in tomorrow's world!

Look Ahead with



Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO
*Manufacturers of vital parts for the automotive, aviation,
refrigeration and other key industries.*

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

MIRRORS of MOTORDOM

Studebaker engineer believes economic considerations will outweigh fancy designing in postwar automobiles. Evolution rather than revolution. . . Mass production methods applied to manufacture of bombsights at GM's AC Sparkplug Division

ECONOMIC considerations will outweigh the urge for gingerbread in postwar automobiles, in the view of R. E. Cole, vice president in charge of engineering for Studebaker, who sees the inevitable higher taxes and the tremendous drain on natural resources occasioned by the war forcing engineers to lean toward designs promising lower operating costs. In this slant he does not differ radically from practically all automotive engineers who are likewise in agreement on the likelihood that the necessity for maintenance of high employment will rule out any immediate radical changes in car designs through the readjustment period.

No one knows for certain just what this readjustment period is going to be—how soon and how long and the degree of reconversion possible. One of the larger motor company groups is drawing up two sets of plans, one to be put in action if Germany should be defeated before Japan, as many forecasters have doped it out, and the other in case the whole war should end abruptly.

At any rate, Studebaker's Mr. Cole goes on to comment on the trends he sees in automotive design following the readjustment period.

"Style—Evolution rather than revolution. Experience indicates a limited market for unusual automobiles. Eventually, fenders will become part of the body. Bumper guards, grilles and such appurtenances as door handles will be submerged.

"Comfort—Vastly improved suspensions. Doors extending into the roof. More headroom and more comfortable seats. Mainly from taking advantage of construction developments in aircraft and railroad cars. Better vision, insulated mechanical controls.

"Economy — If aluminum, plastics, new steels, etc., are priced right, then the engineer will have a partial answer to his hunt for weight reduction. Greater gasoline economy and decreased tire wear will result.

"Serviceability and accessibility—Improvements, some of them major operations, must be made in serviceability if we are to offer the owner increased economy. Accessories will be engineered into the chassis rather than attached to it.

"Engines—There have been experiments with a small, high-speed engine offering 40-50 miles to a gallon but requiring 100-octane fuel. No findings to date to our knowledge prove the practicability of this engine. Advantages would be offset by higher fuel costs.

"Prices—Automobiles at \$400 may be possible, but it should be borne in mind that labor is still a prime cost and approximately as many man-hours are in-

volved in producing a small car as a large one (particularly if it is going to be built by a company which has never built automobiles before). Appreciable savings in materials would mean a disproportionate sacrifice in comfort.

"Rear engine cars—The public does not care whether the engine is in the front, rear, under the seat or in the glove compartment, provided the vehicle is safe to drive, reliable and comfortable. A change in the location of the engine will be made only if we can better these factors or lower costs. A car of this kind must, however, have a more or less conventional appearance."

Conservative Thinking Marks Outlook

Here is sound, conservative thinking on the near-term outlook for automobiles. It belies many of the tinsel-hung dreams of stylists and others who build their cars on sheets of slick paper. Mr. Ford might like to give argument on the \$400 price possibilities but any stern realization of the man-hour cost of labor at the present moment and of the likelihood, if not certainty, that these costs will continue near this level in the postwar period, suggests the difficulty of ever achieving such a low price figure and coming up with an automobile that will sell competitively. It was not such a trick in the "good old days" but they have been consigned to the pages of history.

Possible adaptation of gas turbines to

replace internal combustion engines for powering automobiles is interesting conjecture and points the way to important weight reductions. However, as yet no one has come up with a gas turbine in the horsepower range of automobile engines or with turbine blades which would stand the gaff of the steady day-in and day-out ravages of exploding oil or gasoline.

Introduction of automotive mass production methods to many types of precision work required in various aircraft and ordnance instruments has been an accomplishment of several motor companies and their affiliated organizations. One of the latest to come to light is the manufacture of several thousands of bombsights of a British design, undertaken by the AC Spark Plug division of General Motors. The instruments are now being assembled in a new modernized and conveyerized department at an AC plant in Flint, Mich.

The bombsights comprise two units, the computer and the sighting head. A bombardier uses the sighting head to find his target and when the cross hairs in the head line up with the target the bomb is released. Complexity of the equipment is indicated by the fact there are 4200 parts involved, tolerances being held rigidly from 0.0002 to 0.0008-inch.

Newsmen inspected assembly operations at the plant last week and were greeted by AC officials. Charles W. McKinley, chief engineer, reviewed some of the details of how the AC division first became interested in the T-1 bombsight which was brought from Britain to this country along with blueprints two years ago by Fred Voss of Sperry Gyroscope Co. When AC engineers took over the job in November of 1941 they had to follow the usual process of converting



HOWARD C. KELLOGG



CLAUDE M. NELLES

Ford Motor Co. purchasing activities at the Rouge plant have been under the general direction of Claude M. Nelles and Howard C. Kellogg since the resignation of A. M. Wibel. Both are old-time Ford buyers; Mr. Nelles long has been in steel purchases. Ford purchasing has been undergoing gradual decentralization into the various units of the company for some time past

(Material in this department is protected by copyright and its use in any form without permission is prohibited)

all British drawings and prints to standard U. S. form and redesigning the unit to make use of lighter metals and alloys. The assembly was broken down into subassemblies. Arrangements were made to subcontract a large part of the project, and finally the first sample was completed in May, 1942.

McKinley related an interesting sidelight in connection with the bombsight job. AC engineers were advised that whereas most British planes were equipped with a source of high pressure air and vacuum required to operate the bombsight, it was going to be used in some planes equipped with neither air nor vacuum, so such power would have to be provided. Some years ago AC had been experimenting with a variation of its standard fuel pump to adapt it as a fuel meter handling 600-700 gallons of fuel per hour. This was about ten times the capacity of the company's largest fuel pump, but the new design was made without going to a much larger size, but increasing valves, decreasing clearances, etc. Nothing ever came out of the fuel meter but it turned out to be an ideal vacuum pump, just what was needed on the bombsight equipment.

Some high points in design include—rubber wheels in the servo rotate at over 5000 r.p.m. They stop, start and reverse in direction 110 times per minute and must not wear rapidly lest the accuracy and ease of handling the sight be impaired. They must carry the full load without slippage at all temperatures between 60 below zero and 160 degrees Fahr. Special rubber had to be devel-

oped, and in 48 hours of continuous testing less than 0.001-inch had worn off the diameter of the wheels.

Trail cam on the sight was machined to form in the British design and had to be checked to 0.005-inch at 500 different points. On the AC design, the part was molded of a special bakelite composition and required only the tapping of two holes in each end before installation. Main base casting in the sight is reported to be the largest aluminum die casting ever made, with 14 pounds of metal in it. The die casting replaces a steel plate and two steel stampings used in the English design. Weight of the sight originally was 85 pounds; redesign cut it to 55 pounds.

Difficulties Surrounded Production

Difficulties surrounding the production of the large die cast base were such that the first production sights made by AC used sand cast bases. Because of the delays involved in delivery of special tools to machine the sand casting it was necessary to carry on by hand methods in an experimental shop. A team of four experimental shop men, working long hours, kept the production line supplied for nearly six months. Adding insult to injury, just as the patterns were ready for sample castings, the WPB froze all aluminum supplies and it took six weeks to unfreeze them.

Better than 200 men are engaged full time in salvage operations by Ford Motor Co. at its Rouge plant in Dearborn, repairing a variety of tools, including hammers, drills, reamers, gages, etc. Using

machines designed and built by Ford engineers, the department repairs an average of 800 hammers daily and re-sharpens files by sandblasting an average of 15 times before they are melted down as scrap.

Latest gadget developed by salvage experts is a plastic head for mallets used in assembly work. Reclaimed vinol, plastic used in safety glass, is compressed under high pressure to the desired shape, replacing rawhide which was used formerly.

Many sports enthusiasts are currently casting covetous eyes on the Army's amphibian jeeps for postwar duck hunting. They think the 4-cylinder midgets will be ideal for negotiating swamps and marshy land in chase of the fleeting fowl, and in view of the fact the little amphibians are being produced by the thousands, prospective buyers think they will be able to pick one up for a couple hundred dollars when the fighting is over.

Not so readily apparent is the postwar application of the larger 6x6 amphibians which General Motors Truck is turning out in large quantities and which have already participated in invasion operations. Another lot of close to 7000 is now in production. They will be costly vehicles to operate for the average individual, and are certainly of doubtful attraction to the sportsman. One conceivable use is in sections such as along upper reaches of the Amazon river in Brazil where the difficulty of negotiating the terrain and the scarcity of boats have sealed many of the riches of this country from the eager hands of consumers. "The Duck," as the 6x6 amphibian is called, should be just the ticket for getting at these natural resources profitably.

Materials Used in Typical Passenger Car

Original 1942 models, with accessories, before substitution and conservation of materials

Material	Complete Cars		Material	Complete Cars	
	Gross, lbs.	Net, lbs.		Gross, lbs.	Net, lbs.
Iron	696.66	549.63	Paper Products	61.27	50.13
Steel	3385.38	2397.81	Rubber com- pound	170.58	161.38
Antimony	1.39	1.32	†Crude Rub- ber	(83.36)	(80.14)
Aluminum	3.78	3.21	†Sec. Rubber	(33.38)	(30.71)
Cadmium	0.047	0.042	†Syn. Rubber	(0.11)	(0.09)
Chromium	5.56	4.32	†Fillers	(53.73)	(50.44)
Copper	54.49	45.57	Wood	5.19	3.94
Lead	35.64	33.88	Wool	8.93	8.26
Magnesium	0.010	0.009	Paint and Thin- ner	81.40	26.38
Molybdenum	0.117	0.069	Plastics (Inc. Fillers)	6.75	4.91
Nickel	1.85	1.56	*Phenolic (Inc. Fillers)	(2.07)	(1.65)
Silver	0.005	0.005	*Polyvinyl (Inc. Fillers)	(2.27)	(1.30)
Tin	2.88	2.40	*Other	(2.41)	(1.96)
Tungsten	0.008	0.008	Sulphuric Acid	5.00	5.00
Vanadium	0.0029	0.0016	Grand Total	4781.69	3496.85
Zinc	25.51	23.28	†Included in Rubber Compound.		
Asbestos	3.45	2.60	*Included in Plastics.		
Asphalt	30.51	25.74	Note: Gross poundage is before fabricating operations on various parts. Figures furnished by Automotive Council for War Production, 1943 edition, <i>Automobile Facts and Figures.</i>		
Glass, in safety glass	81.21	46.57			
Glass, other	24.75	15.24			
Mica	0.116	0.102			
Cork	0.929	0.626			
Cotton	66.90	63.13			
Hair	0.627	0.583			
Jute	18.18	16.70			
Leather	2.664	2.447			

G. M. President Wilson Sees Huge Postwar Production

Relative merits of steel and aluminum for construction of postwar automobiles have not been altered by wartime developments and there is little change in the cost factor, said General Motors' President C. E. Wilson, speaking Oct. 19 at a press interview in New York.

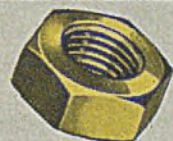
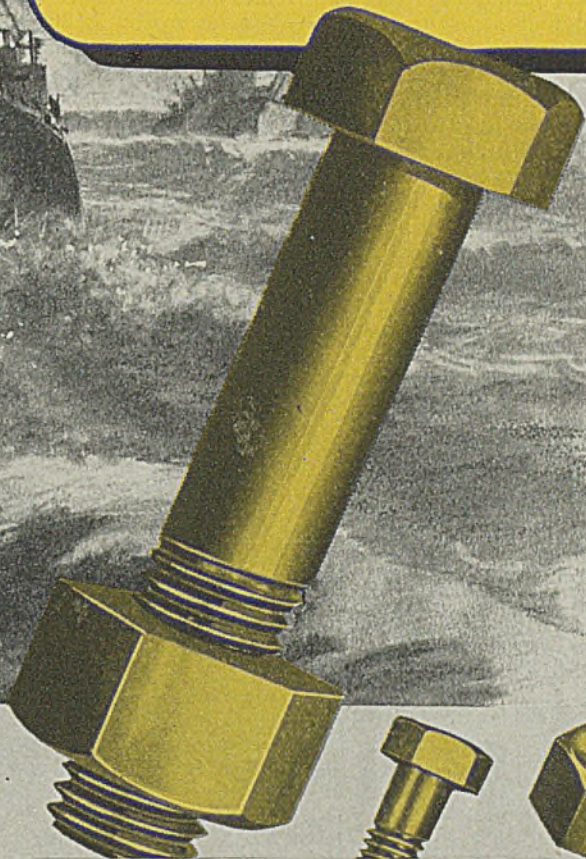
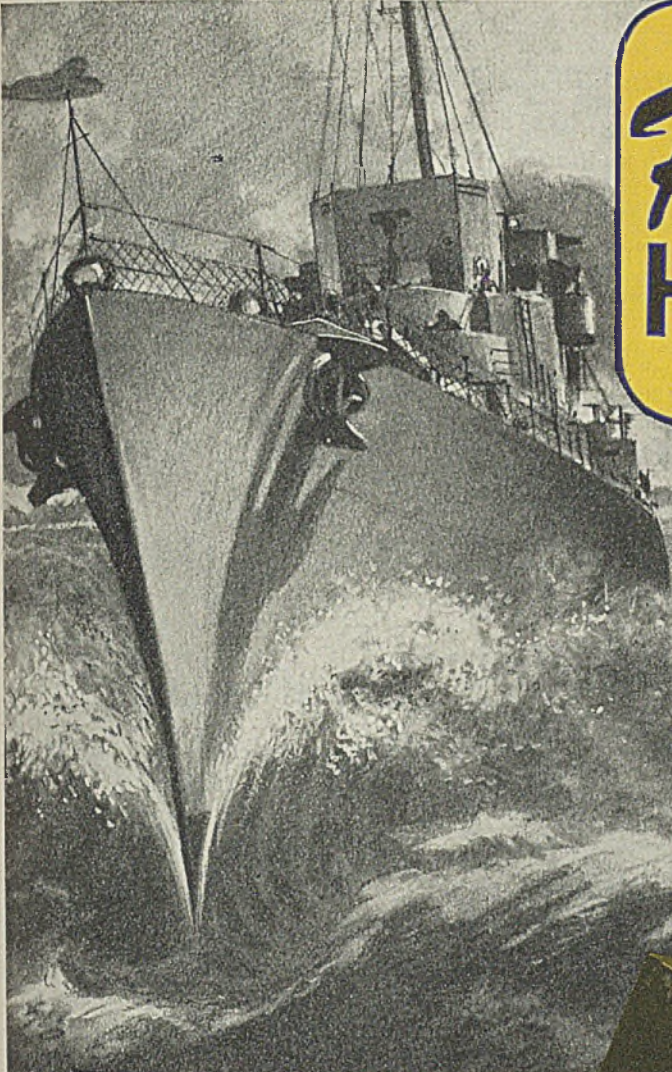
Conversion of General Motors to peacetime production will largely depend upon how quickly the government can terminate its war contracts, release facilities, and dispose of the equipment it owns, said Mr. Wilson.

General Motors had around 75,000 machine tools in its various plants before the war, to which about 50,000 have been added, mostly government property. Generally, Mr. Wilson thinks the corporation could be producing civilian goods about six months after the end of the war.

The first postwar GM car will look like the 1942 model, said Mr. Wilson.

He estimated that during the first full year of peacetime production General Motors will manufacture from 25 to 50 per cent more automobiles than in the best prewar year.

Rust CAN'T TOUCH HARPER BOLTS



HARPER Fastenings resist rust, corrosion, salt laden air and other deep sea troubles. They're made of non-ferrous and stainless alloys. Today they are doing Trojan duty on battle ships, cruisers, aircraft carriers, PT boats, landing boats, submarines and many other types of vessels.

Because they are rust and corrosion resistant, Harper fastenings withstand severe

conditions in the chemical, food, utilities and numerous other industries. In the proper alloys they are non-magnetic, non-sparking, repeatedly removable and have other sterling properties.

4 3 2 0 STOCK ITEMS

... of bolts, nuts, screws, washers, rivets and accessories in the non-ferrous and stainless alloys.

THE H. M. HARPER COMPANY, 2646 Fletcher Street, Chicago, Illinois

BRANCH OFFICES: 45 West Broadway, New York City 7 • 1442 Broad Street Station Bldg., Philadelphia 3 • 332 I. N. Van Nuys Bldg., Los Angeles 14 • 2nd National Bank Bldg., Houston 2, Texas • 800 Broadway, Cincinnati 2, Ohio • 739 N. Broadway, Milwaukee 2, Wis. • Representatives in Principal Cities.

Brass
Bronze
Copper
Everdur
Monel
Stainless

HARPER

EVERLASTING FASTENINGS



Top aviation engineers think largest postwar plane will be 150,000 pound four-engine craft carrying about 100 passengers and perhaps 20,000 pounds of cargo. . . Mere bigness doesn't signify anything in opinion of one authority

REPRESENTATIVE of thinking in top engineering circles of the aviation industry on the subject of future airplane designs is the recent observation by A. E. Raymond, vice president—engineering, Douglas Aircraft Co. Inc., to the effect the largest postwar plane will be a 150,000-pound four-engine craft carrying about 100 passengers and perhaps 20,000 pounds of cargo, cruising at 250 miles an hour and at 20,000 feet.

His opinions are published in the current issue of the Douglas magazine, *Airview*, and Mr. Raymond observes that "mere bigness doesn't signify anything. Your super-super airplane may look swell on the cover of a magazine, but even at 300 miles an hour such a craft will get an operator exactly nowhere if it is a money-loser in service."

As designers of the DC-3 and DC-4 passenger airplanes and their current military cargo versions, the C-47 and C-54, Douglas engineers can be assumed to know whereof they speak. They note that almost all the major air routes of the world will have good landing fields spaced at 2000 miles or less, and the 150,000-pound plane is just right for this distance.

On the matter of helicopters, Mr. Raymond is inclined to the conservative viewpoint, citing that "helicopters today are in the stage of development that our present planes passed through about 1910."

He adds that the helicopter is not yet an efficient flying machine or a practical one, having among its disadvantages the fundamental incapability of being

streamlined, and inherently small size. However, as a sport plane and personal conveyance the helicopter has possibilities which have captured the imagination of many in the aviation industry.

In this connection it is worthy of inclusion in the record that Igor L. Sikorsky's first helicopter design, the VS-300, has been presented to Henry Ford's Edison Museum in Dearborn, Mich., where it will repose for posterity. Before removal to the museum, the plane was put through its paces before an invited audience including Mr. Ford, Mr. Sikorsky, Col. Charles A. Lindbergh and others.

Returning to the outlook for postwar airplanes, Douglas engineers predict that aviation development will continue as a step-by-step evolution so far as they can plot it. The hundreds of cargo planes built by Douglas for the war effort likely will be put to useful postwar purposes, but they will require extensive modification to meet airline standards of comfort. They will need insulation, good seats, appointments, special equipment, etc., work which will help to tide over the difficult period after hostilities cease.

Maintenance of a sizable, standing air force in the postwar period also should help Douglas production, since in wartime the company has supplied one-sixth of all military planes built in this country.

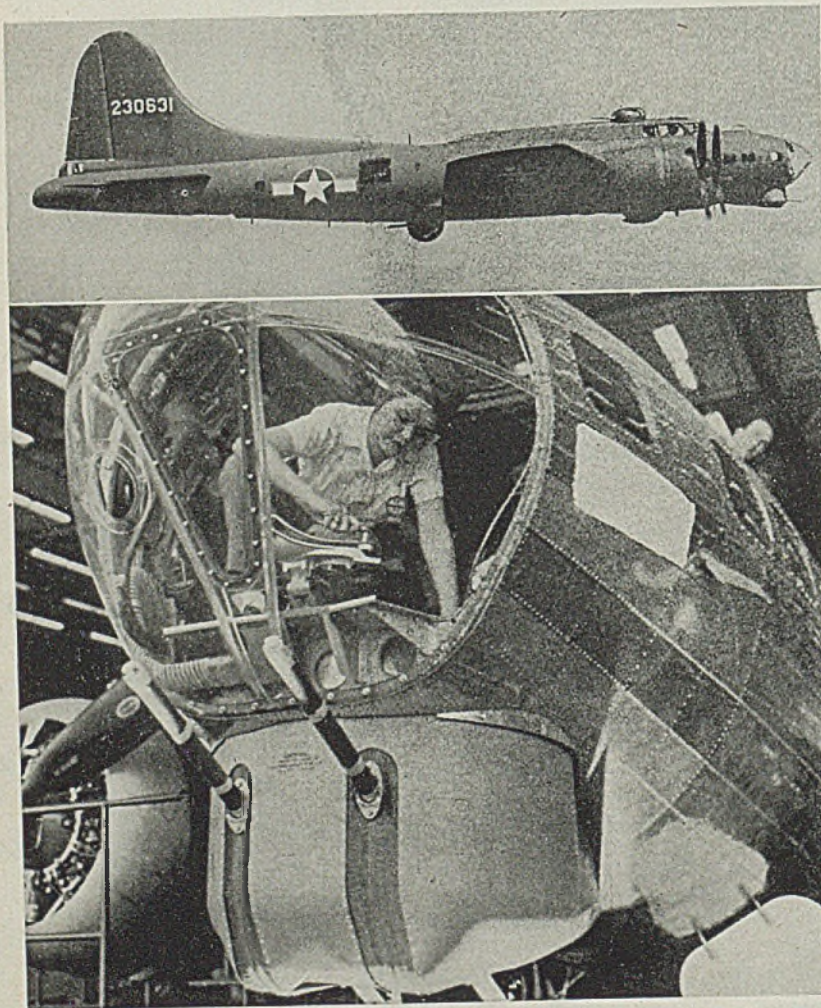
No Definite Policy in Sight

With respect to postwar manufacture of products other than airplanes, no definite policy appears yet to have crystallized in the thinking of Douglas management, other than "a moral obligation to attempt to provide for every technically qualified employe who elects to remain with the company a maximum of employment."

Most important commercial development of the war is "the growth of the air express business," according to a postwar pamphlet entitled "The Outlook for Domestic Air Transport," published by the National Planning Association, 800 Twenty-first street, N. W., Washington. The work of Ernest W. Williams Jr., now transportation analyst for the War Production Board, the pamphlet predicts that much future development of air transport will depend upon its ability to service many more cities and towns through feeder systems using relatively small planes.

"The future of aviation is brilliant," declares Mr. Williams. "Though air transport is essentially complementary to surface transport and will not greatly damage the latter it is due for a great and rapid expansion. Growth of the first-class passenger business, including diversion of most of that which the railroads now handle, transport of most first-class mail, and the building up of a very substantial air express traffic possibly exceeding present railway express volume, are all in prospect.

"Over the seas the day of the huge



DEADLY "WHISKERS": Newly modified Flying Fortress, the B-17G with remote-control power operated chin turret under the bombardier's compartment, is shown above in flight. Below is a close view of the chin turret which carries two 50-caliber machine guns, providing greatly increased protection from head-on attack



**THEY DRINK
SWAMP
WATER**

from a **STAINLESS "WATERWORKS"**

strong, durable and rustless. Bacteria won't cling to its hard, smooth surface. It is easy to keep clean and sanitary—freeing hard-working soldiers for other tasks.

This is just one of many jobs for ARMCO Stainless on the fighting fronts. When peace comes, this battle-proved metal will be ready for the new product designs you may be planning now. For complete information about the different grades of ARMCO Stainless Steels, just write to The American Rolling Mill Company, 2231 Curtis Street, Middletown, Ohio.



Germ-ridden, murky water in a river or swamp doesn't look so good for Yankee soldiers at first sight. Yet it is safe and drinkable when it comes out of this stainless steel water-filtering and purifying unit.

One "waterworks" on a truck takes care of the needs of five thousand men. Designing the equipment was a difficult problem at first, but ordnance men soon solved it with the aid of the right metals and chemicals.

ARMCO Stainless Steel is used in many of these purification units—and for good reason. This versatile metal is

THE AMERICAN ROLLING MILL COMPANY

November 1, 1943

luxury steamships seems limited, for aircraft will more and more handle the mails, the passengers and the cargo of extraordinary value. Tourist and cruise traffic will undoubtedly continue to patronize the medium and smaller ocean liners in considerable volume, and the great bulk of the freight traffic will be untouched. More important, new business will be created in large volume by the saving in time on the long overseas hops.

"Private flying is due for enormous expansion with the advent of foolproof low-cost planes, and much of the intercity automobile traffic may eventually shift to the air. All these prospects constitute a challenge to the aircraft manufacturers, the air transport companies and to the nation to provide the facilities to make them possible and the policies to turn them to the most useful ends."

Forging 8-Foot Aluminum Propeller Blades

Assignment to Chevrolet of a new aluminum forging project—the production of a 96¼-inch propeller blade—has been announced, for production at a Michigan forge plant, one of four whose combined output establishes Chevrolet as a front-rank producer of aircraft forgings.

While no announcement was made of

the type plane or engine requiring a propeller blade of such dimension, it may be assumed that such a plane falls into the "super" bomber or cargo plane class.

In addition to standard blades now in production, an experimental aluminum propeller blade has been developed, the rough forging for which weighs approximately 800 pounds. Rough-forged on a specialty basis, the blade is to be used in test cell operations leading to the development of new and more powerful aircraft engines.

X-Ray Three Hollow Steel Propeller Blades at Once

Three hollow steel propeller blades are X-rayed simultaneously in the "studio" recently installed in the Toledo, O., plant of American Propeller Corp., subsidiary of the Aviation Corp.

Fitted with 400,000 volt X-ray units, the new chamber is used in the second of three prop inspections. All work during the "picture taking" operation is performed by women.

Entire inspection cycle is automatic, from the time of loading blades on trucks to later unloading preceding the next fabrication operation. Loaded on trucks running on an over track, the steel blades are readied for X-ray by the women who place sensitized plates under each piece. Then an electrically operated

door opens, tripping another mechanism that wheels the trucks into position in the X-ray chamber. The shot is made, still automatically, and the electrical door opening and truck moving actions are repeated, the trucks rolling out of the room into unloading position.

Following the plate exposure, the films are developed and checked.

Aircraft Standards Group To Meet in New York

National Aircraft Standards Committee will hold its sixth national meeting at the Lexington hotel, New York, Nov. 8-12, the second this year, of standards and materials engineers of 31 airframe prime contractors, together with principal members of the Army-Navy Aeronautical Board, Aircraft Resources Control Office, and engineering societies at work on the national standards program.

The executive board convenes for two days, followed by a three-day general session to assume the largest schedule since NASC began in 1940.

Officers for the past year have been: national chairman, Eric Dudley of Curtiss-Wright, Buffalo; eastern chairman, W. D. Craig of Grumman; western chairman, Gordon Waite of Consolidated-Vultee at San Diego.

Pennsylvania's Factory Employment Declines

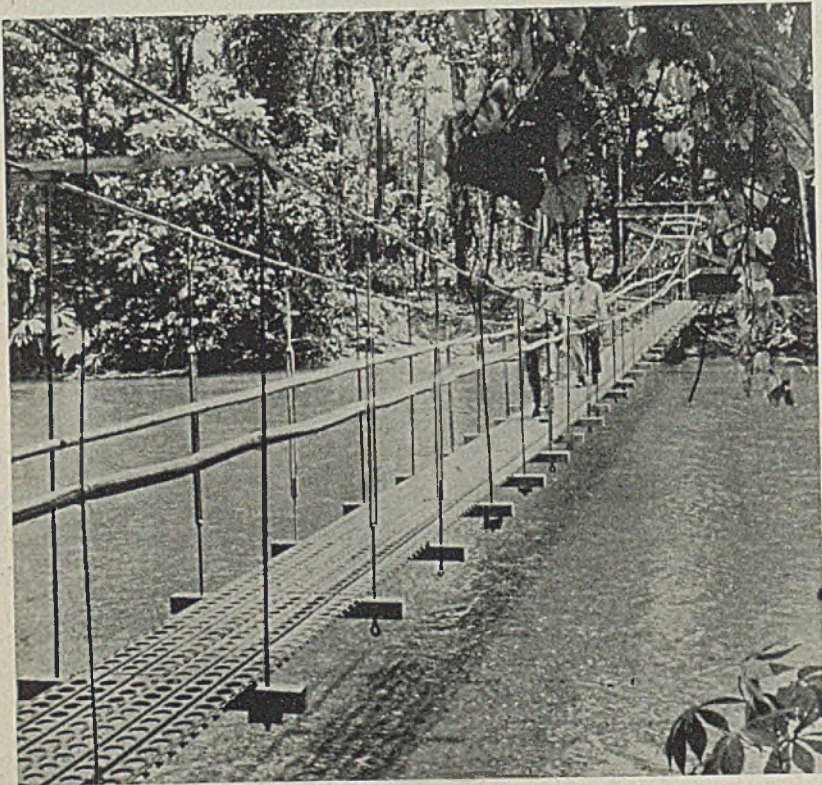
Factory wage earners totaled nearly 1,250,000 and wage disbursements more than \$51,000,000 weekly during September, according to the Federal Reserve Bank of Philadelphia based on reports from 2912 plants in Pennsylvania.

Although employment decreased slightly compared with the previous month, payrolls remained at the August peak. Comparisons with a year ago show gains of 3 per cent in employment and 20 per cent in payrolls.

War Construction Declines 10 Per Cent in August

Total volume of construction activity in August was \$601,381,000, a 10 per cent decline from the July level and a 59 per cent drop from the peak of nearly \$1,500,000,000 in August, 1942, the War Production Board reported recently.

Construction volume declined in August in all categories except chemical plants and high-octane gasoline plants. There were sharp drops in plant construction in the other fields such as a 61 per cent decline in the manufacture of ammunition and explosives, 52 per cent decline in machinery and machine tool construction, 40 per cent decline in construction of non-ferrous metals plants, 21 per cent drop in construction of iron and steel facilities, and a 16 per cent decline in construction of aircraft facilities.

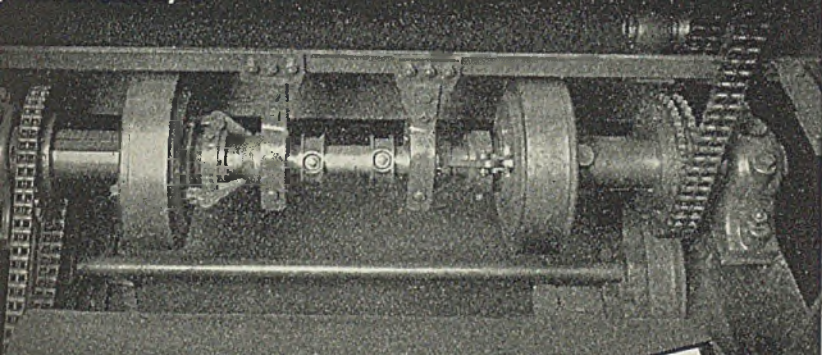


STEEL MATTING SPAN: "Seabees" build a portable bridge across Matanikau river enabling Marines to rush reinforcements to American troops already in enemy territory. Bridge is constructed of steel matting of the same type used on airfields. U. S. Marine Corps photo from NEA

FULL POWER *Control* FREE POWER *Flow*

WITH STURDY DODGE FRICTION CLUTCHES

Dodge Solid Friction Clutches in duplex on reversing mechanism of self-propelled hand-reversed Tripper for Belt Conveyor.



ADEQUATE control of power-flow over the power "roadbeds" of your plant, will minimize power loss. Rugged Dodge Friction Clutches, stationed at proper places on your line shafts or on your machines, assure positive control, and release capacity loads, without loss . . . delivering more horsepower to production machines, to boost battle power!

The Dodge Solid Friction Clutch is one of several popular Dodge types, outstanding for sturdiness, simplicity and economy. It can be quickly furnished for use as a cut-off coupling or with sleeves for mounting pulleys, sheaves, gears or sprockets.

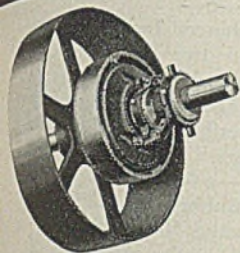
For power transmission on line shaft or on clutch-operated mobile machinery, you'll find the right clutch for every job in the complete Dodge line. Teamed up with other Dodge Power Transmission Equipment, they put all the power into the job, to maintain peak production.

Nearest Dodge Distributor can help you determine whether Dodge Solid, Split, Expanding Ring or Diamond "D" Clutches answer your purpose . . . or write to

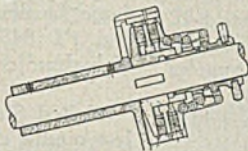
DODGE MANUFACTURING CORPORATION
MISHAWAKA, INDIANA, U. S. A.

DODGE SOLID FRICTION CLUTCH

Clutch with sleeve, used with pulley, sheave, gear or sprocket. Can also be furnished without sleeve for use as cut-off coupling.



Duplex application: Used for countershaft or countershaft where power is to be delivered alternately to two different points (as in main illustration above). Single shifter engages one clutch or the other.



Multiple disc construction reduces pressure required for power transmission. Makes clutch easy to operate. Simple, one-point adjustment provides take-up for any wear on friction surfaces. Compound toggle (on larger sizes) multiplies pressure on shifter; also insures positive release of clutch.



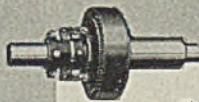
Dodge Diamond "D" Friction Clutches

High precision, extremely rugged, compact, simple, fully enclosed, protected against dirt or dust whether engaged or disengaged. Generous safety factor above rated capacity, for momentary shock loads.



Dodge Expanding Ring Friction Clutches

A machinery clutch . . . compact, rugged, extremely simple, fully enclosed for protection against dust or dirt. Convenient one point self-locking adjustment. Suitable for a wide variety of light machinery applications.



Dodge Solid Friction Clutches

Friction disc type, adapted for general power transmission service as well as many types of machinery applications. Rugged, simple in design, easy to adjust and maintain. Widely used on machinery subjected to severe service.



Dodge Split Friction Clutches

For severe, continuous power transmission service on big installations. Particularly suitable for large shafts operating at slow to medium speeds. Split construction permits easy installation on shafting already in place. Parts interchangeable for replacements.

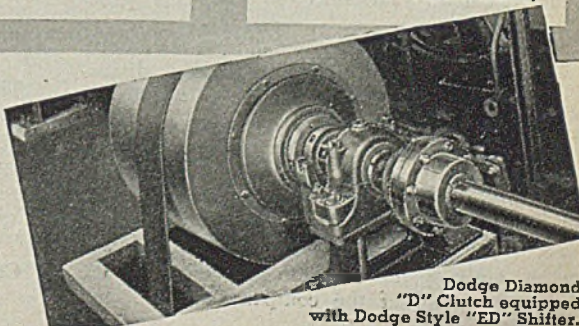
DODGE

MISHAWAKA

TURN ALL YOUR SCRAP INTO THE FIGHT!

BUY MORE WAR BONDS!

THE RIGHT DRIVE FOR EVERY JOB



Dodge Diamond "D" Clutch equipped with Dodge Style "ED" Shifter.

PUT ALL YOUR POWER IN THE JOB

Marks Eightieth Anniversary

Ceremonies at plant of Ferracute Machine Co. draw attention to company's important contributions to the working of sheet metal through the years. . . Veteran employes honored

By GUY HUBBARD
Machine Tool Editor, STEEL

THIS writer has just returned from Bridgeton in southern New Jersey convinced it deserves to be ranked with such industrially historic centers as New Haven, Conn. (Eli Whitney); Harpers Ferry (Capt. John Harris Hall); Providence (Joseph R. Brown); Windsor, Vt. (Robbins & Lawrence); Hartford, Conn. (Samuel Colt and Christopher Spencer); and Naugatuck Valley (Eli Terry and associates).

Those historic places—and men—are familiar to all interested in development of interchangeable manufacturing in America.

It is time the names of Bridgeton and Oberlin Smith be added to this distinguished roll.

Oberlin Smith, who founded what now is the Ferracute Machine Co. at Bridgeton in 1863, was born in Cincinnati in 1840 and as a young man "went east" to achieve fortune and fame as inventor, industrialist, president of the American Society of Mechanical Engineers, and contemporary and friend of Thomas A. Edison, John Fritz, Admiral George W. Melville, Worcester R. Warner, Ambrose Swasey, Samuel T. Wellman and Henry R. Towne.

The important point which has been missed in the career of this man—who died in 1926—is that as one of the first to design and build practical production presses and dies for the plastic working of sheet metal (that is, stamping, forming and drawing) he laid the foundations for and was largely instrumental in developing technique which has had tremendous influence on the course of the automotive industry, the aircraft industry and others in which pressed metal figures extensively in design and construction.

All this was brought forcibly to the attention of more than 700 Ferracute employes, and guests of the company, through ceremonies and an industrial exhibition held at Bridgeton Oct. 23. One memorable feature of the program was presentation by George E. Bass, president, of awards to 36 associates—four of whom have served the company more than 50 years and the rest from 25 to 50 years.

Another was the address by Capt. Alvin Grauer, U. S. A., and his discussion of the state of the war with an army nurse and an army sergeant lately returned from the Mediterranean front.

The program was conducted by John B. Lawson, vice president of the company.

Allusion was made to the fact this was not only the eightieth anniversary of the founding of the company in 1863, but

also the fortieth anniversary of its "re-birth" after the fire in 1903 which left nothing of the big Ferracute shops but a twisted mass of wreckage.

Progress which has been made in presses and their application is driven home forcibly in the eightieth anniversary book prepared by John Cowan and published by the Ferracute company for limited distribution. It is a far cry from the simple little foot press originally built by Oberlin Smith in 1863, to the machines now being built by the company. Some of today's presses are so large they must be assembled in a pit, despite the fact the erecting shop is unusually high. As for speed, it is an equally far cry from the little "kick press" to the automatic presses now being built, which operate with multiple dies on wide strip stock at 1000 strokes per minute. Machines such as these not only represent vital contributions to the war effort, they also have postwar implications.

BRIEFS . . .

Tube Turns, Louisville, Ky., announces the opening of two new West Coast offices. T. H. Pike Jr., Pacific Coast manager, may now be reached at 2611-12 Russ building, San Francisco. John M. Hartley, formerly of the Los Angeles office which was closed Oct. 15, is located at the second office, Smith Tower building, Seattle, Wash.

Detroit Tap & Tool Co., Detroit, announces the opening of a factory branch office at 1506 Toledo Trust building, Toledo, O. M. Teague and W. F. Haverstock are local service engineers at the new branch office.

Colonial Broach Co., Detroit, has opened offices at 601 Tower building, South Bend, Ind., and at 1409 Union Central Life Insurance Co., Cincinnati, O. T. S. Mellen will direct the South Bend office and E. W. Brock the Cincinnati office.

Meehanite Research Institute of America Inc., New Rochelle, N. Y., to hold annual meeting of members at plant of Cincinnati Milling Machine Co., Cincinnati, Nov. 3-4.

Thomas Machine Mfg. Co., Pittsburgh, is producing metal straightening blocks and tables used for repairing bent and warped propellers. These are being manufactured for the Curtiss-Wright Corp.

Carboloy Co. Inc., Detroit, announces the availability of round hole cored dies

in stock sizes as small as 0.004 to 0.007 inches to assist mills producing fine wire and similar products.

Hayward Co., New York city, announces the publication of three new booklets on the care of Hayward orange peel, clam shell, and electric motor buckets.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., announces employment and production reached a new high in August with shipments of war materials more than \$67,000,000, compared with about \$65,000,000 in July, and employment totaling 106,220, about 1200 more than in July.

Whitehead Metal Products Co. Inc., New York city, will open on Nov. 1 an office and distribution warehouse at 415 West North avenue, Baltimore.

International Acetylene Association, New York city, has prepared a booklet entitled, "Preventing Welding and Cutting Fires."

Irving Subway Grating Co., Long Island, N. Y., reports that a unique process to recover vitally needed metal from scrap has been developed in collaboration with the Nassau Smelting & Refining Co.

Hydraulic Machinery Inc., Dearborn, Mich., has issued two new bulletins, SM 843 describing different models of flame hardening and special machinery and PT 845 describing several models of hydraulic presses.

United States Rubber Co., Akron, O., last month celebrated 100 years of continuous experience in the production of vulcanized rubber goods.

RCA Victor division, Radio Corp. of America, Camden, N. J., announces more than 250,000 workers in eastern war plants have been entertained at industrial "sings" sponsored by them and conducted by Lucy Monroe.

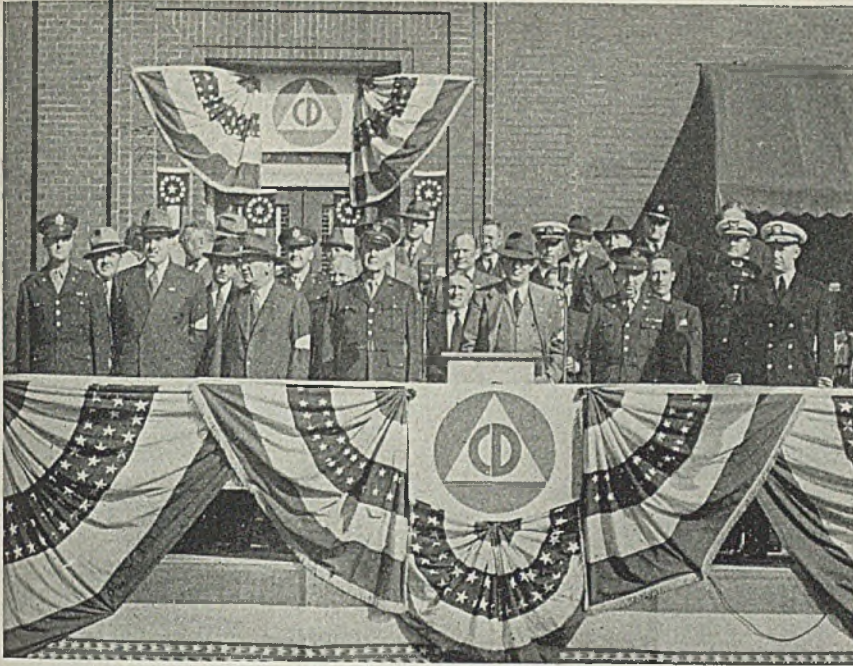
Formica Insulation Co., Cincinnati, states new uses of laminated plastics products have been developed.

Advance Pressure Castings Inc. announces new location of executive offices at 894 Manhattan avenue, Brooklyn 22, N. Y.

Cleveland Tool Engineering Co. announces it has moved into new and larger quarters at 1255 West Fourth street, Cleveland 13.

Interlake Iron Corp. announces it has moved its offices to 1900 Union Commerce building, Cleveland.

A. G. J. Rapp Co., 7001 North Clark street, Chicago, has moved its office to 1323 Lincoln street, Evanston, Ill.



Bethlehem Steel Co.'s Bethlehem, Pa., plant has received the National Security Award established recently by the Office of Civilian Defense to recognize industrial plants which have developed superior safeguards against fire, sabotage, accidents or possible air attack. Left to right, front row: Lt. Col. John B. Warden, OCD; R. S. Lukens, superintendent of plant protection, Bethlehem plant; R. A. Lewis, general manager; Maj. Gen. Ulysses S. Grant III; J. M. Sylvester, assistant general manager; Col. Henry A. Reninger, OCD; Comdr. E. C. Rook, Navy

- Jones & Laughlin Steel Corp., Pittsburgh, receives Maritime "M".
- Mid-West Forging & Mfg. Co., Chicago.
- Briggs Clarifier Co., Washington.
- Davidson Mfg. Co., Chicago.
- Duncan Electric Mfg. Co., plants No. 1 and No. 2, Lafayette, Ind.
- E. I. du Pont de Nemours & Co. Inc., Arlington, N. J.
- Fitzgibbons Boiler Co. Inc., Oswego, N. Y.
- Hercules Powder Co. Inc., Mansfield, Mass.
- Los Angeles Die Casting Co., Los Angeles.
- Murphy Diesel Co., Milwaukee, Wis.
- National Engineering Co., Chicago.
- Ransome Machinery Co., Dunellen, N. J.
- Tennessee Eastman Corp., Holston Ordnance Works, Kingsport, Tenn.
- Whitehead & Hoag Co., Newark, N. J.
- Yale & Towne Mfg. Co., Philadelphia.
- American Steel Package Co., Defiance, O.
- Associated Foundries & Mfg. Inc., New York city.
- Everedy Co. Inc., Frederick, Md.
- International Business Machines Corp., Poughkeepsie, N. Y.
- Intertype Corp., Brooklyn, N. Y.
- Rola Co. Inc., Cleveland.
- Bakewell Aircraft Products Co., Los Angeles.
- H. D. Conkey & Co., Conco Engineering Works, Mendota, Ill.
- Cook Electric Co., Chicago.
- Erie Resistor Corp., Erie, Pa.
- Kansas Color Press Machine Co., Lawrence, Kan.
- National Enameling & Stamping Co., Jacksonville, Ill.

Additional Plants Granted National Security Award

The National Security Award has been granted to the following companies by the Office of Civilian Defense for outstanding protection of their plants and employees:

- Farrel-Birmingham Co., Ansonia, Conn., third renewal.
- Blaw-Knox Co., Union Castings division, Pittsburgh, second renewal.

- Hazard Wire Rope Co., Wilkes-Barre, Pa.
- Johns-Manville Products Co., Jarratt, Va.
- Lane Co. Inc., Altavista, Va.
- Mack Mfg. Co., Allentown, Pa.
- West Penn Power Co., Pittsburgh, Pa.

More Industries Receive "E"

Metalworking and metalproducing plants honored with Army-Navy awards

ADDITIONAL metalworking and metalproducing plants have won Army-Navy production awards for outstanding performance in war production. Plants honored follow:

- Dayton Tool & Engineering Co., Dayton, O.
- Footo Co. Inc., Nunda, N. Y.
- General Motors Corp., Packard Electrical division, Warren, O.
- McElroy Mfg. Co., Boston, Mass.
- Rawlings Mfg. Co., St. Louis.
- Reed & Prince Mfg. Co., Worcester, Mass.
- Savage Tool Co., Savage, Minn.
- St. Joseph Lead Co. of Pennsylvania, Joseph town, Pa.
- Fitzgibbons Boiler Co. Inc., New York city.
- Heller Bros. Co., Newcomerstown, O.
- Sprague Specialties Co., North Adams, Mass., receives second award.
- Amperex Electronics Products, Brooklyn, N. Y.
- David Bell Co. Inc., Buffalo.
- E. I. du Pont de Nemours & Co. Inc., Parlin, N. J.
- Espey Mfg. Co. Inc., New York city.
- Herman Nelson Corp., Moline, Ill.
- Package Machinery Co., Springfield, Mass.
- Payne Furnace & Supply Co. Inc., Beverly Hills, Calif.
- Cincinnati Milling Machine Co., Cincinnati, O., third renewal star.
- Ceco Steel Products Corp., Cicero, Ill.
- Link-Belt Co., Caldwell plant, Chicago.



Toastmaster Products Division, McGraw Electric Co., Elgin, Ill., received the Army-Navy "E" Oct 10. Shown grouped behind the pennant, left to right: Rear Adm. Alex M. Charlton; Max McGraw, president of the company; Comdr. Miles H. Hubbard; D. Scott Campbell, executive vice president of the company; Murray Ireland, vice president in charge of manufacturing; Capt. Robert Henderson, Navy; and Lt. Col. A. B. Pattou, Army

West Speculates on Postwar Prospects

Industrialization of area extends to ordnance and military supply depots holding peacetime significance. . . . Huge plants established

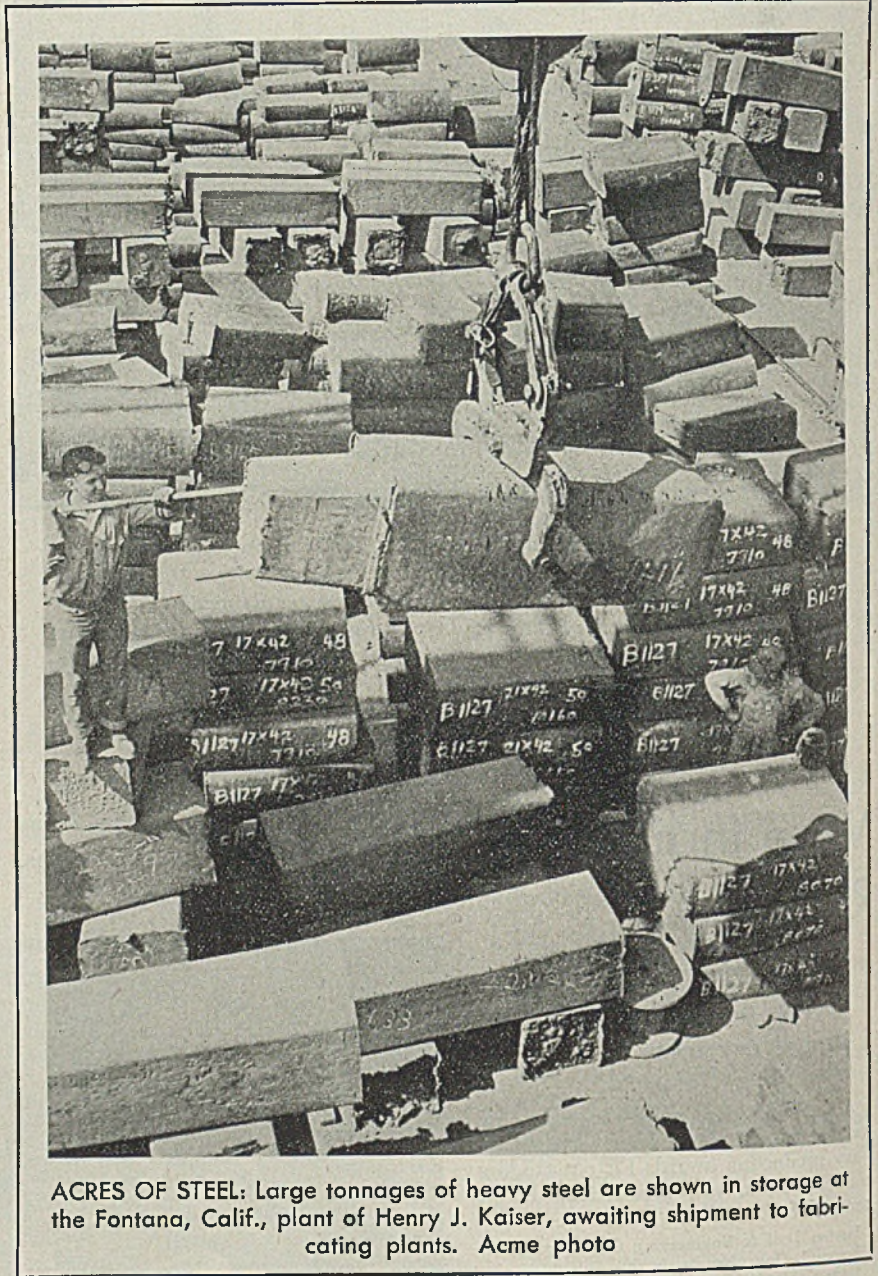
RAPID industrialization of the country west of the Mississippi the past several years has been cause for much speculation as to postwar prospects for the new and expanded industries which have come into being in the area. For the most part, however, speculation has been centered on industry on the Pacific Coast proper with some reference to major inland projects such as the Geneva Steel works in Utah. Relatively little has been said about the tremendous military undertakings which have sprung up all over the West, some of which may hold peacetime industrial significance.

As a matter of fact, relatively little is known of these establishments by the public at large. Military secrecy has been one reason for this. Now, however, censorship appears to have been eased to the extent the wraps have been at least partially removed and some idea of what has been going on in the area with industrial significance for future is being disclosed.

For example, J. R. Mahoney, director, Bureau of Economic and Business Research, University of Utah, Salt Lake City, Utah, recently published his findings on a study of "Wartime Economic Changes and Postwar Industrial Readjustment in Utah" which provides much valuable information. During the past two years, according to Mr. Mahoney, the federal government has completed a building program that makes central Utah probably the greatest central storage and assembly point for military supplies in the country.

Standing next in importance to the Geneva Steel works in the cost of construction is the Utah ordnance plant at Salt Lake City, total of which approximates \$45,000,000. In full-scale operation it requires more than 10,000 employees. Two of the three large manufacturing units are devoted to the production of 30 and the other to 50 caliber shells. About 15,000 workmen have received significant industrial training and experience at this plant that will be available to a prospective operator in the postwar period.

The Navy has constructed at Clearfield, Utah, about 30 miles north of Salt Lake City, one of the two largest naval storage depots in the United States. The



ACRES OF STEEL: Large tonnages of heavy steel are shown in storage at the Fontana, Calif., plant of Henry J. Kaiser, awaiting shipment to fabricating plants. Acme photo

cost was slightly more than \$25,000,000. The plant consists in the main of numerous storage buildings of large dimensions. All of the necessary railroad and trucking facilities are provided. Foundations and floors are of solid permanent construction.

The Hill Field Air Repair Depot located just south of Ogden, Utah, was planned before the outbreak of the war. This plant is designed to overhaul, repair, maintain and store all types of army aircraft. More than 10,000 people are employed at present at this plant which cost more than \$30,000,000. Hill Field is one of the military establishments most likely to survive and function in the postwar period.

The Utah Quartermaster Depot

is another huge military establishment located in the Ogden area. The site embodies about 3 square miles on which an enormous plant has been built costing about \$30,000,000. The plant as first planned and built consisted of durable structures of concrete, brick and steel with modern facilities. All of the huge buildings are provided with railroad and trucking facilities and are supplied with water, heat and power.

This plant is a great central storage reservoir for the extensive line of military supplies. It consists of six divisions: The quartermaster supply section carrying food, clothing, equipment and general supply; an engineer's supply section; an ordnance supply section confined mainly to motor cars and trailers; a sig-

nal supply section carrying a limited line of less dangerous types of gases and a medical supply section carrying a full line of medical equipment. This is the only complete plant of its kind located west of the Mississippi river and except for a small plant at Kansas City, it is the only one between the Mississippi river and the Pacific Coast.

There are three storage depots on the Pacific Coast and to these the Ogden plant performs a function of a central reserve supply depot through which the military operations in the entire Pacific regions are provided. The plant also serves the army camps in the surrounding states direct. Employment at this plant is in excess of 6000 workers.

The Army also has built an arsenal just south of Ogden, Utah, to provide storage for equipment left over after the war. It remained small until 1936 when it was enlarged to include a bomb-loading plant. Again in 1940 a program of expansion was started which made this plant the largest of its kind in the west. Storage facilities were greatly enlarged and several manufacturing units were added to assemble 20 and 37 millimeter shells. Expenditures to date on this plant probably exceed \$30,000,000 and it gives employment to more than 5000 people. More of the buildings are of permanent construction.

Virtually all of the products used by this plant are available as semifinished material in this area. Addition of a tube mill at the Geneva steel plant would provide the type of steel needed for the manufacture of bomb cases.

A large army hospital has been built at Brigham City in northern Utah, some 60 miles north of Salt Lake City. This 2000-bed institution cost about \$10,000,000.

One of the country's largest army ordnance depots has been constructed in Tooele county in west central Utah at a cost of about \$30,000,000. An area of 26,000 acres has been fenced and the necessary facilities to make it a great ordnance and munitions storage depot have been provided. The plant is one of the largest in the United States and is designed to carry on several lines of activity somewhat different from military depots in the Ogden area. Aside from its functions of storage of ammunition and a complete line of army ordnance, this plant will serve two other significant purposes. One is the salvaging of nonferrous metals from used containers, shells and other products. These are accumulated at the plant and properly prepared for shipment to manufacturing plants as scrap metal. The other line of activity will be the repair and maintenance of all types of army ordnance. For this purpose large shops are equipped with all necessary machine tools to repair and recondition army ordnance.

The Deseret Chemical Warfare Depot occupies a 20,000-acre tract well isolated from any towns or villages. This unique plant is the only one of its kind in the

country. The cost of this plant when completed will be between \$15,000,000 and \$20,000,000. The purpose of the plant is for the storage of dangerous gases, chemicals and chemically filled ammunition. In addition to the storage facilities, mainly in the form of igloos, open air storage is made use of extensively. The isolated position of the plant necessitates the building of virtually a self-contained community.

Defense Plant Corp. provided the funds from which the Salt Lake Tungsten Concentrating plant was built in Salt Lake City to recover tungsten from low-grade concentrates.

Special needs brought on by the war for steel by the Pacific Coast shipbuilders was the immediate purpose of the Geneva Steel Co.'s plant. This need it is believed will continue after the war.

Conley Re-elected Head of Steel Construction Group

Re-election of Clyde G. Conley, Mount Vernon Bridge Co., Mt. Vernon, O., to the presidency of the American Institute of Steel Construction, was announced at the closing sessions, Oct. 19-21, of the institute's convention at Rye, N. Y. (STEEL, page 45, Oct. 25)

Retained in office on the same balloting were Clyde MacCormack, Phoenix Bridge Co., Phoenixville, Pa., first vice-president, and Edward K. Klingelhofer, Pittsburgh Bridge & Iron Works, Pittsburgh, second vice president.

Others elected included: T. R. Mullen, Lehigh Structural Steel Co., Allentown, Pa., treasurer; Robert T. Brooks, New York, executive vice president and assistant treasurer; L. Abbett Post, New York, manager and Roberts B. Thomas, New York, secretary.

New directors for three years are: Henry Bohnsack, International Steel Co., Evansville, Ind., and P. F. Gillespie, Judson-Pacific Co., San Francisco. Directors re-elected included: R. C. Mahon, the R. C. Mahon Co., Detroit; W. M. Wood, Mississippi Valley Structural Steel Co., Decatur, Ill.; Art J. Dyer, Nashville Bridge Co., Nashville, Tenn.; Clyde G. Conley, the Mount Vernon Bridge Co., Mt. Vernon, O.; Edward K. Klingelhofer, Pittsburgh Bridge & Iron Works, Pittsburgh; and Clyde MacCormack, Phoenix Bridge Co., Phoenixville, Pa.

National Founders To Meet In New York on Nov. 17-18

Labor policies, renegotiation and termination of contracts and reconversion will be discussed at the forty-sixth annual meeting of the National Founders Association at the Waldorf-Astoria hotel, New York, Nov. 17-18.

The administrative council and committees of the association will meet on Nov. 16 and the alumni dinner will be held that evening.

Explain Plans For Boosting Steel Output

Openhearth men told of steps taken to increase production at Columbus, O., meeting

NOVEL idea is being employed by a Pittsburgh district steelmaker for increasing steel production. A 4 per cent increase in output was divided on 20 furnaces. A bulletin board put up in the open-hearth shop showed production for the first half and that desired in the 4 per cent victory drive. Every furnace is on an equal basis. Delays for furnace, bottom, and other delays as well at each heat and the respective tonnages are posted along with other data.

Every noon each melter knows just what he is doing. Posters scattered over the plant are changed every week. Each time a furnace makes an extra performance a picture of the furnace crew is taken and posted around the plant; a framed picture also is given each of the crew to take home. This procedure has given excellent results.

This plan was one of many explained at the joint meeting of the Ohio Section, National Open-Hearth Committee and the Ohio Valley section of the American Institute of Mining and Metallurgical Engineers, Deshler-Wallick hotel, Columbus, O., Oct. 22-23. About 200 were in attendance.

Next year's meeting of the two groups will be held at the same place, the dates being Oct. 27-28.

Co-operation is the main thing in getting furnace repairs made quickly, one operator stated. All material used to make the repairs is assembled near the job before the furnace is taken off.

At a plant in the Chicago area women have been found inadequate on hot work. They are employed to wheel brick but are only 50 per cent equivalent to men.

Other important data developed at the sessions follow:

Application of sinter permitted a furnace to increase its iron charge from 53 to 65 per cent, thus affording a 10 per cent improvement in the time of heats. Blast furnace sinter was not desirable for this purpose.

Use of scale and fluorspar on open steel was questioned though recommended for killed steel after the refining period. High-lime fluorspar gave poor results even when twice as much was added to the bath.

Use of magnamix for tap holes reported as highly satisfactory.

To combat the shortage of men at one plant, the employes are encouraged to put an extra 4-hour turn before or following their regular work. Response has been so good that more men now are available than can be supervised.

Labor Crisis Absorbs Attention; Indexes Sag

THREATENED labor troubles obscure the future for business. Difficulties in the coal fields are paramount at the moment. Less imminent, but hovering not far distant, are strong possibilities of a walkout by railroad workers if their wage demands are not satisfied.

Industrial indicators registered declines for the most part suggesting proximity of a production ceiling. Steel ingot output rate recently has reflected the influence of work stoppage in Alabama coal mines, and daily average production of bituminous coal is moderately down. Output of automobiles and trucks declined by 1750 units, in the latest week for which data are available. Construction volume, which had shown a total of \$72,800,000 for the previous period, recorded a \$20,000,000 reduction. Electric power distribution was a bright spot, setting a new high for the week that ended Oct. 23.

War Production Board's monthly munitions report shows consistent gains for June, July, and August, but no increase for September—further suggestion of an output ceiling reached or close at hand.

MANPOWER—While the overall situation remains serious, evidence of lessening of the Pacific Coast's labor scarcity is seen in the 2 per cent increase in aircraft production registered for September. The centralized hiring plan, seemingly working well in that territory, will probably be extended to other critical labor areas without delay. Concerning September strikes, a National Industrial Conference Board survey reports that many were occasioned by the War Labor Board's slowness in reaching decisions and its failure to approve raises agreed to by management.

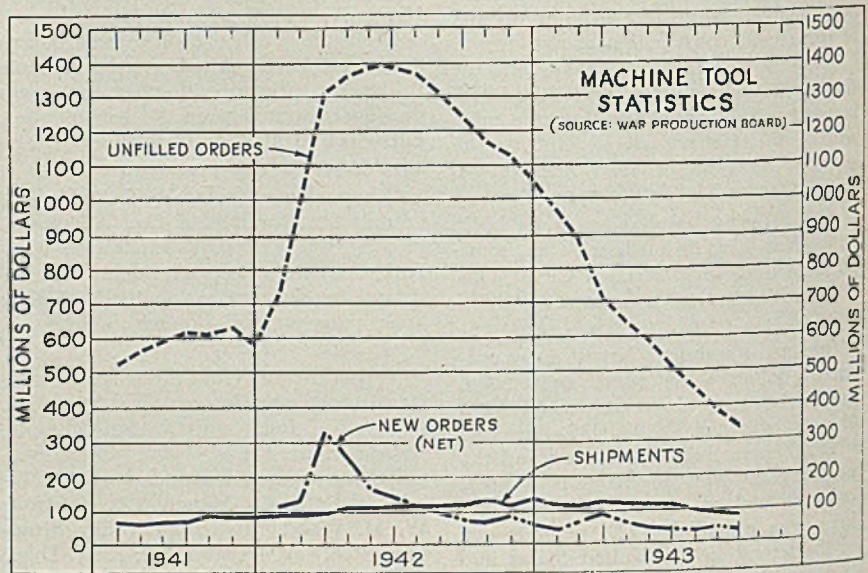
LIVING COSTS—In September cost of living for wage earners and lower-salaried clerical workers rose in 46 out of 69 industrial cities surveyed. Spokane showed a 1.2 per cent increase, and a 1 per cent rise was recorded for Denver, Houston, and

Oakland. Living costs for the nation as a whole stand 4.4 per cent higher than in September of 1942 and 19.9 per cent above the figure for January, 1941.

MACHINE TOOLS—Summer decline in new orders leveled off at a somewhat lower figure for September, and shipments eased gradually. Estimates place total September orders at about \$38,000,000, with cancellations figured at around \$6,000,000. Output for the month is estimated at approximately \$86,500,000, against \$87,700,000 for August and \$97,500,000 for July.

CIVILIAN ECONOMY—Problems involving civilian welfare are demanding major attention. Railroad workers as well as coal miners are restively awaiting settlement of wage disputes. Stability of prices is being relatively well maintained against persistent pressure which is becoming steadily stronger. Congress is opposing payment of food subsidies without proposing an alternative. Food supplies are expected to be about 5 per cent greater this year than last, with 1944 production probably equal that of 1943; but military, lend-lease, and other non-civilian requirements will be so heavy the home-front food supply may be smaller next year.

CONSTRUCTION CONTRACTS—For the first nine months of 1943 contracts in 37 eastern states totaled \$2,623,839,000, a decrease of 57 per cent from the construction total for the same period of last year.



FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity).....	99.5	100.5	99.5	99.0
Electric Power Distributed (million kilowatt hours).....	4,415	4,382	4,360	3,753
Bituminous Coal Production (daily av.—1000 tons).....	1,950	2,016	2,016	1,926
Petroleum Production (daily av.—1000 bbls.).....	4,415	4,438	4,344	3,956
Construction Volume (ENR—unit \$1,000,000).....	\$50.8	\$72.8	\$71.9	\$88.0
Automobile and Truck Output (Ward's—number units).....	17,785	19,535	21,490	20,825

*Dates on request.

TRADE

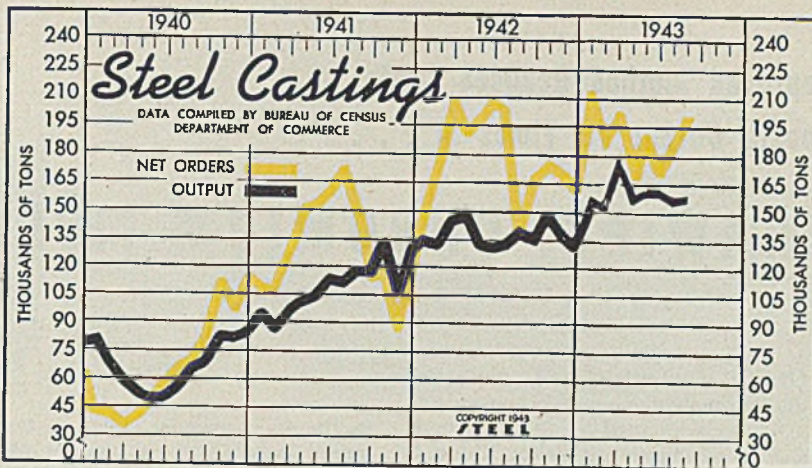
	910†	912	904	903
Freight Carloadings (unit—1000 cars).....	910†	912	904	903
Business Failures (Dun & Bradstreet, number).....	34	36	33	145
Money in Circulation (in millions of dollars)†.....	\$19,019	\$18,978	\$18,714	\$13,995
Department Store Sales (change from like week a year ago)†.....	+9%	-5%	+10%	+26%

†Preliminary. †Federal Reserve Board.

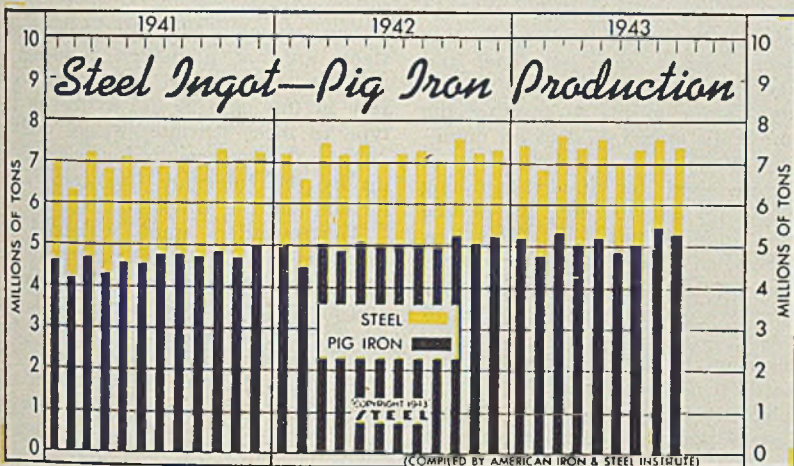
Commercial Steel Castings

(Net tons in thousands)

	Orders		Production	
	1943	1942	1943	1942
Jan.	213.1	150.5	154.7	134.8
Feb.	191.2	179.9	151.5	133.7
Mar.	202.7	211.1	178.5	146.5
Apr.	165.8	191.2	161.4	149.8
May	192.5	199.6	163.8	131.5
June	171.7	208.9	163.9	132.0
July	187.2	202.3	158.7	135.7
Aug.	200.6	141.2	158.8	139.2
Sept. ....	.....	177.5	.....	139.8
Oct. ....	.....	179.5	.....	152.1
Nov. ....	.....	173.3	.....	140.4
Dec. ....	.....	172.3	.....	143.9
Total	2,187.3	.....	1,679.2	.....



Steel Ingot—Pig Iron Production



Iron, Steel Production

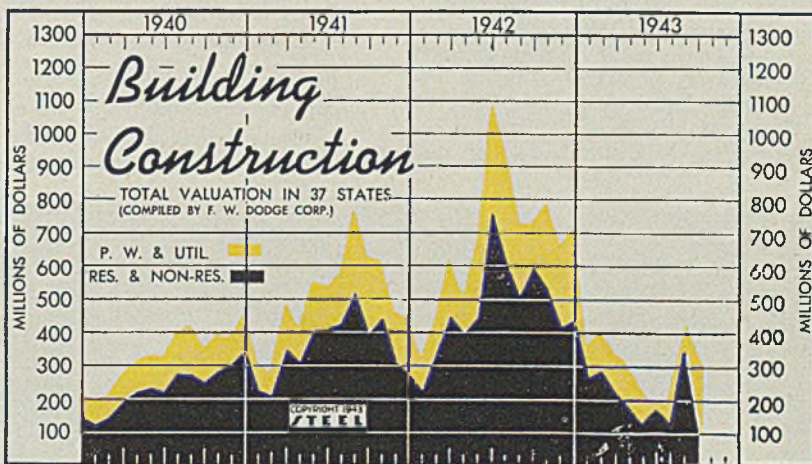
(Net tons—000 omitted)

	Steel Ingots		Pig Iron	
	1943	1942	1943	1942
Jan.	7,424	7,112	5,194	4,983
Feb.	6,826	6,512	4,766	4,500
Mar.	7,870	7,392	5,314	5,055
Apr.	7,374	7,122	5,035	4,896
May	7,545	7,382	5,173	5,073
June	7,027	7,022	4,836	4,935
July	7,376	7,148	5,023	5,051
Aug.	7,562	7,233	5,316	5,009
Sept.	7,489	7,067	5,226	4,937
Oct. ....	.....	7,584	.....	5,236
Nov. ....	.....	7,184	.....	5,083
Dec. ....	.....	7,303	.....	5,201
Total	86,061	.....	59,959	.....

Construction Valuation In 37 States

(Unit—\$1,000,000)

	Total	Public Works—Utilities		Residential—Non-Res.	
		1943	1942	1943	1942
Jan.	350.7	85.8	90.8	264.8	226.0
Feb.	393.5	112.9	95.9	280.5	337.6
Mar.	339.7	123.0	159.7	216.7	451.1
April	303.3	127.7	101.7	175.6	397.0
May	234.4	95.8	227.7	138.8	445.8
June	229.6	73.3	436.4	156.3	753.8
July	183.7	50.0	327.3	133.7	616.4
Aug.	413.7	73.4	213.1	340.3	507.9
Sept.	300.1	175.1	129.6	125.0	593.6
Oct. ....	.....	246.2	.....	534.2	.....
Nov. ....	.....	241.0	.....	413.2	.....
Dec. ....	.....	271.0	.....	437.7	.....
Total	2,540.4	.....	5,714.3	.....	.....



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions).....	\$9,991	\$6,813	\$10,831	\$8,379
Federal Gross Debt (billions).....	\$168.6	\$165.3	\$152.5	\$97.8
Bond Volume, NYSE (millions).....	\$68.8	\$36.2	\$57.0	\$69.7
Stocks Sales, NYSE (thousands).....	3,238	2,368	4,143	3,340
Loans and Investments (millions)†.....	\$51,648	\$51,278	\$49,393	\$35,908
United States Government Obligations Held (millions)†.....	\$36,698	\$36,215	\$34,213	\$22,159

†Member banks, Federal Reserve System.

PRICES

	Latest Period*	Prior Week	Month Ago	Year Ago
STEEL's composite finished steel price average.....	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)†.....	247.6	248.2	248.5	232.6
Industrial Raw Materials (Bureau of Labor index)†.....	112.1	112.1	112.4	102.6
Manufactured Products (Bureau of Labor index)†.....	100.2	100.2	100.1	99.7

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

Improved Method Reduces Costs
Boosts Output 10 Times in . . .

DRAWING CHROMIUM-MOLYBDENUM STEEL

By IRWIN H. SUCH
Eastern Editor
STEEL

DEEP DRAWING of hot-rolled chromium-molybdenum steel, never considered well adapted for this purpose, has been mastered by Walter Kidde & Co., New York, in the large-scale production of high-pressure cylinders for carbon dioxide and oxygen.

The company for many years has been making lightweight high-pressure cylinders for aviation use, carbon-dioxide gas fire extinguishers, and other purposes, but until recently followed the practice of machining the cylinders from heavy chromium-molybdenum forgings purchased from an outside shop.

The forgings were bored inside and turned outside to specified wall thickness. The open end was then necked down by hot-hammer forging, following which it was necessary to machine the cylinders at the neck to remove excess metal, for use in aviation demanded minimum weight yet maximum strength.

For each 10 pounds of steel in the final cylinder, the old process required about 45 pounds of steel in the form of forging. Thus, some 35 pounds were machined away as scrap. With the new process, developed under the direction of Daniel Mapes, vice president of engineering, for each 10 pounds of steel

in the final cylinder, there is now required only about 16 pounds of steel sheet, reducing the scrap to about one-sixth of that necessary under the old process. At the same time, production has been boosted some ten times and costs cut down materially.

Today, the company is meeting the demand of the armed services for unprecedented numbers of cylinders, many of which are used for fire-extinguishing equipment on aircraft, etc., for oxygen and for life-raft inflation. The new type of cylinder now in production for aviation use is made shatterproof from gun fire by a closely wound covering of piano wire.

Conversion to the deep-drawing process made it necessary to lick a number of problems. Deep drawing of ordinary low-carbon steels is comparatively sim-

ple. In fact, Kidde engineers themselves had considerable experience with this type of work in the manufacture of the familiar small, but somewhat complicated, cartridges for soda water bottles.

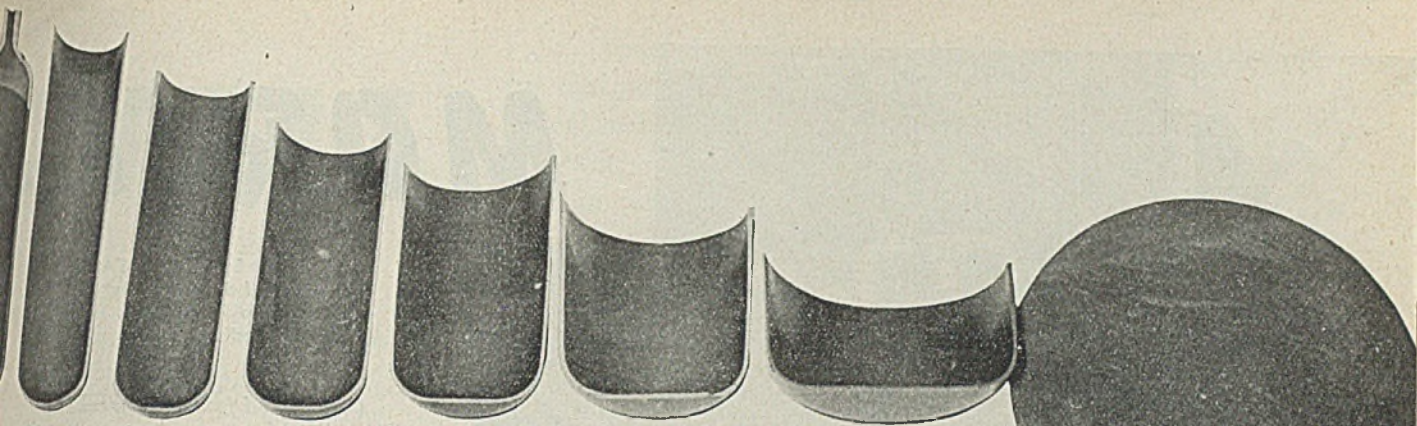
The tough chromium-molybdenum steels are not normally considered of deep-drawing quality, but it was necessary in this case to use a steel of this type to meet strength, weight and dimensional requirements for cylinders set up by the Interstate Commerce Commission and the armed services.

The cylinders must withstand test pressures of 3000 pounds per square inch and service pressures up to 1800 pounds, and at the same time meet rigid weight specifications. Also, they must be free from scratches and retain uniform wall thickness. On top of all this, it was necessary to maintain volume production of some 30 sizes! These range in

Fig. 1. (Left, below)—Here blanks are being stamped from chromium-molybdenum sheets on a 500-ton single-action double-crank mechanical press

Fig. 2. (Right, below)—Forty per cent of total reduction is achieved in first cupping operation. Cups are ejected into a pit below the press, removed by conveyor and loaded on trucks for removal to the mechanical cleaning and annealing department. Cleaning and annealing follow every draw





capacity from 8 to 2000 cubic inches, in length from 7 to 50 inches and in diameter from 2 to 9 inches. No shells are drawn, however, measuring over 7 inches in diameter and 28 inches in length, due to limitations of the press equipment. The large sizes are made by hot drawing, as they are not used in aviation and hence low weight is not vital.

In working out the manufacturing procedure, which principally involves

drawing, cleaning, annealing and heat treating along with a minimum amount of machining, punches and dies proved to be one of the most difficult problems requiring solution. High carbon or commercial punch and die steels worked well in blanking out circles but when it came to the drawing operations it was necessary to introduce special methods and experiment with various types of

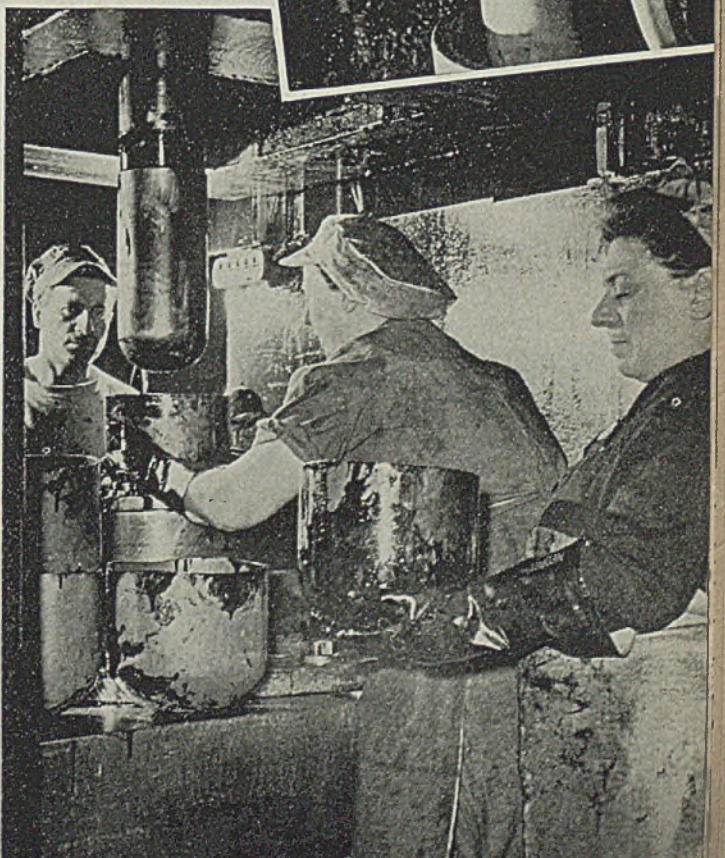
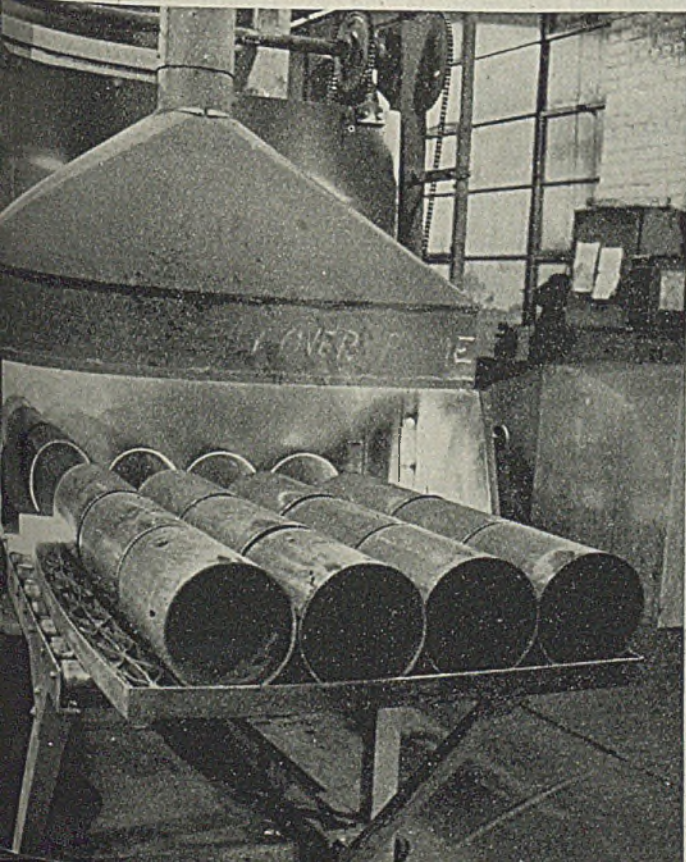
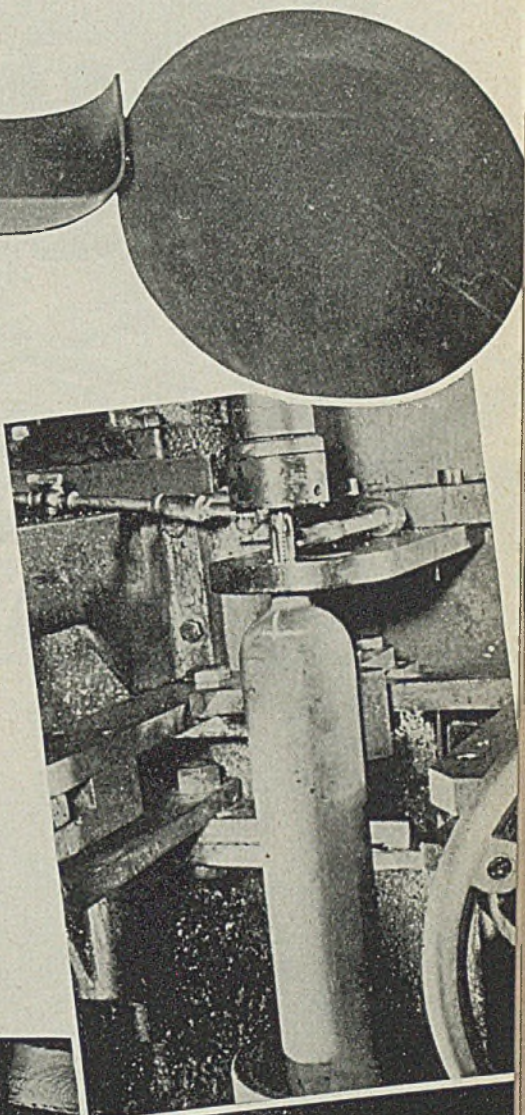
(Please turn to Page 124)

Fig. 3. (Above)—Indicated here are six steps in reduction of 17½-inch circle of SAE-X4130 steel to cylinder with 147-cubic-inch capacity in one of Walter Kidde & Co.'s plants. Note even wall thickness and lack of excess metal at base of neck in completed cylinder

Fig. 4. (Right, center)—Neck of large cylinder is shown being threaded on manually operated tapping machine. After cleaning, the cylinders are ready for fitting with valves and safety disks

Fig. 5. (Left, below)—Cylinders are loaded by batches into continuous annealing furnaces of this type. Annealing time depends upon size of cylinders but temperature is held at 1300 degrees Fahr.

Fig. 6. (Right, below)—After stress relieving, cylinders undergo another draw to increase length and reduce diameter. Kidde finds women work out well in operating presses and handling material



MORTAR

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

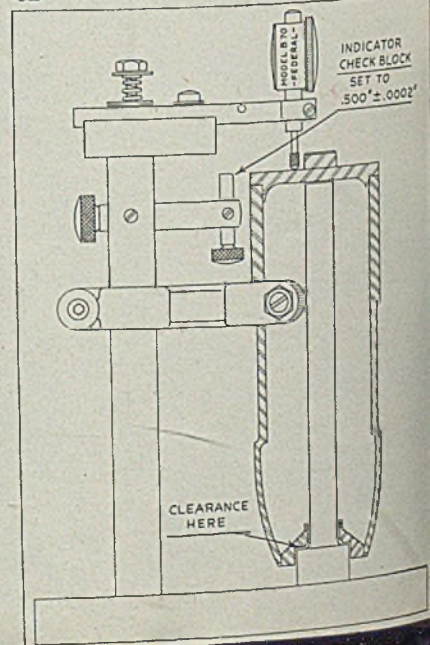
(Concluded from Last Week)

THE SHELL now go to an automatic Stamet shell turning lathe, Fig. 14, for concentricity turn, operation 16, Table I. This is perhaps the most important operation on the entire line, inasmuch as the wall thickness of 0.116-inch at the back of the ogive must be held to plus zero minus 0.010-inch and the front of the ogive held to 0.134-inch plus zero minus 0.010-inch with a maximum eccentricity of 0.005-inch. These thickness limits could not be held if the concentricity turn varied more than 0.005-inch. It is obvious from this that much depends on this operation.

Fig. 14. (Top left)—Stamet automatic contour turning lathe specially designed for shell production shown here turning body of 4.2-inch mortar shell at Lempco. Note multiple tooling, roller conveyor section in front of machine with pivoted loading device. This operation 16, Table I (first part of this article, last week) is highly critical, must meet close limits

Fig. 15. (Center, left)—Special gaging setup for checking concentricity. Pivoted arm contacts interior surface of shell while shell is turned on rollers. Other end of arm registers any movement on dial indicator gage. Operation 17 and 18, Table I

92



SHELL

. . . . concluding details of highly developed production line for making 4.2-inch mortar shell from seamless tubing. Excellent machining work holds down total scrap to less than 2 per cent. Inspector's rejections run as low as 1/10 of 1 per cent on some operations

Tools used are 1 x 1½-inch Firth-Sterling T-16 grade or Kennametal KH or KM, 35-degree front angle, 15-degree side angle, 6-degree clearance, 5-degree top rake, ⅜-inch radius chip breakers are 3/32 x 0.020-inch x 30-degree. Fig. 14 shows three tools are used simultaneously. Speed is 300 surface feet per minute, feed 0.030-inch, 40 to 1 coolant mixture. The shell outside diameter is held to 4.293 inches plus 0.007-inch minus zero.

Note in Fig. 14 the roller conveyor delivering shell in front of work station and the tilt loading device to facilitate positioning the shell in the machine.

Inspection on this operation is 100 per cent, both by Lempeco and CWS inspectors using a horizontal gage, Fig. 15, consisting of three sets of equally spaced

rollers mounted on a surface plate which also carries an arm 22 inches long pivoted at the center, contacting a dial indicator gage mounted exactly 11 inches from center of arm. A roller is mounted on other extremity of the arm. The shell is placed on the rollers with the arm on the inside of shell and the roller contacting the inside diameter, transferring the reading to the indicator gage. By rotating the shell, it is obvious that any eccentricity will be recorded on the dial indicator, extreme left, Fig. 15. Eccentricity cannot be more than 0.008-inch total indicator reading at any point on shell.

The CWS inspectors also recheck all bore diameters and counterbore depths. Each shell must bear the CWS stamp of approval before it can proceed to the

next operation. Shell that exceed the concentricity limits are recentered and a light cut sufficient to correct the error is taken on the outside diameter.

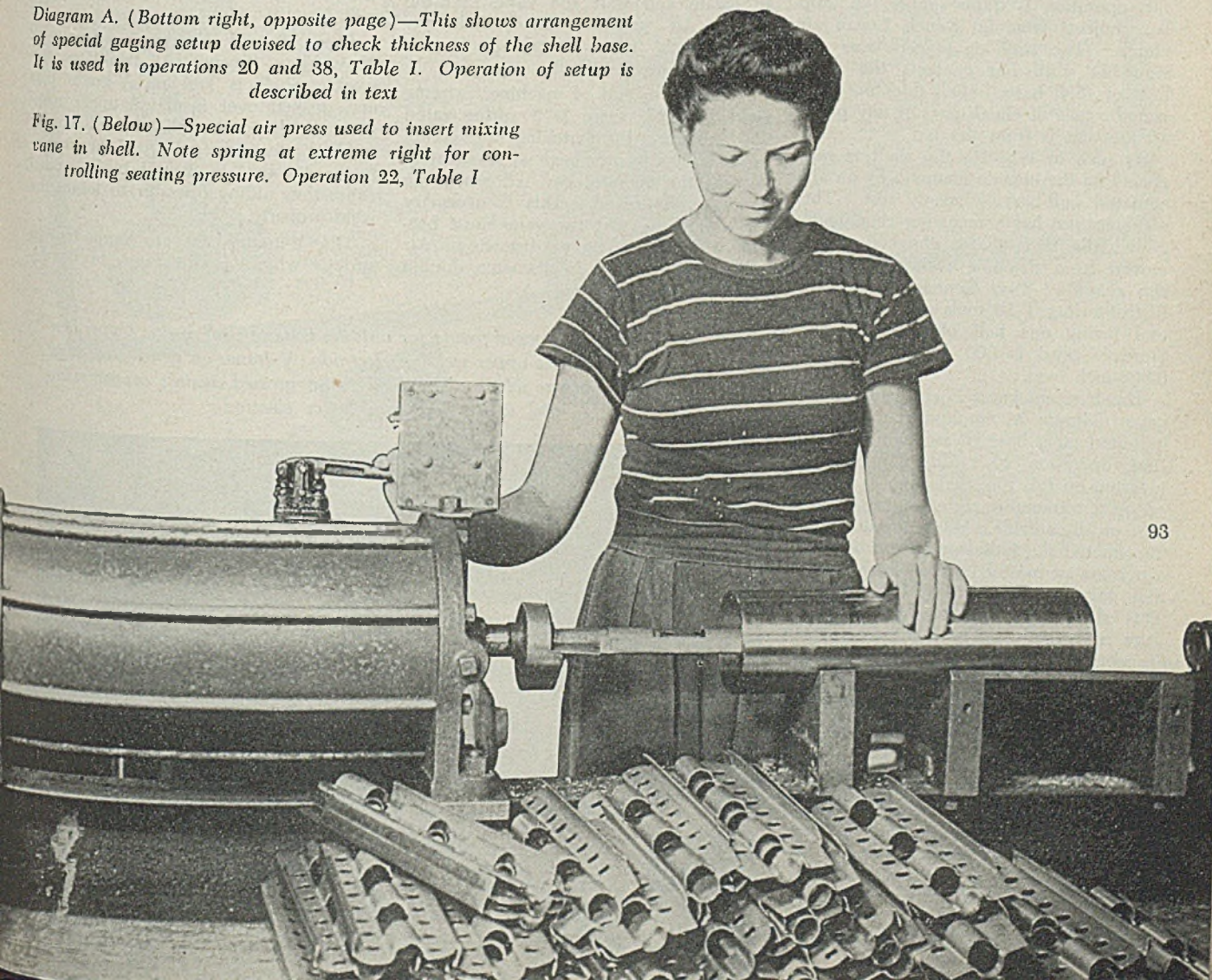
All shell have approximately 1/32-inch excess stock on the front end of counterbore, allowing for slight errors that may develop in process. By allowing this 1/32-inch, any shell that may be short from bottom of counterbore to base plug can be repaired by taking a light cut on inside of base. If shell is long on the same dimension, the counterbore can be bored deeper and the excess length can be faced off the front of shell. Rejections at this point are less than one-fifth of 1 per cent.

The scheme just described, in addition to using plant limits under CWS limits, means that almost all errors in

Fig. 16. (Bottom left, opposite page)—Rough facing base of shell, operation 19, Table I. See diagram A for gaging setup

Diagram A. (Bottom right, opposite page)—This shows arrangement of special gaging setup devised to check thickness of the shell base. It is used in operations 20 and 38, Table I. Operation of setup is described in text

Fig. 17. (Below)—Special air press used to insert mixing vane in shell. Note spring at extreme right for controlling seating pressure. Operation 22, Table I



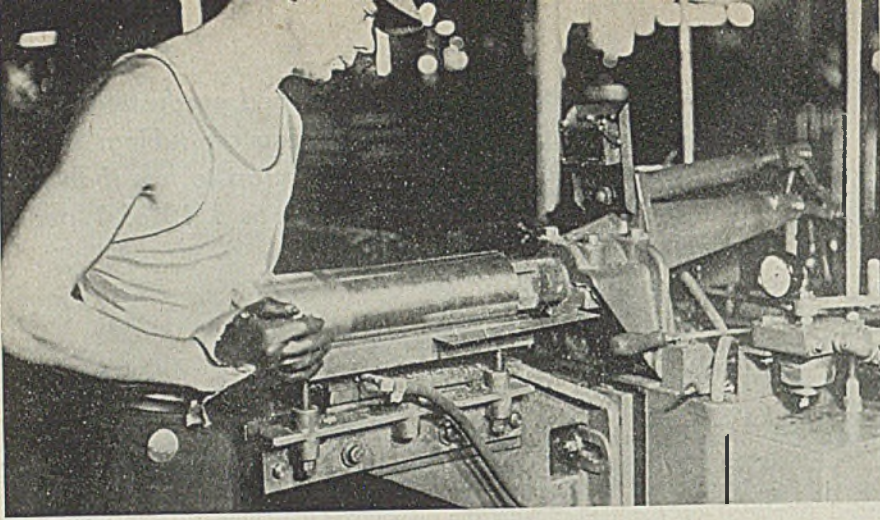


Fig. 18—Spot welder makes eight welds along each edge of vane on this special setup. Operations 23 and 24, Table I

machining can be corrected. It is this carefully planned system of limits that largely accounts for the amazing low overall rejections of less than 2 per cent. All of these can be rectified. In addition another 2 per cent cannot be corrected and are classed as scrap.

The shell now goes to a Bradford engine lathe, Fig. 16, for rough facing the base to a uniform thickness of 0.531-inch plus 0.005-inch minus zero. This operation (19, Table I) is very important as it controls the overall length of the shell after nosing. The setup on this operation is quite simple. A stop bar projects from an 8-inch Logan air chuck. The shell is placed over the stop bar until bar contacts the inner face of shell base. Shell does not contact the face of chuck jaws at any point, all locating is from the bar.

As seen in Fig. 16, the shell is supported on the outside diameter by an air-actuated ball-bearing steady rest. This machine also has a receiving ring which allows the shell to be chucked or removed from machine *without stopping the spindle*. Two Kennametal KH or Firth-Sterling T-16 tools are used—each tool facing one half of the total cut. Surface speed is 300 feet per minute, 0.008-inch feed.

The base thickness is checked on dial gage, diagram A, employing a stop pin mounted on a base in an inverted position, operation 20, Table I. Shell is inverted on this pin, dial gage is mounted on a retractable slide, contacting the base on the outside. When the dial slide is retracted the indicator button contacts a permanent master button which moves dial gage to the correct base reading. This shows the operator whether the gage is correctly set or if it has moved. Inspection is 10 per cent on this operation. A girl handles this job.

The next operation is chamfering the open end 1/16-inch by 40 degrees. This is done for the purpose of providing a lead for the nosing die. It was found that chamfering gave the die approximately 50 per cent more life besides a more accurate contour. A Lipe Rollway rapid production lathe takes care of this operation. Chuck, steady rest and feed are air activated, all three being con-

trolled from a single foot-pedal valve to leave the operator's hands free to load and unload stock. Cutting speed is 400 surface feet per minute. Vascalloy Ramet grade EM tools are used here. Machine is operated by a girl.

The shell now moves to a special air press, Fig. 17, designed and built by Lempco for pressing in the vane, operation 22, Table I. The casing is laid on a V-block while the vane is slipped on a carrier pin mounted on the end of the air-cylinder piston rod. The shell is pushed sharply over the vane by hand to locate and start the vane into the shell. Air pressure (90 pounds per square inch) is now applied, forcing the vane into the shell.

At the base end of machine, extreme right Fig. 17, there is a spring rated 450 pounds. By matching the spring until it has compressed approximately 1/4-inch, the operator can tell when the vane has bottomed. This is necessary for the reason that the vane must bottom without binding or distorting. Air cylinder is 8 inches in diameter, double

cushioned. A girl operates the machine. The vane is formed from 1/16-inch thick cold-rolled steel stock. Its purpose is to stir up the chemicals which partially solidify during storage. Rotation of shell in flight causes vane to stir chemicals violently, assuring proper action. Of course, high-explosive shell employ no vane.

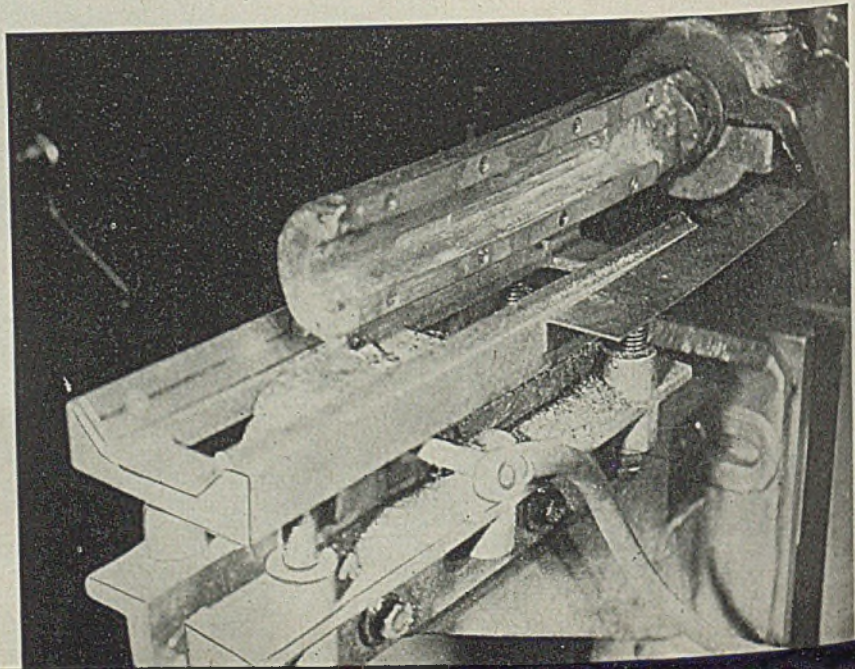
Next shell go to spot welders, Fig. 18, for welding the vane to casing. Specifications call for eight equi-spaced spots on each side of the vane. These welds are made one at a time. The completed welds must meet a torque test of 2000-foot pounds without yielding. Welding is performed on special resistance welding machines designed and built by the Federal Welding Machine Co., Warren, O. These units are completely water cooled and automatically timed for each phase of welding.

The first four welds on each side of vane at the base end of the shell are made on one machine and the welding checked at 1200-foot pounds torque. Then the eight spots near nose of shell are made on a second welder. Both machines are rated 50 kilovolt amperes (21,000 secondary amperes) and are set at No. 6 or 7 heat, with 60 pounds air pressure in the air cylinder clamping mechanism. Automatic timers are set according to physical properties of each mill heat. Tip (forged copper) life is 75 to 150 pieces, depending on steel analysis of casing and vane with different mill heats.

Figs. 18 and 19 show arrangement of welding fixture that facilitates this work. Shell is laid on V-guide bars and pushed over insulated upper mandrel which carries the forged copper welding electrode on tip of lower surface. Mandrel is shaped to fit around vane, thus aiding operator to locate the weld properly.

The V-guide bars are supported on springs which permit them to be de-

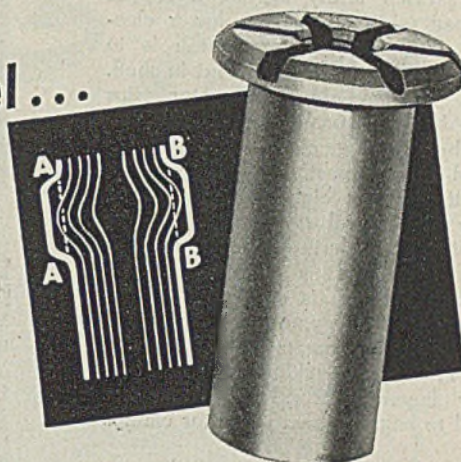
Fig. 19—Closeup of special fixture for welding vane to shell body. Upper arm is insulated and carries upper welding electrode. V-frame on which shell rests is mounted on springs which allow shell to be pressed against copper mesh pad which serves as lower electrode



HERE'S A GOOD WAY to help your designers and production men get the most from Stainless Steel...

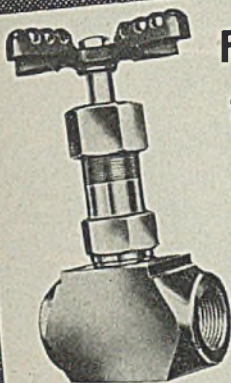
For useful information that can help you and your men do a trouble-shooting job along the production line, get in touch with your nearby Carpenter representative. He can provide fabricating hints—and technical data to help your engineers get the most from the properties of various types of Stainless Steel.

Combine your production-engineering knowledge with Carpenter's diversified experience in solving Stainless problems.

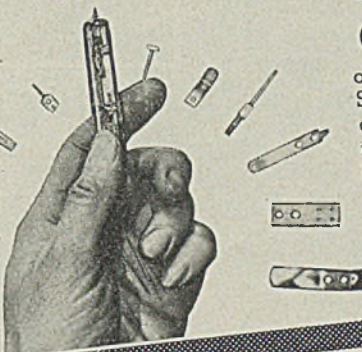


In spite of tremendous pressures and highly abrasive conditions in service—forged knuckle pins like this stay on the job longer because they are made from Carpenter Stainless. And note in the diagram that forging produced an even grain flow throughout, thus strengthening the thin sections at points AA and BB.

Faster Output



of valve parts such as bodies, bonnets and needles is possible when this Stainless is used. Ever since Carpenter invented free-machining Stainless Steels, it has been possible to make Stainless valve parts that help prevent scratching, galling and seizing in service.



Easy Bending and Punching

of hardened Carpenter Stainless Strip helps to assure accuracy in making radio control parts like these. Another reason for using this strip is its dependable uniformity, coil after coil.



Quick Answers to your questions about Stainless Steels...

This 98-page book contains practical information to help you speed the production of Stainless Steel parts. It is completely cross-indexed to help you quickly find the answer to your specific problem. Use it to help you get the most from Stainless today—and to plan the use of Stainless in new products that will have to win sales battles tomorrow. "Working Data for Carpenter Stainless Steels" is available to Stainless users in the U.S.A. For your copy, drop us a note on your company letterhead.

The Carpenter Steel Company • 139 W. Bern Street, Reading, Pa.

Carpenter STAINLESS STEELS



BRANCHES AT
Chicago, Cleveland, Detroit, Hartford,
St. Louis, Indianapolis, New York, Philadelphia

...for

- Strength
- Rigidity
- Heat Resistance
- Corrosion Resistance
- Longer Product Life
- Sales Appeal

pressed when mandrel is actuated by an air cylinder through the toggle mechanism seen at right rear in Fig. 18. This allows the outside surface of the shell to be pressed firmly against a copper mesh pad which forms the lower electrode. Purpose of copper mesh is to prevent hard spots at weld point in shell. Pad is water cooled. Operator trips foot pedal to actuate mandrel and initiate the welding cycle.

Weld yield inspection is 100 per cent on each group of eight welds. Testing is done on a special torque machine, Fig. 20, designed and built by Lempeco. This machine can exert a torque of 6000-foot pounds which is equivalent to approximately 40,000 pounds at the inertia point. Operator inserts shell open end down in large chucking fixture. Stationary fingers extend into open end of shell to engage vane. Operator clamps

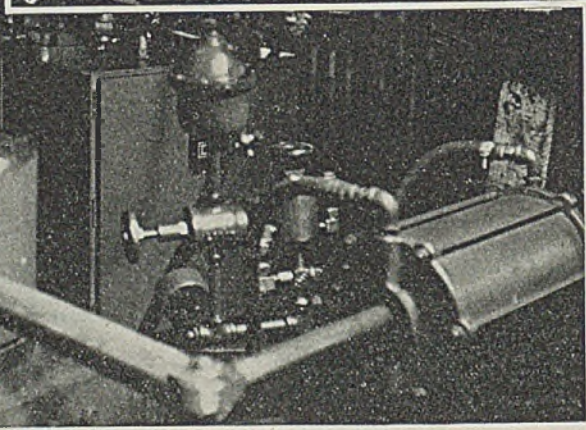
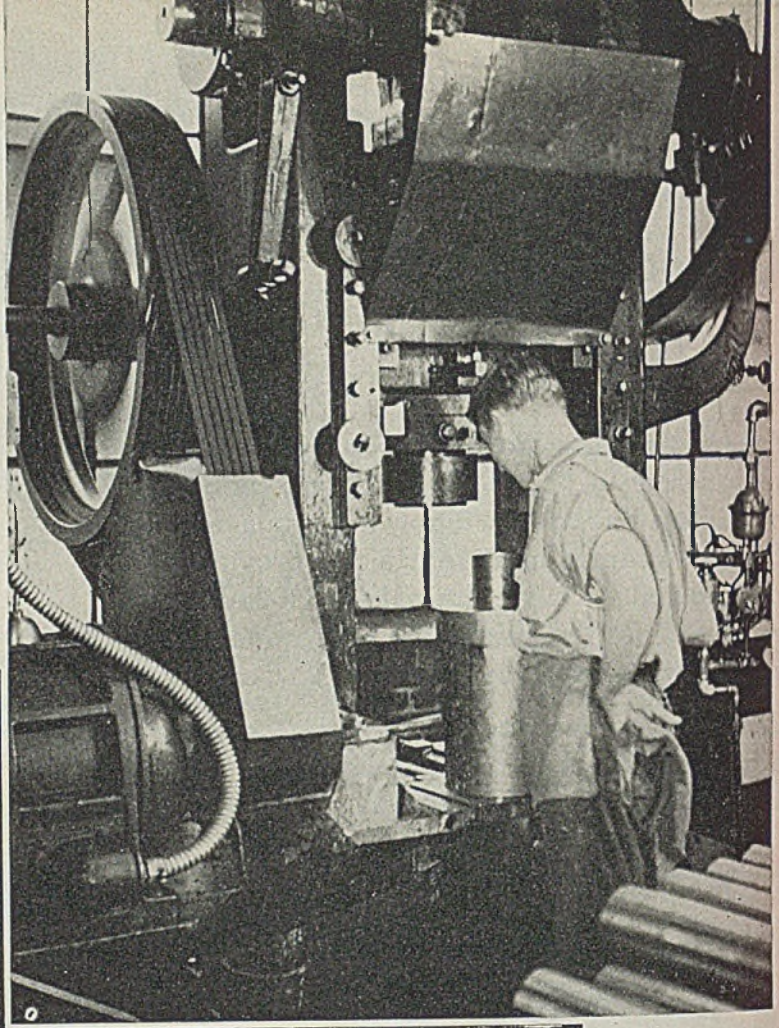
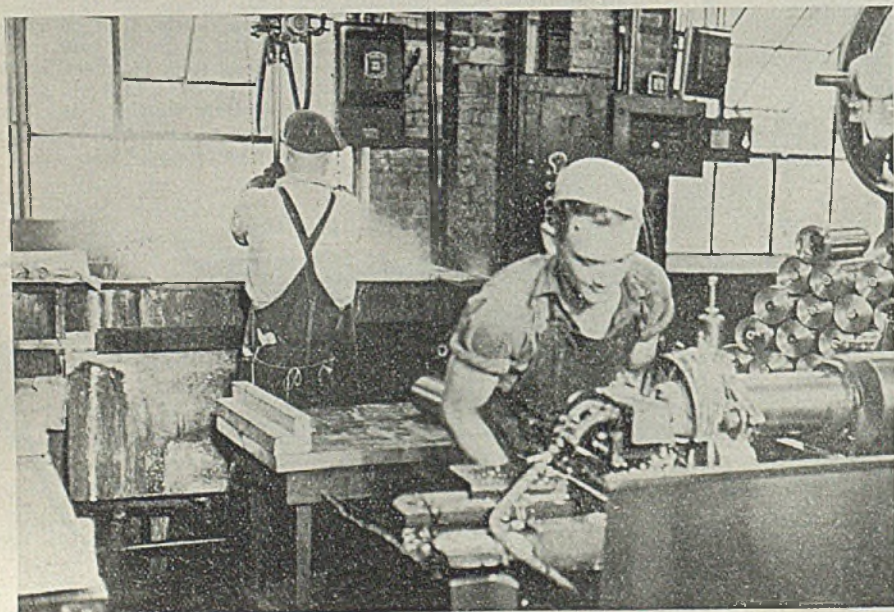


Fig. 20 (Left) —Torsion test used to check strength of welds joining vane to shell body, operation 25, Table I. Vane must not yield under specified torque

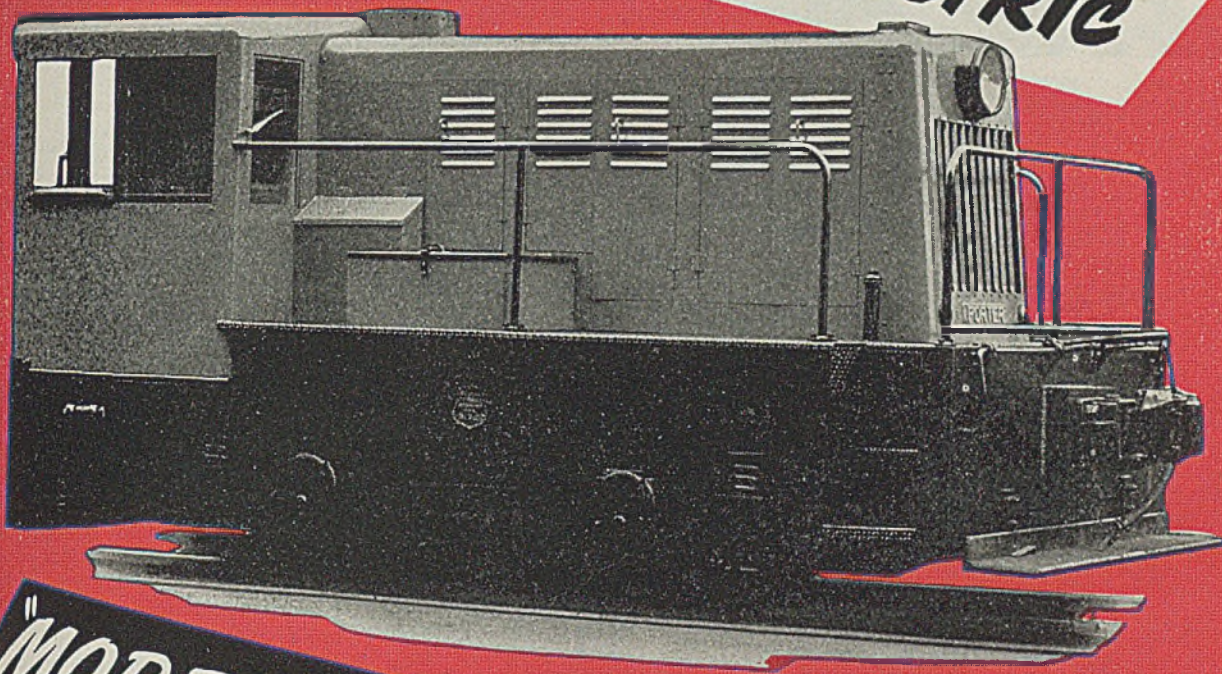
Fig. 21 (Top right)—Shell is nosed cold, operation 26, Table I, in this press. Air cylinder back of lower platen moves a slide carrying the collet assembly, allowing operator to load shell into collet in convenient position

Fig. 22 (Left)—Operator in rear is working tankful of shell bodies up and down in wash bath using an air hoist, operation 29, Table I. Man in foreground is doing operation 28, Table I—a bore, face and chamfer on nose preparatory to attachment of nose adapter



PORTER

35 TON DIESEL-ELECTRIC



"MORE POWER PER TON"

By eliminating every pound of unnecessary weight, PORTER engineers have designed a switching locomotive of exceptionally high efficiency. This sturdy, compact, single-engine Diesel-Electric delivers a remarkably high ratio of power per ton of dead weight, with resulting economies in cost of operation and maintenance. Unskilled labor can quickly be taught to operate and service this 35-ton unit—it's as easy to drive as a truck! Write for complete specifications.



LOCOMOTIVE DIVISION:
Diesel, Diesel-Electric, Steam, and
Fireless Steam Locomotives.

PROCESS EQUIPMENT DIVISION:
Agitators, Mixers, Blenders, Autoclaves,
Kettles, Pressure Vessels, Driers,
Ball and Pebble Mills.

QUIMBY PUMP DIVISION:
Screw, Rotax, Centrifugal, Chemical Pumps.

ORDNANCE DIVISION:
Projectiles, Heavy Forgings, Breech Blocks.

Only PORTER builds a Complete line of Locomotives



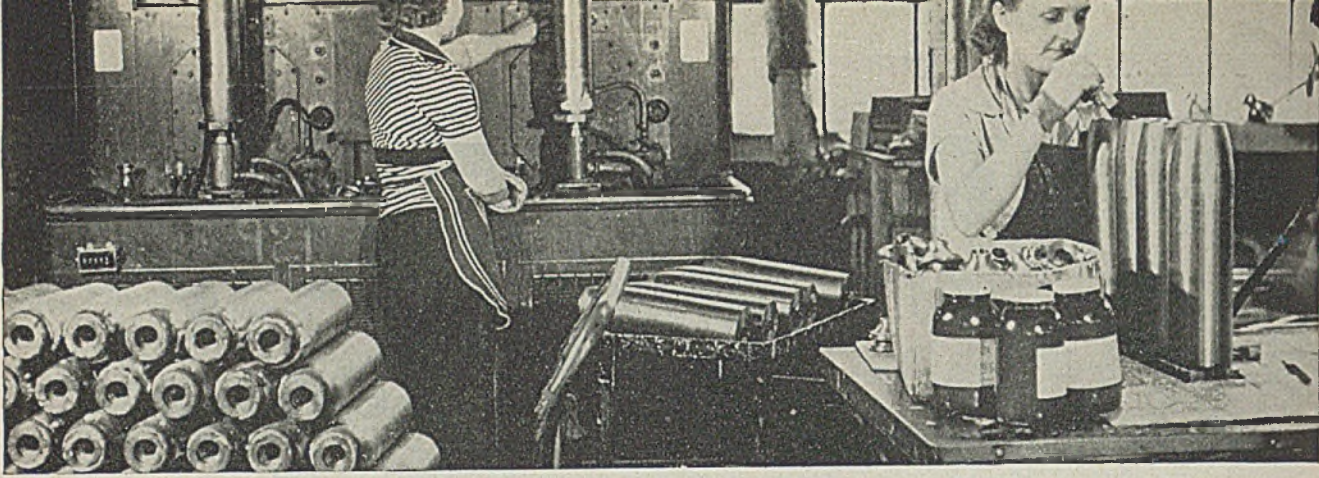
H. K. PORTER COMPANY, Inc.

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

FACTORIES:

PITTSBURGH, PA.
BLAIRSVILLE, PA.

NEWARK, N. J.
NEW BRUNSWICK, N. J.



(Top to bottom)

Fig. 23 — Operation at right is cleaning and fluxing shell nose. Then adapter is assembled with silver brazing and placed in Tocco Jr. induction heater in background for brazing, operation 32, Table I. Each of the working stations on the induction heater handles two shell as in Figs. 12 and 13

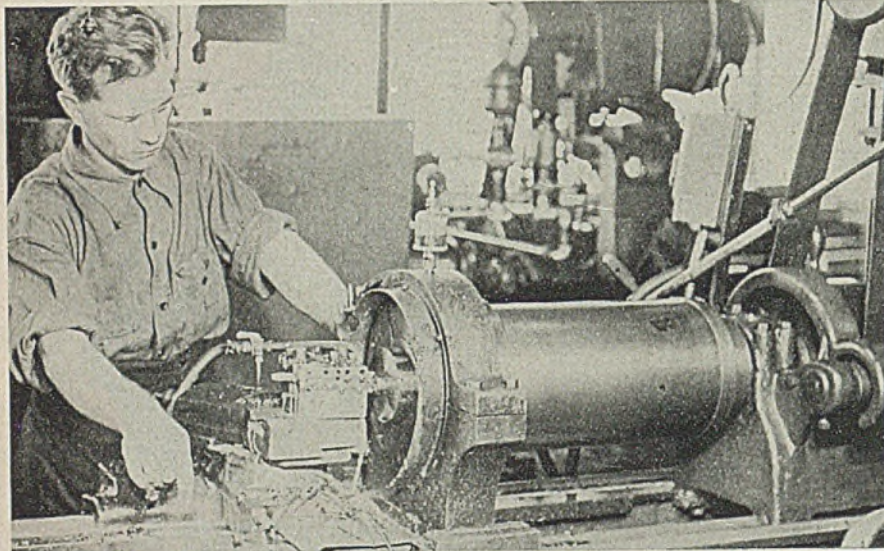


Fig. 24—Base is finish faced and lug is turned and chamfered in operation 37, Table I, shown here. Work is positioned against stop bar in collet center. Girls now operate these machines

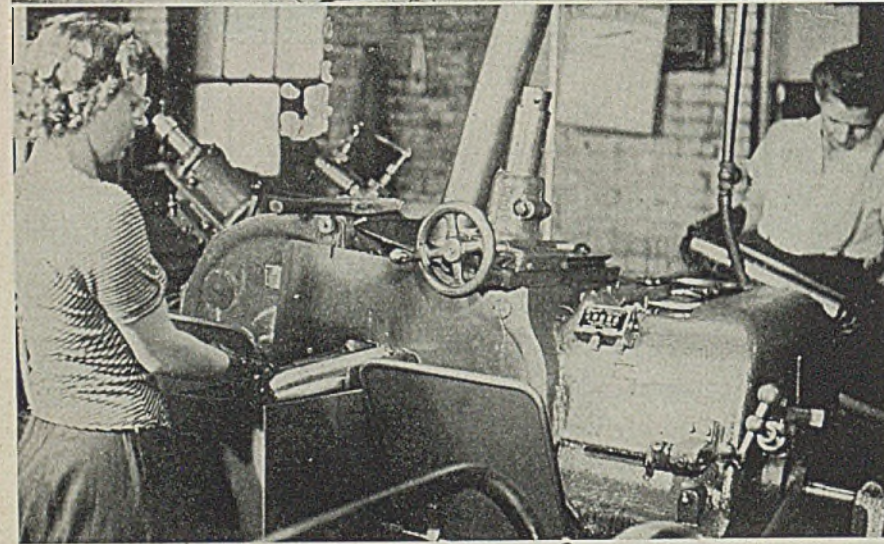
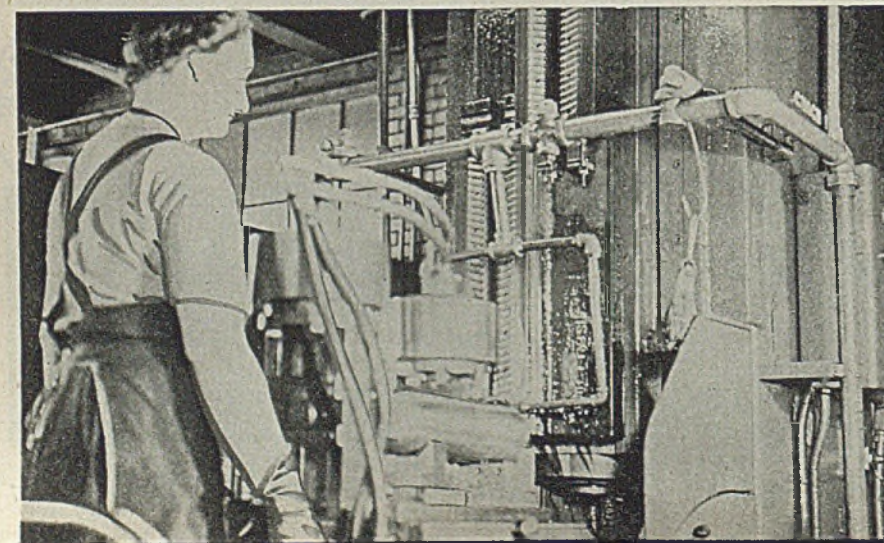


Fig. 25—Centerless grinder rough grinds outside of shell. In through feed setup, shell are fed in one side, come out at rear where a second operator inspects shell as shown here. Operation 39

Fig. 26—Broaching key across shell base, operation 41, Table I, is done on this setup, using two off-set broaches to work two shell in one stroke of machine



shell in fixture with handwheel, Fig. 20, and applies air to cylinder, extreme right, which then develops torque in shell by turning fixture through 16-inch radius arm (24 inches to center of shell).

Three times each day a shell is tested to determine maximum strength by torquing to the breaking point. A record is kept on each test. If any excessive variation in breaking or yield point is shown, welding operations are immediately checked to ascertain the cause of the variation. Men operate this job most of the time, although girls do quite well on it.

The shell now goes to a redesigned No. 305 Bliss press (about 100-ton), Fig. 21, for closing the nose to the contour desired. The shell, base down, is placed in a large collet to depth of 11 $\frac{1}{8}$ inches. Base of collet does not "bottom" in the outer collet carrier. As the pressure from the nosing die is exerted, it causes the collet to close snugly about the outside

(Please turn to Page 126)

21 Ways that Jones & Lamson Optical Comparators help your



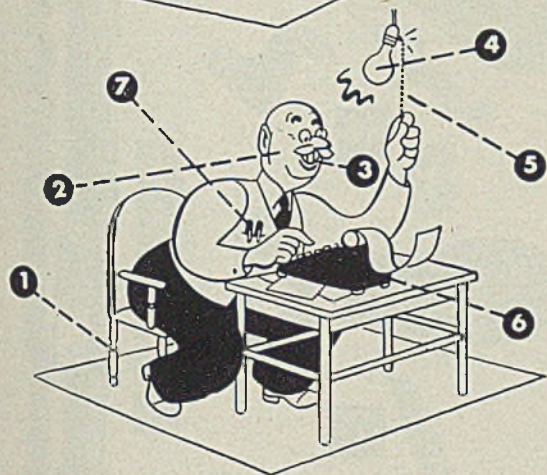
READIN'

1. Electrical equipment
2. Radios
3. Slide fasteners
4. Type faces
5. Paper making machinery
6. Button dies (plastic)
7. Matches



'RITIN'

1. Hardware
2. Textile machinery
3. Hair clippers
4. Eye glasses
5. Typewriters
6. Bottle molds and closures
7. Pen points



'RITHMETIC

1. Wood and metal cutting tools
2. Electric shavers
3. Tooth brushes
4. Light bulbs
5. Light chains
6. Adding machines
7. Automatic pens and pencils



The enlarged shadow image reveals, at a glance, the exactness of all dimensions of even the most complicated tools, parts and products.

During the past 22 years, Jones & Lamson Optical Comparators have been used for inspecting thousands of interesting and peculiar jobs. Readin', 'ritin', and 'rithmetic have been definitely helped, just as have the food you eat—the clothes you wear—the room you're in—the war you're fighting. Whatever product you manufacture, be it mechanical, electrical—anything—call in a Jones & Lamson expert to show you how you can inspect it more accurately, faster, at less cost, through the use of Jones & Lamson Optical Comparators.

Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Die Heads



JONES & LAMSON

MACHINE CO., SPRINGFIELD, VERMONT, U.S.A.
Profit-producing Machine Tools

CHEMICAL BLACKENING PROCESS

... for steel finds new favor as production tool

By A. P. HILL
E. F. Houghton & Co.
Philadelphia

SURFACE FINISHING of steel by chemical blackening processes recently has encountered increasing favor among manufacturers of many products and others now facing finishing problems would do well to examine its possibilities.

Blackening of steel by manipulation of heat and chemicals is an old art but its application was limited for many years to such items as guns and pistols. In fact, the process long was a gunsmith's secret, involving much trial and error and the use of judgment.

Modern blackening methods have lifted the process from a confused background of craftsmanship into a zone of industrial production where thermostatic control and exact chemistry replace judgment and skill.

Because chemical blackening has always been associated with extravagant labor and costly guns and tools, general acceptance of modern blackening processes is handicapped by a tradition of wholly imaginary expense and complications. Actually, it is one of the simplest,

most economical and satisfactory of finishes, involving less skill and material than in plating, dipping or brushing.

There is a temptation to regard the process as a makeshift in the absence of plating materials. On the contrary, it might very well become established as a
(Please turn to Page 136)

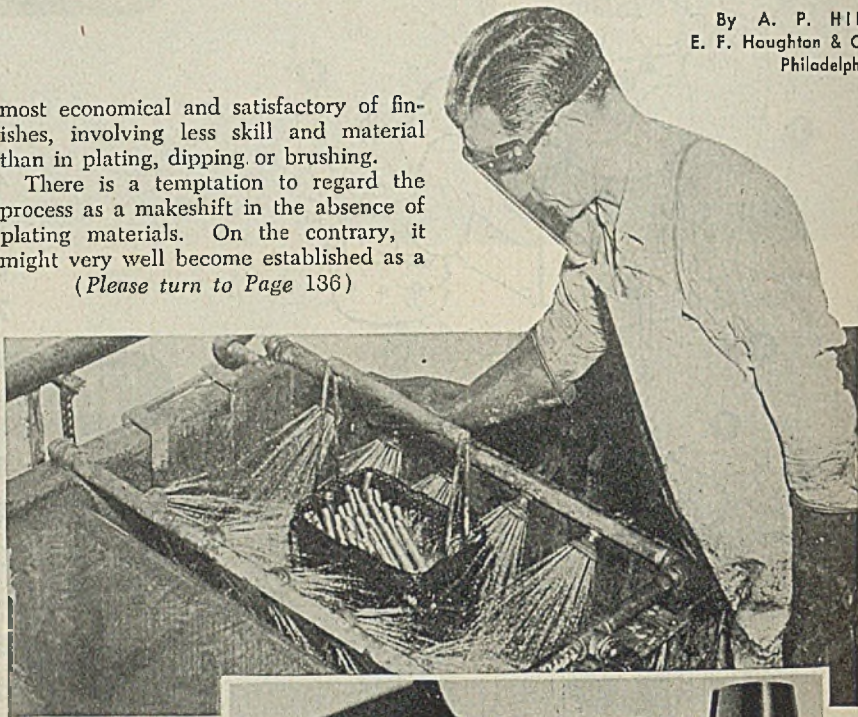
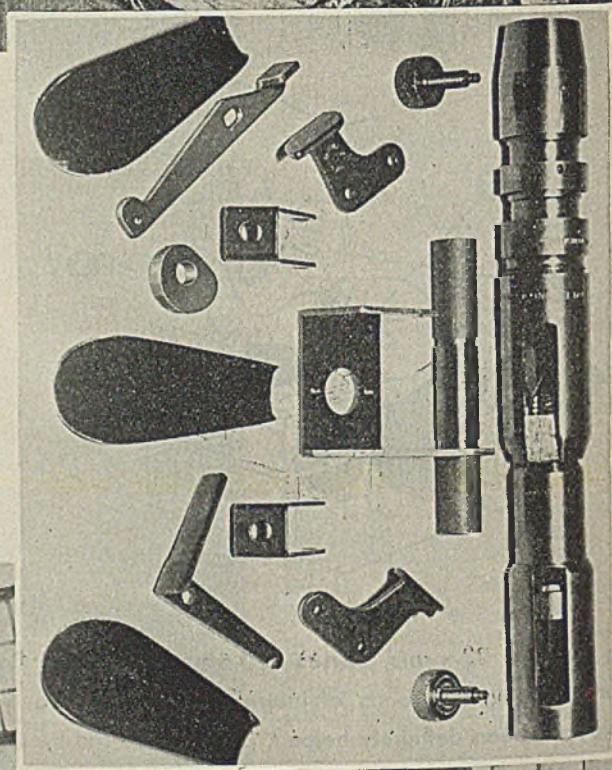


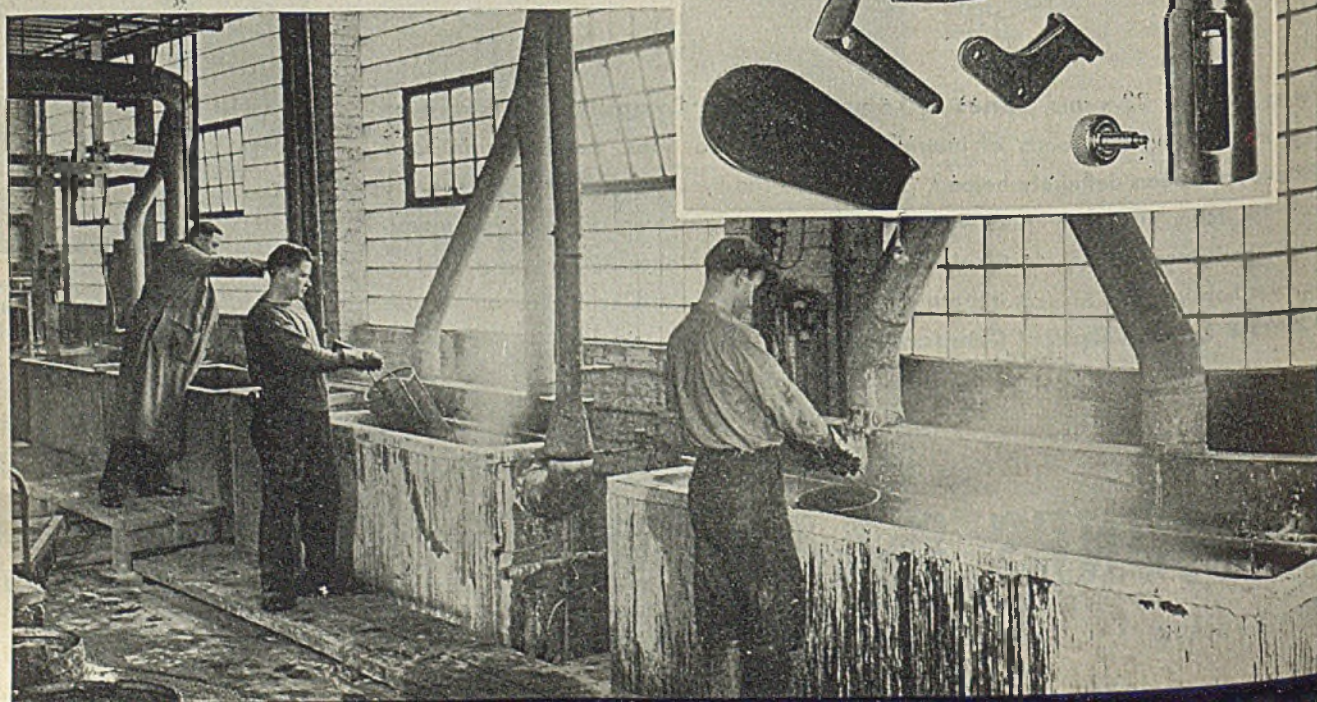
Fig. 1 (Top right)—In one factory, basket of work is being sprayed after cleaning in tank at right, prior to cold rinse, hot rinse and blackening

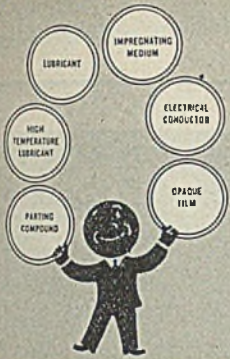
Fig. 2 (Right, center)—Parts like these may be given a jet-black noncorrosive finish at low cost and with little delay in production time through use of a blackening bath

Fig. 3 (Below)—Typical installation for applying black finish to steel. Tanks at right and center contain blackening solution, usually sodium hydroxide with smaller additions of potassium nitrate and sodium nitrate. Third tank in line, right to left, is for rinsing parts and fourth tank contains cleaning compound



100





"LET'S GET ON WITH THE WAR" these free booklets will help...

These 5 free booklets on **dag** colloidal graphite can help you in more ways than one. Each covers a different use or group of uses for **dag** products in industry. If you haven't used **dag** colloidal graphite or don't know all these uses meet Mr. **dag** today by writing for one or more of the booklets. Just clip the coupon.



ASSEMBLING AND RUNNING-IN ENGINES AND MACHINERY

Lists 10 advantages of adding **dag** colloidal graphite to liquid lubricants for these operations and tells why with photographs, charts, and simple, non-technical text.

BULLETIN No. 421



PARTING COMPOUNDS

Tells how **dag** dispersions prevent objectionable freezing, rusting or sticking together of metals and other materials. Cites use on screw threads, lamp bulbs, aviation and driving equipment; also in glass, rubber and foundry industries.

BULLETIN No. 422



HIGH TEMPERATURE LUBRICATION

How **dag** colloidal graphite takes over when the going gets too hot for conventional liquid lubricants. Gives examples in forging, oven conveyors, kiln cars, bottle and die casting machines, etc.

BULLETIN No. 423



"dag" COLLOIDAL GRAPHITE FOR IMPREGNATION AND SURFACE COATING

of textiles, asbestos, felt, abrasives, porous metals, paper, wood, etc. to impart lubrication properties, electrical conductivity, opacity, color, or other desirable qualities.

BULLETIN No. 431



GENERAL BOOKLET

The story of **dag** colloidal graphite. 12 pages fully illustrated. Gives the how and why of colloidalization, explains the various liquid carriers and suggests dozens of places where **dag** dispersions can speed up production.

BULLETIN No. 430

dag ACHESON COLLOIDS CORPORATION
Port Huron, Michigan

Please send me free copies of the bulletins checked below:

No. 421 NAME _____

No. 422 COMPANY _____

No. 423 POSITION _____

No. 430 ADDRESS _____

No. 431 CITY & STATE _____

Our Present Oil Supplier Is _____

(Lubricants containing **dag** colloidal graphite are available from major oil companies.)

Dept. AZ

"dag" is the registered trademark of Acheson Colloids Corporation

Jigs and Fixtures

... for arc welded
mass production

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

(Continued from Last Week)

PRIMARY function of a weld positioning fixture is not only to hold the parts in proper relation for welding, but also to make it possible to turn the assembly so the welding may be done in the most favorable position, usually down-hand or flat position. This brings the work within the realm of the best economy of the welding process for such welds are made easier and faster.

Fixtures used in positioning for finished welding, like those for setting up of parts, should usually be made specifically for the job they are to handle. While generalizing fixtures for certain types of parts is possible, almost all weld positioning jigs should be designed and built for the particular work involved.

Welding positioners may be grouped for the purposes of discussion in four general classes as follows:

(A) Fixtures for small parts and structures.

Parts small enough to be handled with relative ease and which may be turned by hand as the operator deposits his weld, may frequently be placed on weld positioning fixtures such as the one shown in Fig. 6. This device involves only a single point of suspension on one plane, the axle being adjusted to 45 degrees from perpendicular for this structure. This design allows the part to be placed on the axle and turned by hand. Certain welds on the part thus can be made in the down-hand position.

Note that a square box-like structure with four welds to be made on each end could be placed on the axle and each of

Fig. 6 — Fixture and subassemblies welded on it. Note simple hold-on C-clamp, adjustable angle axle, unobstructed clearance for turning parts during welding — an effective fixture



the four welds deposited in the down-hand position by turning it on the axle through the full 360 degrees. Removing the part and turning it so the other end is up would permit finishing the welding on the other end also in the downhand position.

This type of fixture is one of the simplest, and lends itself to a large variety of parts if it is properly constructed. It serves well for circular parts which may be turned without any additional power drives as the operator deposits his metal.

Fig. 7 shows a variation of this fixture.

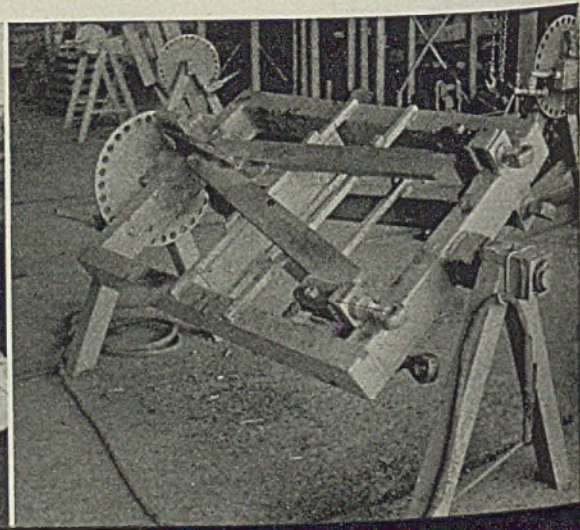
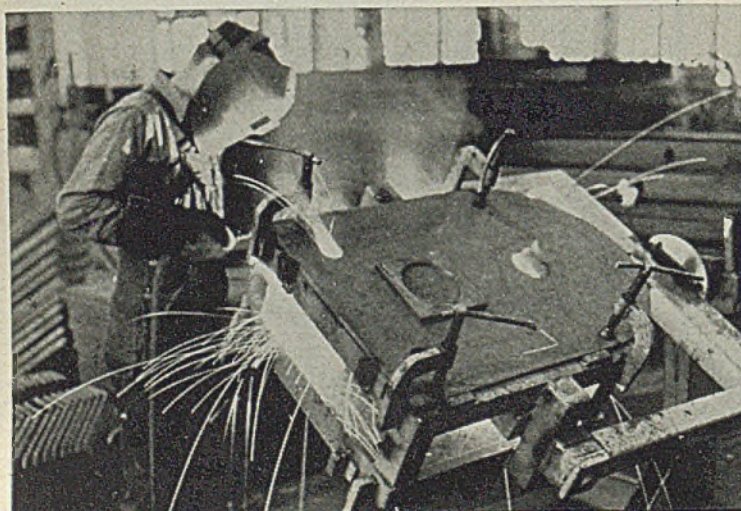
Fig. 7 (Left, below)—A variation of fixture shown in Fig. 6. Secondary axle crosswise primary axle provides rotation to permit downhand welding of any part. Simple hold-down clamps and locating stops also aid here

Fig. 8 (Right, below)—Structures with most welds in one central plane are handled well in fixture consisting of central axle suspended from end frames as shown here as it positions most welds

It allows moving the part to any position desired because it has a secondary point or axis of suspension. Combination with the first suspension axis makes a universal positioning unit. This type of fixture is very effective for small irregularly shaped parts or assemblies with a large number of welds in different planes, assemblies ordinarily difficult to position.

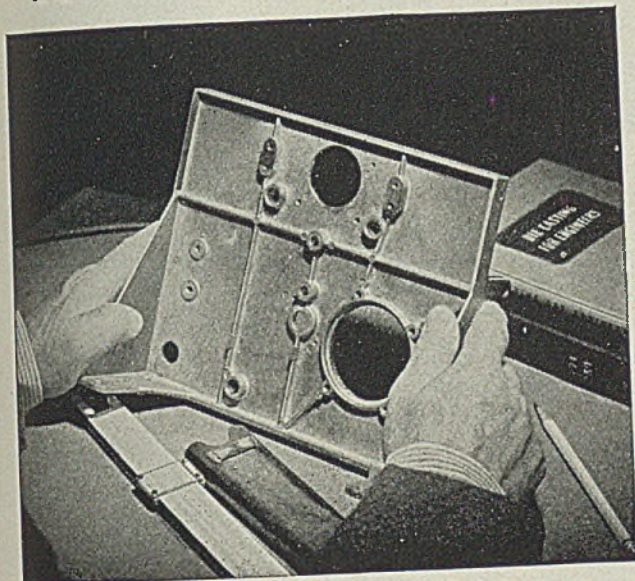
(B) Spinner jigs for medium sized or large structures.

Many structures have the majority of welds in one central plane. These assemblies may be welded in a simple fix-



FOR WAR TODAY—FOR YOUR PRODUCTS TOMORROW

DIE CAST OF ZINC ALLOY
—TO SAVE \$3.37 PER PART



A part for an aviation training device.

The zinc alloy die casting shown above — machined and ready for assembly — costs \$3.63. As originally produced by another method, of another material, it cost \$7.00. And this saving is realized despite a comparatively small number of castings required. The casting is employed in a device for training aviation students in blind flying.

Although the economic advantages of zinc alloy die castings are now well known among design engineers, the impression may exist that these economies are true only when long production runs are involved. The above application is one of many which dispel this misconception.



Can be held in any position desired.

THE



ALLOY POT



A publication issued for many years by THE NEW JERSEY ZINC COMPANY to report on trends and accomplishments in the field of die castings. Title Reg. U. S. Pat. Off.

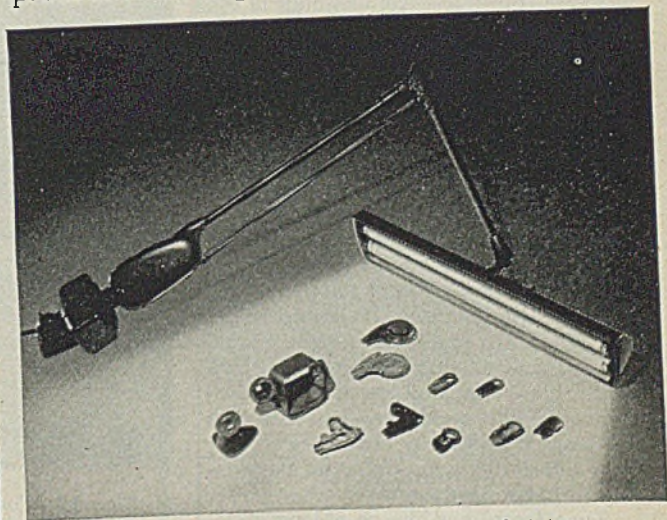
STEEL MAGAZINE EDITION

No. 15

11 DIE CASTINGS GIVE MAXIMUM ADJUSTMENT

The lamp shown below features unusual adjustability—to carry the light source in a six foot spherical field. Its die cast joints—and an ingenious balancing mechanism—permit the reflector to be held in any position desired. This lamp is serving in the 'round the clock operation of war plants and engineering offices. It also serves to emphasize the many advantages of zinc alloy die castings.

Consider the 11 zinc alloy die castings from these standpoints: *unusual shapes* in one piece to minimize the number of parts and assembly operations required; *accuracy of dimensions* for the snug fit of mating parts; *smooth surfaces as-cast* for easy finishing in rich brown enamel; *low cost production* through the elimination of machining.



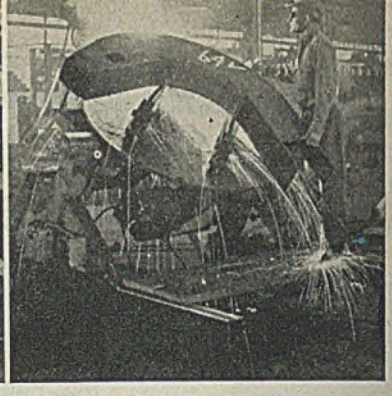
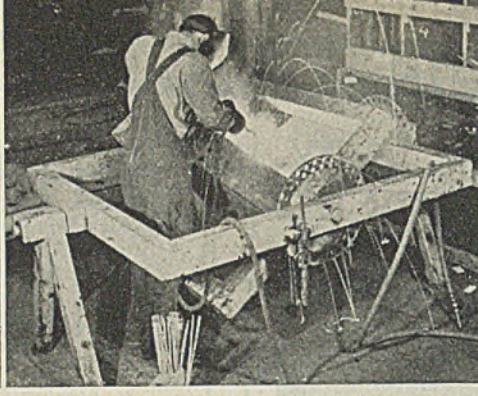
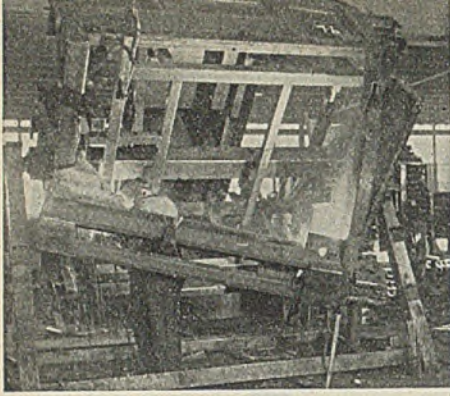
The mating castings constitute the lamp's joints.



THE NEW JERSEY ZINC COMPANY

160 FRONT ST., NEW YORK 7, N. Y.

HORSE HEAD SPECIAL (99.99 + %) ZINC



ture consisting of a central axle upon which the structure is mounted, suspended by two end frames, such as shown in Fig. 8.

Careful study of many structures will show that there is a sufficient quantity of welding in one direction, or centered around one plane, so that spinning or revolving it in only one direction will position a large enough percentage of the welding (not necessarily number of welds, or inches of welding). Thus the simplicity of a two-point suspension fixture around one axis will best solve the problem of positioning the structure for welding. There may be some welds which will not be positioned, but they can be welded in the horizontal fillet position in most cases; and thus may be less expensive than if a complicated fixture was constructed to position the entire structure for complete downhand welding.

Economical for Complex Jobs

This type of fixture very often is found to be most economical for even some large and quite complex structures. An example of such a structure is the scraper body in the spinning jig, shown in Fig. 9.

The parts which constitute this unit are set up for tack welding in fixture, which is shown in Fig. 4 (in part one, last week). After the parts are positioned and tack-welded, the whole setup fixture is picked up by an overhead crane and placed in the socket-like hubs of the spinning fixture so the whole unit becomes a spinner for the scraper body and its setup jig. This particular assembly is designed so that all but two long welds may be made in this fixture before the part is removed from the setup fixture and its spinner, Fig. 9.

Here again careful study must be made of the expense of positioning the entire unit for downhand welding compared to the extra cost of the fixture and the handling required to do such positioning. Often it is found that to spin around one plane is all that is economical, considering the ease and speed with which horizontal fillet welds may be made with modern, shielded-arc electrodes.

(C) Spinner Jigs for Universal Positioning of Large Structures.

Some large, box-like or oblong structures, such as motor bases, machine bodies, and the like, may be positioned profitably in a fixture like that in Fig. 10. This fixture is similar to a two-point suspension jig except that it has within the main axle another frame-like structure

Fig. 9 (Left)—"Spinner" type positioner accommodates even such large complex structures as this scraper body for an 8-cubic-yard capacity earthmover. Most of the welds are positioned

Fig. 10 (Center)—This "spinner" fixture has secondary axis of rotation that permits universal positioning of relatively large structures

Fig. 11 (Right)—Volume production of curved box sections and similar structures with long heavy welds may justify use of power driven universal positioner with variable speed controls

with a suspension at a right angle to the first suspension axis. This permits a part to be rotated 360 degrees in a plane cross-wise (at 90 degrees) from the original plane of suspension.

This type of fixture has several advantages and some disadvantages.

Most important advantage is that this type of fixture allows the complete turning in any desired direction of a structure without removing it from the fixture during welding. Another advantage is that it is an inexpensive unit which may be turned by hand by the operator. It may be positioned so that all of the welds around one plane may be made in one rotation of an axle; and then by turning the main axle a part of a turn, all welds around a different plane may be deposited.

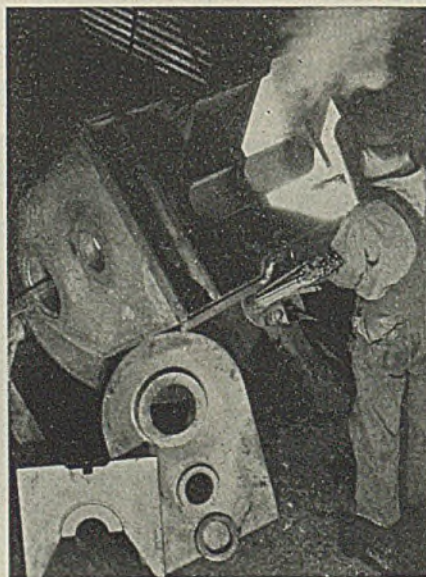


Fig. 12—Power driven universal positioners are suitable where a large number of heavy welds, some of which are curved, are found. This tractor transmission case, sub-structures for which are seen in foreground, is an excellent example

This type of fixture is readily adaptable to box sections and to many other rather complex structures with regularly spaced welds in one plane. It is not so well adapted to structures with circular welds with varying radii.

One of the disadvantages of this type of welding fixture is that the fixture itself tends to be quite large because the spinner frame which suspends the axle upon which the structure is placed must be capable of rotating the whole part and must also be suspended on the primary axes. This often causes the structure to be suspended high up off the floor, or to have impaired clearance for some welds because of the frame suspending the secondary axle.

(D) Power-driven Positioners.

Power-driven weld positioning units offer measurable advantages in welding certain types of structures, but their limitations should also be appreciated.

The use of a power-driven universal positioning fixture such as shown in Fig. 11 must be justified on a basis of a careful study of the number of structures to be produced, as well as full consideration of the particular type of structure being made. Structures with long, heavy welds and varying radii, such as shown in Fig. 11, may often best be welded in a universal positioning fixture, when there is enough such work to justify the fixture cost.

It must be borne in mind that box sections such as the one shown in Fig. 11 must be removed from the fixture after half the welds are made, turned over and then finished after being returned to the fixture. This extra handling is a costly process and on many small box sections, especially with straight sides, it usually is sufficient to justify the use of a spinner jig which can be made for a small fraction of the cost of a universal, power-driven unit.

Gear cases and similar structures involving curved welds or a large amount of welding on a relatively complex and heavy structure, such as the tractor transmission (Please turn to Page 139)



How **O.S.** *untied a knot*
in a steel mill turbine

IF THERE'S a tougher type of turbine to lubricate than a turbo blower in a steel mill, we haven't heard about it. No wonder one of the country's large steel producers couldn't get turbine oil to last longer than 6 months!

But in November, 1940, this manufacturer filled one of its turbo blowers with the then new Shell Turbo Oil. The phenomenal result is shown at right. After 18,553 hrs. of operation Shell Turbo Oil still shows no signs of deterioration. This performance is the reason Shell Turbo Oil is now used in 14 turbines of this steel company.

For further details on this and other outstanding performances of Shell Turbo Oil call in the Shell man. Or, write Shell Oil Company, Inc., Dept. "C," 50 W. 50th St., New York, N. Y., or 100 Bush St., San Francisco, Cal.

*** CERTIFIED PROOF OF THE SUPERIOR**
OXIDATION
STABILITY
OF SHELL TURBO OIL



CHARACTERISTICS		
156	Viscosity @ 100° F.	156
Clear	Appearance	Clear
.05	Neutralization No.	.05
.1	Saponification No.	.2
90	Steam Emulsion No.	90

Performance record of Shell Turbo Oil in one of the fourteen units of a large steel producer

SHELL TURBO OIL



Currently, the U. S. Navy has first call on Shell's entire production of marine turbine oil.

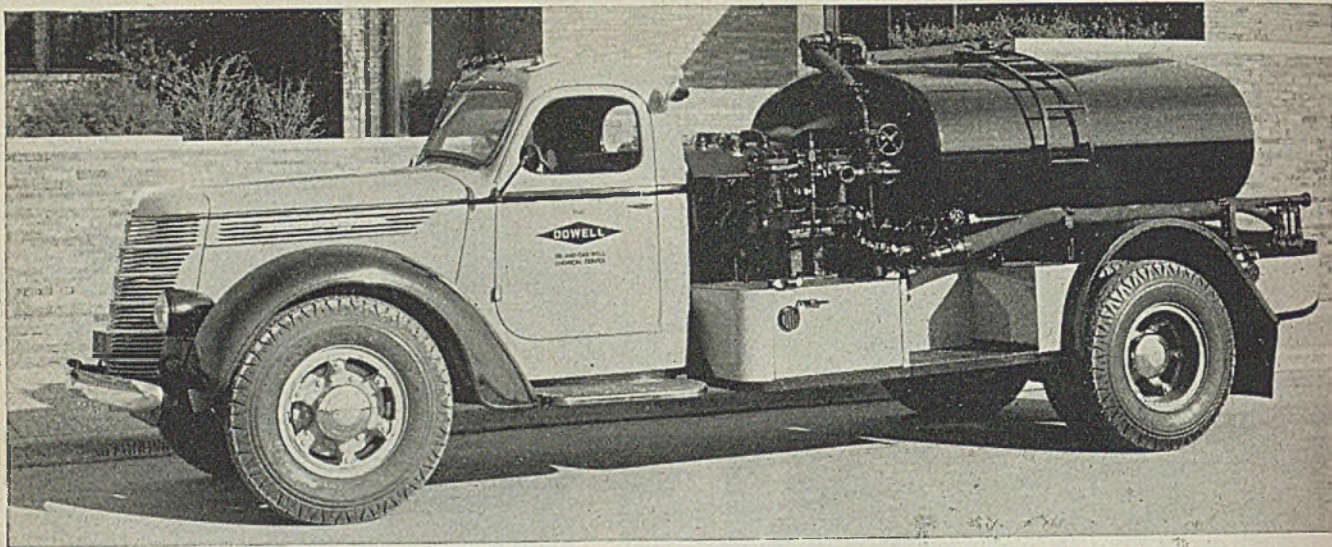


Fig. 1—Truck for transporting pumps and chemicals to the job to be serviced

Removing SCALE and SLUDGE

by

Chemical Treatment

INDUSTRIAL engineers for many years have been experimenting on the chemical removal of various types of scales from heat exchange surfaces. Many of these projects failed completely while others produced poor and uneconomic results. The negative results may have been due to numerous causes but in all probability the greater percentage of failures can be contributed to incomplete knowledge of the scale composition, lack of proper solvents, poor handling equipment, and the inability to properly inhibit the scale solvents against corrosion of the metals comprising the unit being treated.

The present emergency necessitates that all equipment operate at highest capacity and efficiency. Demands for sustained and increased output from

By L. W. LEE and E. C. HARDY
Dowell Inc.
Midland, Mich.

all types of industries precludes continuation of the practice of shutting down vital equipment for the extended periods needed to remove scale and sludge accumulation by mechanical means. Additional operating problems are encountered when attempts are made to replace or repair units that have failed due to scale deposition. These conditions throw a heavy burden on executives and engineers who must keep their plant operating continually at highest capacity.

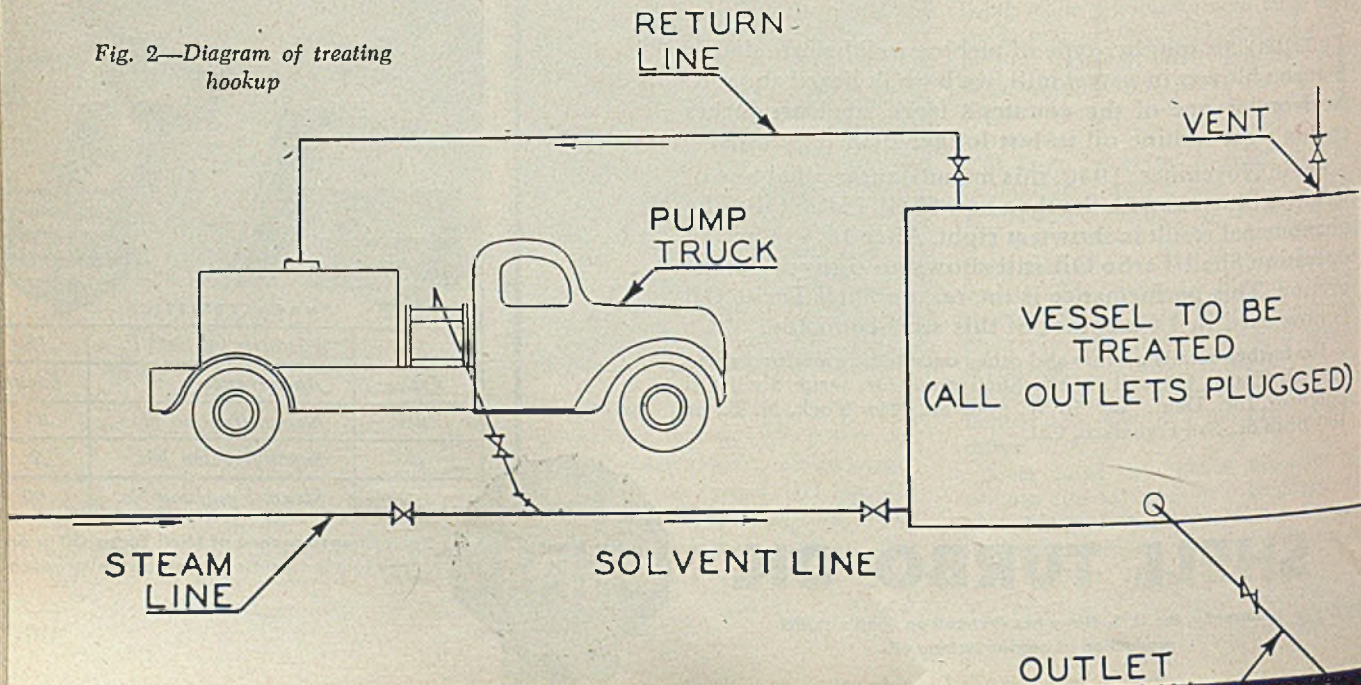
The application of chemicals for the removal of many types of industrial

scales is not new. For more than a decade the petroleum industry has successfully been using specially blended and inhibited solvents in deep, high temperature oil and gas wells to increase production. The same industry has been removing many types of scales and sludges from boiler installations, pumping equipment, fluid transmission lines, all types of refinery vessels and auxiliary equipment with profitable results.

Extensive research has resulted in the improvement of materials, techniques and equipment used in chemical cleaning of industrial equipment and has overcome many of the problems that for years retarded this effective and economical method of combating the problems arising from industrial scale accumulations. A long record of successful chemical cleaning operations has resulted in the adoption of this method by various industries including power plants, steel mills, ordnance works, oil and sugar refineries, and processing industries.

(Please turn to Page 120)

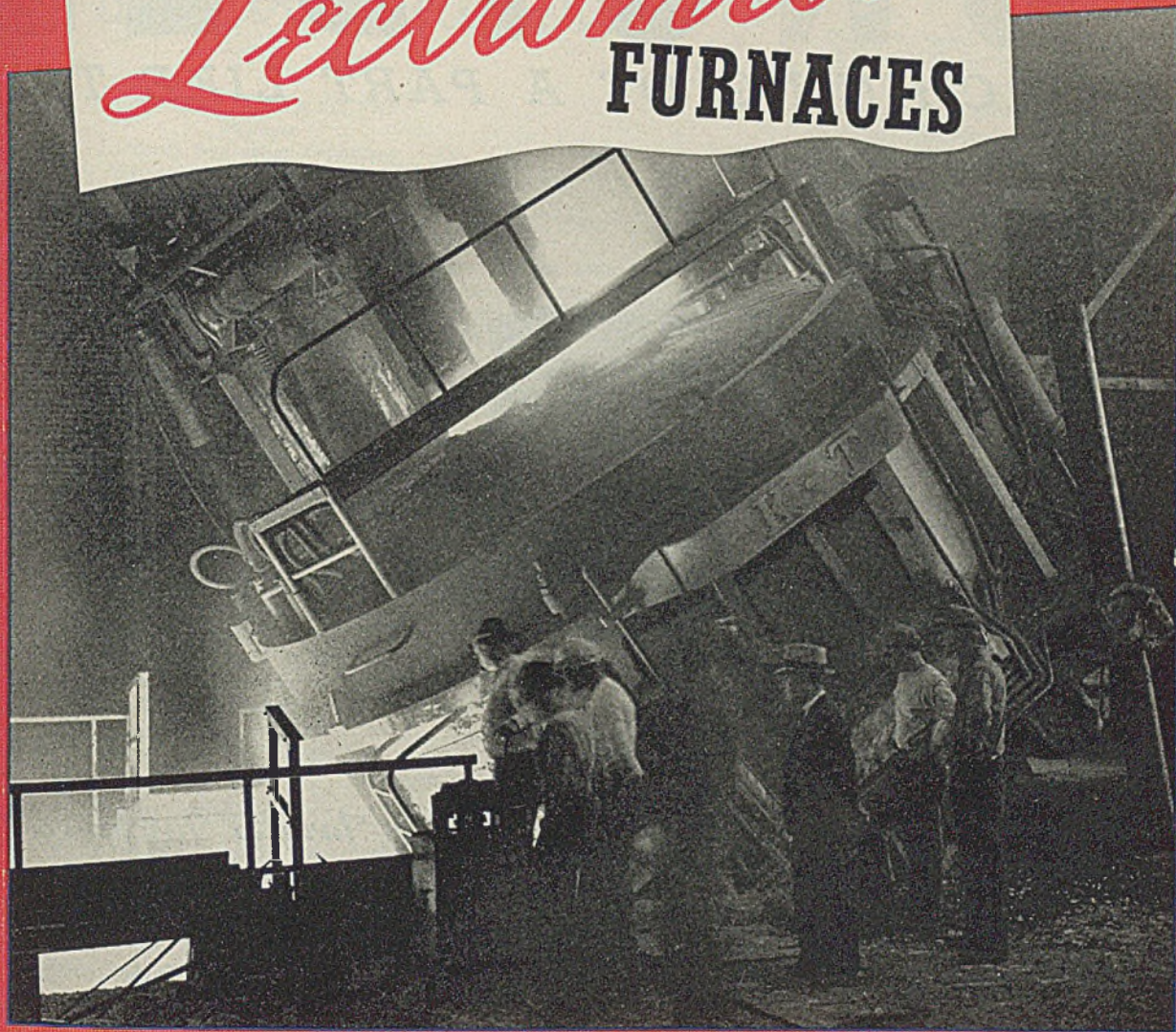
Fig. 2—Diagram of treating hookup



MOORE RAPID

Lectromelt

FURNACES



Lectromelt top charge furnaces are rapidly charged by means of a crane handled drop bottom charging bucket, thus increasing America's tonnages of carbon and alloy steels.

Lectromelt top charge furnaces, simply yet ruggedly constructed, are available in sizes from 100 tons to 250 pounds capacity. They are designed to meet today's demands for quality steel faster.

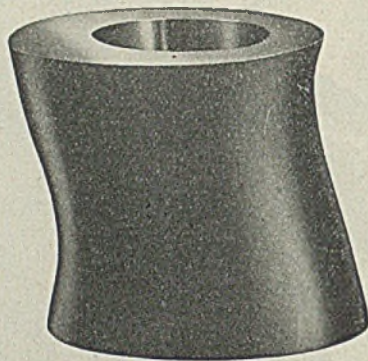
Write for complete information.



PITTSBURGH LECTROMELT FURNACE CORP.
PITTSBURGH, PENNSYLVANIA

CONSIDER

THE MACHINING OF A PART LIKE THIS!



SUPPOSE you had a contract to turn out thousands of the highly eccentric spool-like cams pictured here. Consider the work—the man-hours, the expense — of producing them unit by unit. What would your per unit cost soar to? How many rejects would you have to expect? What about the time element? What would happen to your production schedule?

The manufacturer of this cam eliminated those questions by *Turning to Turchan*, the all-hydraulic duplicator. A Turchan Follower, attached to a standard type lathe, proved to be the perfect answer to his problem. They are now produced about 20 times faster than was possible previously.

You, too, can *Turn to Turchan* and save time, money and reject worries.

Turchan Followers attach easily to any standard type lathe, planer, shaper, grinder or mill. They do not interfere with normal use of the machine and what is just as important, they fit equipment you now have in your plant. You do not have to purchase new and expensive machine tools to use a Turchan Follower.

Turchan Followers, made for one, two or three dimensional work, are tops when it comes to die sinking or any other eccentric contour job. Write today for our new illustrated booklet.

TURN TO
Turchan

FOLLOWER MACHINE CO.

Originators of Hydraulic Duplicating Attachments

8255 Livernois Avenue

Detroit 4, Michigan

ELECTRONICS

In Postwar Industry

By A. C. MONTIETH
Manager
Industry Engineering Department
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

PROPERLY APPLIED, electronics can be one of the most important factors in postwar industry.

Chief difficulty with industrial electronic applications in the early thirties was the fact that they were ahead of industrial acceptance. The limitations were not truly appreciated, resulting in headaches that slowed up acceptance of electronic applications. In the meantime, considerable work has been done not only to improve the early developed applications but to develop new ones.

Despite the lure of fascinating gadgetry, only uses that pay their own way can be expected to survive. The strength of electronic applications in industry is two-way in that they permit performance of useful tasks otherwise impossible and second, they often make possible doing a job better or cheaper than by other means.

Already Widely Accepted

Already, many widely accepted and important applications of electronics have occurred in metal fabricating and metal producing plants. Just as essential as ore from the earth are large quantities of electric current in the production of aluminum and magnesium.

This electric power must be in the form of direct current and not as alternating current in which form it is usually produced. This conversion job is being done by an increasing amount of electronic-rectifier equipment of the Ignitron type. This device has approximately half the losses of former types with outstanding improvement in reliability. The use of such equipment in the aluminum and magnesium programs saved the installation of 60,000-kilowatt power generation equipment because of improved efficiency. Some 120 million dollars' worth of electronic rectifiers have been installed in this field in the last five years, 70 million dollars of which was Westinghouse equipment.

Looking to the future, we can see there will be a trend to wide general industrial use. Instead of building 60,000-ampere rectifiers for aluminum and magnesium production, future business is expected to be in smaller units of 1000 amperes or so. This equipment is now available for a complete range of direct-current power requirements of all applications from 45 kilowatts up to installations of over 200,000

kilowatts. The equipment is designed for the practical range of factory voltages from 125 to 900 volts. The idea of factory built and assembled apparatus has been extended to this type of equipment so units now available require practically no installation work.

There is definite evidence that hesitancy in applying such rectifiers is fast disappearing. Some 14,000 kilowatts of Ignitron type rectifiers are being installed at the present time in a western steel plant to supply power for driving auxiliary machines in the mill. In another western steel mill, an Ignitron rectifier is supplying power to the main roll motors.

Similar equipment is being adapted for frequency conversion from 60 cycle to 25-cycle power, or vice versa. Studies indicate that long distance transmission of power from large hydro-electronic developments offers opportunity for direct-current transmission, another field for such equipment.

High voltage cable circuits may be the first to utilize direct-current transmission. In certain metropolitan areas, rectifier equipment is expected to be used more extensively to supply low-voltage direct-current power.

Keen Competition Foreseen

Broadly speaking, the electronic rectifier is going to be a real competitor of rotating conversion devices wherever direct current is needed in industry. The rectifier is now a very reliable device and has the advantage of no rotating parts, which minimizes maintenance.

Another important application of electronic devices is in the form of electronic communications equipment where power transmission wires do the double job of carrying information as well as electric power, thus saving the copper in a separate pair of telephone wires. What this means to the power industry can be had from the fact that on a recent job two lines equipped with carrier-current relaying devices were able to increase the capacity of these lines 50 per cent over what they would be rated if ordinary mechanical type relays were to be used. In other words, the equivalent of a third line was obtained by carrier-current relaying—a saving of six million dollars made by an investment of \$50,000.

Another electronic device known as

the electrostatic dust precipitator is looming in increasing importance, for its more compact design and exceptionally high cleaning efficiency is important in cleaning air in motor rooms of steel mills, in precision aircraft production, in gage and standard rooms and similar applications.

There is great interest in its use for taking oil mist out of the air in machine shops. This not only improves the efficiency of the lighting equipment but also cuts maintenance. One trial installation collected four gallons of oil in 24 hours from a single machine. Although this is possibly an extreme case, nevertheless it indicates the amount of oil that could have been deposited on the walls, windows and other fixtures in the shop.

Still another important application of electronic devices is in the field of control of machines and processes. These include speed and process controllers, welding timers, motor controllers and the like.

Already production of planes, ships and many mechanical devices has been increased many fold through use of electronically controlled welding. A large variety of timers for accurately controlling the welding cycle have been built and made possible only by the use of electronics. Some eight million dollars' worth of electronic welding control equipment has been marketed in the past 5 years.

Aids Machine Tool Production

Production on machine tools has been increased by the use of electronic controls for more accurately adjusting the speed of motor drives over a wide range. Flexible control of speed is now available over a 20-to-1 range with a new electronic control device. Its application is yet in its infancy and is expected to broaden greatly where wide speed ranges with good speed regulation are desired in handling materials, driving machine tools and controlling various processes.

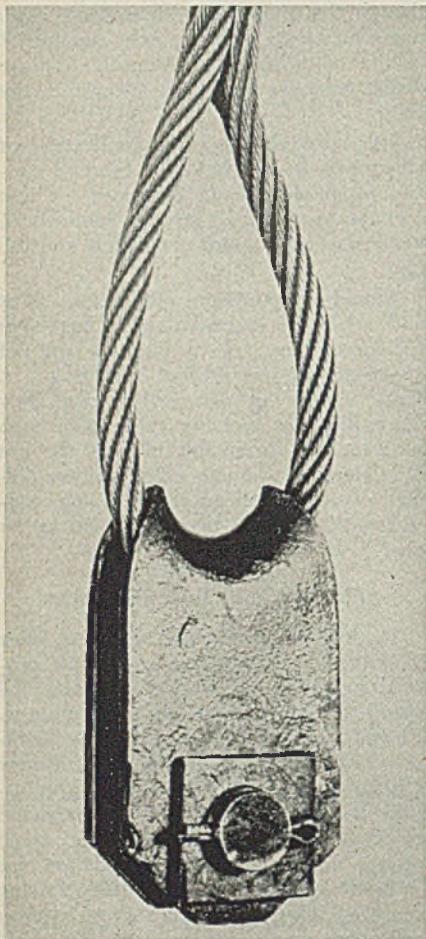
Fluorescent illumination is yet another application of electronics. Fluorescent lighting has become popular because it provides over twice the light output per unit of power than obtainable with incandescent light. Also, the higher voltages that can be used readily with this type of lighting often result in saving as much as 50 per cent of the copper in the distribution system. Some 70 million dollars' worth of business in lamps alone and 275 million dollars' worth in fixtures has been done in the past 3 years in this field.

High frequency induction heating is perhaps one of the most vital industrial applications of electronics. One of the important uses in this field is in the flowing of tin on electrolytically deposited tin plate. Electrolytic tin plate requires only about one-third of the amount of tin needed by other processing methods. Successful utilization of electrolytically deposited tin has been

(Please turn to Page 118)

Wire Rope Fitting

Gar-Bro Shimble is the name of a new wire rope fitting developed by Garlinghouse Bros., 2416 East Twenty-sixth street, Los Angeles 21, to overcome the scarcity of standard shackles and thimbles. The Shimble is adaptable to many uses such as guy anchorages, tractor hitches, crane slings, equalizers, boom topping, turnbuckles etc. Hot forged from steel plate and shaped to



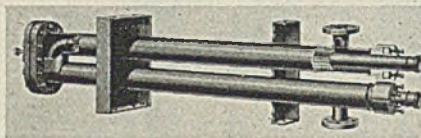
the correct rope radius, the fitting is rigid, eliminating distortion under load. For flexibility of use it also may be welded to other attachments, or the side plates may be bent to fit special conditions for safe connections.

Heat Exchangers

A non-removable rear-end assembly is one of the improvements incorporated in the new sectional heat exchanger introduced by Brown Fintube Co., Elyria, O.

The operator is required only to remove the bolts, back the cover plate off far enough to clear the plates of the adjacent "section," then swing the plate through a 180-degree arc and rebolt it in this position to gain clear, unobstructed entrance into the exchanger. This greatly simplifies installation and maintenance, makes inspection and cleaning quick and

easy. It also permits use of hairpins employing "plain longitudinal" or "cut and twisted" Fintubes having different ratios



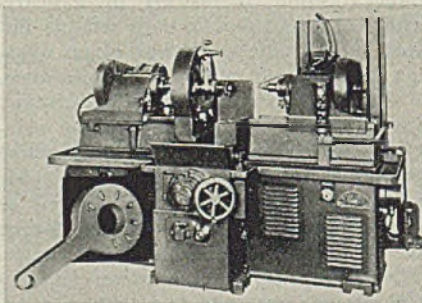
of "secondary to primary" surfaces and different heat transferring capacities to be interchanged one for another as desired.

The new "head" seal of the exchanger, consisting of a solid ring and two split collars tightened with cap screws, can be assembled with only a conventional 8-inch crescent wrench. In addition, the new exchanger features a welded one-piece "hairpin" which positively prevents any mixing of the tube-side and shell-side commodities.

Milling Machine

Featuring a production rate of about three rods per hour, the new hydraulic double-end spline milling machine recently introduced by Snyder Tool & Engineering Co., 3400 East Lafayette street, Detroit, cuts two slots at a time, one on each side of an aircraft master rod.

In operation, the part is loaded and clamped on an indexing fixture having seven indexes. The fixture assembly is mounted on an adjustable, reciprocating table. The two milling heads of the machine advance rapidly against hydraulically operated feed stop screws and feed into the work by steps which are adjustable from 0.005 to 0.060-inch per infeed stroke. During this operation the hydraulically operated, automatically reciprocating table maintains its transverse travel cycle, back and forth, establishing the length of the slots. The transverse table movement is adjustable for feed travel of 1/2 to 10 inches per minute. When the cutters reach full depth, they are allowed to dwell in the work during



several reciprocations in order to produce a clean finish in the slots. When completed, each slot measures 1 1/8 x 7/16 x 7/16-inch.

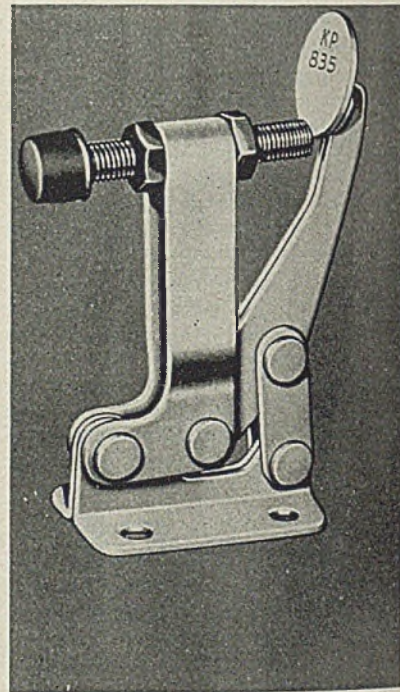
For setup and try-out purposes, the infeed can be controlled manually. Amount of infeed, per stroke, is indicated on a calibrated dial located beside the handwheel.

The base of the machine is of steel

and houses the bulk of the reciprocating and feed mechanism. Hydraulic equipment is housed separately in the rear of the machine as also is the coolant container.

Toggle Clamp

Simple clamping action of a new hand-operated horizontal toggle clamp announced by Knu-Vise Inc., Detroit, will produce a pressure of 550 pounds at the clamping point. The unit is for table-height operation. Known as model KP 835, it features a U-shaped bar which provides for the horizontal posi-



tioning of the pressure spindle and permits the clamping of varied thickness of work without disturbing the original location of the clamp.

The device measures 6 inches in length when closed. Its spindle has a Neoprene pressure pad to protect smooth finished surfaces against marks. An adjustment range of 1/4 inches horizontally within the channel of the U-bar is provided.

Pressure-Tight Fitting

A new gas and liquid-tight fitting for connecting flexible tubing of plastic or rubber to any kind of tubing or outlet was developed recently by Industrial Aircraft Mfg. Corp., 12205 Euclid avenue, Cleveland. It enables gases or liquids to flow regardless of extreme temperatures—high or low.

Tests reveal that incessant vibration cannot dislodge the tubing or break the air seal. Pressure tests show the fitting, called the Ayr-Flo-Matic, suitable for all stratosphere flying. It is equally successful in its application to commercial

Park #200 Quench Oil

A faster oil for all Quenching Operations

Another step forward in the metal industry is this No. 200 Quench Oil recently developed in the Park Research Laboratories. It is an "accelerated" quench oil that greatly enhances the hardening of steel and is not affected by carry-over from salt baths.

This Park No. 200 Quench Oil is being used by some of the largest manufacturers in the country, and has been proved most successful in their heat treating departments.

Comparison of the hardenability curves obtained in Park No. 200 Oil with those obtained

in ordinary quenching oils shows a greater surface and center hardness.

It is true that there is but a few seconds difference in cooling rates between this No. 200 Quench Oil and others but these few seconds make all the difference between partial and complete hardening or the difference between costly rejects or inspection proof work.

For complete technical data about this Park No. 200 Quench Oil or Park's No. 100 and "S" Quench Oils, phone one of our representatives listed below or write us today. No obligation, of course.

SPECIALISTS IN HEAT TREATING SINCE 1911



W. P. Woodslee, Jr.
Phone: Fairmont 0519
Cleveland, Ohio

R. Hammerstein
Phone: 45704
Lansing, Mich.

T. J. Clark
Phone: Jackson 72563
Cincinnati, Ohio

J. P. Clark, Jr.
Phone: Ogontz 0850
Philadelphia, Pa.

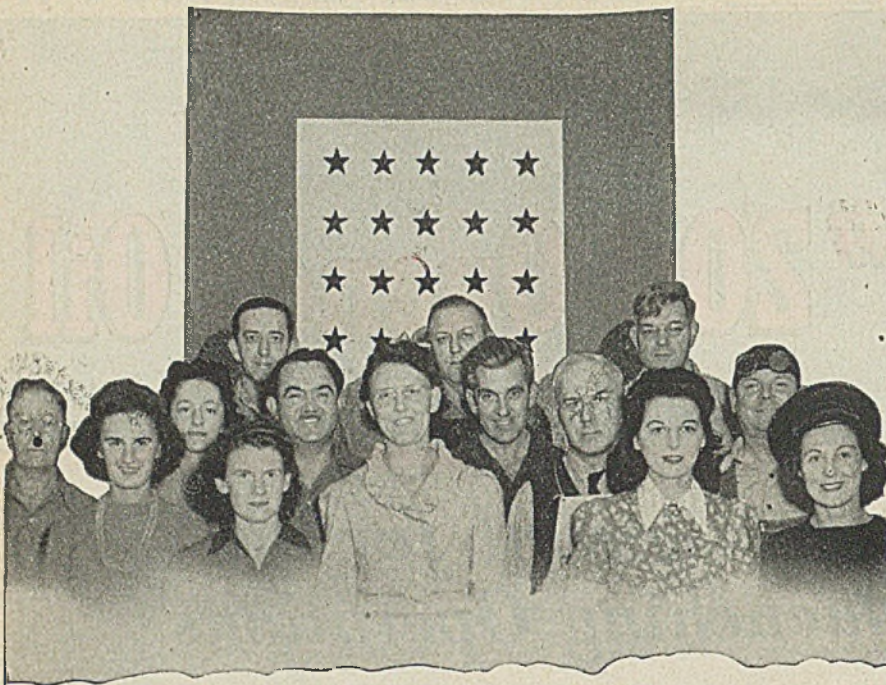
J. C. Thomson
Phone: Riverside 2350
Chicago, Ill.

R. N. Lynch
Phone: Tyler 6-8500
Detroit, Mich.

F. W. Reiber
Phone: Tyler 6-8500
Detroit, Mich.

8080 MILITARY AVE.

DETROIT, MICH.



They also Serve

WHO FIGHT THIS WAR AT HOME

★ Frankly, we at Udylite have been too busy fighting this fight for Victory in our own remote way to do much bragging about it.

Udylite's products and services are practically unknown to the man on the street, the housewife or our boys and girls in the service.

In spite of this obscurity there are few pieces of fighting equipment today where metal finishing and corrosion resistance are necessary that have not benefited by the efforts of Udylite's army of employees—the years of intensive research for better methods and the high standard of dependability for which Udylite is known.

Udylite's men and women are part of this fight. The fruits of their labors are of vital importance to the fighting equipment of every branch of the service. Their knowledge and efforts have helped give our boys better fighting tools than the enemy.

To those of our customers who have so graciously "taken second" to vital government requirements on our services we extend our sincere thanks and the hope that we may soon again render them typical Udylite service.

L. K. L. Dahl

PRESIDENT

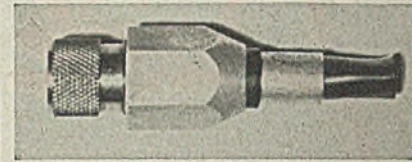
THE UDYLITE CORPORATION

1651 East Grand Blvd., Detroit, Mich.

★ OUR BOND QUOTA IS OVERSUBSCRIBED—IS YOURS? ★

uses, and can be adapted to harder surface formulation of plastics by eliminating the previous flaring method.

The fitting is being offered of metal, part metal and part plastic or entirely of plastic. It consists of a female flare fitting, a plastic drop seal ring finished with a seal seat on one end and a

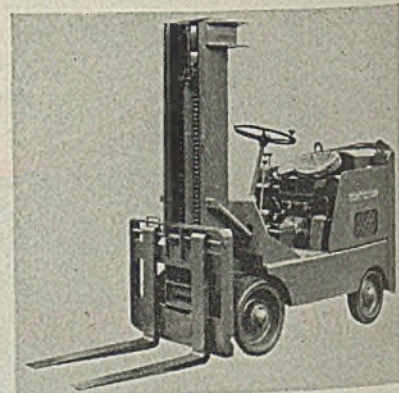


male connector applicable on the opposite end for any desired fitting.

During assembly, the fitting will not cut or rupture soft rubber tubing. In its application with harder surface formulations of plastic, a heat-controlled internal mandrel is used to bring the tubing to a softened stage. Then a rolled-back collar inside the mandrel causes the tubing to roll back over the sleeve where it is locked in place by the female fitting, making a pressure-tight union.

Industrial Truck

A wider range of capacities of lifting, moving and stacking all types of materials is featured by the new model LT-50 industrial truck introduced by Towmotor Corp., Cleveland 10. Available in a 5000-pound capacity with 144-inch lift, it replaces models LT-46 and LT-53 and rounds out the line of trucks offered in



wheelbases of 40, 44, 50, 56, 62 and 72 inches.

Maximum travel speed of new truck is 8 miles per hour; loaded lift speed is 40 feet per minute. A 50-inch wheelbase, outside turning radius of 92 inches, overall width of 42 inches, overall length (less forks) of 88 inches and center underclearance of 6 inches permit maximum maneuverability of the unit in close quarters, along narrow aisles and over steep ramps. Forks supplied are 36 inches long.

Gear Tester

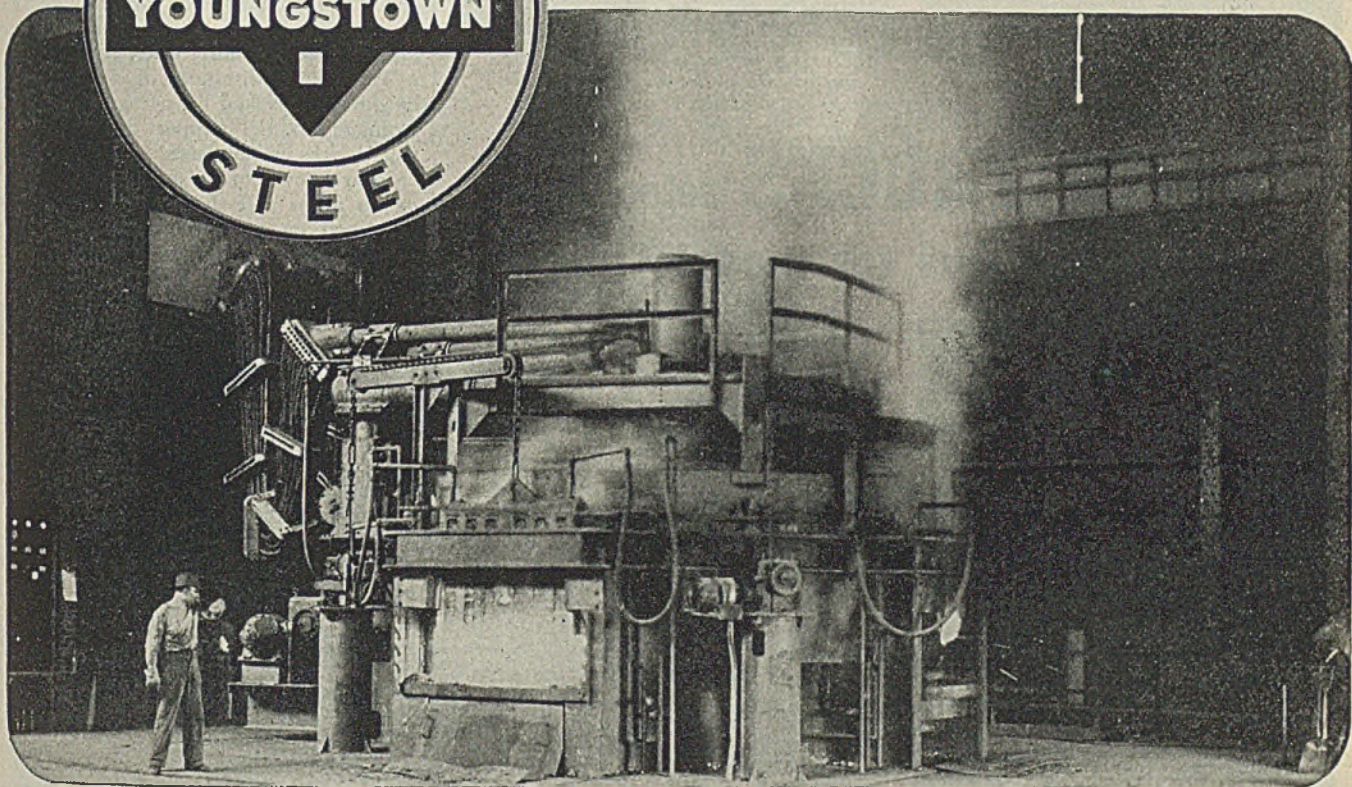
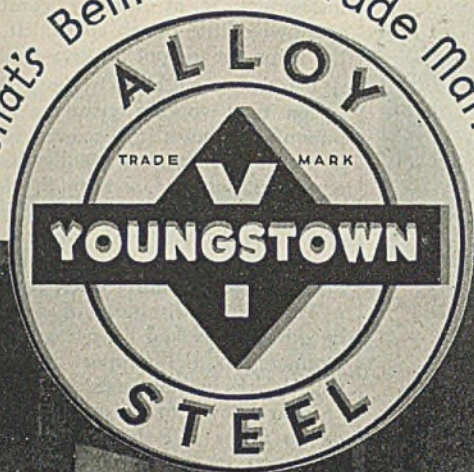
A gear tester which detects and locates faults during manufacture and also checks the accuracy of gears when com-

STEEL

Electric Steel —

BARS-RODS-SHAPES

What's Behind the Trade Mark?



AT our new electric furnace melting plant at Indiana Harbor, we are now manufacturing Electric Steel. Two Heroult furnaces, 30-ton and 60-ton in size, increase our basic capacity by 120,000 net tons of ingots. Converted into rods, rounds, squares and shapes, this means an annual increase of 75,600 net tons of rolled steel products.

This increased tonnage is readily absorbed by our present blooming, billeting and merchant mill facilities. As a result our entire producing and finishing capacity is better balanced. It permits Youngstown to further increase its contribution to the war effort and provide a better rounded service to its customers.

Pipe and Tubular
Products - Sheets -
Plates - Conduit -
Bars - Tin Plate -
Rods - Wire - Nails -
Tie Plates and
Spikes - Alloy and
Yoloy Steels

The YOUNGSTOWN

SHEET AND TUBE COMPANY, *Youngstown, Ohio*

Manufacturers of

CARBON • ALLOY AND YOLOY STEELS



Tiering cartons on pallets three high with Baker Fork Truck to conserve storage space.



Tiering on racks allows access to underneath pallet load with Baker Fork Truck.

BAKER TRUCKS selected by Sherwin-Williams for model Chicago Warehouse



Horizontal storage on racks allows removal of single drums without disturbing drums above.



Box car or truck loading is speeded by handling pallet loads with fork truck.

When Albert Kahn designed the huge new Chicago warehouse for the world's largest paint manufacturer, no effort was spared to make it the last word in practical efficiency.

Since all of the operations in a warehouse involve material handling, it is highly significant that Baker Trucks and Tractors were specified to play the major role. Drag chain conveyors supplement the trucks to provide one of the most flexible mechanical handling systems of its kind yet developed.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker-Raulang Company
2167 West 25th Street, Cleveland, Ohio

In Canada: Railway and Power Engineering Corporation, Ltd.

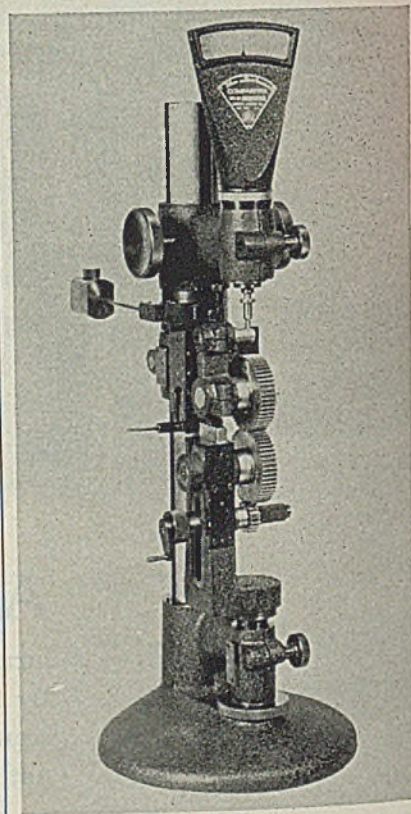
FACTS AND FIGURES

- Warehouse occupies space 288 x 624 ft.
- Has accommodations for 8 railroad cars and 20 highway trucks within building.
- Handling equipment includes fork truck and pallets, tractor and trailers, and conveyors.
- Packages comprise 50 and 30 gal. drums, 5 gal. pails and a wide variety of smaller units in cartons.
- Smaller items alone arrive from production at rates up to 60 per minute.
- More than 10,000 different items are received, sorted, stored, and shipped.

pleted is reported by George Scherr Co., 128 Lafayette street, New York 13. The instrument is of vertical construction, occupying little bench space. It enables the inspector to spot all gear faults.

The tester will check rolling action between two working gears or gear and pinion. It shows up eccentricity, if any is present and makes readily discernible any variation in gear tooth thickness. The instrument also may be employed to check gear train assembly, quickly giving indication of runout which may have been caused by faulty assembly of gears.

The center distances of a gear may be quickly checked by setting up the instrument to the proper distance with gage blocks or standards. A master gear or gear known to be accurate is placed on an arbor and the gear to be tested is placed on another arbor directly in contact with the master. The master



gear bracket is provided with a counter-balance which can be adjusted so that the pressure between master and gear to be tested is always uniform.

Beneath the gear under inspection appears a handle with pinion, which the operator uses to rotate the gears. Any divergence or error is quickly shown in the comparator head which reads to 0.001, 0.0005, 0.0025 or 0.0001-inch as desired.

Trolley Feeder Switch

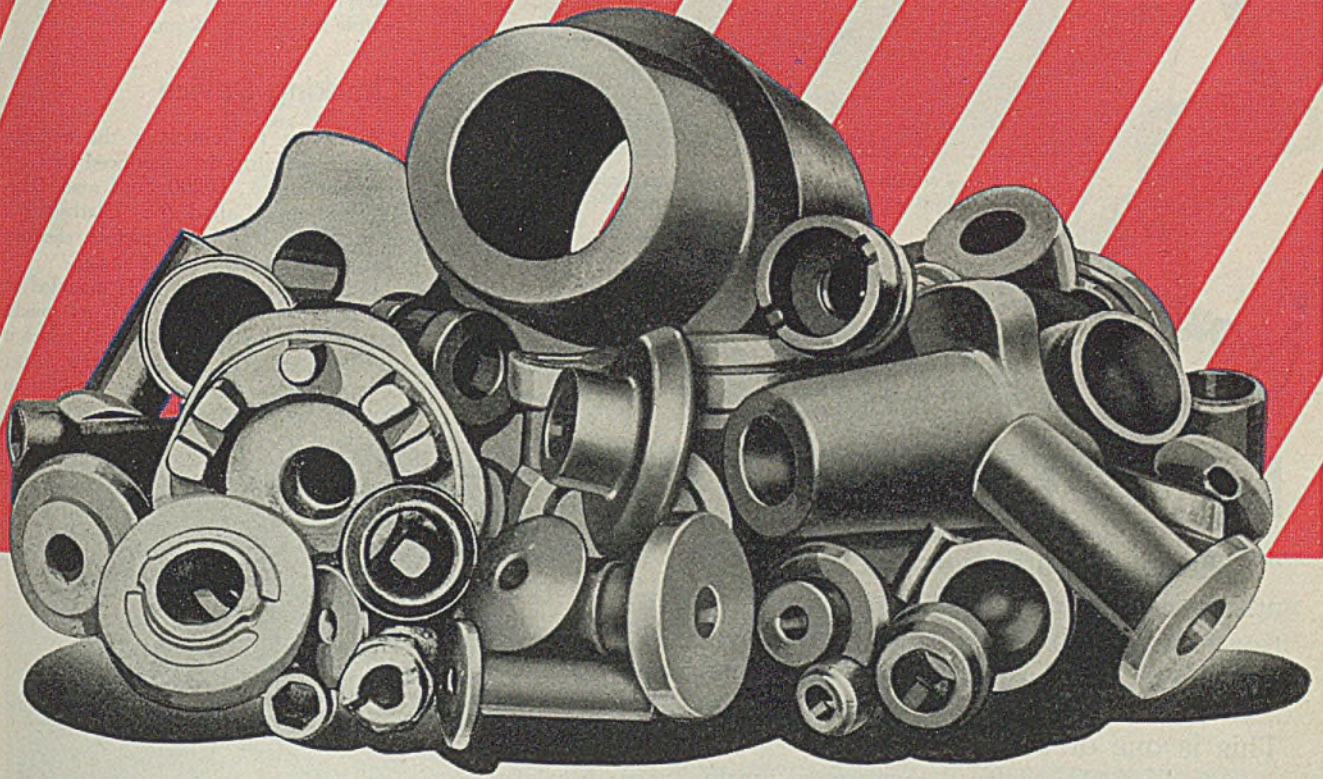
Knife edge approach to insure a smooth underrun is the feature of the new trolley feeder-switch equipped with double insulated suspensions and recently placed on the market by Mosebach Electric & Supply Co., 1170 Arlington avenue, Pittsburgh 3. It is a combina-

Baker INDUSTRIAL TRUCKS

STEEL

"Stanco"

UPSET FORGINGS (TUBES AND SOLIDS)



IN the manufacture of Upset Forgings for peacetime products, such things as dependability, quality and speedy delivery are important factors. In the manufacture of these parts for war products, dependability, quality and speed are an absolute "must."

Years of experience in the making of forgings for commercial and industrial uses has made the trade name "Stanco" synonymous with reliability on each of these counts. And that reputation has been enhanced since the start of the war through the speedy delivery of thousands of dependable, quality-built shell forgings for Army and Navy use.

We have the personnel, equipment and skill to make Upset Forgings in tubes and solids of all standard and many specialized varieties. Right now, we are in a position to fulfill additional contracts on "Stanco" forgings.

If you have a war assignment that is bottle-

necked because of a slow supply of forgings, write, wire or telephone your problem to us and let us see if we can help.

BUY MORE WAR BONDS!

THE STANDARD TUBE CO.

Detroit  Michigan

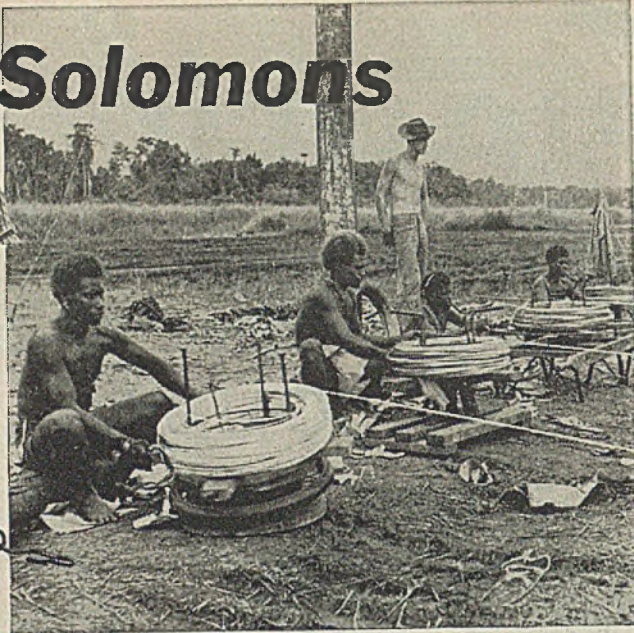
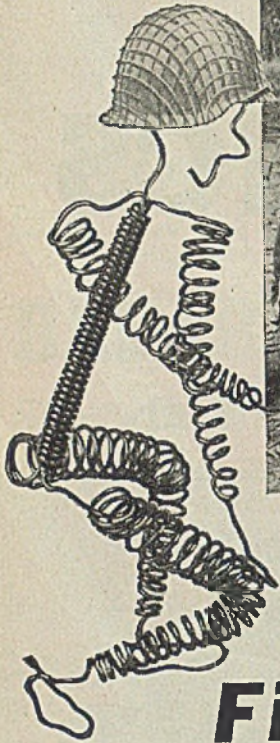
Welded Tubing

Steel Forgings

★ Complete Tube Stocks Maintained by ★

STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N. Y.
LAPHAM-HICKEY COMPANY, 3333 West 47th Place, Chicago, Ill.
UNION HARDWARE & METAL CO., 411 East First Street, Los Angeles, Calif.

In the Solomons



A crew of natives tending the reels as wire is played out for new telephone lines on the Solomons.

Press
Association
Photo

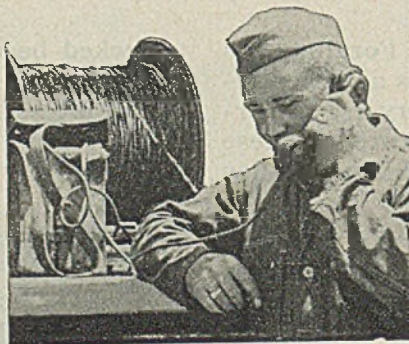
and on All Fighting Fronts

KEYSTONE *Wire*

"Fighting units are no farther apart than the communications that reach them", is a by-word of the Army. And *wire* plays a vital role in linking our fighting units together.

This is one of the many uses of wire mill products at the front. You'll find products made from Keystone wire fulfilling many other essential needs of our fighting forces.

That's why Keystone production for civilian uses must be restricted until victory. But we are looking forward to again supplying *your* civilian needs "when our boys come marching home."



Field communications . . . one of the thousands of war uses for wire mill products.

KEYSTONE STEEL & WIRE CO., Peoria, Illinois

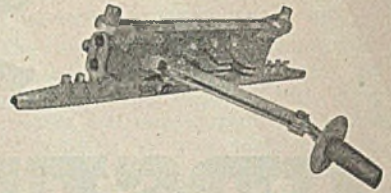
Special Analysis Wire
for All Industrial
Uses



SCRAP is still critically needed . . . get every pound to the steel mills.

tion single or double feeder type.

The switch employs two $\frac{1}{4}$ x $\frac{1}{2}$ -inch copper blades hinged on an insulated

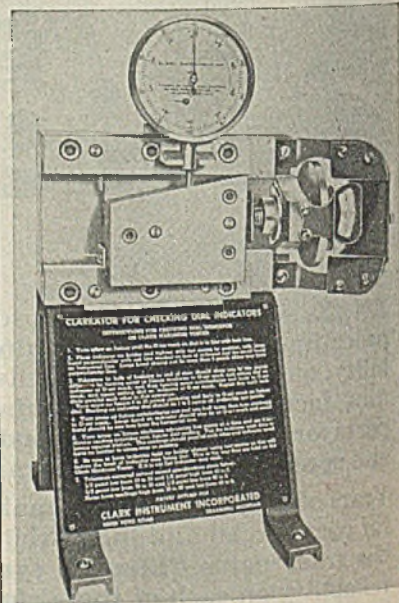


wood block and is equipped with a single or double feeder-clamp connection which is easily installed and removed. For safe manipulation and application, the switch includes a soft rubber handle with a fiber guard. Dowel holes in the blades facilitate locking the switch in open position.

Checking Device

A device for checking the accuracy of dial indicators is announced by Clark Instrument Inc., 10200 Ford road, Dearborn, Mich. Called the "Clarkator," it employs the sine bar principle, checking against the tangent of the angle.

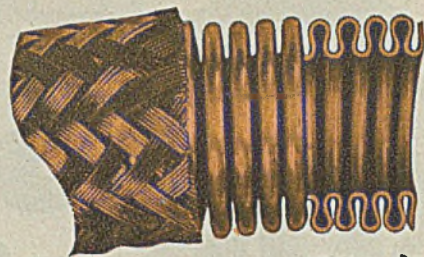
Indicator to be tested is mounted on the top of the device with its spindle resting on a lapped angle block which is advanced or retracted by a screw. After clamping the indicator in position so that its zero reading coincides with the dial face on the Clarkator, the screw is revolved in either direction to check other indicator readings. Reading of the checking dial is by means of a mir-



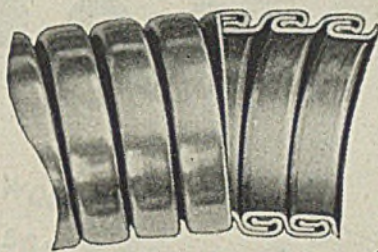
ror, enabling it to be seen together with the indicator.

The unit is suitable for the inspection both of the standard direct-reading indicator and the reversed reading indicator used on rockwell hardness testers, each revolution of the screw equalling 0.020-inch, and each point on the dial 0.0002-inch. The back angle provides a direct method of checking hardness tester indicators, each revolution of the screw equalling 0.01962-inch.

Dependable Action BECAUSE IT'S Flexible



American Seamless Flexible Metal Tubing—Bronze.

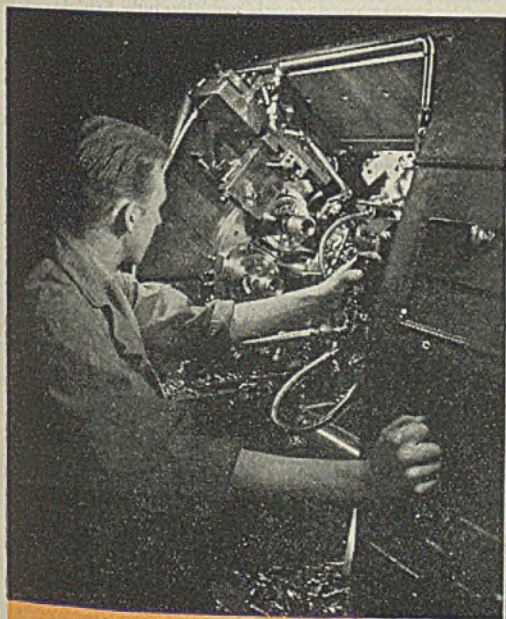


American Interlocked Flexible Metal Hose—Steel.

For conveying air, water, oil, steam or fuel, where flexibility is required, there is *nothing* more dependable than flexible metal hose and tubing. Illustrated here are 2 typical installations of American Seamless—selected from a seemingly endless range of applications.

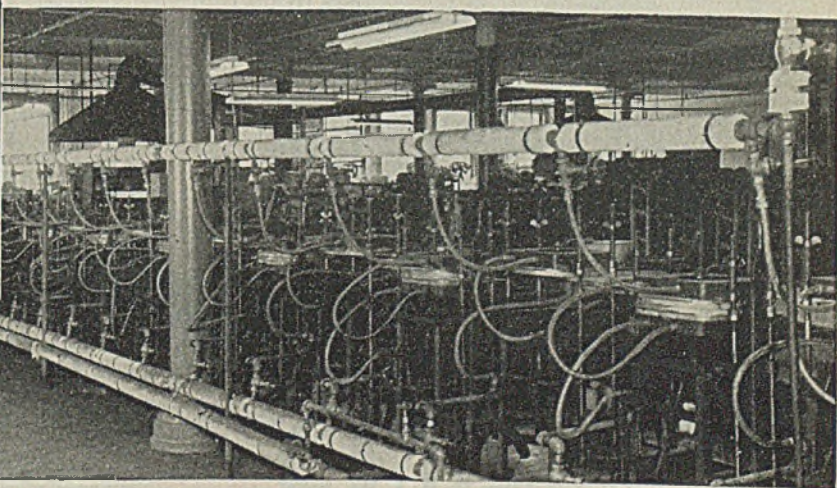
Using almost any workable metal, we can build a flexible hose or tubing from a simple spout to a high pressure seamless hydraulic line. Whether you need a flexible connector for misaligned or moving parts, for isolating vibration, or for conveying fluids, you'll likely find we have a flexible metal hose or tubing to do the job dependably and economically.

43206



Above: American Oil Feed and Coolant Tubing lubricates the work on machine tools.

Right: Live steam being fed through American Seamless to hat forming presses.



American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ontario

Electronics

(Concluded from Page 109)

made possible by remelting the tin coating on the steel to close up the pores which exist as the material comes from the plating line.

Heating the electrolytically tinned surface by electric induction using high frequency current generated by electronic tubes overcame the difficulties involved in other methods of heat application and has been generally adopted by the steel industry in the last 6 to 9 months. As the tin-coated steel strip passes continuously through the induction heating equipment, the tin melts and flows slightly so that it forms a smooth layer 1/30,000 of an inch thick. Designs have been completed for tin flow speeds up to 1300 feet per minute for 30-inch sheets—the equivalent of plating both sides of a sheet the size of a football field in 12 minutes.

High frequency heating units for this application now on order or installed by Westinghouse total 48, with individual groups as large as 1200 kilowatts. Three 1200-kilowatt units are being installed in one plant. This total is more than two and a half times the amount of power produced by all the commercial broadcasting stations in the United States today. Incidentally, the first trial installation of induction heating for flowing tin was made with an obsolete broadcasting set and is still in regular operation.

One development nearing completion in the Westinghouse Research Laboratories is called the "mass spectrometer". This is an electronic centrifuge which sorts out different gases on the basis of their molecular masses just as a cream separator does for a liquid.

Other familiar applications of electronics include industrial X-ray, electric eye safety devices for protection of machine operators, temperature controls, cathode-ray oscillograph equipment for various types of testing machines, automatic precision balancing machines, and others.

Development May Outmode Rubber Inner Tubes

A new material that promises to outmode rubber in automobile inner tubes and numerous other products as completely as the automobile itself outmoded the horse and buggy was recently announced by Glenn L. Martin Co., Baltimore. The new elasto-plastic, known as Marvinol, has demonstrated its superiority to both natural and synthetic rubber for such varied applications as inner tubes, elastic gloves for home, hospital and laboratory use.

Marvinol is not a synthetic rubber, according to the company, but a completely new material. Inner tubes, for example, can be fabricated from Marvinol more easily than from rubber, and because of the absolute impermeability of the elasto-plastic, the seepage of air through the sidewall of the tube is entirely eliminated.

Yours for the asking

Let's not worry about thumb prints - this belongs in your shop

HKP
PORTER CUTTERS

Page 46-47 How to Prevent Breakage of Taps and Drills

Page 42-43 Hints on Hand Filing

Page 4-5 How to Choose the Right Bolt Clipper

Page 6-7 Correct Cutting Technique

Page 44 How to Use the Ball Pein Hammer

Page 48 Cutting Angles on High Speed Bits

All this and a lot more practical shop information in this FREE book

JUST SEND A POSTCARD - Ask For PORTER'S TOOL MANUAL

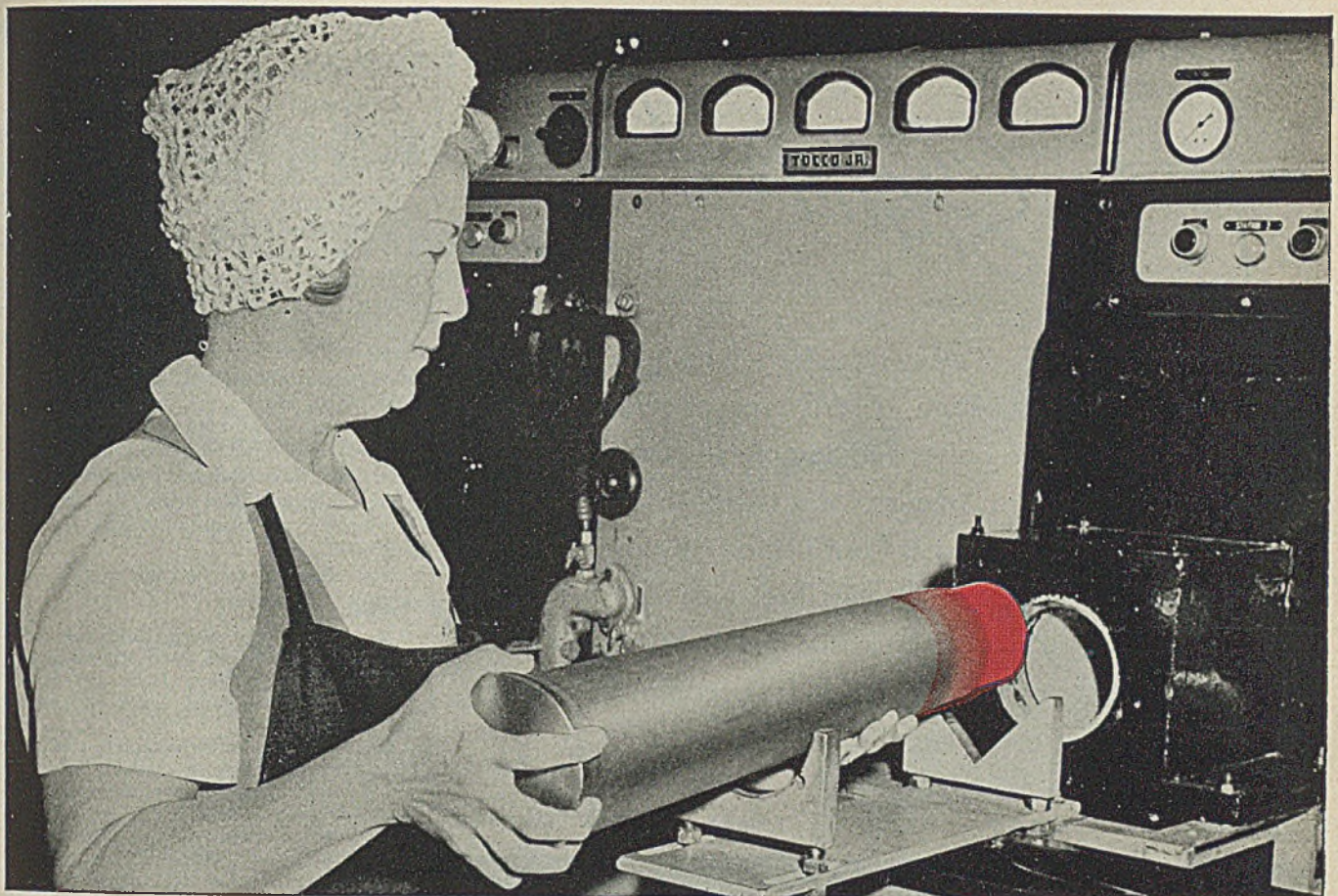


HKP

PORTER CUTTERS

BOLT CLIPPERS — AUTOBODY REPAIR TOOLS — PRUNERS

H.K. PORTER, INC., 401 Ashland St., Everett 49, Mass.



Courtesy Norris Stamping and Manufacturing Co., Los Angeles, Calif.

SOFTENING A HARD PRODUCTION PROBLEM

SEVERAL of the toughest problems in converting cartridge cases from brass to steel have been solved by TOCCO. For example:

Forming the mouth of 3" case by cold-drawing causes work-hardening. This area should be ductile, to permit crimping to the projectile and to assure a gas-tight seal in the gun on firing. On the other hand, the side wall up to the mouth should be hard and "springy" to withstand the high firing pressures and still

permit easy extraction of the case after firing. The hard-to-soft transition zone should be accurate.

The answer was found by annealing the cartridge case mouth. TOCCO Induction Heating applies a uniform amount of heat for an exact length of time to a definite, prescribed area of the case . . . softens the mouth without affecting the side wall . . . assures accurate results on every single piece at a high production rate.

Material treated is SAE 1030 spherodized steel. Heated to 1300° F. Heating time per shell 4 seconds. Hardness before, 98 R.B.; after, 70 R.B. Output per machine (2 stations), 1000 cases per hour. TOCCO machine is clean and compact; doesn't require skilled labor.

Find out how TOCCO can help solve *your* annealing problems . . . your hardening, brazing and heating problems, too . . . present and post-war.

THE OHIO CRANKSHAFT COMPANY, *Cleveland, Ohio*



TOCCO

HARDENING..BRAZING
ANNEALING..HEATING

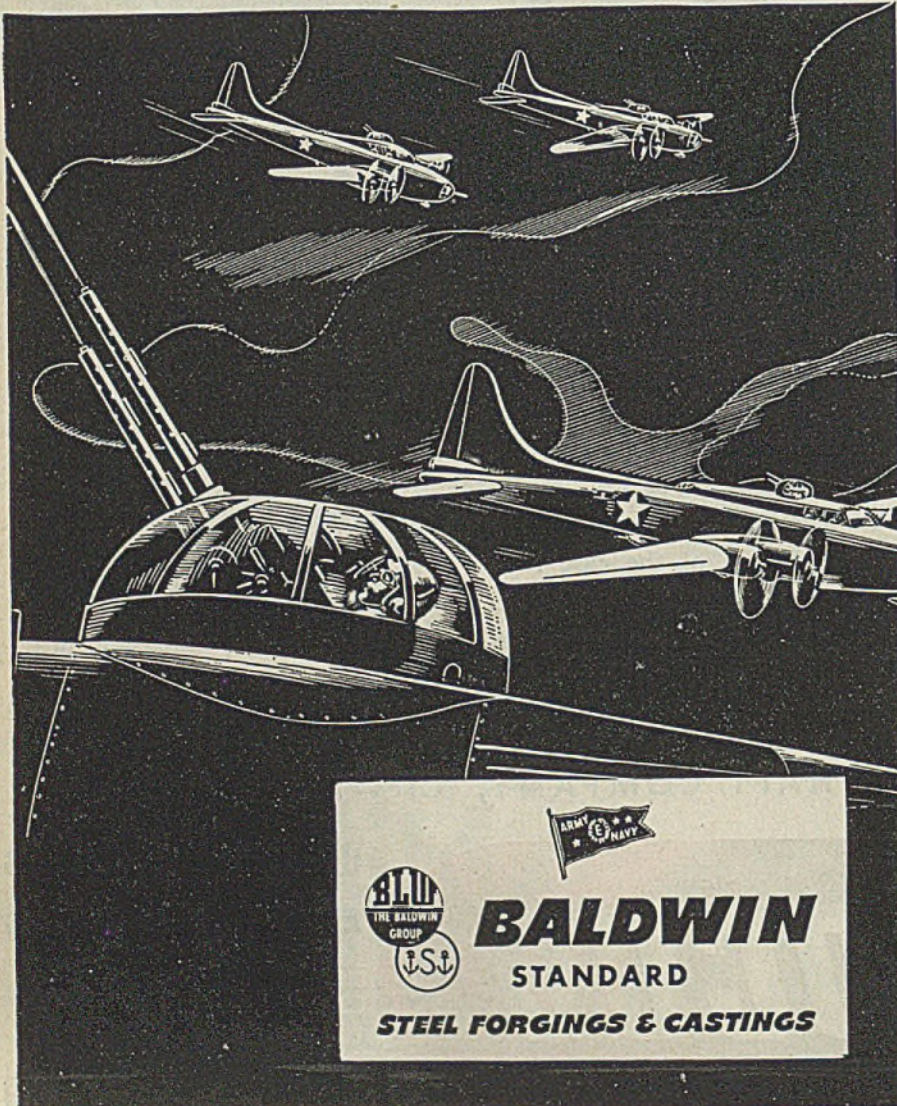


Ring forgings for turrets

by Standard

Weldless ring forgings of many types have long been a specialty at Standard. The adaptation of this type of forging to the latest needs of war is only one example of the use of steel forgings by Standard in America's war effort. In peace as well as war, throughout 148 years of our Nation's history, Standard has supplied quality forgings as specified. Not only our armed forces but America's great railroads and industries as well, can attest their worth. The Baldwin Locomotive Works, Standard Steel Works Division, Burnham, Pa., U. S. A.

FORGINGS • CASTINGS • WELDLESS RINGS • STEEL WHEELS



Removing Scale-Sludge

(Continued from Page 106)

Equipment at steel mills that can be descaled or chemically cleaned includes water-cooled skewbacks and doors at open hearths; blast furnace cooling plates, cooling jackets, piping and gas washers; ammonium scrubbing towers, condensers, and oil coolers at by-product coke plants; rolling mill bearings; and, boilers, condensers, water-cooled gas burners, water strainers, water lines, heat exchangers, economizers, superheaters, evaporators, air-conditioning equipment, etc.

The main advantage of chemical scale removal is in time and labor economies. An industrial chemical treatment requires relatively few hours to effectively dissolve or disintegrate and remove the scale.

The chemical method offers other important advantages:

1. Eliminates dismantling the unit because the solvents used can circulate through existing connections and penetrate wherever steam, water and other fluids flow.
2. Results in more complete cleaning of equipment because cleaning solvents reach scale deposits not accessible by other cleaning methods.
3. Replacements of large numbers of special gaskets unnecessary.
4. Downtime for cleaning reduced to a minimum.
5. Maintenance materially decreased.

The key to successful chemical scale removal is found in a correct analysis of the scale, determination of the volume of the scale to be removed and types of metals used in the construction of the unit to be treated. The scale analysis may be made by X-ray, X-ray and spectroscopic, or chemical methods. As time is always an important item the analyses are made by the quickest method, usually the X-ray. Chemical studies are always made when the X-ray or spectrograph indicates the necessity for using special catalysts, special addition agents and elevated solvent temperatures to secure optimum scale removal results.

Some scales may be only slightly soluble in conventional acid base solvents and, therefore, appear unfit for successful chemical treatment. It often is learned, however, that after careful laboratory tests have been made with different solvent combinations, concentrations and temperatures, the scale can be dissolved or disintegrated by proper chemical formulae and treating temperatures. It frequently happens that many scales vary in composition thus making it necessary to vary the solvent formula as the treatment of the scaled-over vessel progresses in order to secure optimum results in the shortest possible time.

A pretreatment examination of the equipment to be descaled always is made to determine the quantity of scale to be removed. The volume of the vessel should be known so that sufficient solvent is available to fill it, thus assuring that all the scaled-over parts will be

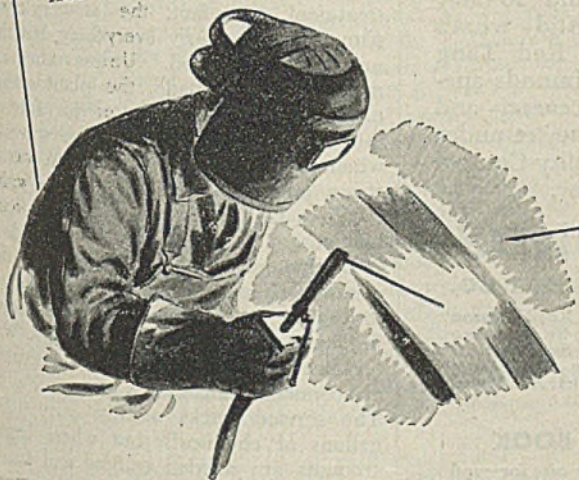
MUREX ELECTRODES

FOR CARBON-MOLY

and other high strength steels

Murex Type M, Carbon-Moly.50 and Molex electrodes are designed especially for welding carbon-molybdenum steel castings and plate and high pressure-high temperature piping. They can, of course, be used for welding various other high-strength steels having tensile strengths of 70,000 lbs. per square inch and more in which pick-up of elements from the parent metal provides added weld strength.

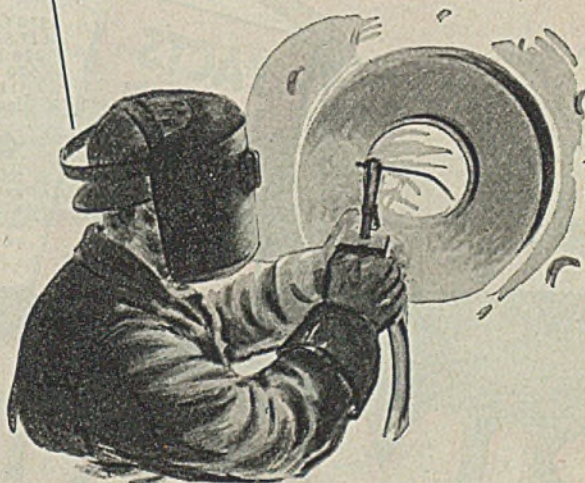
"When I've got a job of butt or fillet welding high strength steels, I use Murex Type M electrodes every time to be sure of top results. I've found that I can rely on these downhand electrodes for X-ray sound deposits, for smooth, clean welds with excellent properties. And when I'm working with silicon-killed steels, I know I can count on them to give me a weld free from reaction pits."



"If you want an all-position electrode for use with direct current on reverse polarity, you can't beat Murex Molex electrodes. I've found that you get little spatter with this electrode even when used at high amperages. And it has plenty of tensile strength and ductility."



"For working in tight, awkward places, I'll take Murex Carbon-Moly.50 electrodes. That spiral winding of asbestos yarn anchors the coating to the core wire and makes it possible for me to bend the electrodes so that I can get at any job. And, of course, they have the same swell advantages as the Murex Type M rod."



HERE'S SOMETHING TO MAKE YOUR JOB EASIER:

A large wall chart listing all the important facts to help you quickly select the right Murex electrode—physical characteristics, suggested applications, advantages. And in addition, six suggestions are given to improve welding practice. Copies are obtainable from Metal & Thermit or your own Murex distributor. Get your free copy today.

METAL & THERMIT CORPORATION



Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.



120 BROADWAY, NEW YORK 5
ALBANY · CHICAGO · PITTSBURGH
SO. SAN FRANCISCO · TORONTO

SIMONDS RED TANG

the **FILE** that's
bought for
Longer Life
Cleaner Cutting
and **Controlled**
Quality

War workers find that Simonds Red Tang Files are easier to use . . . cut truer and faster, with less elbow-grease and fatigue . . . and require far fewer trips to the tool crib for replacements. That's because the teeth are shaped like those on a Simonds Metal Saw . . . they cut instead of scrape, and so stay sharp far longer. And what's more, *all* Simonds Red Tang Files are made to Simonds special standards of accuracy and quality . . . because they're under Simonds 100% Quality-Control every step of the way.

SIMONDS SAW AND STEEL CO.

1350 Columbia Road, Boston
127 So. Green St., Chicago
228 First St., San Francisco
520 First Ave., So., Seattle
311 S. W. First Ave., Portland, Ore.

FACTS
For Mechanics



SIMONDS

← FREE BOOK

tells how to care for—and get the most use out of—files, hacksaws, and bandsaws. How many copies do you want? *Write today.*

in intimate contact with the chemicals. An important factor in the success of a chemical treatment is the inhibitor used to protect from corrosion the metals of the equipment being treated. Many inhibitors are available that will provide adequate protection at atmospheric temperatures but the effectiveness of many of these decrease rapidly with a rise in temperature. In addition some inhibitors provide better protection on some metals than others. These facts make it necessary to know in advance of the treatment what types of metals are in the unit to be treated, and the required solvent temperatures so that the inhibitor combination capable of providing maximum protection be made available. Another inhibiting factor is involved in the treatment of equipment used in water distribution or the manufacture and distribution of food. Inhibitors have to be nontoxic and leave no bad obnoxious odors or taste. Such inhibitors are available and are always used by the service company that makes a business of scale removal work.

Provides Suitable Materials

Application of chemicals to the scaled-over unit usually is done by a competent service company who furnishes, in addition to all the chemicals, the necessary equipment to transport them to the plant, suitable pumps, solvent heaters, mixing devices and tanks. The service company with adequate experience in this type of endeavor will have also competent engineers who will supervise and conduct all phases of the treatment. In fact, the service company supplies nearly everything but the unit to be descaled. Unless other arrangements are made, the plant owner or operator provides water for solvent mixing, steam for heating the solvents when necessary. Connections to water, steam and drain lines should be within 15 to 20 feet of the location or connections on the vessel to be descaled.

Equipment used to transport the cleaning chemicals and pumps is shown in Fig. 1. A schematic diagram showing how the solvent tanks, pumps, water lines, drains and other equipment are connected together is given in Fig. 2. The service trucks usually carry 1000 gallons of chemicals, but where larger amounts are needed trailers and transport units supplement the equipment illustrated. The pumping unit is of large volume capable of handling more than 200 gallons per minute. Power to operate the pump is furnished by a power take-off from the truck motor.

Among the many factors that contribute to the success of chemical cleaning of industrial equipment are, (1) experience, (2) well-trained engineers, (3) adequate laboratory control, (4) proper chemicals including inhibitors and addition agents, (5) specially designed treating equipment.

Industrial chemical treatment for the removal of scales and sludges should be entrusted only to those with a full appreciation and knowledge of the factors involved.

SIMONDS

Famous Family
of Metal-Cutting Tools

★ Bought Your War Bonds This Week? ★

STEEL

How the Navy Speeds Material Handling with the

FORK TRUCK—"TRACKLESS TRAIN" SYSTEM

Reproduced through the courtesy
of Exide Ironclad Topics.

Materials-Handling Methods Used by the U. S. Navy

Sea warfare is a struggle for strategically located bases scattered over the globe. An important ally of the enemy in this struggle is the combination of our lack of shipping space and the vast distances between our bases and continental United States. To reach U. S. naval outposts requires enormous amounts of time.

Time was never more golden than now. In this naval warfare every single minute saved in getting supplies up to the battle areas means that fewer lives will be lost in combat. Consequently, the working time of every person handling Navy supplies must be made as productive as human ingenuity can make it. As in other fields of war activity, the supply of manpower available for materials handling is not inexhaustible. Therefore, in order to make the most of every available man-hour of time, the Bureau of Supplies and Accounts of the Navy Department fully utilizes every kind of modern materials-handling machines and the most efficient methods of operating them.

In an effort to speed the movement of supplies all along the line, the Navy Bureau of Supplies and Accounts prefers contractors to pack materials in unit loads on pallets, wherever practical, so they can be handled in Navy depots with fork trucks. The handling of palletized unit loads with fork trucks eliminates many manual labor operations, which results in a decided saving of time when compared with the "bucket brigade" method of handling now so prevalent—a method older than Egypt's pyramids. Fewer handling operations also reduce the number of chances for the occurrence of damage to materials.

Through a standardized use of palletized materials, it is possible to load or unload railroad cars and highway vehicles by the use of fork trucks more quickly and with fewer men, and fewer accidents. This faster turnover of freight cars and trucks is a very important factor in the full utilization of all available transportation facilities.

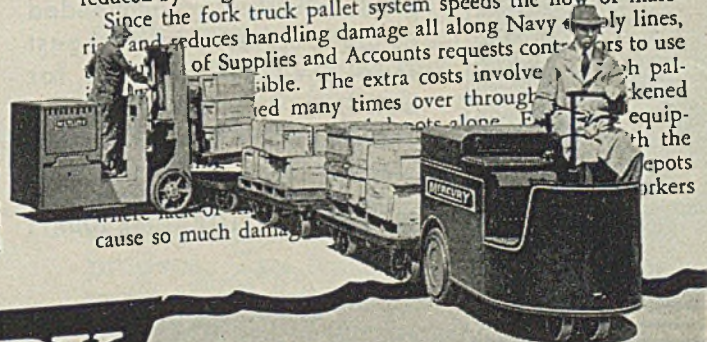
When hauling distances exceed 300 feet, fork trucks are most effectively used to load trailers, which are then made up into trains and hauled by industrial tractors whatever distance may be necessary.

At Navy storage and distributing areas palletized materials permits quicker storage and stacking of larger volumes of materials without additional manpower. Materials properly packed on pallets can be stacked with a fork truck to a height of 16 to 20 feet, wherever headroom permits. In many Navy depots and warehouses this high tiering of materials has more than doubled storage capacity. The fork trucks used by the Navy to handle the tremendous, ever-growing volume of materials are essentially elevating (lifting) machines. However, it is practical to use them for hauling if distances do not exceed 300 feet. When hauling distances exceed 300 feet, fork trucks are most effectively used to load trailers, which are then made up into trains and hauled by industrial tractors whatever distance may be necessary. The fork truck, tractor trailer system enables better all-around operation, since neither men, fork trucks nor tractors stand idle during the loading or unloading of trailers.

At the present time an important result obtained from handling palletized unit loads is the increased speed with which barges, lighters and ships can be loaded with fork trucks operating on the barges or in the hold of the ship. The amount of port time thus saved in a year is often enough to allow each ship to make at least one extra trip to some distant naval base.

The fork truck pallet system of materials handling is saving millions of man-hours of critical labor each year. If labor shortages should become more acute, it permits the utilization of less skilled labor, such as older men and women. Furthermore, because fork trucks do the brute work of lifting and carrying, the efficiency of workers is not nearly so noticeably reduced by fatigue toward the end of each shift.

Since the fork truck pallet system speeds the flow of materials and reduces handling damage all along Navy supply lines, the Bureau of Supplies and Accounts requests contractors to use palletized unit loads wherever possible. The extra costs involved are more than offset by the savings in time and materials. The equipment is used many times over through the use of the fork truck system. In depots where materials are stacked high, the use of fork trucks is essential to prevent damage to the materials.



MERCURY

THE MERCURY MANUFACTURING CO.
4140 So. Halsted St. • Chicago 9, Ill.

TRACTORS • TRAILERS • LIFT TRUCKS



A
Sensational
**WELDING
 DEVELOPMENT**
by
AGILE

★ **SILVER-RED** ★
ELECTRODES

build up lasting cutting edges on medium and low carbon steels. They give maximum satisfaction when used in the salvaging or manufacture of cutting edges that encounter high abrasion.

★ **SILVER-GREEN** ★
ELECTRODES

produce a steel recommended as the toughest and strongest steel for forming tools, for building new or salvaging old dies of all types, for shear blades, chisels, etc.

SEND FOR THE LITERATURE TODAY!



AMERICAN AGILE
Corporation

5806 HOUGH AVE. • CLEVELAND, OHIO

Deep Drawing

(Continued from Page 91)

steels, especially to reduce die wear and metal pickup.

High-carbon and high-chromium steels formerly were used for punches and drawing dies. Later it was found that graphitic punch and die steels worked well all along the line and now are being used in considerable quantities. However, carbide drawing dies also have proved advantageous, especially for the last two or three draws, but their use is limited at present since they cannot be made in the large diameters required for cupping and the early redraws on most sizes of cylinders.

The large size of punches (up to 18 inches in diameter) and dies required render heat treating difficult. It is now the practice to harden all types in automatic controlled-atmosphere furnaces, followed by an oil quench for the graphitic steels and a water quench for the others. All tools, of course, also are machined by Kidde.

Common Lubricants Used

Considerable experimentation has been done with various lubricants for the several drawing operations but the special compounds tried earlier in the operation have since been replaced by the more common types.

The company buys SAE-X4130 in flat sheets for the cylinders from several steel companies. Carbon range in this steel is 0.25 to 0.35 per cent; chromium 0.80 to 1.10, manganese 0.40 to 0.60 and molybdenum 0.15 to 0.25 per cent. Circles are blanked out on a 500-ton single-action double-crank mechanical press. All subsequent cupping and drawing operations are performed on double and single-action hydraulic presses, the number of draws (usually about six), depending upon the size of the cylinders, of course.

About 40 per cent of the total reduction is achieved in the first cupping operation with the percentage of reduction diminishing in subsequent steps. As an indication of the specifications which must be met, final wall thicknesses are held to tolerances of plus or minus 0.005-inch in the sizing operation after the cylinder has been drawn to specified diameter and length.

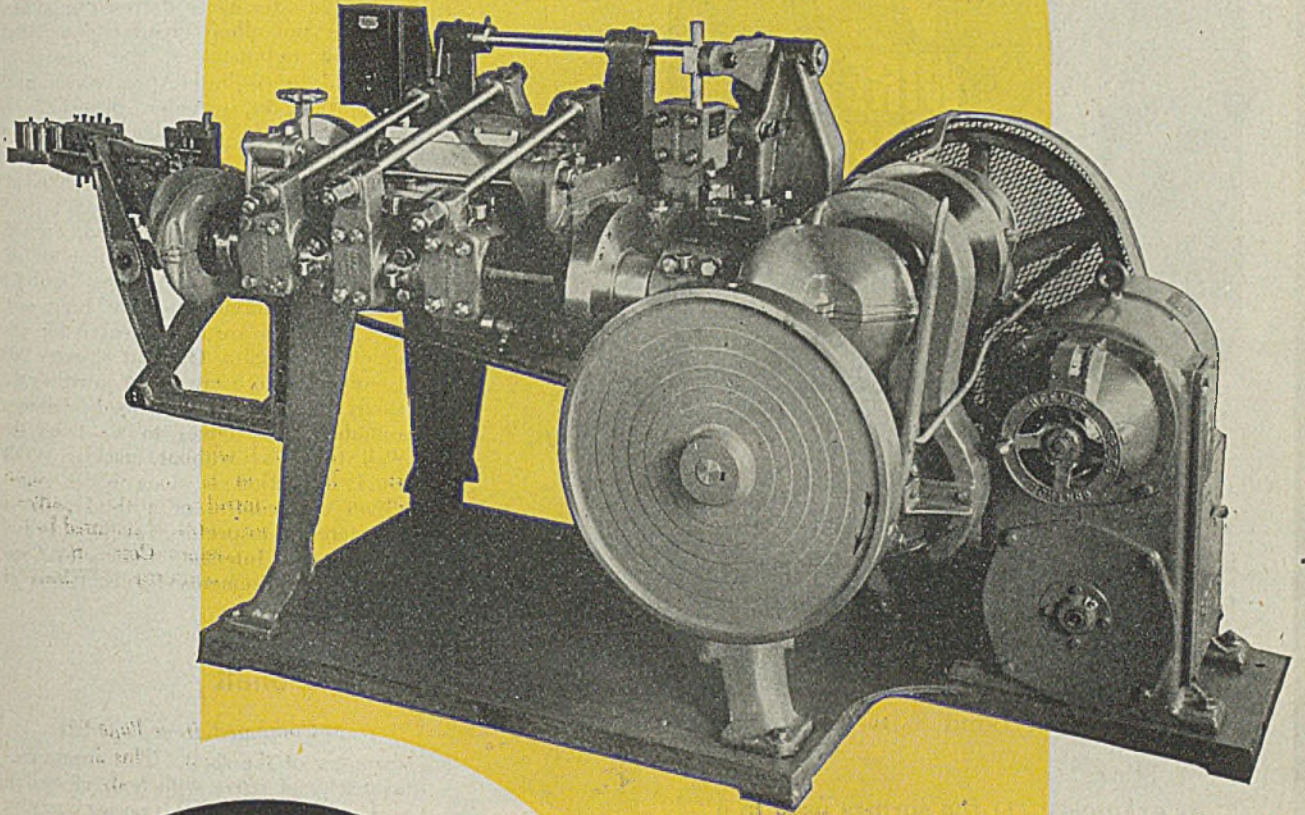
Following each draw, the cylinders are cleaned with a chemical solvent in continuous washing machines and are then annealed at 1300 degrees Fahr. in continuous gas-fired inert-atmosphere type furnaces.

The open shells, after being cut off to the desired length, are closed at the open end so that they may be threaded for valving. The necking is done by hammer forging or swaging, using gas or electric induction heating. This process is under rapid improvement to eliminate completely all machine dressing of the domes and necks.

After the necks are closed in the domes and necks are dressed on lathes for appearance "clean up", and the openings are bored and taper reamed, prep-

NILSON

automatic metal wire forming machine



The Nilson line includes machines for forming paper clips, buckles, coat and hat hooks, ceiling hooks, wire ears, cable rings, screw eyes, sash chains, automobile slide chains, flat open link chains, staples, cotter pins, hose clamps, etc. Nilson also makes wire straighteners, wire reels, frame bending machines and special presses.

The machine pictured here is a simple and ingenious contrivance. Sturdy, solid, compact, requiring little space, it is a highly efficient and practical machine for forming wire and punching patterns from ribbon stock. Various patented features and extra attachments make it a necessary factor in reducing the manufacturing cost of your product. The Nilson automatic metal wire forming machine turns out the work faithfully, accurately and speedily—and it functions a long, long time free from repairs and replacements.

THE A. H. NILSON MACHINE COMPANY
BRIDGEPORT, CONN.

PAGE for WIRE



Today's production of **PAGE WIRE**, of course, is directed to the war effort and to essential industry—whether it be Stainless Steel Shaped Wire, Carbon Steel Shaped Wire, Welding Wire or such general items as Spring Wire, Bond Wire, Telephone Wire, etc.

As examples: (1) the springs used in a rifle that has attained a world-wide reputation for its performance in battle, are Page Stainless Steel Spring Wire; and (2) a special electrode developed by Page for welding armor—a contribution to the production of tanks.

* * *

Although completely occupied with the war effort, you will find our organization well able to work with you on plans you may have for the use of wire after the war.

PAGE STEEL AND WIRE DIVISION

Monessen, Pa., Atlanta, Chicago, Denver, Los Angeles,
New York, Pittsburgh, San Francisco, Portland



In Business for Your Safety

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

aratory to the heat treating operation.

The heat-treating operation is performed in a continuous gas-fired batch-type furnace at 1550 degrees Fahr. and is then followed by an oil quench. The cylinders next are cleaned and tempered at 1250 degrees Fahr. Time in furnaces in all cases depends upon size of the cylinders.

Necks then are threaded internally. Finally the cylinders are pickled and Parkerized inside and out.

During the entire course of manufacture, the cylinders are subjected to close inspection and checking. Each piece is inspected after every draw for scratches, pickups and other imperfections. After drawing to diameter, the pieces are checked for wall thickness which is in proportion to cylinder diameter. A 3 $\frac{3}{8}$ -inch inside diameter cylinder, for example, must have wall thickness of 0.08-inch held within plus or minus 0.005-inch.

After the necks are closed, dressed, threaded and the cylinders heat treated, hydrostatic tests determine whether strength requirements have been met. The cylinders are also checked for volume and weight. One out of every 200 is subjected to a crush test in which the shells must be collapsed between rounded knife edges to six times the wall thickness without cracking. This rigid inspection is done under supervision and control of a third party—a disinterested inspector as required by law to meet the Interstate Commerce Commission requirements for containers of this type.

Mortar Shell

(Continued from Page 98)

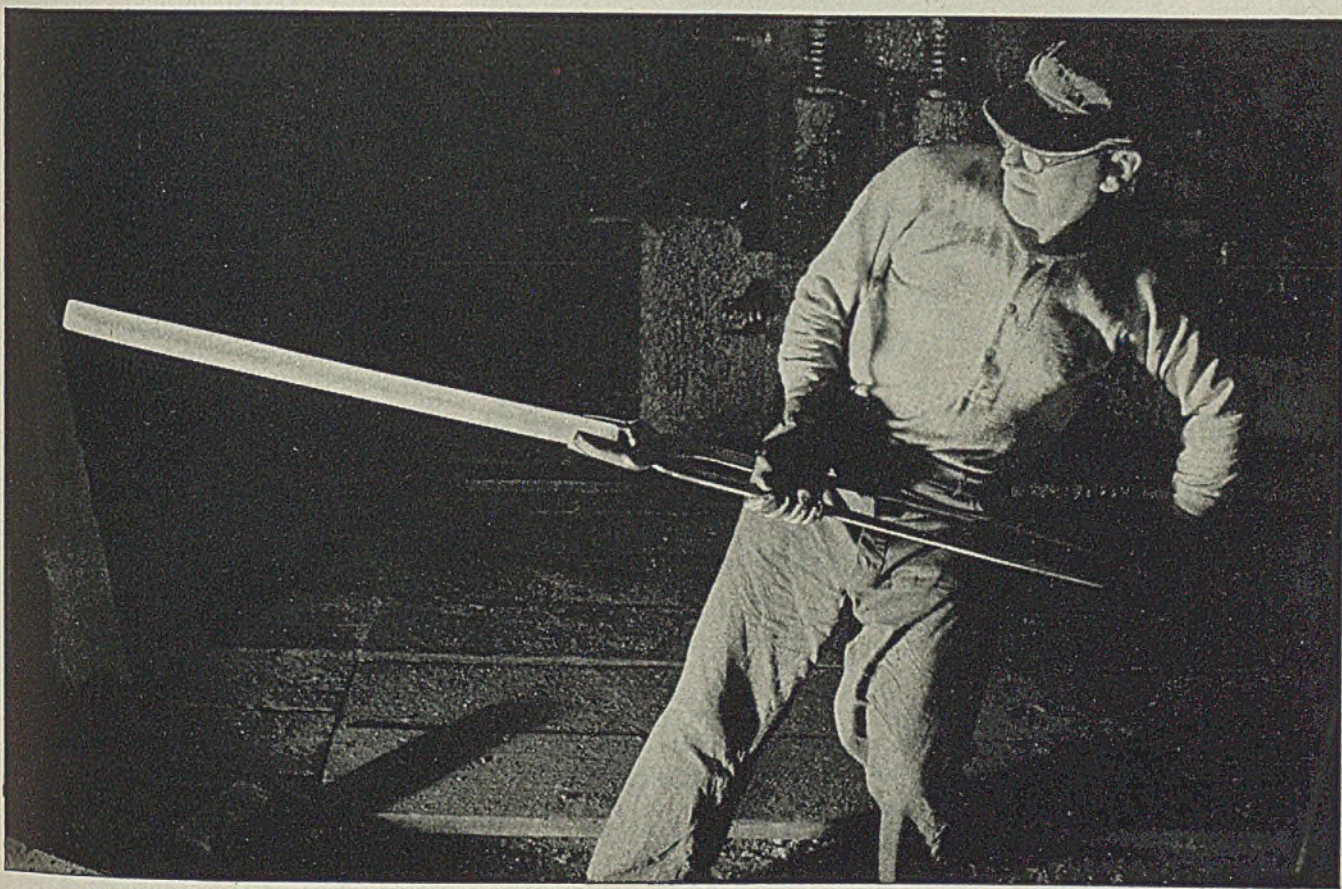
diameter of the shell. This assures concentricity of ogive with body of shell.

Much depends on this nosing operation and it is a tough one on which to obtain uniform results, for the slightest variation in physical properties of the metal in the shell results in variations in wall thickness. The ogive or nose thickness at a point $\frac{1}{2}$ -inch from front of the shell must be held to 0.134-inch plus zero minus 0.010-inch. After the finish turn, thickness just ahead of the front bourelet is held to 0.116-inch plus zero minus 0.010-inch with a gradual increase in thickness to the 0.134-inch dimension.

The ogive is finished to a radius of approximately 10.220 inches. To attain this dimension the nosing die is ground to a radius of 10.870 inches. The reason for the difference in radii is the growth in wall thickness due to compressing the metal from a diameter of 4.300 inches to the nose diameter of 2.968 inches. Maximum eccentricity of nose must be held to 0.005-inch or a total indicator reading of 0.010-inch. This is checked on a gage similar to the concentricity gage, Fig. 15. Inspection is 10 per cent.

Several test shell are run through the entire line every 2 hours. Nose adapter is removed from finished shell and nose thickness checked with a model

Stingers for war birds



It won't be long before this bar of alloy steel, heat-treated, drilled, rifled and machined to exact dimensions, will be poking out of the leading edge of a fighter-plane wing or out of the body of a bomber. This bar is the embryo barrel of a .50-calibre machine gun.

Here's what the diary of a captured Jap aviator has to say about our Flying Fortresses, which are armoured by .50-calibre guns: "Our combat planes cannot get close to the enemy Flying Fortress. It is very regrettable that the only alternative is for us to flee from being killed."

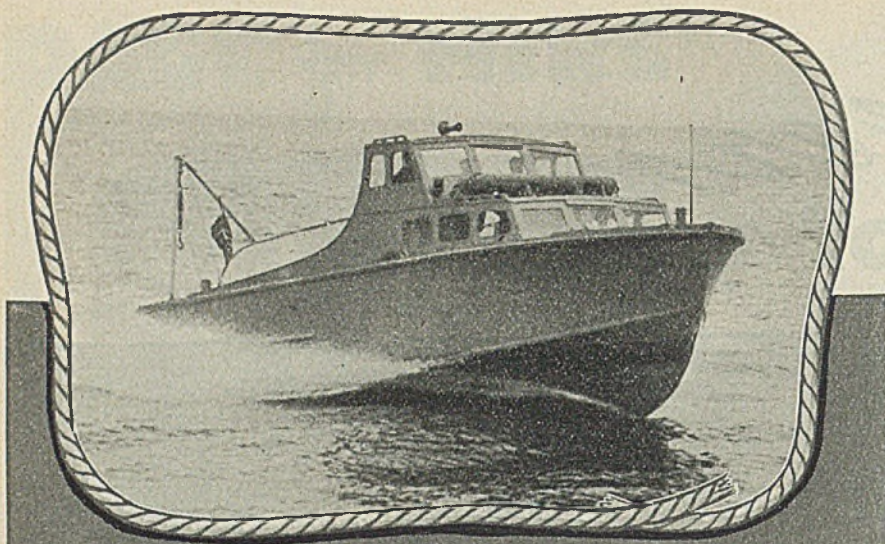
Bethlehem Steel Company is producing large tonnages of alloy bar steel for use in manufacturing both machine-gun barrels and rifle barrels for service in the air and on land and sea. Our big job now is to do our part toward making sure that the supply of these and other weapons made of steel keeps increasing until the war is won.



★ ★

★ ★

BUY MORE WAR BONDS



In Aircraft Rescue Boats

Assemblies Welded with AMPCO METAL Assure Rigid, Safe Construction

Coated aluminum bronze welding rods, made from Ampco Metal and known as Ampco-Trode electrodes, were used in the construction of many newly designed 36-foot aircraft rescue boats because the high strength values of the rod assured a rigid weld joint.

These rescue boats, designed to pick up aircraft crews who have crashed at sea, must often buck high waves—strength in each part is imperative. Here the propeller shaft stern tube of manganese bronze is welded to the hull plate of aluminum bronze to form a rigid fabricated unit which resists vibration and shock.

The acceptance by American Industry and Government contractors of Ampco Metal in various forms is based on proven performance by leaders in aircraft, machine tool, ordnance, and heavy machinery fields. Ampco Metal is daily rendering valiant service. With outstanding physical properties, this aluminum bronze alloy has high strength, controlled hardness, and corrosion-resistance—vitaly needed for specialized service.

Test Ampco Metal under actual operating conditions and get results that justify your judgment. Ask for "File 41—Engineering Data Sheets," giving case histories and technical information. Sent free on request.

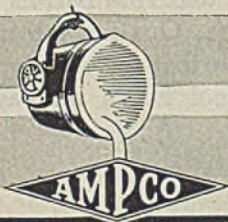


AMPCO METAL, INC.

DEPARTMENT 5-11,

MILWAUKEE 4, WISCONSIN

**AMPCO
METAL**



THE METAL WITHOUT AN EQUAL

47 Federal dial gage. A record is kept of each set of test shell by both Lemco and CWS inspectors. Each set must be okayed by CWS inspectors before the press operator can continue with the nosing operation.

The nosing die is made of Bissett non-shrink steel. From records kept of die life, it was found that dies of this steel gave very good service. Average production per die runs around 38,000 to 40,000 shell before regrinding becomes necessary. Dies are usually electroplated with a heavy deposit of chromium before regrinding. This fills any scratches or cavities that may have developed from use. Kelley No. 16 nosing compound is used as a lubricant. Men operators are employed here.

Another air cylinder greatly reduces operator fatigue and facilitates this work. As can be seen in Fig. 21, it is connected to a slide so that it can push the collet assembly out from under the upper die to a position where the operator can load and unload the collet with little effort. Although shell weigh only about 15 pounds each, everything possible is done to ease the work.

Lathe Bores, Faces and Chamfers

Mouth of shell is now bored to 2.720 inches, minus 0.002-inch plus zero, faced and chamfered for the nose adapter, right foreground in Fig. 22. A Springfield engine lathe, using a multiple tool block, completes the above operations in one pass. The facing operation, in addition to providing a smooth and square face for the nose brazing operation, is also figured so as to maintain the correct overall length of the shell. This lathe is completely equipped with air chuck, air steady rest and the quick-loading receiver as are almost all the machine tools on this line. Speed is 400 surface feet per minute with Vascalloy Ramet EM tools being used.

The shell is now washed in a strong Oakite bath, seen at left in Fig. 22, and rinsed in clear water. Shell are handled by placing in a large basket with a capacity of 30 shell. The basket is raised and lowered into the wash tank with a Curtiss air hoist. Solution is heated by gas and air blast. The adapters, base plugs and other component parts are also washed in this same setup.

The next operation is brazing in the nose adapter, which is done in a 40-kilowatt Tocco Jr. electric induction heater seen in Fig. 23. This is a two-station unit similar to that in Fig. 12 except that no air cylinders are needed to clamp the assemblies. Weight of the shell itself provides all the force required to push the parts together as the silver alloy ring melts in the joint. Both shell and adapter are cleaned with Tromax cleaning fluid and then carefully cleaned with a stiff bristle brush and carbon tetrachloride.

Before the fuze adapter with its silver alloy brazing ring is pushed into position on the shell nose, Scatflux is applied to the sections to be joined. This flux has low surface tension and is fully active

STEEL

at 900 degrees Fahr. Since it melts at low temperature, it spreads evenly over the surfaces to be joined, dissolving oxides and preventing further oxidation.

The fluxing material also permits wide variation in brazing temperatures since it is active and stable at temperatures exceeding 1650 degrees Fahr. or, in other words, above the usual silver alloy brazing range. The material is soluble in water at 140 degrees Fahr., making it unnecessary to use acid or alkaline reagents for cleaning the metal after the brazing operation.

This flux, incidentally, was originally developed as a research project at Mellon Institute of Industrial Research to be used by the Scaife Co., Oakmont, Pa., for their own use in copper brazing of pressure vessels.

Two shell are brazed at a time at each station. One station is off to allow time for cooling, unloading and loading while work at the other station is heating. Current cannot be applied to both stations simultaneously. Two girls run this operation, which is number 32, Table I. Current is applied automatically for 26 seconds.

There is always a bank of 400 to 1000 brazed shell between the Tocco and the next operation. There are several reasons for maintaining this large bank. The main reason is to provide cold shell for the next operation. It takes 2 to 3 hours for the brazed shell to cool sufficiently to handle. They cannot be cooled rapidly by water quenching for this hardens the nose to a 50 to 60 rockwell C which is far too hard for machining at production speeds and feeds.

Leaks Readily Detected

The next operation (33, Table I) is air testing for leaks at a pressure of 250 pounds per square inch. This is done in a special setup designed and built by Lempeco. The shell is placed in two V-blocks. A plunger, actuated by air, clamps the shell against a ground face. This ground face or pilot carries a leather washer which seals the shell sufficiently to carry a pressure of 250 pounds per square inch.

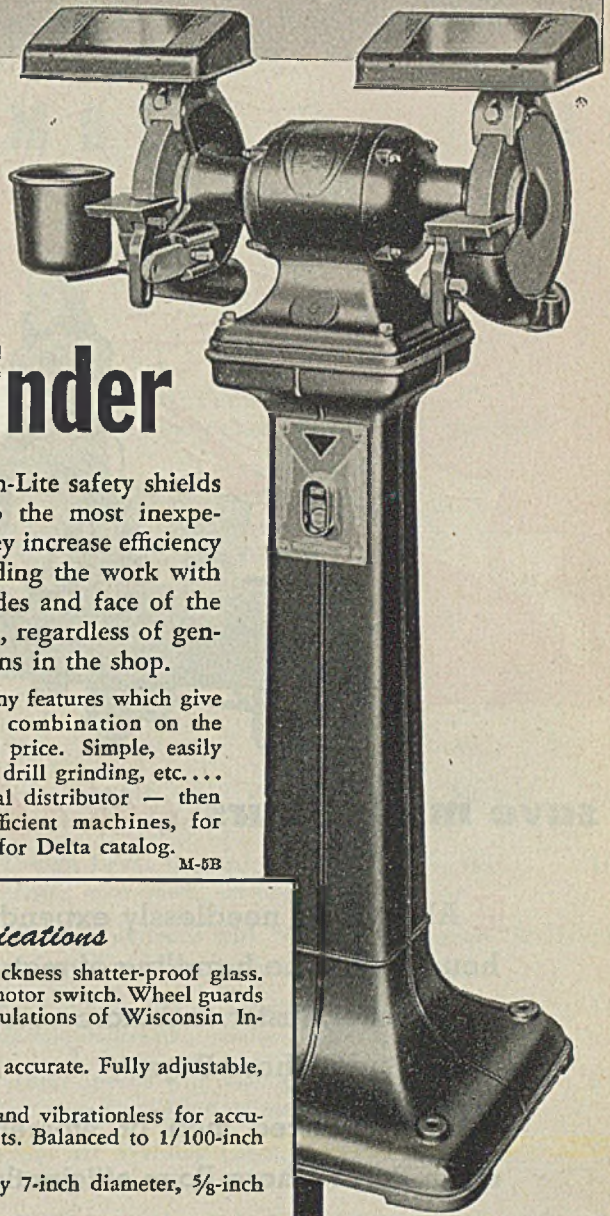
Entire carrier unit is mounted on a tilting device that is so actuated as to immerse it in water deep enough to cover the entire shell. Obviously any leaks that might be present can be readily detected when under this high air pressure as the finest pinhole will throw a steady stream of bubbles. The immersing is also air operated. The girl operator merely sets the shell in place and then controls the entire operation through valves.

Rejections are about one-fourth of 1 per cent. All leakers are sent back to the brazing crew for reworking. They are very easily processed as location of leak is marked with crayon by the pressure inspector. The adapter or base, whichever joint is defective, is reheated on the Tocco unit and removed from the casing and a new part brazed in. The removed parts go to the salvage department to be cleaned and reinspected

Your newest trainee can't forget these "safety goggles" — they're built-in

Extra convenience, efficiency, safety, ... with this

Delta Tool Grinder



Delta's patented Twin-Lite safety shields minimize the risk to the most inexperienced operator. They increase efficiency and accuracy by flooding the work with light . . . on both sides and face of the wheel . . . at all times, regardless of general lighting conditions in the shop.

This is just one of many features which give you the finest working combination on the market — regardless of price. Simple, easily adjusted attachments for drill grinding, etc. . . . See your Delta industrial distributor — then install one of these efficient machines, for creditable results. Send for Delta catalog.

M-5B

Specifications

Safety shields: Double thickness shatter-proof glass. Two lamps wired to motor switch. Wheel guards meet strict safety regulations of Wisconsin Industrial Commission.

Tool rests fully machined, accurate. Fully adjustable, easily detached.

Wheels: Absolutely true and vibrationless for accurate, satisfactory results. Balanced to 1/100-inch ounce.

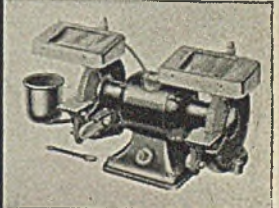
Size: One-inch face by 7-inch diameter, 3/8-inch hole.

Type: 60N and 46M aluminous oxide.

Bearings: Precision double-sealed New Departure ball bearings — lubricated for life, protected against damage from abrasive dust.

Heavy Base: 14 1/2" x 15 1/2". Tool rests 39" from floor.

Price complete f.o.b. Milwaukee, (depending on type of motor required). \$72.00 to \$89.50. A-1-A priority required.



Bench Model

Price complete (depending on type of motor required) f.o.b. Milwaukee, \$56 to \$65.75.

Tear out and mail today



DRILL PRESSES
GRINDERS
CUT-OFF MACHINES
BAND SAWS
ABRASIVE FINISHING MACHINES

THE DELTA MANUFACTURING CO.
702 M. E. Vienna Ave., Milwaukee 1, Wis.
Please send me your new catalog giving full details on the Delta Tool Grinder and your full line of low-cost machine tools.

Name.....Position.....
Company.....
Address.....
City.....(.....) State.....

the truck of a thousand uses



save man-hours with a *Chore Boy!*

MAN-HOURS needlessly expended are man-hours lost! The handling of materials can be done better, faster and more economically by using Buda Chore Boys.

Inexperienced men or women easily operate Buda Chore Boys efficiently.

Low First Cost . . . Low Operating Cost . . . Low Maintenance Cost

Write or wire for bulletin.

BUDA

HARVEY (Chicago Suburb) ILLINOIS



PUSH CARS



JACKS



MOTOR CARS



RAIL BENDERS

for defects. If passable, they then go back into the line.

From the air test, the shell goes to the adapter-facing operation, 34, Table I. This is also extremely important although it looks quite simple. Depth to bottom of the counterbore from face of shell or rather from the face of the burster well (in the adapter) must be held to 0.505-inch plus or minus 0.005-inch. While this seems like a large tolerance, it is rather difficult to hold for a number of reasons, chief of which is that the overall length of the shell at this point may vary more than the 0.010-inch limits. The rough dimension on the adapter face also varies.

These two factors eliminate any positive stop that might be used. Lemppo uses a tool block with a built-in indicator. An extension reaching from the indicator to the bottom of the counterbore positions the tool. The extension is pulled back far enough to clear the face of shell while the facing operation is taking place.

The Vascalloy EM tool is ground in such a way as to enable the operator to chamfer the adapter $\frac{1}{8}$ -inch by 30 degrees with the back face of the tool. Cutting speed is 350 surface feet per minute. Bradford engine lathes completely air-equipped and with a loading device are used on this job.

Rejects Can Be Reclaimed

Inspectors' rejections on this operation are about one-tenth of 1 per cent. If not too bad, most rejects can be repaired by resurfacing other faces of the adapter as all depths and dimensions of the adapter are held to the high or low side, whichever one at a particular point would make remachining possible in case of error. This is rather hard to explain without a drawing of the adapter and an explanation of its functioning but it is an important aid in cutting scrap losses.

Finish turning of outside diameters and nose contour on a Stamet shell turning lathe is the next operation (35, Table I). These automatic machines are standard except for special cams to follow the nose contour for this particular job. The shell is turned to 4.198 inches plus 0.005-inch minus zero on the bourrelets. The relief is turned to 4.125-inch plus zero minus 0.010-inch by $5\frac{1}{4}$ inches long. The nose or ogive is turned to a radius of 10.220 inches.

The nose diameter is held to 2.750 inches plus 0.005-inch minus zero. This is considerably under the tolerance allowed by CWS but it was found that the ogive wall thickness could be held much closer to specifications by holding the above dimension. At this point girls operate and set their own tools with a setup man who also acts as inspector on hand at all times to insure shell quality. Actual machine cutting time is 22 seconds.

Cutting speed is 300 surface feet per minute at 0.022-inch feed. Firth-Sterling T-16 Kennametal KM or KH tools are used. On certain heats, Vascalloy EM gives very good results. Tool life is about 75 to 80 pieces per grind. Tools are

STEEL