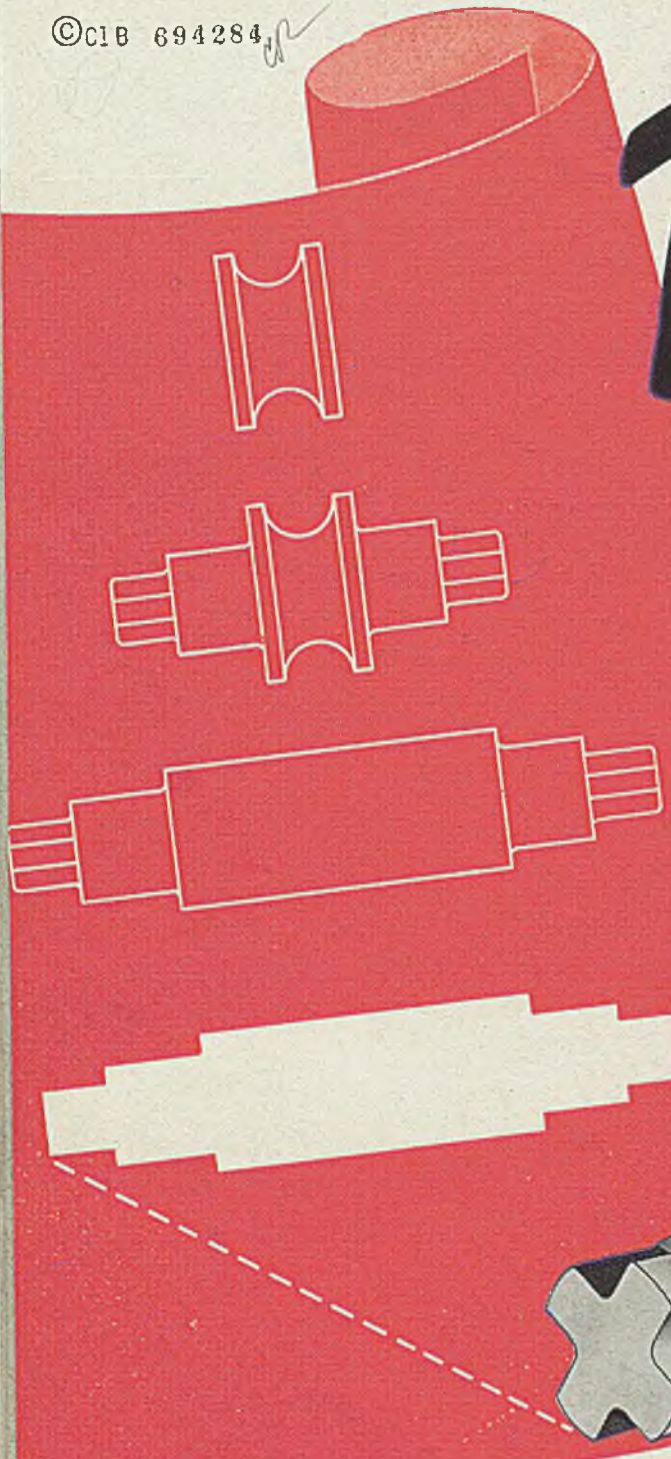
September 17, 1945

STEEL

The Magazine of Metalworking and Metalproducing

ESTABLISHED 1882

ANOTHER PRODUCT OF AETNA•STANDARD



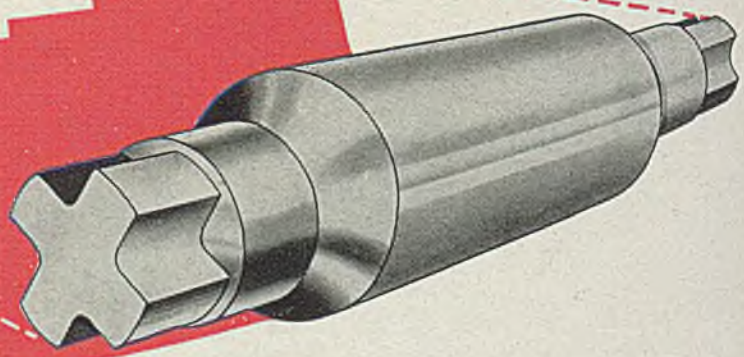
ROLLS

There is an Aetna-Standard size and ty of Roll for every purpose . . . .

Sizes . . . from rolls for an 8-inch mill, intermediate sizes, up to large plate m rolls, 34" x 206".

Plain Chill	Special Alanite
Moly Chill	Grain
Nickel Chill	Asex
Alanite	Asex Special

Forming, welding, and sizing Ro for steel pipe, rolls for rubber a plastic mills.

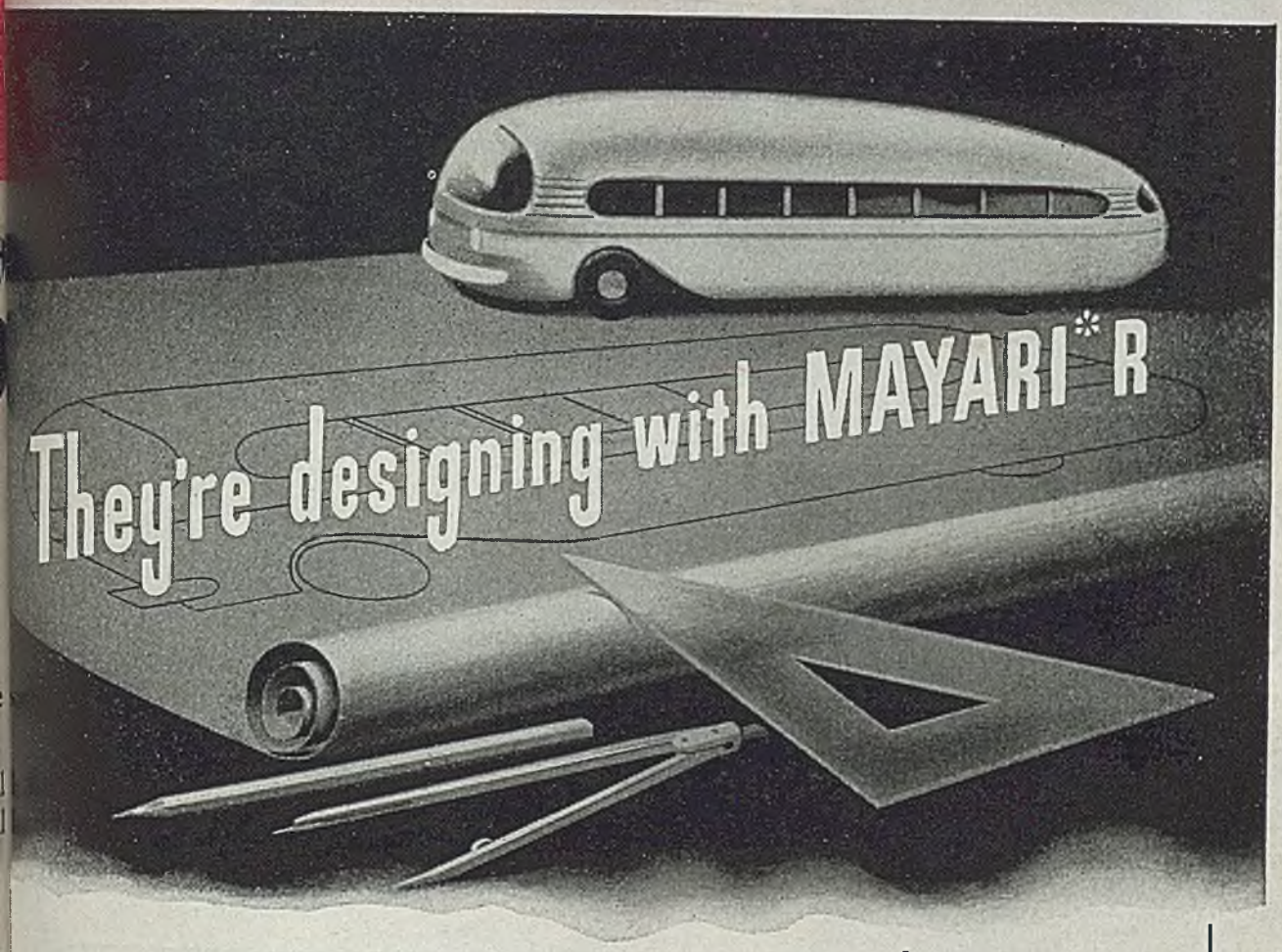


THE AETNA•STANDARD ENGINEERING COMPANY

YOUNGSTOWN, OHIO

DESIGNERS AND BUILDERS to the Steel, Non-Ferrous

ASSOCIATED COMPANIES:
HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND



There's a lot being said these days about the role of low-alloy, high-strength steels in the industrial picture. Designers of automotive and railway equipment, especially, are thinking in terms of these versatile steels, and when they think of such steels, they think of Bethlehem's Mayari R.

Let Mayari R make your postwar product lighter . . . stronger . . . longer-lasting. You can specify Mayari R with confidence, for it has been long and thoroughly tested, and has given a good account of itself, both in the uses of peacetime, and in the grimmer arts of war.

Among the many things about Mayari R which have made friends for it, from the front office to the shop, there's one that's especially worth emphasizing. Where Mayari R is used with weight-saving in mind, in many cases its additional cost is quickly repaid in extra advantages—in ease of fabrication, in increased pay-load, in greater stamina and resistance to atmospheric corrosion.

Herewith, at right, are briefly given the chief points about Mayari R. For fuller information, write for the illustrated Mayari R catalog. Address the nearest Bethlehem district office, or Bethlehem Steel Company, Bethlehem, Pa. No obligation, of course.

Mayari R
advantages at a glance

Yield point: 50,000 p.s.i.—almost double that of mild carbon steel.

Corrosion resistance: five to six times that of mild carbon steel; two to four times that of copper-bearing steel.

Strength plus corrosion resistance making possible weight savings up to 40 per cent.

Remarkable resistance to impact even at sub-zero temperatures.

Highly ductile, easily fabricated under regular shop practices.

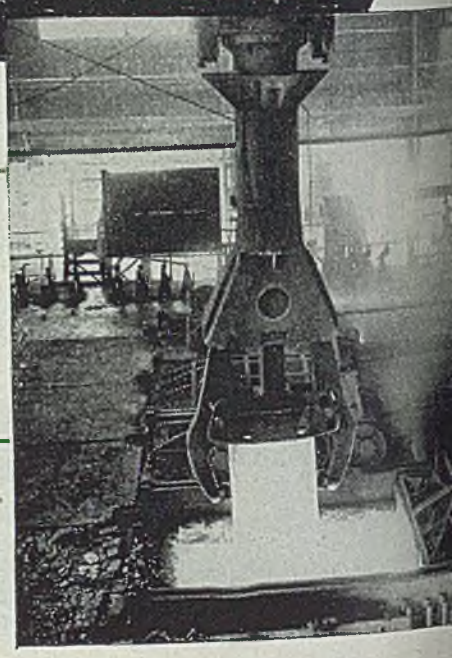
Readily welded by usual methods. Non air-hardening. No heat treatment needed.

★ BETHLEHEM STEEL ★

**Rhymes with "fiery." The "R" indicates "Rust Resisting."*

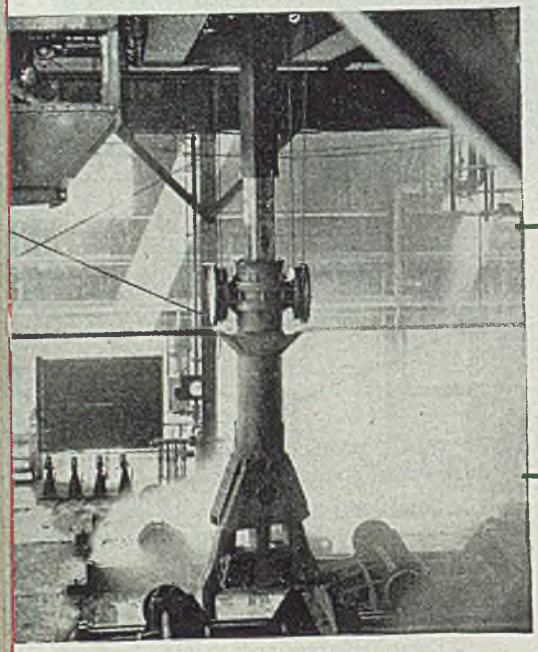
Mayari R *makes it lighter... stronger... longer lasting*

New Alliance Soaking Pit Crane in Action



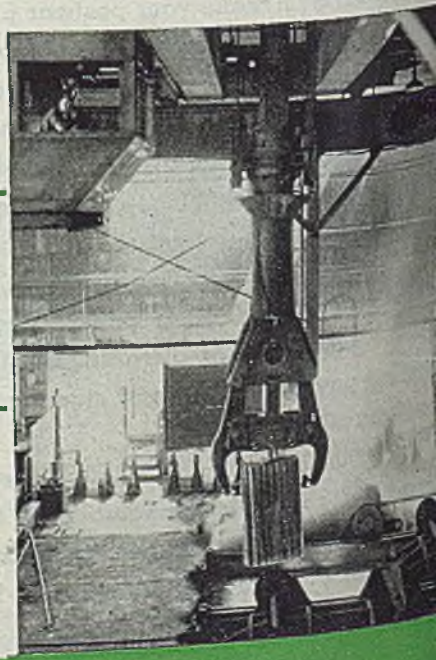
MULTIPLE RANGE TONGS

By means of an ingenious locking pin, the tongs can be adjusted, *in less than a minute,* to any one of four positions: Position (1) takes care of ingots up to 10" x 22"; position (2) — 18" x 40"; position (3) — 36" x 52"; and position (4) — 48" x 60". Maximum and minimum range can be made to suit any requirements.



HOLLOW, RECTANGULAR TELESCOPIC STIFF LEG

Telescopic • Self-Lubricating • Revolving • Flexibly Connected • Adjustable Range Tongs with Variable Intensity Grip.



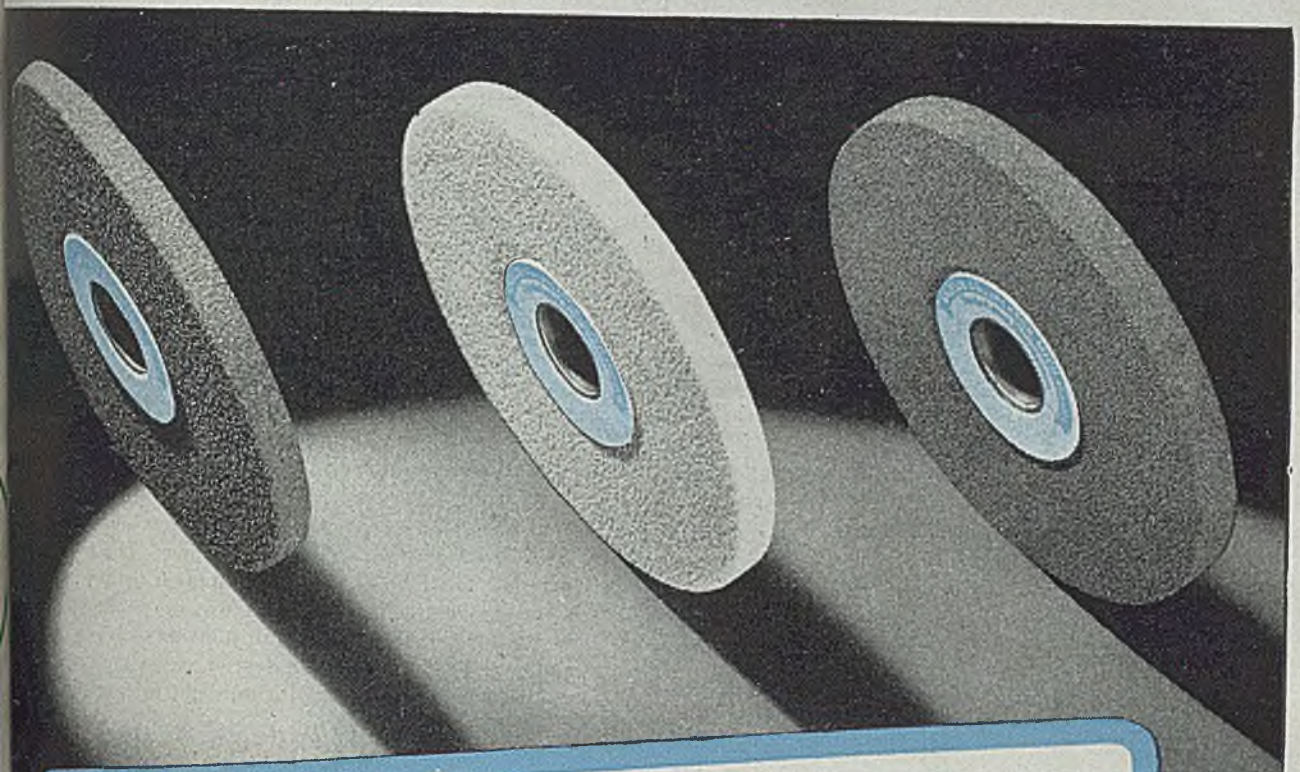
FULL VIEW OPERATION

Write to Alliance, world's largest builders of the world's largest cranes, for profitable data on this new advancement in soaking pit cranes.

ARMY E NAVY

THE ALLIANCE MACHINE COMPANY • ALLIANCE, OHI

PITTSBURGH OFFICE : 1622 OLIVER BUILDING

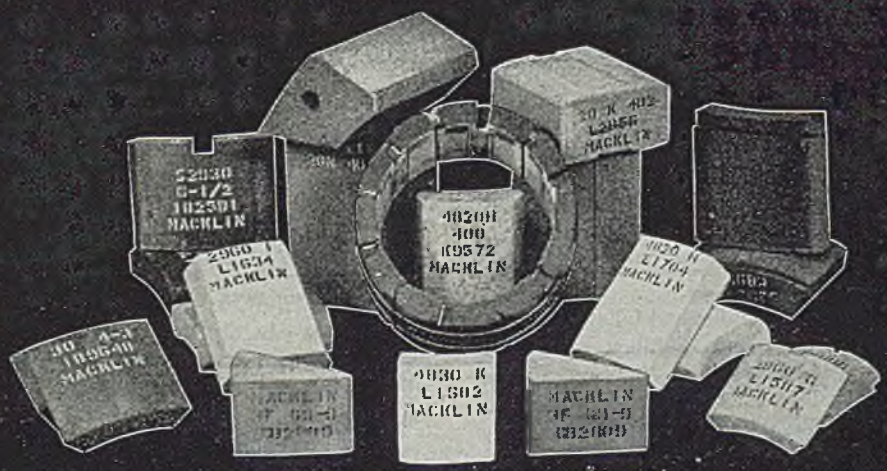


"PROTECT YOUR PRODUCTION"

With Macklin high quality, uniform wheels for any grinding job.
MACKLIN segmental wheels are available for any size chuck and give exceptional, efficient and economical results.
Ask for the services of a Macklin Field Engineer.

MACKLIN

MACKLIN COMPANY • *Manufacturers of* GRINDING WHEELS—JACKSON, MICHIGAN, U.S.A. • Distributors in all principal cities • *Sales Offices:*
Chicago • New York • Detroit • Pittsburgh • Cleveland • Cincinnati • Milwaukee • Philadelphia



BEHIND THE SCENES

Paging Mr. Haagstad

This week in the mail comes a letter from the National Desertion Bureau, an organization new to us but apparently a philanthropic society which does a very fine job of contacting missing members of families.

It seems there is a gentleman they feel can be reached through these pages and although we do not claim in any way to be an amateur detective, we're glad to pass along this notice and hope that we, too, are being philanthropic:

"Information is being sought of Raymond Haagstad, who has been missing since May, 1943. He is 6 ft., 1 in. tall, weighs 190 pounds, has reddish blonde hair, green eyes and was a steel salesman by occupation. Anyone aware of his location is requested to communicate with the National Desertion Bureau, 67 West 47th st., New York 19."

Fish Story

This story doesn't exactly point a moral that there should be truth in advertising but it does show how much can sometimes be done with so little.

It seems that the proprietor of a certain New York restaurant didn't have much money for advertising purposes, so he bought the biggest fish bowl he could find, filled it with water, and put it in the window with this sign: "Filled with invisible goldfish from Patagonia."

It took ten policemen to keep the crowd moving.

Secret Solution

We've bored about everyone we've seen the last couple of weeks with that puzzle about the house numbers and no one has even come close to the right answer, just as we didn't until the editors took pity on us. So, we really were impressed when L. B. Shapleigh of Bethlehem's Cincinnati office and L. P. Hughes of the Four Wheel Drive Auto Co.'s purchasing department crashed through with the right answer. The editor who told us said that it all came to him in a vision one morning when he woke up with a terrific hangover, so we don't know just what to think of our two ardent readers.

Exposed At Last

It's been ten long and arduous years now that we've hidden our light under a bushel. Or to be more honest, that we've escaped many a scathing remark by being that "fellow Shrdlu".

Now, if you are a funny-page fan and follow the trials and tribulations of Barnaby and O'Malley, you know that the cat is out of the bag, and that we, Shrdlu, are not just a figment of a linotyper's imagination, but a real, honest-to-God flesh and blood (well, anyway paper and ink) character.

Crockett Johnson brought us to life in the form of an impish little printer's devil with a couple of vestigial horns protruding slightly from a very low forehead, a lovely long spiked tail, and an extremely deadpan expression. And then, with the unkindest cut of all, he labels us Shrdlu, Imperfectionist. C. Harold Lource, Ingalls Iron Works, picks it right up from there and says he always figured we must look like the devil, but now he notes we even have his tail. And at long last he discovers that our true mission in the printing world is to misspell all the words. Even our good friend Ed Claar of Eastern Clay Products is amazed at the close resemblance.

We fully intend to have a few private words with Mr. Johnson to see who is going to sue whom, and we'll keep you informed on the proceedings. In the meantime, we are calling the boss's attention to the fact that according to the funny papers we are supposed to go to work when the day shift quits and leave as the night shift starts up. We feel that we can stand all of these mean wisecracks for an eight minute day, with no overtime.

Greek To Us

Just to prove that Crockett Johnson may be right in calling us the guy who is responsible for all omissions, typographical errors, pied lines, switched captions, and misspelled names, we were just this week put on the pan by H. G. Taylor, Mechanical Engineering Dept., Diamond Chain and Manufacturing Co. for not knowing the plural of "opus" in the September 3 issue. Mr. Taylor says:

> **This word may be all Greek to you but it is just plain Latin to many of us including the Quiz Kids. Or perhaps you don't enjoy attending the plural of "opus"!**

We'll have to admit that most of the plurals of "Opus" that we've been talked into attending by the little woman have been Greek to us. The plural, of course, is *"Opera"*.

Good News

If you've been like we have this summer, a game of golf has been a very infrequent affair. It's not that our game is any lousier than usual (it couldn't be), nor that we couldn't have sneaked out a few of those prettier afternoons. The whole problem has been an utter dearth of those little white round pellets which hook and slice so easily.

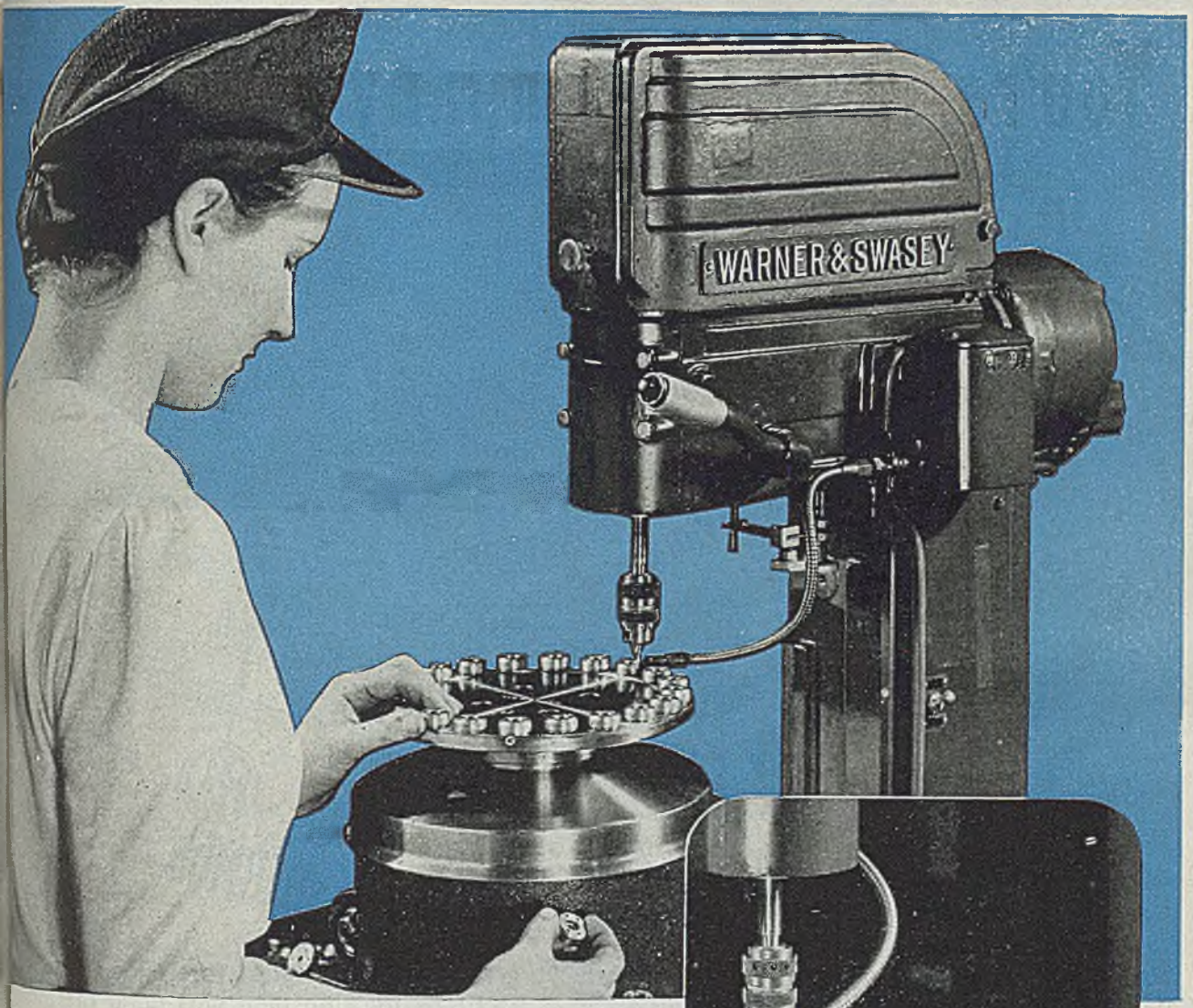
But now, good news from the production front says that by late fall the new synthetic balls will be on the market and in peak production by next spring.

The new jobs are said to give about 95 per cent as much distance as the prewar ball, which means roughly that those long screaming drives of ours will now be lucky to get to the end of the tee.

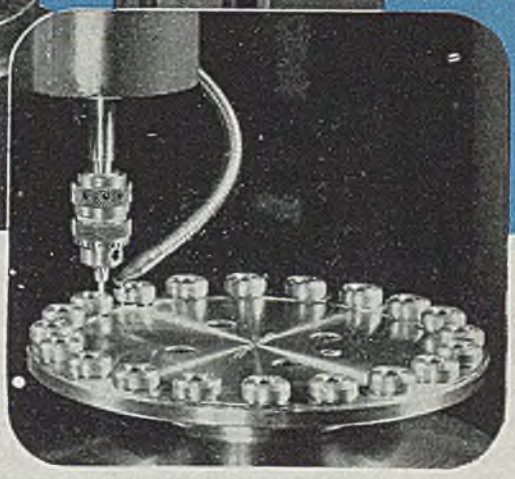
SHRDLU

Vol. 117, No. 12, Sept. 17, 1945, issue of STEEL, published every Monday at Cleveland, Ohio. Entered as second class matter at post office, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00.

Editorial Contents, Page 81



1100 CLASS 3 THREADS PER HOUR IN TOOL STEEL!



THIS Warner & Swasey No. 10 Precision Tapping and Threading Machine *automatically* taps 5-40 N.C. Class 3 threads in tool steel parts at the rate of 22 holes per minute—1100 in a 50-minute hour!

This work is handled by a special air-operated revolving fixture designed by Warner & Swasey to speed production on a vital job at an East Coast Naval Arsenal. The operator's only part in the tapping cycle is to load and unload the pieces.

A solenoid air valve synchronized with the upper and lower limit switches of the machine tapping stroke indexes the fixture after each operation. The fixture can handle other jobs of a similar type by using additional dial feed plates.

Only the absolute depth control and the new, positive lead screw tapping principle found on Warner & Swasey Precision Tapping and Threading Machines make possible this accurate, rapid-fire work in S.A.E. 52100 tool steel.

If you are interested in greater production, for lower tap costs and lower scrap losses in Class 3, 4, and 5 fits, ask your Warner & Swasey representative about this new principle. In many plants these new machines pay for themselves in tap life alone!

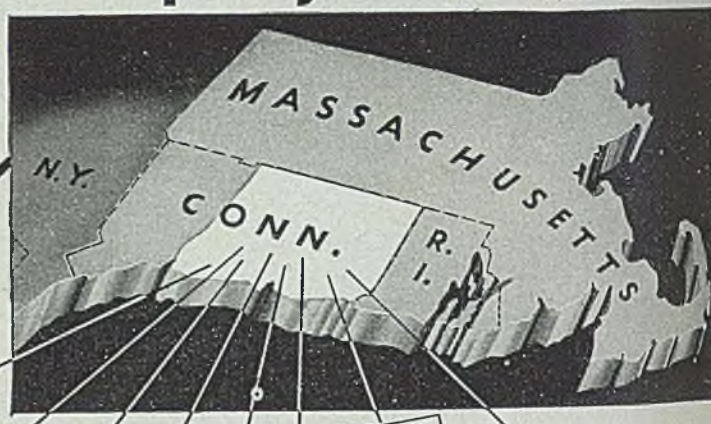
YOU CAN MACHINE IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

WARNER & SWASEY Machine Tools *Cleveland*

TURRET LATHES. SADDLE AND RAM TYPES • CHUCKING AND BAR TOOLS
PRECISION TAPPING AND THREADING MACHINES

You're in good company . . .

in *Southern New England*



No matter where you go in industrial Southern New England, it won't be long before you come upon the plant of a well-known manufacturer.

For example, in this section of Connecticut, nationally-famous typewriters, locks, firearms, silverware, brushes, tools, safety razors, rugs, vacuum bottles, aviation engines and propellers, rubber goods, shaving cream, soap and skin lotion, as well as many other products, are manufactured.

Every one of these products has a name as familiar as your own. Many of them had their beginnings here. Others have come because of conditions favorable to manufacturing . . . generations of skilled craftsmen; abundant power; fair taxes; industrially-minded banking; State and local government that grew up with industry and understands its problems.

But that is only part of the story.

Southern New England lies in the heart of the world's richest, most-highly concentrated market.

Within a radius of 500 miles live 58,000,000 people to absorb not only Southern New England's consumers' goods but her producers' commodities —the tools and parts that go into other industries.

And because no part of Southern New England is more than 125 miles from tidewater and the great ports leading to foreign markets, manufacturers locating here will be at the threshold of the huge overseas trade that will develop during the great era of peacetime commerce ahead.

Southern New England offers better personal living, too, for it abounds in charming residential communities with good schools, churches, lakes, hills and sandy beaches—all close by.

In planning your tomorrow, don't overlook Southern New England—perfect for your new or expanding business . . . and for your all-around enjoyment of life.

An industrial booklet in full color, "Southern New England for Tomorrow's Industry", is yours for the asking. Write to P. E. Benjamin, Manager of Industrial Development, The New Haven Railroad, 80 Federal Street, Boston 10, Mass.

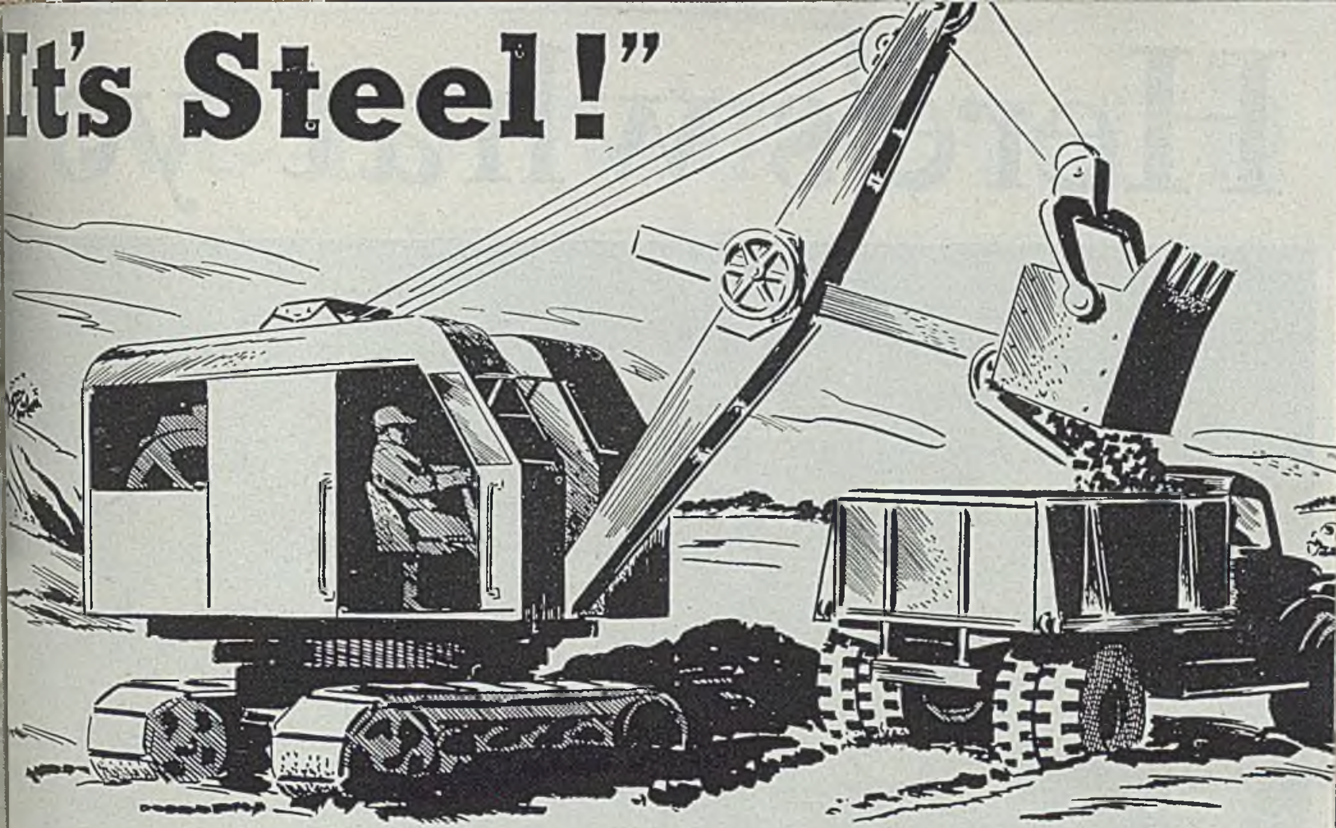
This is one of a series of advertisements presenting the industrial advantages of Southern New England.

THE NEW HAVEN R.R.

Serving SOUTHERN NEW ENGLAND *with a new of rail and highway transportation that puts manufacturer* "ON THE MAIN LINE".

STE

It's Steel!"



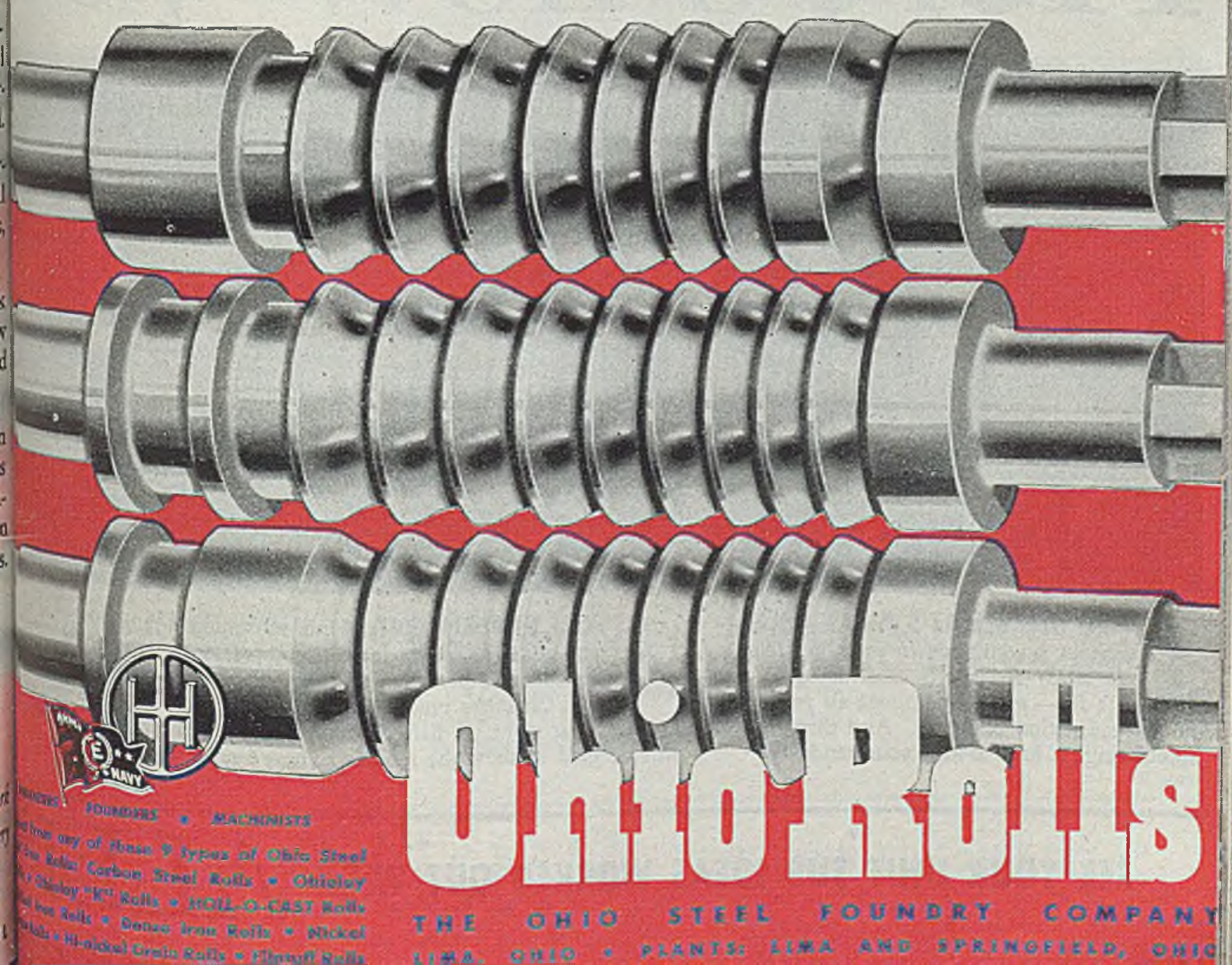
What more is there to say?

Unqualified, the merits of steel have been proved in thousands of applications, from steam shovels to washing machines.

The net result is a market that is waiting impatiently for articles made from steel—and they'll accept no substitute.

Logically, then, steel must be produced in quantities never before paralleled in the history of peacetime production.

Obviously, rolls will also be needed in proportion to this demand. It is Ohio Steel's intention to produce these rolls—*right* and in a minimum of time.



FOUNDERS • MACHINISTS

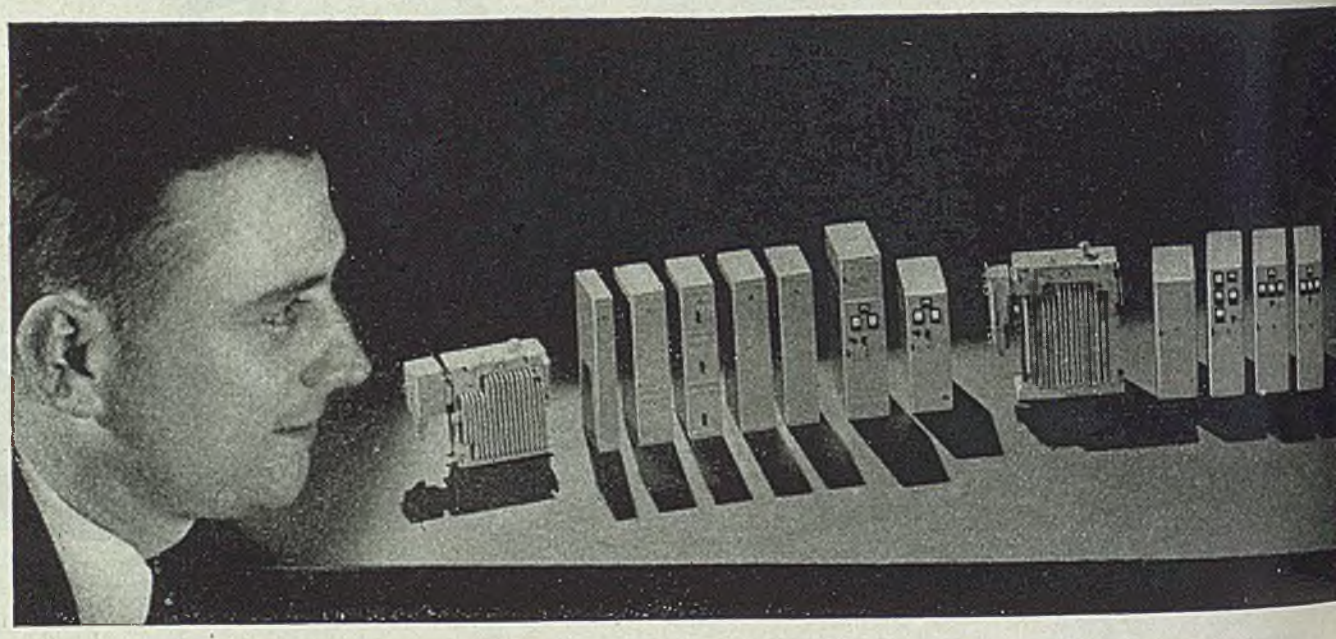
...from any of these 9 types of Ohio Steel ...Rolls: Carbon Steel Rolls • Ohioloy ... Ohioloy "K" Rolls • HOLL-O-CAST Rolls ... Iron Rolls • Denso Iron Rolls • Nickel ... Rolls • Hi-nickel Grain Rolls • Flintuff Rolls

Ohio Rolls

THE OHIO STEEL FOUNDRY COMPANY

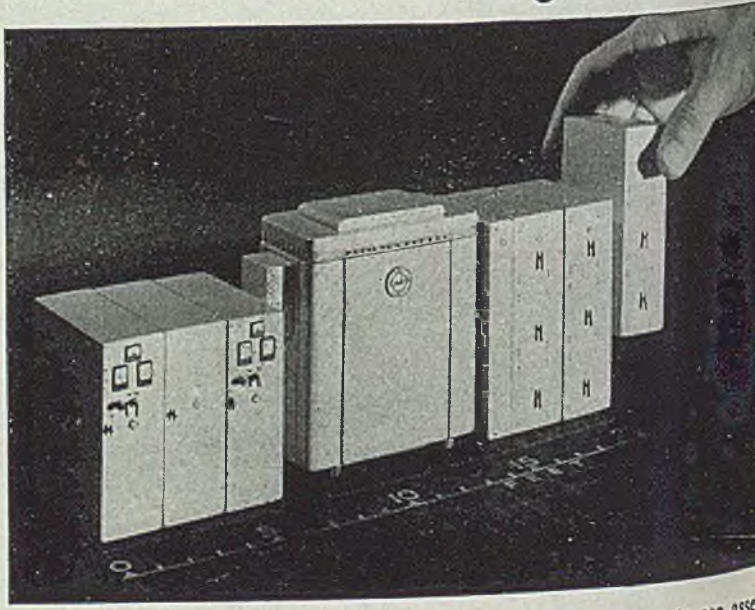
LIMA, OHIO • PLANTS: LIMA AND SPRINGFIELD, OHIO

Here's what you



Here's how you

1 YOU SEE WHAT'S AVAILABLE — without bogging down in tables, charts, diagrams. Accurately constructed—½ in. to 1 ft — models eliminate all guesswork in unit substation planning. And they're idea-stimulating . . . hard to keep your hands off.

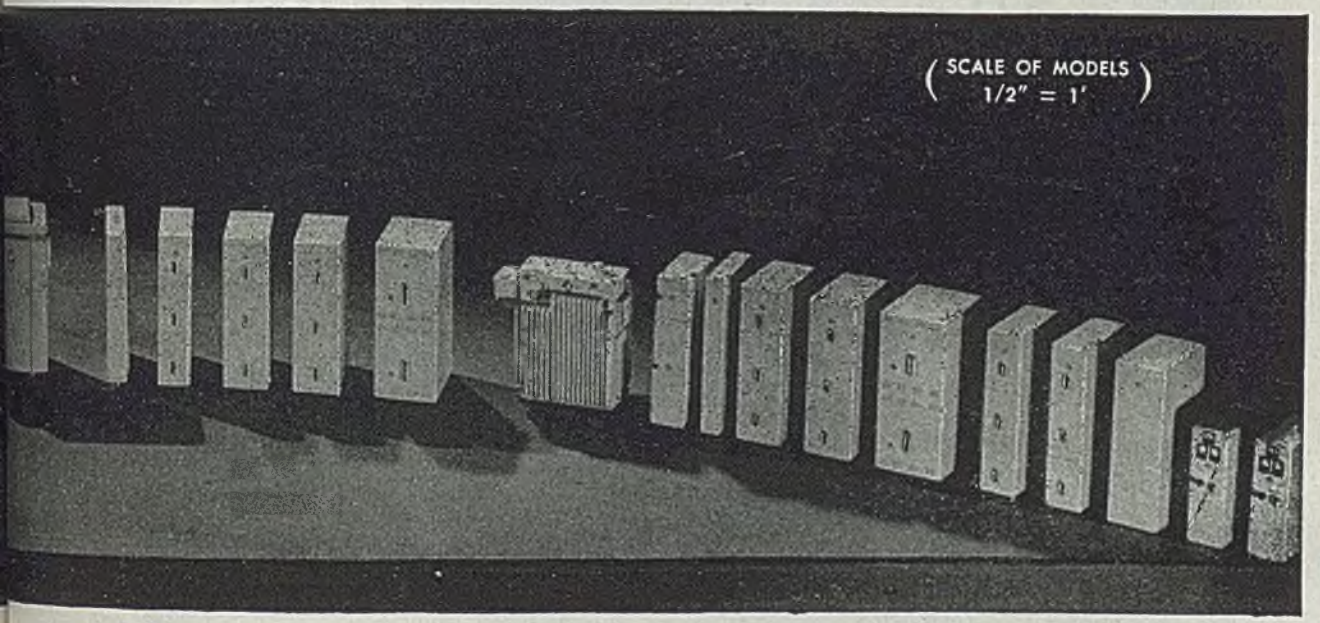


2 YOU EXPERIMENT. Unit substation arrangements are asse bled quickly . . . allowing easy comparison of alternate plans. Thi eight models permit you to see for yourself the great flexibility Allis-Chalmers unit sub equipment . . . determine the *right* sub tion for your plant. A field engineer from your nearby A-C district o will be glad to show the models. There's no obligation.

SEE YOUR UNIT SUB IDEAS WORKED OUT WITH ALLI

STE

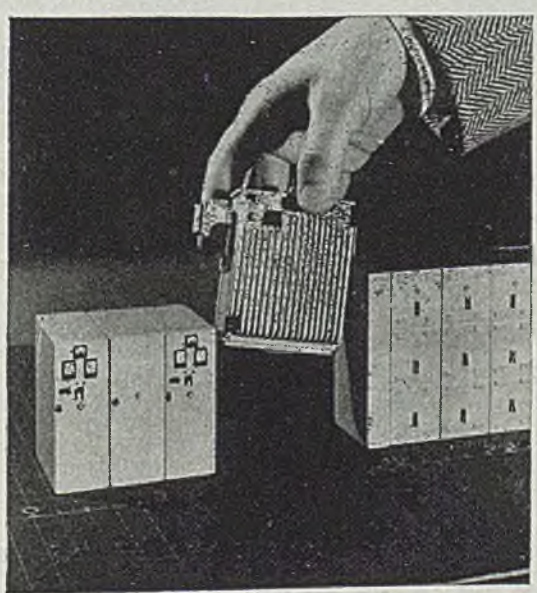
ave to work with



work:

When you use Allis-Chalmers scale models to help solve Unit Sub problems!

3 YOU DETERMINE what size circuit breakers will be needed when you use Allis-Chalmers' handy Unit Sub Slide Rule to ...lculate secondary short circuit current ...ickly, easily, accurately.



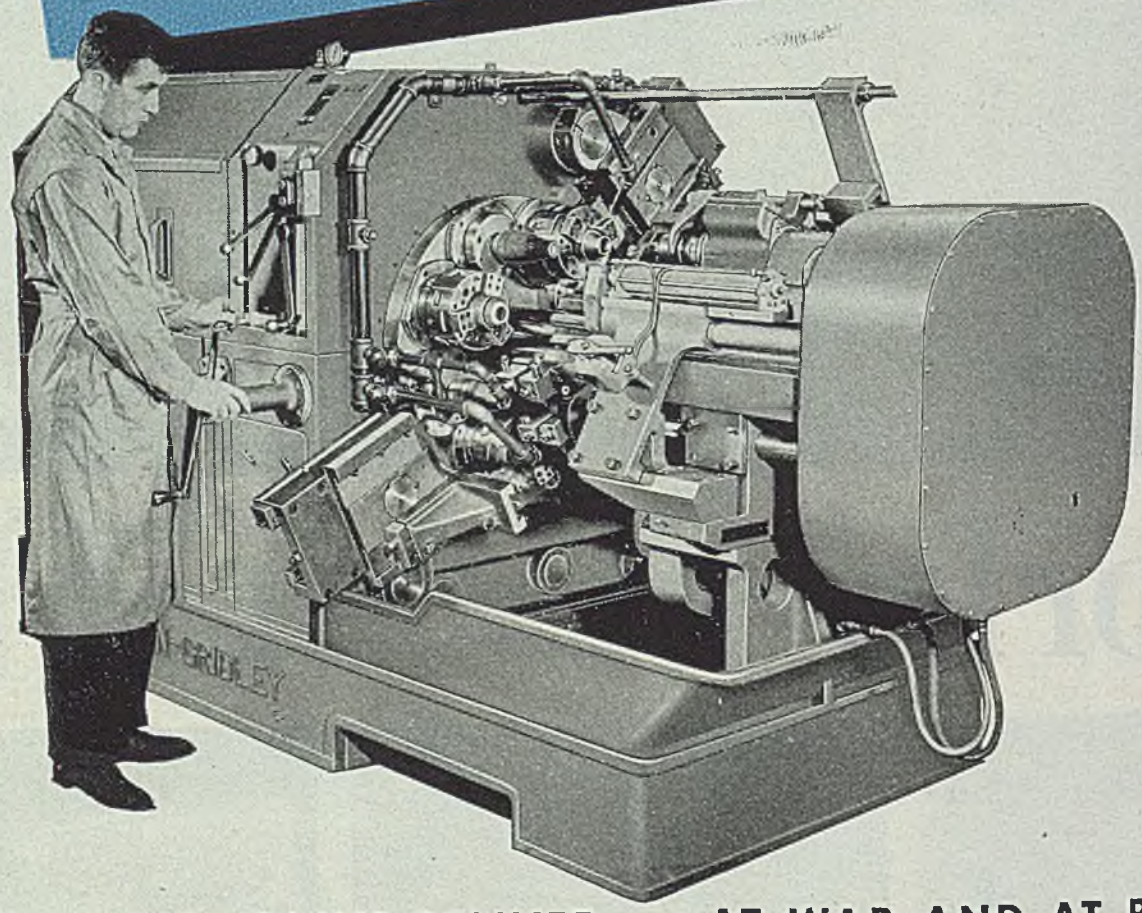
4 YOU VISUALIZE SOLUTIONS to your power distribution problems right on the top of your desk. At a glance, you see what space your proposed unit substation will occupy. You also see how it will look when actually installed in your plant.

5 YOU DOUBLE CHECK with A-C's Check List book which reduces every basic consideration in unit sub planning to its simplest possible form.

A 1828

CHALMERS "UNIT SUB BUILDER" SET

LEADERSHIP
PROVED BY HUNDREDS OF CASE HISTORIES . .



NEW BRITAINS DELIVER . . . AT WAR AND AT PEACE

The automatic chucking machine business had its inception in the heart of Connecticut in the year 1911. Basic designs and operational features met with immediate success, for here was new speed and production of efficiency.

New Britain chuckers built in 1911 were years ahead in functional design and application, and extensive research coupled with advance engineering has kept them way out in front . . . to cope with mass production methods and keen competition.

New Britains' ability to speed up production of essential ammunition parts and equipment proved of great importance back in '18. During the era of industrial development that followed World War I, American initiative and ingenuity accounted for many refinements in design . . . to meet rigid specifications, quality and quantity production demands.

Today, the Army-Navy "E" award and three continuous performance stars are evidence of New Britain Machine's outstanding contributions to achieve a decisive Victory in World War II . . . a combination of the best in men, machines and materials to produce the ultimate in multiple spindle bar and chucking machines.

NEW BRITAIN AUTOMATICS

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT
NEW BRITAIN-GRIDLEY DIVISION

M-01017

STE

...Here's One

Extensive metallurgical research is resulting in new manufacturing economies while turning out higher quality parts and products. The motor end frame is one of several typical jobs employing an alloy in preference to cast iron.

The aluminum alloy part presented an extreme chucking problem due to its 6.741" diameter and fragile ⅛" section. The selection of New Britain 88's proved to be the solution. Twenty-two (22) well-placed tools in eight positions are required to completely machine the rough casting . . . a part every 11.8 seconds. The machines are running 574 R.P.M. and produce 305 motor end frames per hour.

FIRST POSITION

Load in two-jaw hydraulically operated chucks.

SECOND POSITION

Face end of skirt from cross arm — Core Drill .7775 diameter — Rough turn 6.738 diameter. Face end of hub.

THIRD POSITION

Core drill 1⅛" diameter and 15/16" diameter. Rough turn 1.330 diameter.

FOURTH POSITION

Single point bore .7775 and 1⅛" diameters. Rough turn 1.433 diameter.

FIFTH POSITION

Single point bore .7775 and 1⅛" diameters and chamfer 1⅛" diameter. Semi-finish turn 6.738 diameter.

SIXTH POSITION

Finish face side of skirt from cross arm. Rough recess both grooves.

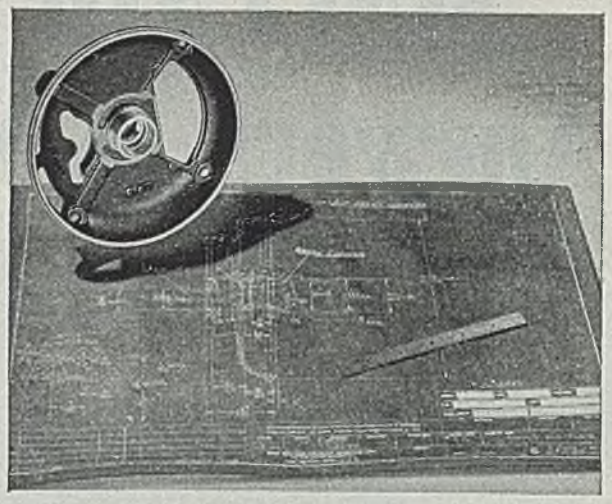
SEVENTH POSITION

Finish recess both grooves.

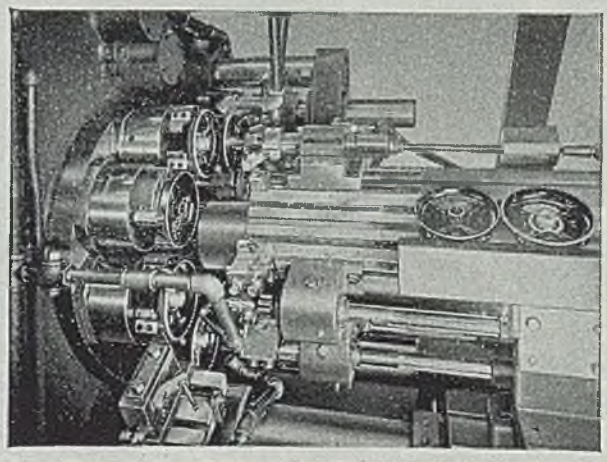
EIGHTH POSITION

Ream .7775 diameter — Finish turn and chamfer.

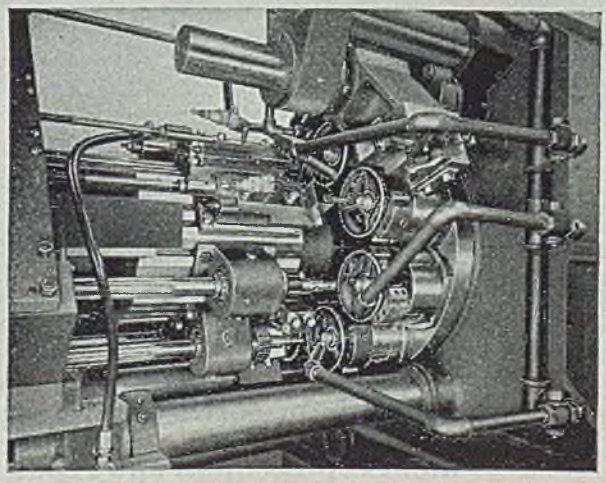
This difficult machining of an aluminum alloy motor end frame is but one of many outstanding applications of New Britian automatics . . . bar and chucking machines that are establishing new records daily for accurate and economical production. To manufacture your peacetime quality product at less cost . . . machine it on a New Britain multiple spindle automatic.



Finished Aluminum Alloy Motor End Frame machined to exacting tolerances.



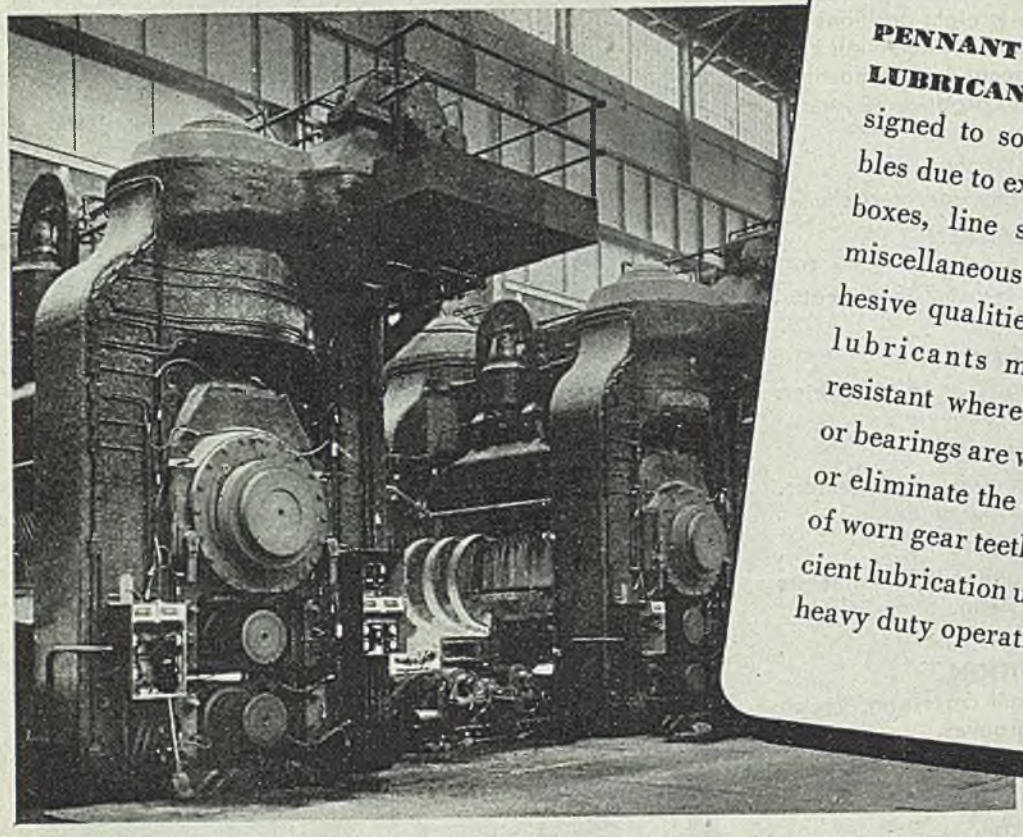
Front View of a New Britain Model 88 used in finishing the motor end frame . . . Note accessibility through open end construction.



Rear View of a Model 88 shows relationship of cross arms to toolslide . . . Permitting more efficient tool layout and production.

The New Britain machine line includes four, six and eight multiple spindle automatic bar machines up to 2¼" capacity. Also a wide range of four, six and eight multiple spindle automatic chucking machines up to 12" capacity.

SINCLAIR has the Answers to MILL Lubrication Problems



FOR EXAMPLE:

PENNANT NO-DRIP LUBRICANTS are specially designed to solve lubrication troubles due to excessive wear in gear boxes, line shaft bearings, and miscellaneous bearings. The adhesive qualities of these Pennant lubricants make them leak-resistant where seals are broken or bearings are worn. They reduce or eliminate the chatter and noise of worn gear teeth . . . provide efficient lubrication under continuous heavy duty operation.

• In cooperation with mill engineers and equipment manufacturers, Sinclair has developed specialized heavy duty lubricants which help solve today's equipment replacement and repair difficulties. Sinclair lubricants for iron and steel mills are designed to prolong machine life by partial correction of mechanical conditions which impair operating efficiency and may lead to breakdown.

A complete guide to simplified mill lubrication is available to you. Write for it.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20

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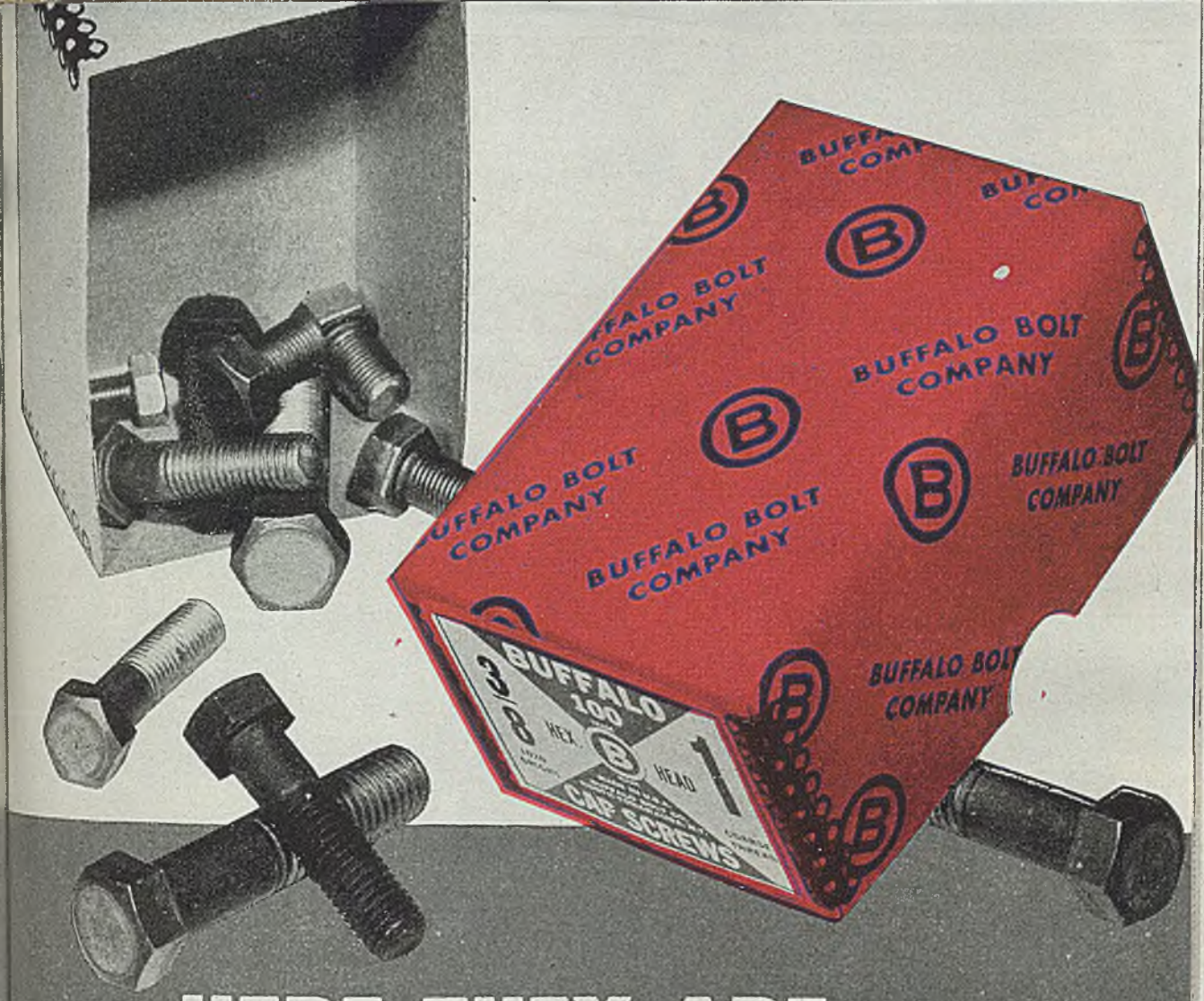
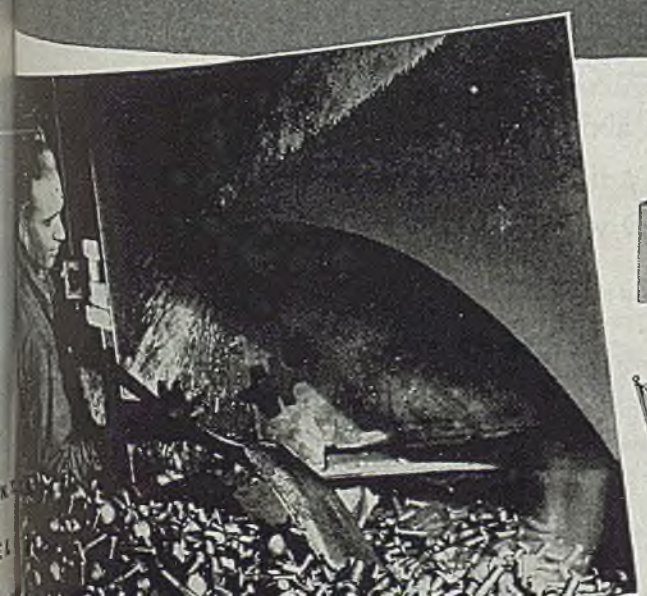


HERE THEY ARE...

Ⓑ CAP SCREWS

• • • Buffalo Bolt Company's new and improved product

At the request of many manufacturers and members of the trade, we have augmented our line of circle Ⓑ fasteners with a complete assortment of cap screws in all stock sizes, both bright and black satin finish. These new products, of Buffalo Bolt quality and uniformity from head to the final thread, are now available through your jobbers. Write for complete specifications and list of stock sizes and name of jobber in your territory.



◀ A new method of heat treating gives circle Ⓑ cap screws their black satin finish.

BUFFALO BOLT COMPANY

ARMY NAVY

NORTH TONAWANDA, NEW YORK

SALES OFFICES IN PRINCIPAL CITIES

. . . . ON BEING SEEN . . . NOT HEARD

Once in awhile he could do it . . . If he tried real hard . . . If he could think kinda heavy about things around the room . . . Then he could—just sit . . . Got awful tiresome tho'—sittin' not talkin' . . . He wondered now and then, if Mom wasn't askin' a lot . . . Each time before company came, she reminded: "Children should be SEEN NOT HEARD".

Yes, it was askin' a lot . . . Just the same as it would be for grown-ups . . . We can all be SEEN NOT HEARD—once in awhile.

Our quality, dependability and service can be seen . . . But we get so eager to talk to you about our Seamless Copper and Brass Tubing, that the words must spill out . . . Let us tell you about our products—at your convenience . . . Drop us a line for information . . .

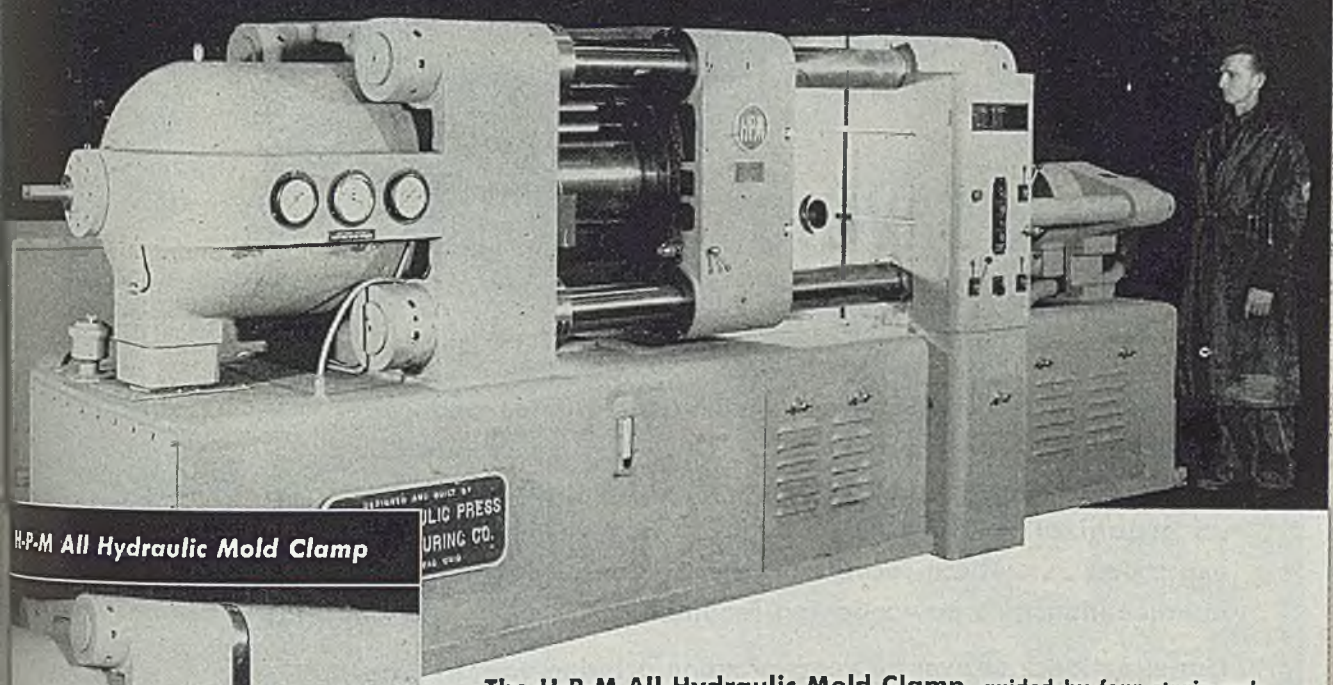
To be SEEN AND HEARD will be to our mutual interests.

WOLVERINE TUBE DIVISION

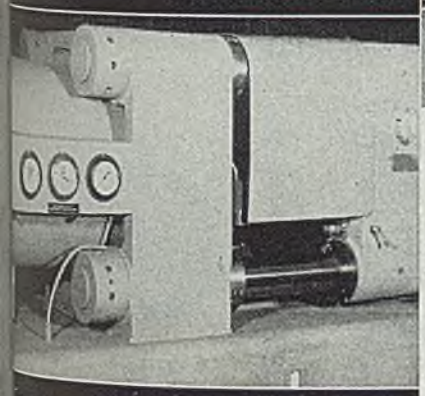
Calumet & Hecla Consolidated Copper C
1411 CENTRAL AVE., DETROIT 9, MICHIGA

STE

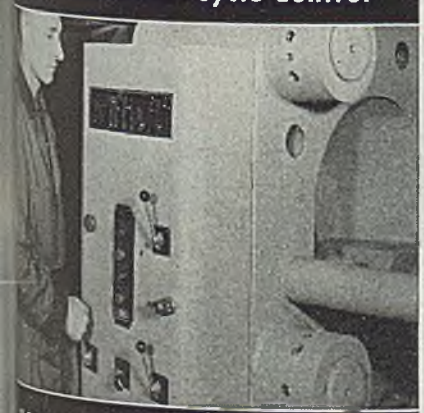
CHECK ✓ THE DESIGN FEATURES OF THIS NEW *All-Hydraulic* MACHINE FOR *High Pressure Die Casting*



H-P-M All Hydraulic Mold Clamp



H-P-M Automatic Cycle Control



H-P-M Hydro-Power Operating System

The H-P-M All-Hydraulic Mold Clamp, guided by four strain rods, assures positive mold alignment. Die change-over is simple and fast. Both clamp stroke and pressure are adjustable. Positive overload protection is provided at all times. High speed closing and opening, with automatic slow-down prior to mold contact guarantees fast, shockless operation.

H-P-M Automatic Cycle Control permits maximum production. Manual effort has been minimized. Electric hand switches control mold clamp, hydraulic ejector and core pulls. A single Multiflex timer controls the automatic cycle after metal has been ladled into "cold" chamber. A selector switch is provided for manual operation of the entire cycle, if desired.

The H-P-M HYDRO-POWER Operating System provides a direct and compact source of hydraulic power. No accumulator is required. Pumps valves and controls are all built by H-P-M for heavy duty oil-hydraulic service. Undivided responsibility to the user is guaranteed. Each pump is equipped with convenient volume and pressure controls. Only electric power and cooling water are required for operating this self contained machine.

Write today for your free copy of H-P-M Bulletin 4402 describing these revolutionary H-P-M All-Hydraulic high pressure die casting machines.

THE HYDRAULIC PRESS MFG. COMPANY

Mount Gilead, Ohio, U. S. A.

Branch Offices in New York, Philadelphia, Cleveland, Detroit and Chicago. Representatives in principal cities.

HPM

All-Hydraulic... High Pressure

DIE-CASTING MACHINE

REVOLUTIONIZING PRODUCTION WITH HYDRAULICS SINCE 187

MAKERS OF EVERY TYPE OF GEAR AND GEAR SPEED REDUCER

Established 1888

D.O.James

ARMY E NAVY

POWER SAVING PRODUCTS

We have been making various types of cut gears and gear speed reducers for many years . . . Our extensive present day facilities for their manufacture are the outcome of developing an organization that would capably handle our resultant expansion . . . These facilities give us a capacity that readily handles industry's power-saving requirements.

Our experience of over 58 years of manufacturing various types of gears and gear reducers is invaluable in the selection of the proper type of gear speed reducer for your power-saving transmission problems.

D.O. James Gear Sales-Engineers are located in key industrial centers.

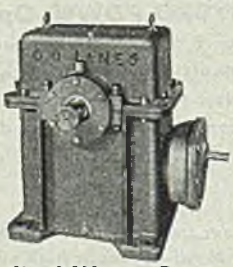
D.O.JAMES MANUFACTURING CO.
1140 West Monroe Street Chicago, Ill.

Continuous-Tooth Herringbone Speed Reducers

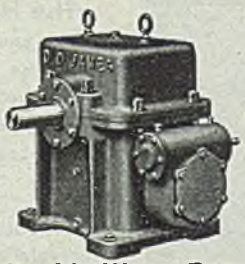
Planetary Gear Speed Reducers

Spiral Bevel Gear Speed Reducers

Type "H" Worm Gear Speed Reducers



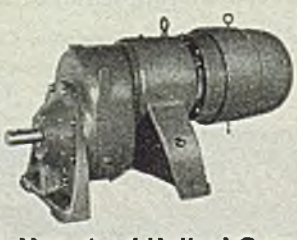
Helical Worm Gear Speed Reducers



Double Worm Gear Speed Reducers

Spiral Bevel Herringbone Speed Reducers

Motorized Worm Gear Speed Reducers

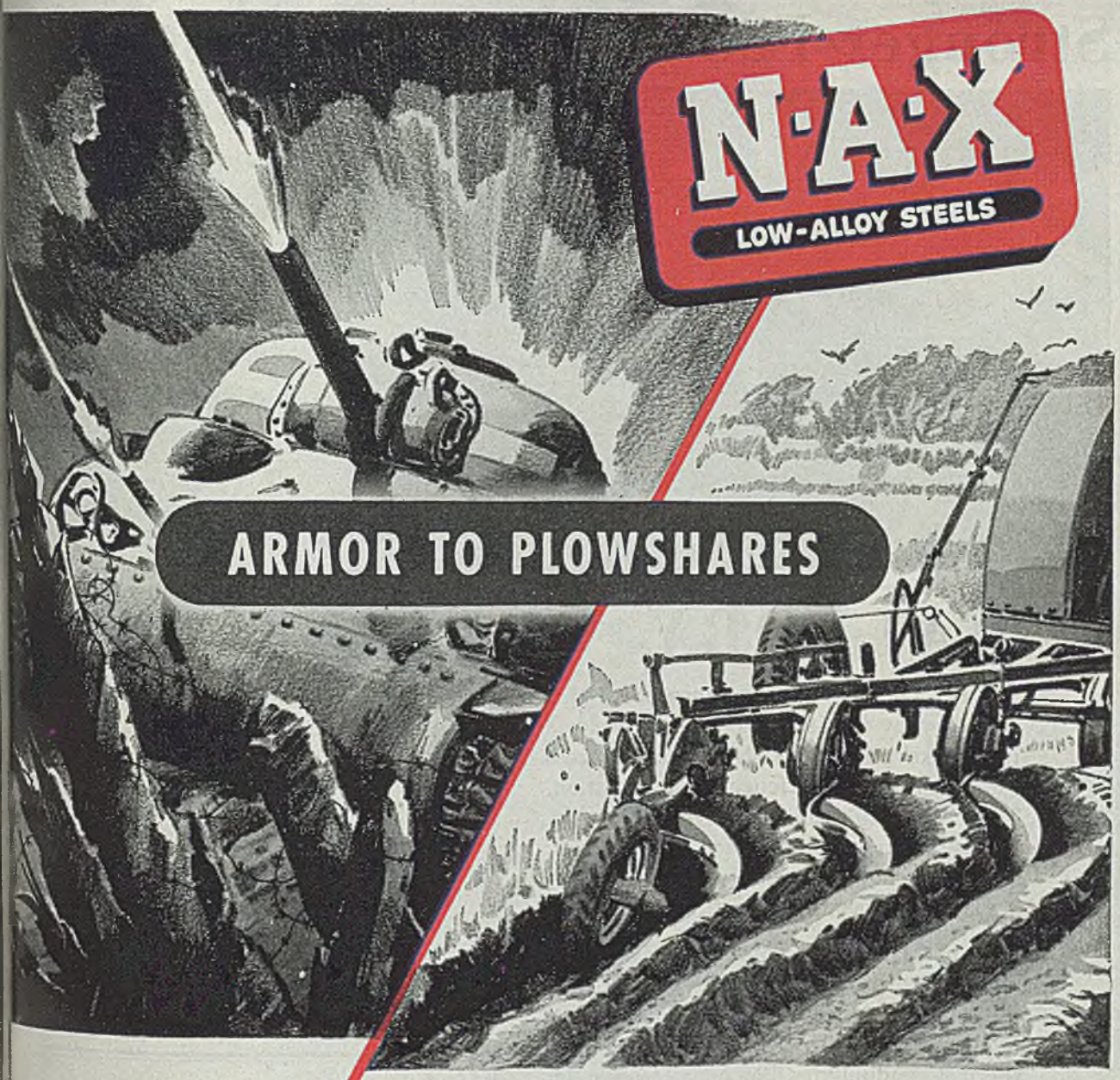


Motorized Helical Gear Speed Reducers

Motorized Planetary Gear Speed Reducers

Spiral Bevel Planetary Gear Speed Reducers

STE



It has already happened. . . . One of the fine-grained N-A-X low-alloy steels — steels that have provided armor for tanks and landing craft, frames for all jeeps, and vital parts for scores of fighting vehicles — has been "beaten into plowshares" to produce priority equipment for agriculture.

The particular steel was N-A-X 9120, a carburizing grade. Its ready response to carburization and heat-treatment is utilized to produce a farm implement that is "tough to the core" and that has the required surface hardness to resist abrasion and wear.

The conversion of an N-A-X low-alloy steel from tools of war to tools of peace is not surprising . . . just prophetic. For the same wide range of desirable properties that made these fine-grained steels a great military material recommends their use in civilian products.

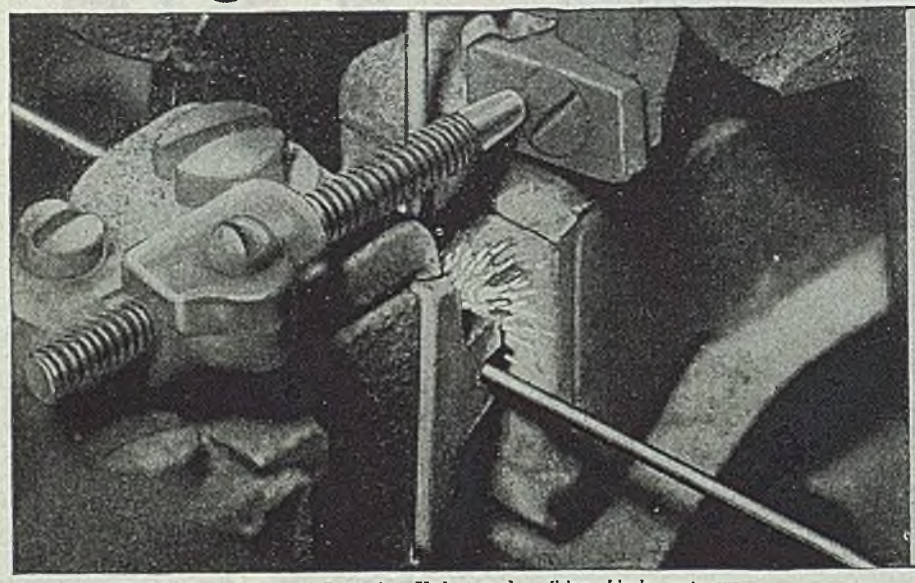
GREAT STEELS FROM GREAT LAKES

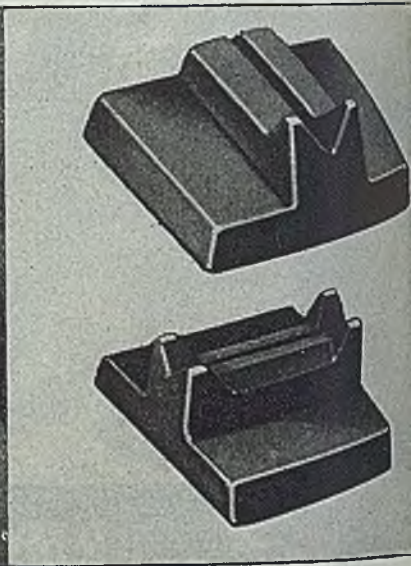
GREAT LAKES STEEL
Corporation

N-A-X ALLOY DIVISION • DETROIT 18, MICHIGAN

UNIT OF NATIONAL STEEL CORPORATION

Stronger Fence Produced Faster *with*





Flash is shown for sake of illustration. Under actual conditions this does not occur.

MALLORY WELDING DIES

MILES of wire fence are turned out each day by high-speed cross-wire welders that make a series of strong joints across the entire width of the fence, in one operation. This cross-wire welding has been speeded by the use of Mallory Resistance Welding Dies, and tests show that the welded joints are actually stronger than the wire itself!

Dies of Mallory 100 Metal, now standard equipment, provide many advantages over the bronze welding dies originally used. This Mallory alloy, with its high electrical and thermal conductivity, conducts heavy welding currents without overheating and rapidly dissipates heat from the welding surface of the dies—permitting faster welding. Dies retain their correct contour over long production runs, and "down time" for dressing or replacement is minimized because of the excellent physical and mechanical properties of the Mallory alloy.

Savings in production time because of faster, better welding with Mallory Standard Resistance Welding Electrodes are commonplace throughout the metal fabricating industries. Whether you need spot welding tips and holders, seam welding wheels, or dies for flash, butt or projection welding, specify Mallory. Often a *standard* electrode will solve your problem. Consult us today.

Invaluable Information

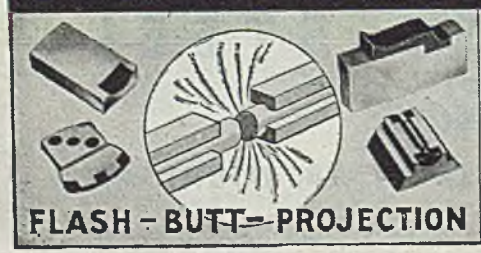
—now available, Third Edition Mallory Resistance Welding Data Book, a comprehensive text on resistance welding practices. Sent gratis to resistance welding engineers, when requested on company letterhead. Available to students, libraries and schools at $2.50 per copy, postage paid.

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

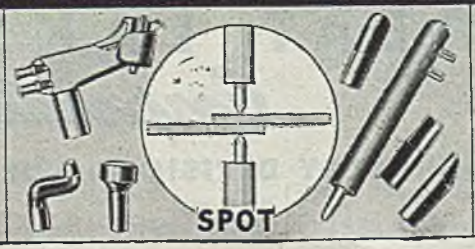
In the United Kingdom, Made and Sold by Mallory Metallurgical Products, Ltd., London.

P.R. MALLORY & CO. Inc

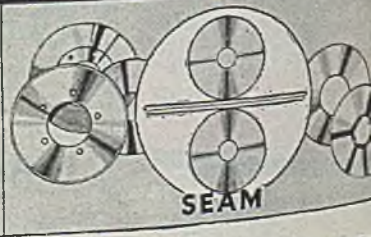
MALLORY *Standard Resistance Welding Electrode*



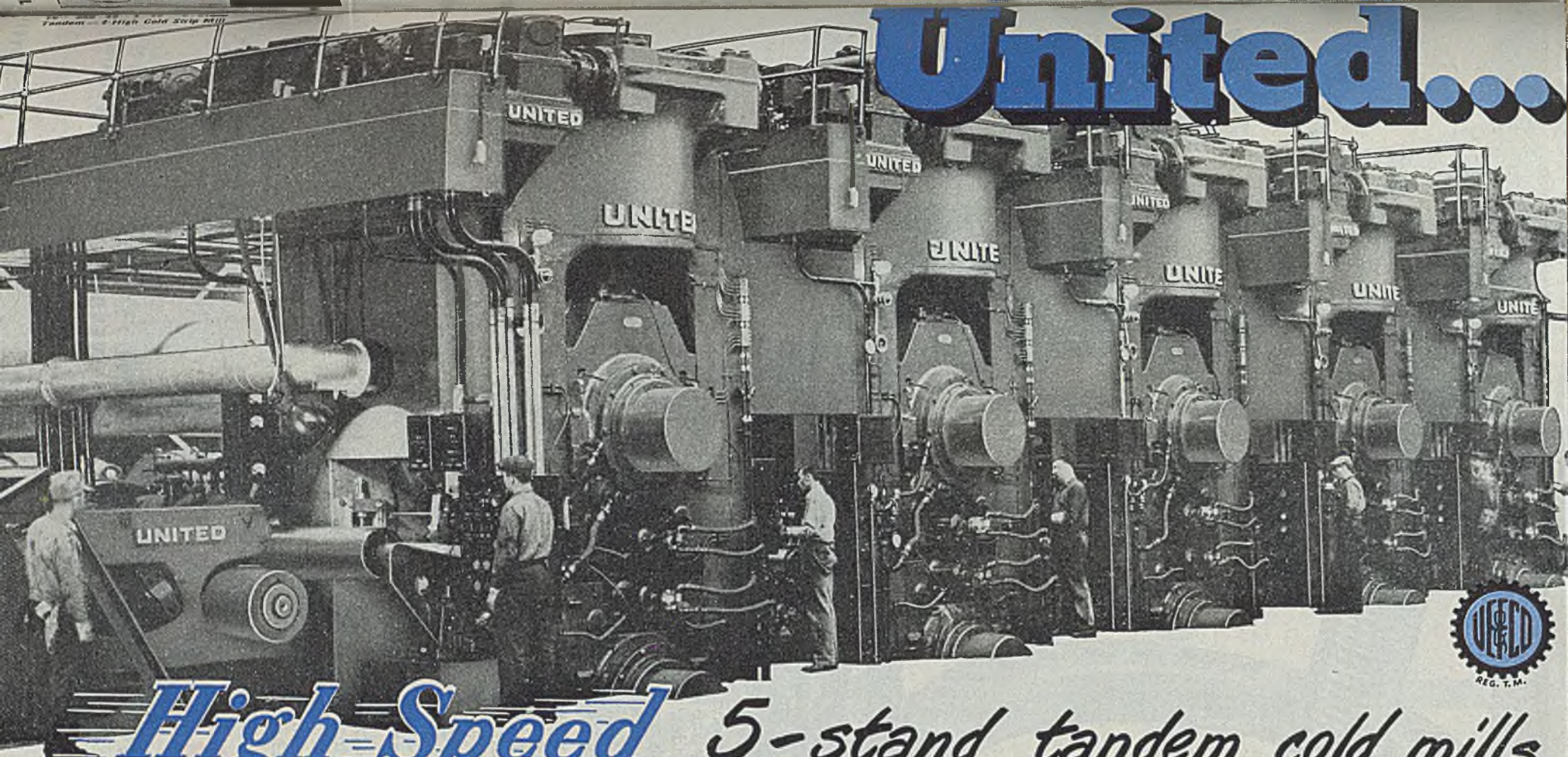
FLASH – BUTT – PROJECTION



SPOT



SEAM



High Speed 5-stand tandem cold mills

FOR PRODUCTION OF SHEET AND TINPLATE STOCK

UNITED ENGINEERING and FOUNDRY COMPANY, for 40 years leader in the development of cold reduction processes, offers immediately available designs for high speed, high production, 5-stand tandem tinplate mills with finishing speeds up to 5000 F.P.M. Also available are designs for modern 4-stand and 3-stand units.

These mills embody all the latest features in auxiliary equipment including uncoilers, guides, coolant systems, tension rolls, coilers, etc.

Consult UNITED'S engineers when making plans for reconversion and expansion.

UNITED ENGINEERING AND FOUNDRY COMPANY

PITTSBURGH, PENNSYLVANIA

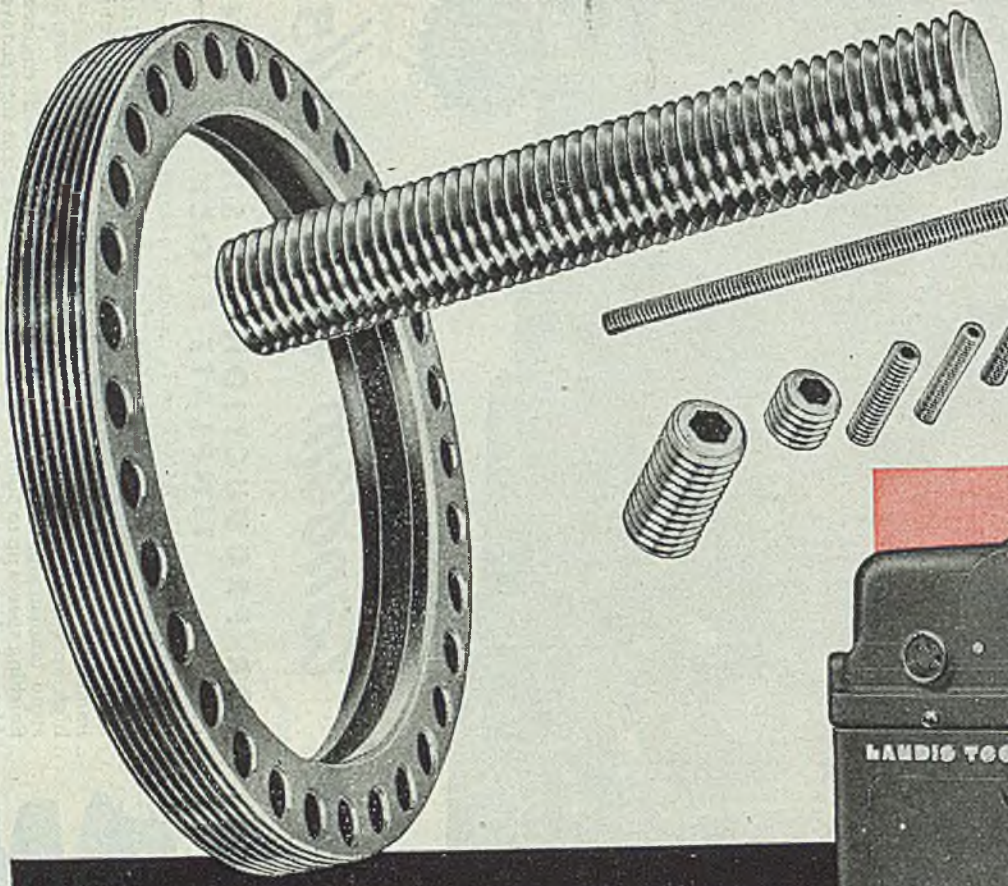
Plants at PITTSBURGH · VANDERGRIFT · NEW CASTLE · YOUNGSTOWN · CANTON

Subsidiary: Adamson United Company, Akron, Ohio

Affiliates: Davy and United Engineering Company, Ltd., Sheffield, England

Dominion Engineering Works, Ltd., Montreal, P. Q. Canada

The World's Largest Designers and Makers of Rolls and Rolling Mill Equipment



LANDIS TOOL
CENTERLESS THREAD GRINDER

STRONGER, MORE ACCURATE THREADS

At Lower Cost

BY THE LANDIS TOOL CENTERLESS THREAD GRINDER

Centerless ground threads, made possible for the first time by the new LANDIS TOOL Centerless Thread Grinder, have all the advantages of a ground finish such as accuracy, smooth surface, bright finish *plus* the special centerless advantages of high production at low cost of a wide variety of threaded parts.

Centerless ground threads are stronger and more accurate because you start from solid hardened stock. No final heat treatment is needed and chance of thread warpage and cracking is eliminated. All threads are smooth, clean and perfectly uniform when viewed through a magnifying glass or a comparator. The multiple groove formed wheel is equivalent to a series of accurately formed wheels that grind each thread.

Costs tumble because of speedier production, fewer rejects, less inspection. If you can use the accuracy and low cost of centerless ground threads, it will pay you to investigate the new LANDIS TOOL Centerless Thread Grinder.

ADVANTAGES

- Bright finish
- Freedom from burrs
- Perfect thread form
- Perfect lead control
- Perfect starting thread
- Smooth surface

25A

LANDIS TOOL
Precision Grinders

LANDIS TOOL COMPANY
WAYNESBORO, PENNSYLVANIA

Then he said to himself

"No Joy—No Strength"

HIGH point in faith toward a losing technique was exhibited by "Herr Doktor" Ley . . .

—leader of Hitler's "Strength Through Joy" Youth Movement.

Sitting between two GI's who had frisked him of his cyanide vial, he unjoyfully maintained:

"Adolph Hitler was Germany's greatest man."

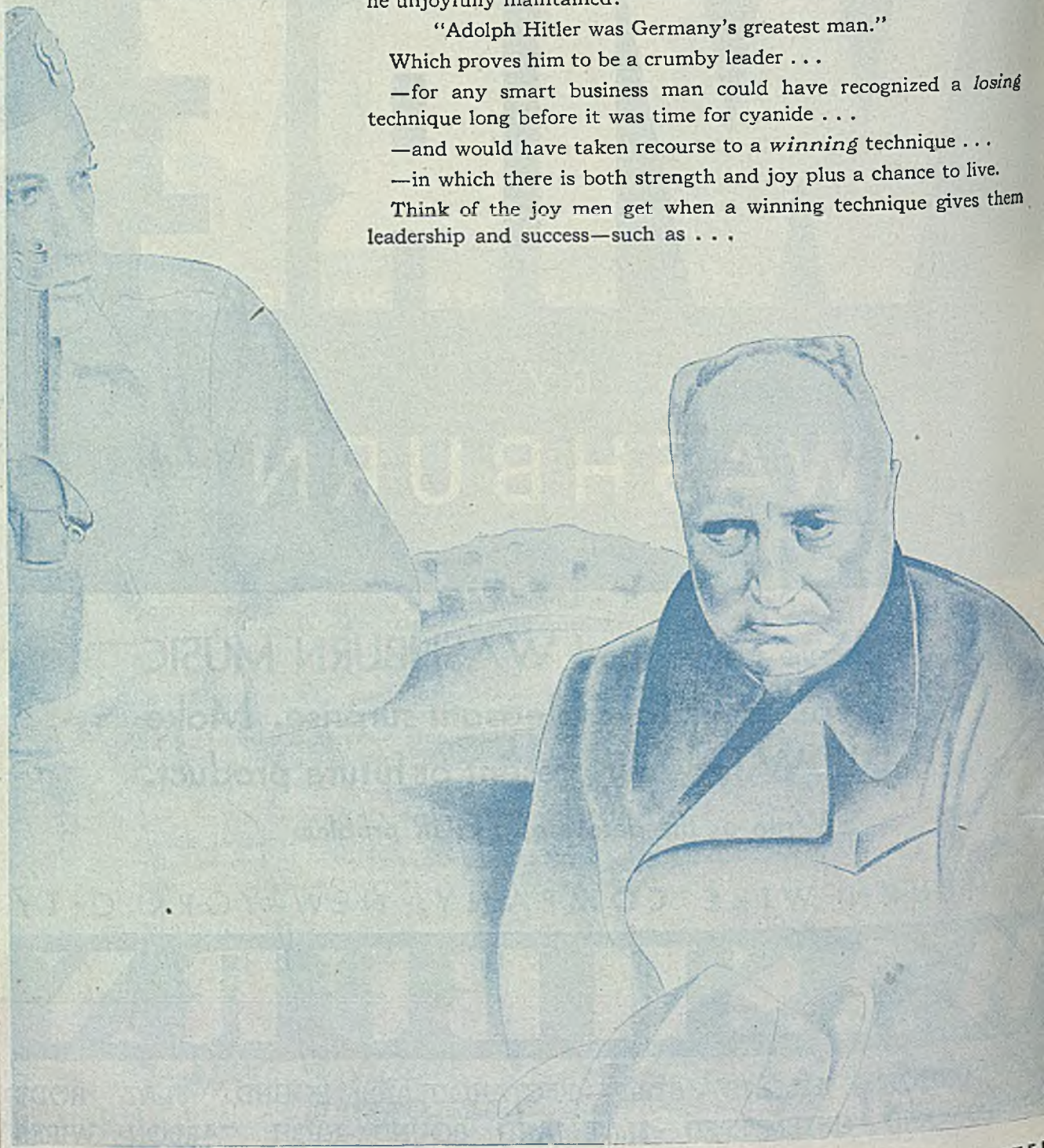
Which proves him to be a crumby leader . . .

—for any smart business man could have recognized a *losing* technique long before it was time for cyanide . . .

—and would have taken recourse to a *winning* technique . . .

—in which there is both strength and joy plus a chance to live.

Think of the joy men get when a winning technique gives them leadership and success—such as . . .



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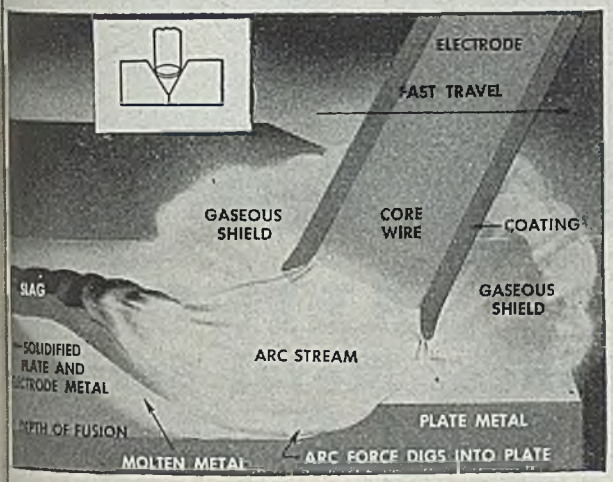
LOOK, HERR DOKTOR, how to obtain

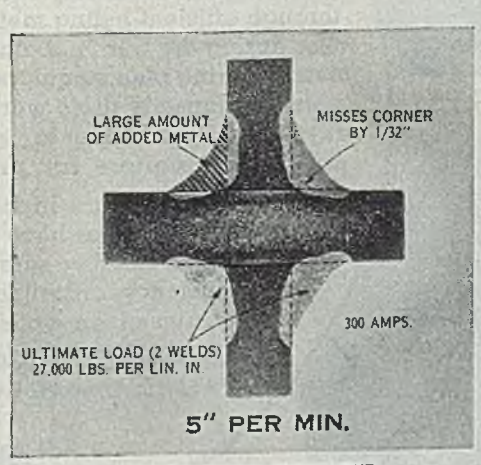
STRENGTH THROUGH "FLEET-WELDING"



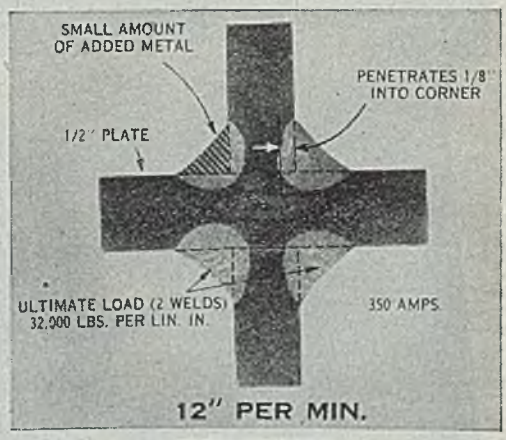
CROSS-SECTION OF ARC IN V GROOVE

Competitive Strength. "Fleet-Welding" utilizes *arc force* to get higher travel speed and greater penetration with less deposited metal. For butt welds in 3/8" plate, speed is 350% higher; cost is 75% less than conventional method.

Physical Strength. Effect of "Fleet-Welding" penetration on speed and weld strength of fillets. Conventional technique gives ultimate load capacity of 27,000 lbs. per lin. inch whereas "Fleet-Welding" gives 32,000 lbs. per lin. inch.



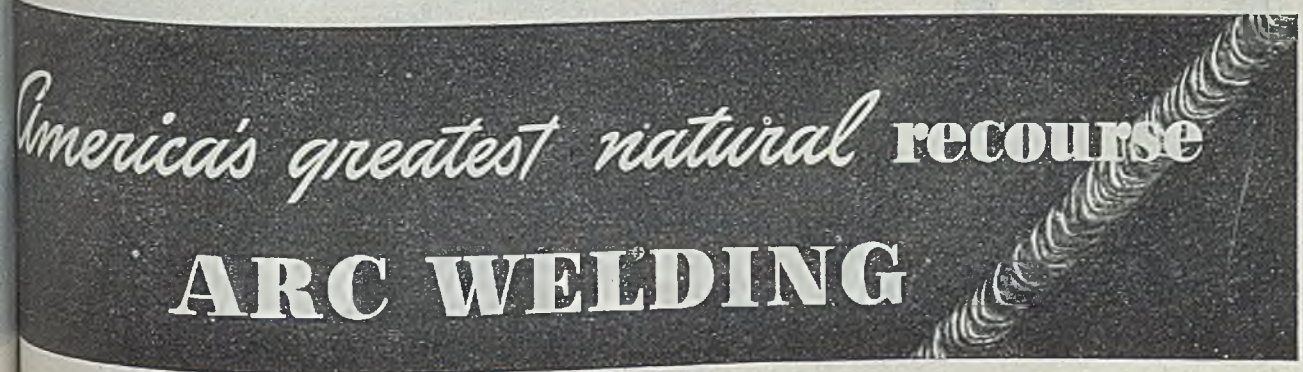
CONVENTIONAL TECHNIQUE

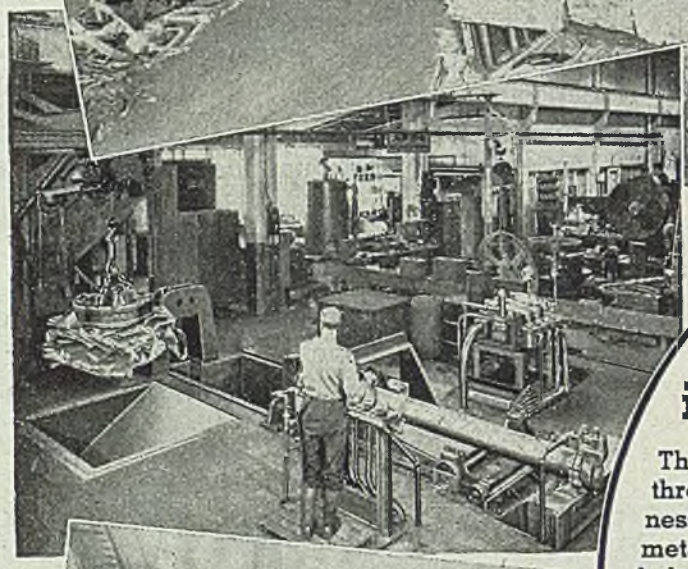


"FLEET-WELDING"

Handy pocket manual, Bul. 444, gives "Fleet-Welding" procedures for all types of joints and welding positions. Free on request. Ask for it on your business letterhead.

THE LINCOLN ELECTRIC COMPANY • DEPT. L-1 • CLEVELAND 1, OHIO



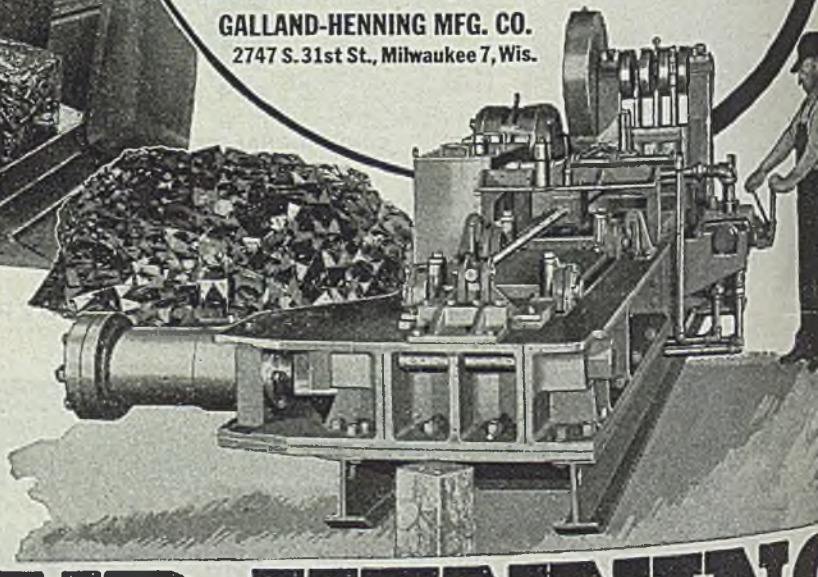


BALING
Sheet Metal Scrap is *Good Business!*

The continuous orderly salvaging of sheet metal scrap, through efficient baling methods, has proven good business during the war . . . both for the war effort and for the metal working plants equipped with hydraulic scrap metal balers. Fortunately there were enough of them in the early days of war production to partially supply the demand of mills and smelters for properly baled sheet scrap.

G-H Hydraulic Balers installed in scores of additional plants during the war have proven to be *good business* not only in reducing scrap losses but in promoting plant efficiency, orderliness and safety. For experienced counsel on your baling problems, write

GALLAND-HENNING MFG. CO.
2747 S. 31st St., Milwaukee 7, Wis.



GALLAND-HENNING

SCRAP METAL BALING PRESSE

STE

aking Surgical Instruments of Stainless Steel

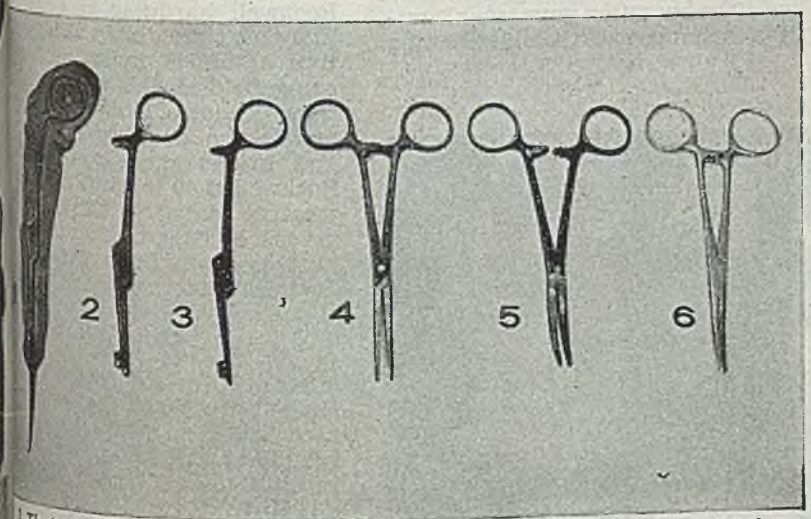
A report on one manufacturer's methods of forging, heat-treating and finishing small STAINLESS STEEL parts

INLESS STEEL which is to be into surgical instruments of ully controlled qualities needs care in heat treating. Inspec- likewise must follow more of production operations than is with ordinary "carbon" steels. these precautions and a few ges in procedures STAINLESS s can go down the same pro- n line as ordinary steels. Eli- tion of plating is a great ad- ge to both the fabricator and ser. Such is the experience of efel Bros. Corporation, Newark, , makers of the famous "La- " instruments.

STAINLESS STEEL itself, of e, must be made with utmost the way it is made by Rustless and Steel Corporation. Any of uniformity in the steel can trouble along the fabricator's ction line by yielding irregular nse to standardized heat-treat- and finishing procedures. In the first lots of STAINLESS STEEL to be fabricated and continuing whenever minor troubles occur or changes in procedures are made to improve results and reduce costs.

The first production operation in making artery forceps, for example, is slitting. Most surgical instruments are pointed; therefore, when flat bar stock raw material is used it is slit diagonally instead of being cut off square thus providing two pointed ends simultaneously. When round stock is used it is generally forged off the end of the bar.

The hot forging operation follows. Forging is done on small (500 to 800 lbs.) board drop hammers. The operator is able to raise the hammer to various heights and therefore to strike blows of varying forces. He can vary the number of hammer blows applied to each piece, being careful not to fold or wrinkle the metal. Generally he finishes each piece with three or four full blows;



1. The forging. 2. Trimmed. 3. Milled. 4. Assembled. 5. Jaws bent. 6. Finished.

the proper grade for surgical dental instruments and similar ces is one which must consist- y produce a hardness of Rock- C 40 to 45 following a pre- ed heat treatment. Important is sales engineering service as is given by Rustless. This ice is periodic, beginning with any greater number may permit the steel to cool too much and result in hardening. This particular grade of STAINLESS is drastically air hardening when cooled quickly from above 1500°F.

Trouble at the hammers is readily avoided if the correct heating method is used. STAINLESS STEELS must be heated to slightly higher forging temperatures than carbon steels and must be struck harder blows. The operator who is used to judging carbon steel temperatures "with his eye" may go wrong on STAINLESS temperatures. Schnefel finds it entirely satisfactory to use an optical pyrometer to check this several times every day while some other shops prefer a recording pyrometer. The material is heated to between 2100°F. and 2200°F.

Controlled Soaking

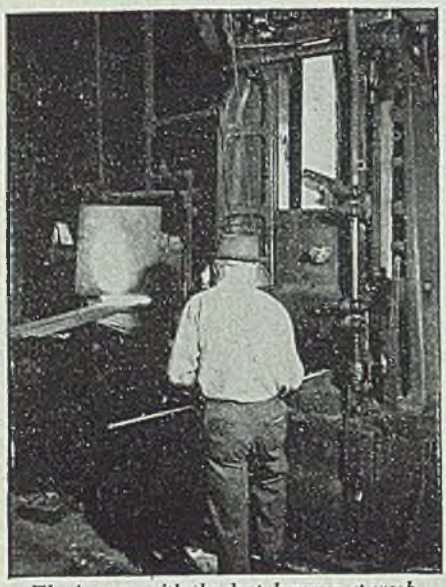
A heating and soaking period of about five minutes is necessary, depending upon the stock size. And this also must be controlled. Too short a soak means poor forging, too long means excess scale which will be beaten into the surface of the metal by the hammer and cause indentations which increase the costs of polishing.

An average forging time cycle for each kind of instrument part is used to control the heating and soaking time. On one part, for example, it takes ten seconds for the operator to put a cold piece into the furnace, take a heated one out, do his forging, plunge the forged piece into a refractory material and pick up another cold piece. Since a five-minute period contains 300 seconds, the keeping of 30 pieces in the furnace at all times and taking them out and replacing them in rotation will result in a five-minute heating and soaking period for each.

Slow Cooling

The pieces as lifted from the dies are at about 1600°F. They are buried immediately in the refractory material so they will cool slowly as otherwise they might strain crack. As a rule they are left to cool below 300°F.

After being removed from the refractory material, the pieces are



The furnace with the drop hammer at work.

pickled in full strength commercial muriatic acid, or the solutions recommended on Pages 40 and 41 in Rustless' booklet "Heat Treatment of Stainless Steels," to remove the forging scale.

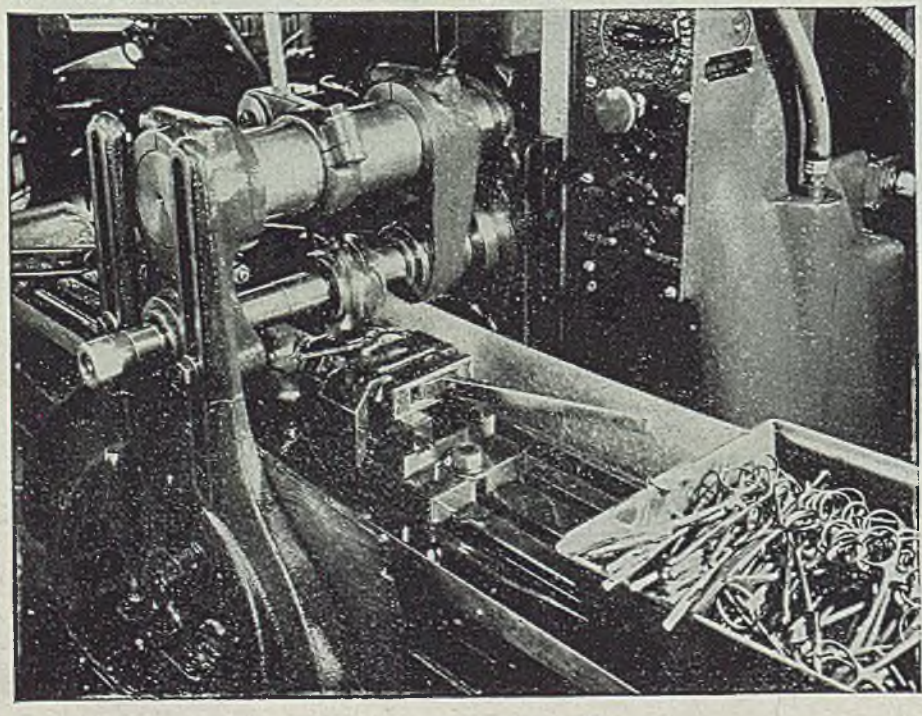
Annealing at Schnefel Bros. is in sealed 35 nickel, 15 chrome pots placed in a Hones atmospheric-type furnace. Four hours' time is used to bring the cold pots up to 1600°F. to 1650°F. The pots are held at that temperature for at least one hour. Cooling is by easy stages. With heat kept on the furnaces the pots are allowed to cool not more than 200° in the first hour and 200° more in the second hour, and cooling will be slower than this if the parts had been harder than Rockwell 25C. But when the pots are down to 1200°F., the heat is turned off and the pots are allowed to cool in the furnace for the remainder of the annealing period.

Rockwell Test

The parts are pickled again to remove the light scale and then hardness tested. A hardness of Rockwell B90 Max. is aimed at as this is excellent for machining. To remove any remaining forging and annealing scale the parts are tumbled overnight. Tumbling imparts a rough polish. The parts are inspected again for any pits or faulty surfaces or other defects which might make further operations inadvisable. Nearly all pass inspection and are sent to the secondary operations departments.

Secondary operations include trimming in punch presses, cold pressing, drilling, rough grinding, shaping the blades, and some spot welding in the case of tweezers. There are no important deviations from the processes applied to carbon steels except that the forging flash may be removed from carbon steel parts by cold punching before annealing but in the case of STAINLESS STEEL the flash is removed after annealing. Milling of the STAINLESS STEEL is about 15% slower than that of carbon steel and the milling cutters have from 30% to 40% shorter lives. The operation gave trouble until a sulphur-base soluble cutting

One of the milling operations.



Trimming off the flash.

oil recommended by Rustless Iron and Steel Corporation engineers was used.

Final Heat Treatment

After the secondary operation Schnefel gives the parts their final heat treatments. They are heated to 1825°F. in free rinsing salt, held for a 5-minute soaking period and quenched in low viscosity quenching oil. Rockwell testing follows the rinsing of the quenching oil in a kali cleanser and hot water. The parts now must show a uniform Rockwell hardness of C 47 to 5[illegible]. They next are drawn at a temperature of 550°F. in recirculated air being held at this temperature for thirty minutes. Drawing greatly improves the ductility of the parts and brings them to the desired Rockwell C 40 to 45. (Further heat treating data on this and other grades of STAINLESS are contained in Rustless' "Heat Treatment of Stainless Steels.")

Salt Bath

Schnefel Bros. have found it necessary to be careful about the salts used in the baths. Some salts which they have tried can produce barium precipitates on the metal surface and these will not wash off in water.

A short pickling cycle is then applied prior to grinding to remove the slight scale resulting from heat treating.

The final operations such as pointing, shaping, buffing, assembling and final polishing are done by skilled craftsmen.

It is here that the rewards of careful control in inspecting and heat treating are found.

An operator buffs a piece large

its "feel" against the wheel, but at will tell him very little if he es not know exactly how his ma- ial will behave. Shaping and nting the instruments—a buffing d hand-grinding process — is ged somewhat by visual inspec- n but mostly by the feel of the cisely tempered STAINLESS STEEL. e all-important "setting up" op- tion, getting the blades to meet ctly right and with precisely the ht amount of friction at the ts, making sure that ratchets ch are to hold instruments at ct pressures on arteries of the man body will hold just right but not stick, is a matter of know- exactly how the instrument uld feel and of being sure that feels right it is right.

Nitric Acid Passivating

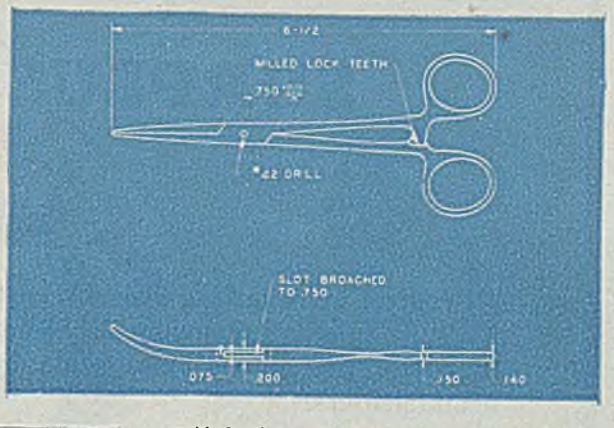
assivating, to remove the last es of foreign material and forti- the natural passive surface film areas inaccessible to the buffing el is the last operation before a l light buff. A solution of 13— nitric acid at 110°—120°F. is d.

here are tests which the instru- ts for the Government must . One of them is the "blue stone," ther the "boil." In the blue stone the parts are submerged for 6 utes at room temperature in a dard solution of copper sul- te, sulphuric acid and water. The must show no plating-on of per. (Government Specification -3.)

Boil Test

the boil test the parts are ed with soap and water, dipped in alcohol, dried in an oven or wiped dry, submerged in still water, brought to a boil, boiled for thirty minutes and then allowed to remain submerged for 24 hours. Not more than 2% of their surfaces (visual estimation) may then show any discoloration.

These tests are standard. But for the real test, no standard can be laid down. The real test is the way the instruments feel in the hands of a surgeon or a nurse while working against split seconds of time to save a human life in a hospital or on a battlefield. It is a real tribute to American manufacturers that a tremendous number of satisfactory instruments were made during the war when many, unlike Schnefel Bros., had had little or no previous experience in the field.



Salt bath hardening. Note nearness of quench tanks.

That exactly right, completely dependable "feel" is put into their splendid instruments by the careful heat treatments, inspections, and workmanship of Schnefel Bros. But behind it is the equally careful work of Rustless Iron and Steel Corporation. It is a strange fact, but success in the operating room starts in the steel mill.

Rustless specializes in STAINLESS STEELS, and through long, concentrated study and experience has learned how best to forge, heat treat, machine, electropolish, and otherwise fabricate STAINLESS into products of enduring beauty, cleanliness and economy. All our knowledge is at your command. Our engineers will gladly work with your production men. The authoritative Rustless booklets are free. The one mentioned in this advertisement, "Heat Treatment of Stainless Steels", containing 56 pages and 9 Data sheets will be sent on application.

Finishing on the wheel.

SALES OFFICES:
BALTIMORE • BOSTON • BUFFALO • CHICAGO
CINCINNATI • CLEVELAND • DETROIT
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Rustless

Producing STAINLESS STEELS *Exclusively*

RUSTLESS IRON AND STEEL CORPORATION

BALTIMORE 13, MARYLAND

How to buy

SURPLUS MACHINE TOOLS

– and get value

Of course, we're talking about Acme-Gridley Multiple Spindle Automatics only—not trying to advise you on machines made by other manufacturers.

DON'T buy a used Acme-Gridley merely because it is offered to you at a cheap price.

DON'T buy a used machine without knowing its age, its capacity, and above all, its present condition.

DO buy a used machine if you are sure that purchase price—plus its cost for whatever reconditioning and retooling may be necessary —totals less than the price of a new machine of equal capacity and performance.

REMEMBER that you cannot expect new-model production from a machine five years behind today's improvements.

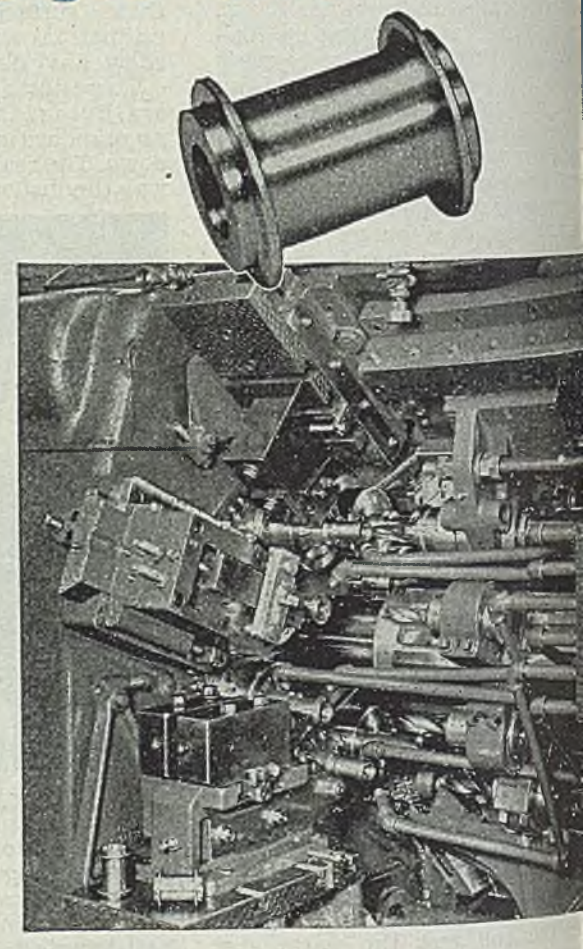
There are a lot of Acme-Gridleys now on war work that will someday be out of a job. They were all top-notch producers when delivered, but some of them may have been overworked or under-cared for.

Our interest is to see that you get maximum value from any Acme-Gridley, whether you buy a used machine on the open market, or a new machine from us.

Please feel free to write us when in the market.

ACME-GRIDLEY BAR and CHUCKING AUTOMATICS

maintain accuracy of the highest spindle speeds and fastest feeds modern cutting tools can withstand.



A TYPICAL ACME-GRIDLEY COST-SAVING JOB

2¼" diameter steel hub turned from bar stock on 2⅝" Model RB 8-Spindle Bar Automatic.

15 operations—15 tools at work simultaneously—machine time, 28 seconds.

THE NATIONAL ACME COMPANY

170 EAST 131st STREET • CLEVELAND 8, OHIO

WAREHOUSES IN NINE KEY CITIES

Serve you promptly!

WE HAVE nine large warehouses* located in key manufacturing areas from which deliveries can be made quickly to any point. During war years these warehouses have done a good job of living up to their famous reputation for fast service. Today our stocks are larger—there is a wide variety of steel available for immediate shipment, including all standard grades and sizes of U·S·S Stainless Steel and a complete line of Carbon Steel Products. When you need steel in a hurry, phone, write or wire our nearest warehouse. We will continue to exert our best efforts in making deliveries to meet your requirements. Our service has helped many customers avoid serious delays in production. Your orders and inquiries receive prompt, careful attention.

***Our Boston warehouse has been taken over by the Navy for storage of vital supplies. But we maintain our Boston Sales Office to expedite service to our New England customers from all our other warehouses.**

UNITED STATES STEEL SUPPLY COMPANY

CHICAGO (90) 1319 Wabansia Ave., P. O. Box MM—BRUnswick 2000

BALTIMORE (3) Bush & Wicomico Sts., P. O. Box 2036—GILmore 3100

BOSTON (34) 176 Lincoln St., Allston, P. O. Box 42 STAdium 9400

CLEVELAND (14) 1394 E. 39th St., HEnderson 5750

MILWAUKEE (1) 4027 West Scott St., P. O. Box 2045—Mitchell 7500

NEWARK (1), N. J. Foot of Bessemer St., P. O. Box 479—BIgelow 3-5920 REctor 2-6560, BErgen 3-1614

PITTSBURGH (12) 1281 Reedsdale St., N. S. CEdar 7780

ST. LOUIS (3) 21st & Gratiot Sts., P. O. Box 27 MAin 5235

TWIN CITY 2545 University Ave., St. Paul (4), Minn. NEstor 2821

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air.* American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

UNITED STATES STEEL

Snyder "SPECIAL" HOLLOW MILLS TRUNNIONS on VARIOUS SIZED CONVERTER BLADES

This double-end, special-purpose machine was designed and built by Snyder to combine accuracy and fine finish with high production in hollow milling converter blades.

The operation is hollow milling one or two trunnions on these blades which vary in size and shape. Accuracy is held to .001" and finish is such that no further work is required after the milling operation.

The machine consists of two Snyder self-contained hydraulic units and multiple heads and an electrically driven fixture trunnion with holding jaws, assembled on a welded steel base. Coolant tank is in rear of base.

Tool spindles are guided in the trunnion side members and are equipped with precision end stop adjustment to maintain depth and accuracy of cut. The trunnion is indexed by a Geneva index mechanism mounted on top of the trunnion assembly.

Parts are located in the jaws by means of side locating plates. A hydraulic cylinder for each individual fixture automatically clamps the part while fixture indexes from loading to first working position. Each station has three fixtures holding three parts which are identically processed at the same time.

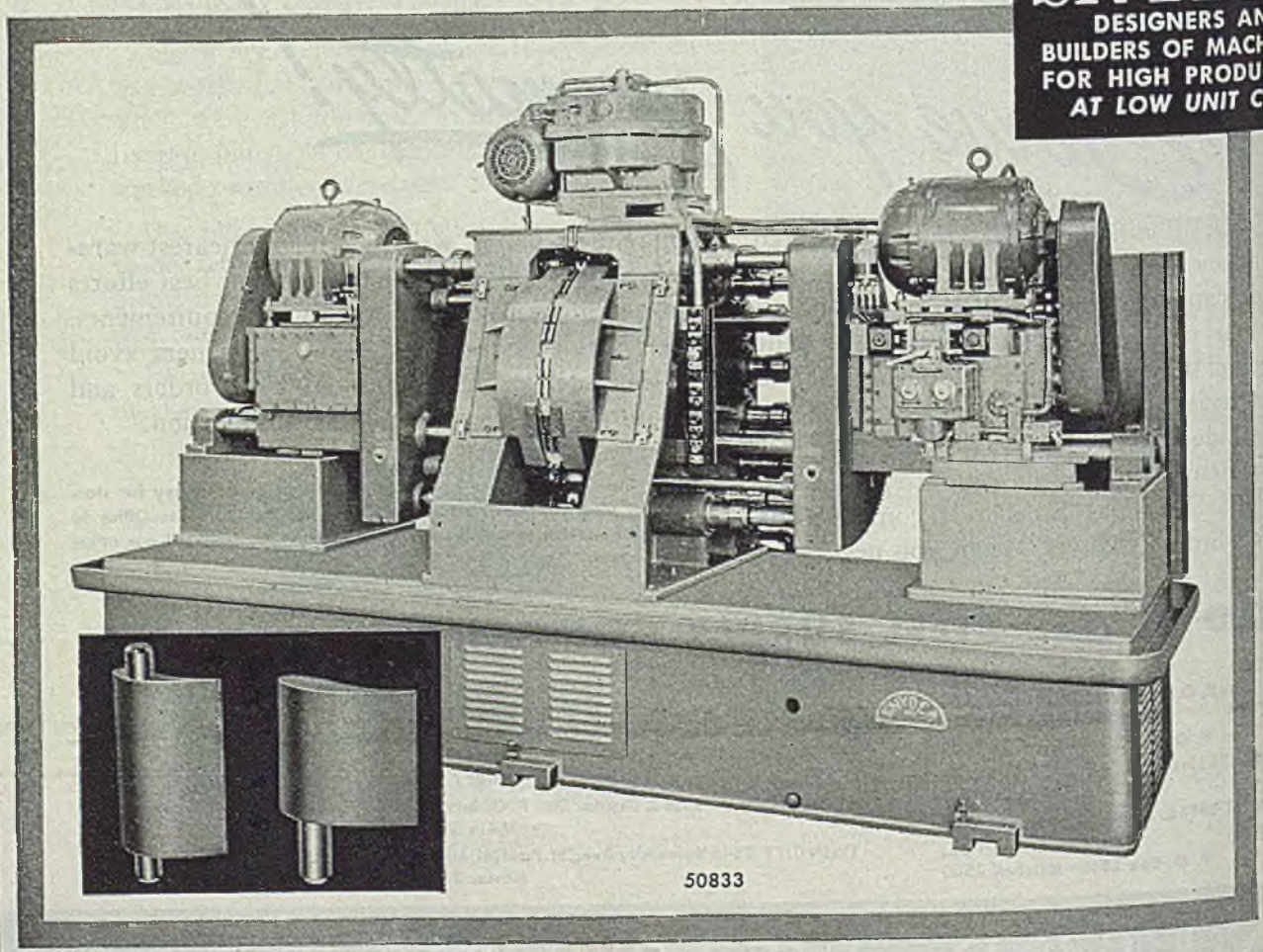
Semi-automatic work-cycle requires the operator to press a button after loading three pieces. Cycle consists of an index followed by tool work. Unloading is automatic.

Production is 575 pieces an hour at 80% efficiency. Various sized and shaped parts are accommodated by exchanging holding jaws and adjusting the side locating plates.

This is another typical example of the ability of the Snyder organization to create special-purpose machines which provide complete control over production time, accuracy, finish and production cost. If you have a production problem in the metal-cutting field, we invite your inquiries. *Snyder Tool & Engineering Company, 3400 E. Lafayette Avenue, Detroit 7, Michigan.*

20 Years of Successful Cooperation with Leading Industries

SNYDER
DESIGNERS AND BUILDERS OF MACHINERY FOR HIGH PRODUCTION AT LOW UNIT COST



A Tent of Aluminum ?

A tent of aluminum is more than a possibility for the future. It has many new advantages, including durability, attractiveness and showmanship. You will be surprised at the many products you will see in which the light alloys—aluminum and magnesium—will be used to replace heavier metals or other types of construction. If you would like to discuss the many sales advantages and cost cutting features made possible by these new light alloys, the Bohn Engineering staff is at your service.

BOHN

BOHN ALUMINUM AND BRASS CORPORATION, DETROIT 26, MICHIGAN

GENERAL OFFICES — LAFAYETTE BUILDING

Designers and Fabricators — ALUMINUM • MAGNESIUM • BRASS • AIRCRAFT-TYPE BEARINGS

To those still waiting for

VEGA

THE SUPER-DUTY SILICA BRICK

IN an effort to meet the constantly increasing demand for VEGA production, facilities for this super-duty silica brick have been materially expanded. However, even today's greater output still falls short of the amount required to fill present demands promptly. As soon as conditions will permit, the production capacity will be further increased. We hope and believe it will not be too long now until orders can be placed with the expectation of actually getting VEGA within a reasonable time. Meanwhile we ask your continued patient indulgence in reference to the unavoidable delay in VEGA shipments.

If you have not already received your copy of this fact-filled booklet on VEGA, The Super-Duty Silica Brick, send for it today. Learn how VEGA was developed — and how its 60° to 100° higher refractoriness under load gives longer life in open-hearth roofs, permits higher temperatures — and also increases tonnage output.

IMPORTANT NOTICE

Licensing Arrangemen

A definite contribution to longer furnace life and greater steel p
duction, VEGA brick should be made available as soon as poss
to the largest number of steel producers.

Harbison-Walker will therefore license other responsible produ
of silica refractories to manufacture brick under VEGA patents.

Super-duty silica refractories, made under VEGA patents by o
manufacturers, will carry this identifying symbol of plus quality
following the manufacturer's established brand name.

HARBISON-WALKER REFRACTORIES CO.

AND SUBSIDIARIES

World's Largest Producer of Refractories

GENERAL OFFICES • PITTSBURGH 22, PENNSYLVANIA

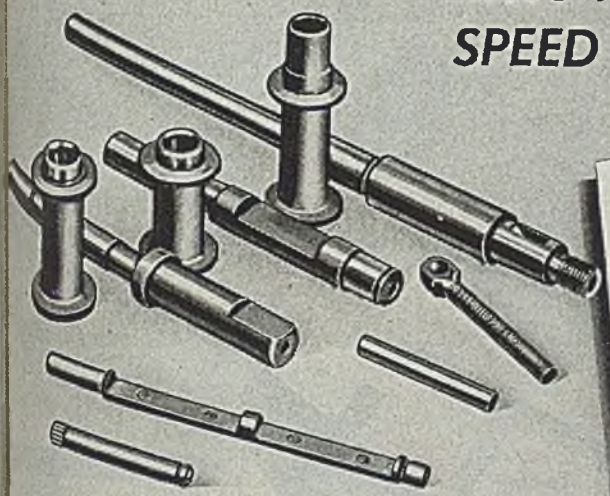
STE

What do you mean ....

"SPEED CASE is an expensive steel"?

PIERCE GOVERNOR CO., INC., ANDERSON, IND., REPORTS

☆ *Savings in production which more than equal the cost of their SPEED CASE Cold Drawn Bars...*



THE PIERCE GOVERNOR COMPANY, INC. Anderson, Indiana, U.S.A.

July 12, 1945.

Monarch Steel Company,
545 W. McCarty Street,
Indianapolis 7, Indiana.

Attention: Mr. S. W. Terry

Dear Sir:

I am pleased to confirm our conversation regarding the results obtained from the use of your SPEED CASE X1515 STEEL for manufacturing five different parts in our plant. These parts are SLEEVES, SCREWS, SHAFTS WEIGHTS AND PINS.

The savings on MACHINABILITY on SPEED CASE X1515 as compared to X1020, X1314, etc. are from 20% to 40%. Increased tool life is also an important factor, as in one case we saved $2000 in seven months in the cost of Broaches alone.

SPEED CASE heat treats easier and better than any other steel we have ever used. We are getting stronger and tougher parts with greater wear resistance than we have ever had previously. The lack of warpage in both heat treated and un-heat treated parts has reduced our rejections from 22% to 35%. This has eliminated considerable delays in our production.

On one part, because of SPEED CASE, we were able to deliver 100% more finished parts to our stock room. This was due to increased machinability, greater Tool Life, easier heat treating, less warpage, etc. On this item we feel we saved more than the cost of our raw material.

We have standardized on SPEED CASE X1515 on all our machined and carburized parts. We have eliminated errors in our raw material stock room and greatly simplified our manufacturing and heat treating problems accordingly.

Assuring you it is a pleasure to give you the above information, we are,

Very truly yours,

THE PIERCE GOVERNOR COMPANY, INC.,

James T. Parker

James T. Parker, Metallurgist.

JTP/t

Here's the Parts! Read the Facts!

- Five different parts made from Speed Case Steel—sleeves, screws, shafts, weights, and pins ... VERSATILITY!
- Savings over X1020, X1314, etc. = 20 to 40%.
- $2,000 saved in 7 months Broaching cost.
- Treats easier and better than any other steel ever used. Stronger—tougher—longer wearing parts than ever before. Warpage rejections reduced 22 to 35%—speeded up production.
- Speed Case increased production on one part 100%!
- They have STANDARDIZED on Speed Case X1515 for all machined and carburized parts.

Licensee for Eastern States

THE FITZSIMONS COMPANY

YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Licensor

MONARCH STEEL COMPANY

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for SPEED
and SPEED
CATALOG
Metallurgists
your service

This sort of Goods* can be fabricated cheaply... and FAST

*and thousands of other items too varied to describe

Auto and Aircraft Parts

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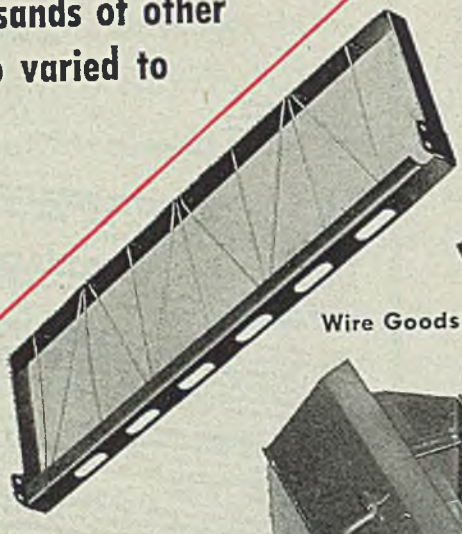
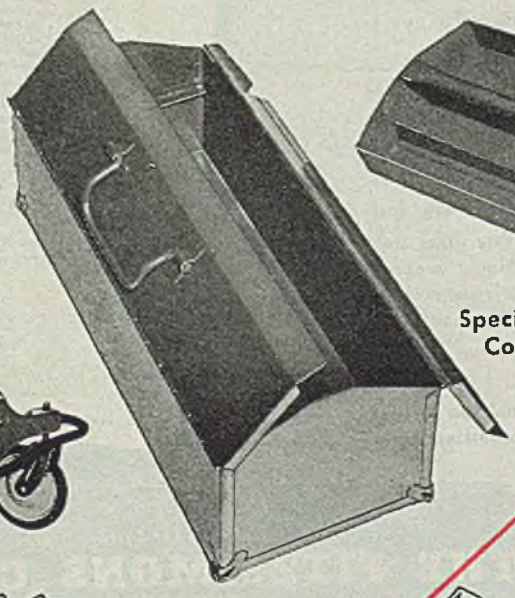
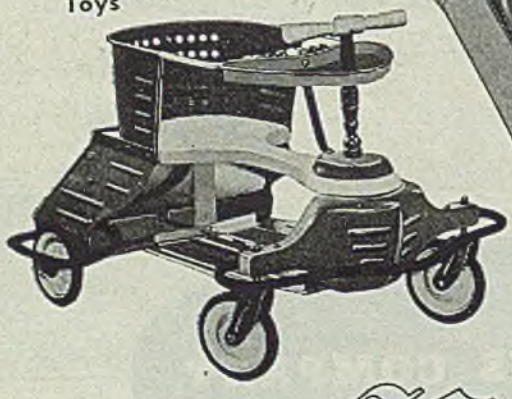


Wire Goods



Special Shapes Containers

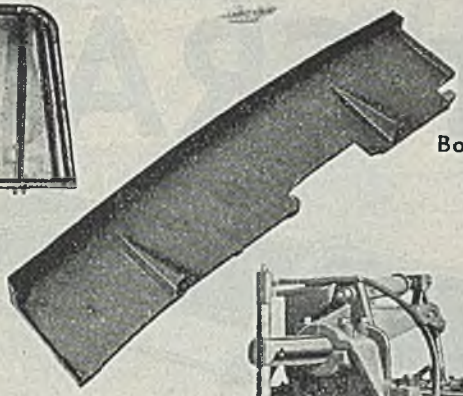
Toys



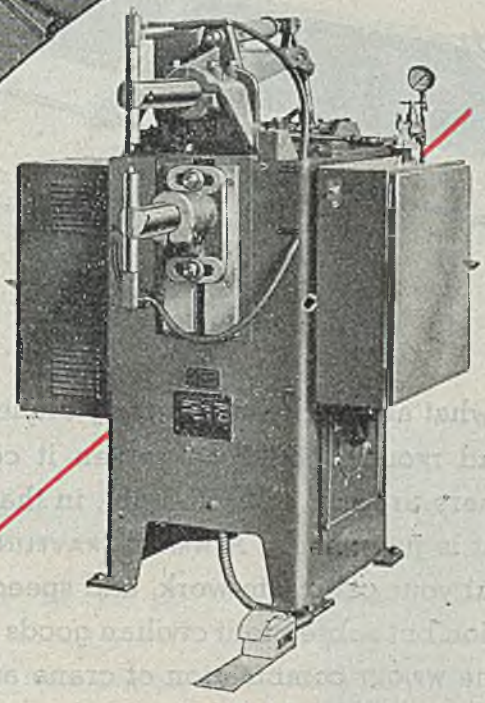
*Federal also all other ty resistance w

THE Federal MACHINE AND WELDER CO

Cabinets and Doors



Body Panels



on these types of

Federal

RESISTANCE WELDERS

Let us tell you How

MEMBER RESISTANCE WELDER MANUFACTURERS ASSOCIATION RWMA

202 DANA ST.
WARREN, OHIO

VERSATILE MODERN PRODUCTION TOOLS

READY-TO-NAIL MOULDINGS

Decorative or utility type metal mouldings with steel brads permanently attached, ready for continuous nailing, are made on a high production basis with the aid of automatic resistance welding employing a press type welder developed by The Federal Machine and Welder Company. The moulding is automatically indexed for proper spacing and the brads automatically cut and fed from wire reels. They go on in a hurry, and they never come off. The process is adaptable to many sizes of moulding and brads or nails.

"SELF-FASTENED" FABRICATIONS

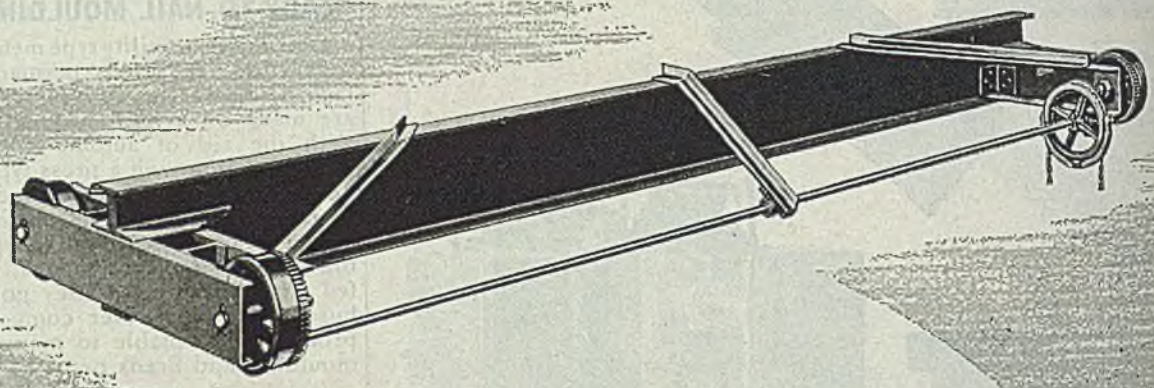
Heavy duty metal tool and tackle boxes are made in the modern manner without the aid of any fasteners other than weld nuggets of the fabricated metal. One manufacturer has devised a lid-locking box in which not only is the box itself completely resistance welded, but hinges, handles and even the removable tray are made without fastenings. Using Federal spot welders with variable electrodes, this method can be made highly flexible . . . profitable on small runs of a variety of sizes and styles of containers. Such welders, operated according to instructions, make fabrications that are well nigh indestructible . . . neat and modern in appearance.

USEFUL SPOT WELDER BOOK

Detailed descriptions of a complete line of rocker-arm type spot welders made by The Federal Machine and Welder Company, plus some interesting discussion of the type of work to which they are best suited, are included in a new book offered by this company. Designated as "Bulletin No. 4510", it contains helpful information on air-operated, motor-operated and foot-operated spot welders.

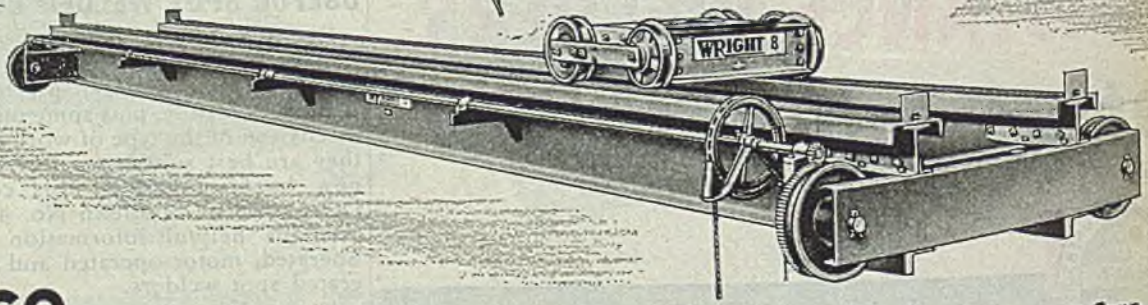
The new book gives a clear idea of what a rocker-arm spot welder is and what it can do. It combines data formerly available in a group of separate folders, and is designed to simplify the problem of selecting the type of spot welding equipment best suited to particular production set-ups. Free copies may be had on request.

WRIGHT CRANES



THINK what an overhead traveling crane, with a WRIGHT HOIST and TROLLEY, could do—when it comes to moving machinery around, or in and out, in that reconversion job that is just ahead. A WRIGHT TRAVELING CRANE would really put your ceiling to work, and speed up not only reconversion but subsequent civilian goods production as well. The WRIGHT combination of crane and hoist would help bring your production costs down to competitive levels.

WRIGHT material handling equipment (cranes, hoists and trolleys) is built in any desired capacity and to meet the most exacting specification. If your problem is special, ask local WRIGHT distributor (see metropolitan classified telephone directory) to call in a WRIGHT engineer. In the meantime, write for WRIGHT Specification Bulletin, or Catalog 12-D.



ACCO

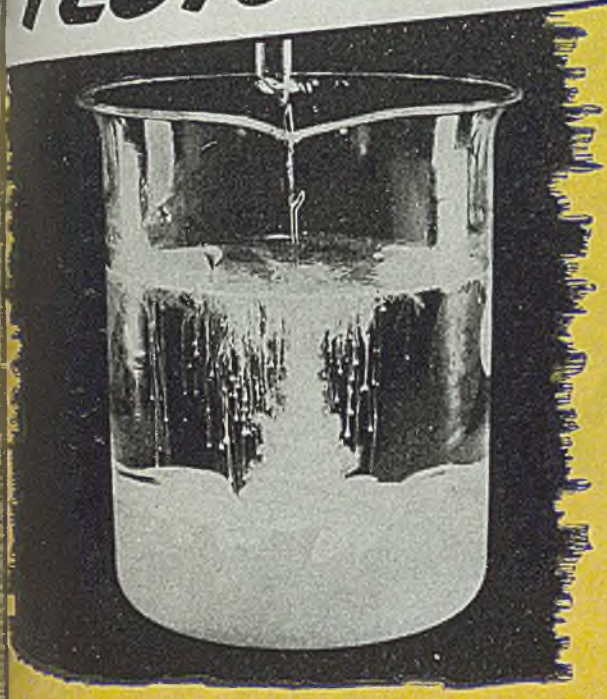
York, Pa., Chicago, Denver, Los Angeles, San Francisco, Portland, New York, Bridgeport, Conn.

WRIGHT MANUFACTURING DIVISION
AMERICAN CHAIN & CABLE

TRADE MARK

In Business for Your Safety

TESTS PROVE the superiority of



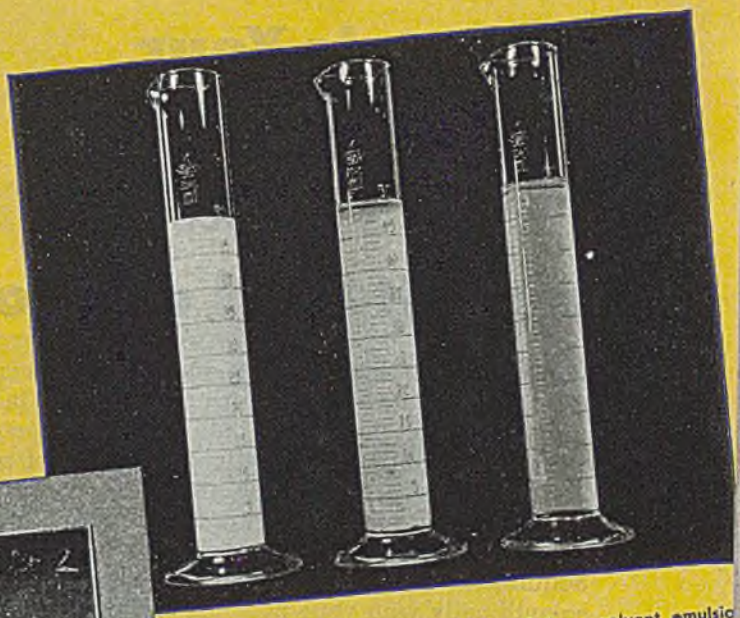
PENNSALT CLEANER EC-10

U. S. PAT. NO. 2324113

. . . A New Emulsion-Type Cleaner

A *SINGLE* *OPERATION* QUICKLY FREES METAL PARTS OF DIRT, OILS, GREASES, METAL CHIPS

Embodying a new principle, Pennsalt Cleaner EC-10 actually removes some types of soil which alkaline cleaners won't budge in the short time today's stepped up production demands. Smut deposits, together with lubricants, tripoli, rouge and various metal finishing agents many times require lengthy, time-consuming cleaning operations.



These graduates show comparison of three solvent emulsio cleaners, diluted 1:50 with water. After standing forty-eig hours No. 1 (Pennsalt Cleaner EC-10) shows a thick den emulsion, while No. 2 and No. 3 show considerable separatic This test demonstrates the high degree of stability of Penns Cleaner EC-10 in water emulsion.

A strip of polished aluminum contaminated with shop dirt fingerprints was dipped in a solution of Pennsalt Cleaner EC The picture shows the result after a portion of the strip been dipped in concentrated EC-10 for thirty seconds, cold water rinsed.

Use Pennsalt Cleaner EC-10 for:

1. Spray washing and rust inhibiting in one operation
2. Precleaning before alkaline cleaning and subsequent plating
3. Cleaning before painting
4. Cleaning painted surfaces
5. Grease and oil removal from any metal surface

SPECIAL CHEMICALS DIVISION PRODUCTS

Acid-, Alkali-, and Solvent-proof Cements • Lead Fluoborate Concentrates • Fluoboric Acid • Acid, Alkali and Solvent Emulsion-Type Cleaners • Paint Strippers • Pickling Agents.

Send for FREE booklet

SPECIAL CHEMICALS DIVISION

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING, PHILADELPHIA 7, PA.

SPECIAL CHEMICALS DIVISION
PENNSYLVANIA SALT MANUFACTURING COMPANY
Dept. S9, 1000 Widener Building, Philadelphia 7, Pa.

Kindly send me descriptive booklet on Pennsalt Cleaner EC-10

NAME..... TITLE.....

COMPANY.....

ADDRESS.....

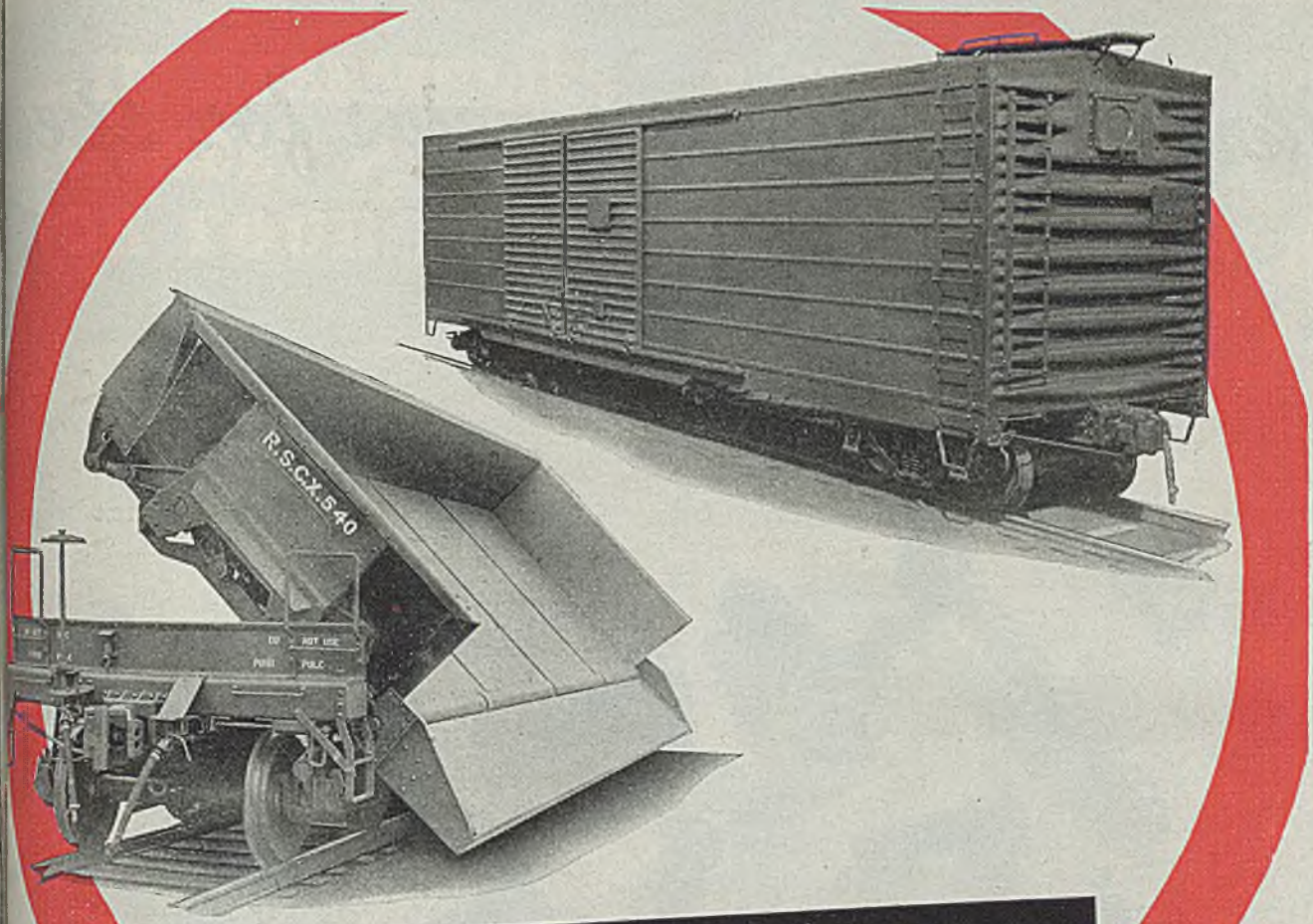
Is Your Lubrication *Still* a matter of opinion?

Replacement of friction-worn gears and parts is taking a tremendous tariff from industry every day in cost of parts, lost man hours, delayed production, etc.—because lubrication has remained a matter of opinion. Your initial investment is no greater if you avail yourself of the more than 35 years of specialized lubricator experience offered by Gits Engineers. This experience, acquired from dealing with actual field problems, deals scientifically with your problem and gives you the assurance of the right amount of lubricant at the right places at all times. Results can only be a very minimum of parts replacements and production delays—true economy. Gits offers you this specialized experience, plus the largest selection of oilers, from small oil hole covers and grease seals to intricate multiple oilers. Consult Gits on all your lubricating problems. If you do not have a copy of catalog No. 60—write for it!

GITS BROS. MFG. CO.

1836 South Kilbourn Ave., Chicago 23, Ill.

Exclusive for over 35 years



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• When planning on new equipment, whether railroad cars, industrial machinery or other applications involving steel plates, remember that Republic Plates—in carbon, alloy, high strength and stainless steel—are available to meet your exact specifications.

Because every step in their production is carefully and scientifically controlled by *one closely knit organization,* you are assured of uniformly high quality in all Republic Plate Products.

Our engineers will be glad to discuss your requirements for structural, tank, boiler, marine, locomotive, truck or other applications at any time. Write to:

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Export Department: Chrysler Building, New York 17, N. Y.

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UNIVERSAL AND MILL SHEARED **PLATES**

Republic Products include Carbon, Alloy and Stainless Steels—Pipe, Sheets, Strip, Bars, Wire, Pig Iron, Bolts and Nuts, Tubing

Thread-forming screws for spee

Machine screws and Tappin
are completely described
two new file size folders,
prices and valuable engi
information. Write for you

...IN ASSEMBLIES...A SMART WAY TO MEET PRODUCTION SCHEDULES FOR YOUR POST-WAR PRODUCTS

An improvement *in methods* is the first answer to look for in solving the problem of stepped-up demands of production, whether in war or peace times. War production would have been immeasurably slowed down had it not been that the *thread-forming screw* eliminated the need for tapping many millions of holes in material that had to be joined together in a hurry. Wherever a thread-forming screw could be used in the assembly or fabrication of war materiel, time was saved when time was most precious. Saving of time by American methods was one of the prime factors in winning this war—an essential ingredient of quick pick-up of peacetime production.

Lamson makes thread-forming and sheet metal screws in tremendous quantities. Three standard types are produced for metal and plastic applications. Types "a", "c" and "b" are made with slotted, Phillips or Clutch heads. Type "c" (thread-forming) screws have American National Standard coarse thread.

Because of the need for more detailed information on thread-forming and sheet metal screws, a new Lamson folder showing detailed lists, stock sizes and essential information is ready for you. Just use the coupon at the right to get your copy. Samples of Lamson thread-forming and sheet metal screws will be sent you on request.

THE LAMSON & SESSIONS COMPANY, General Offices: Cleveland 2, O.

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

"BOLTS, NUTS & SCREWS"—1944 REVISION. Cloth bound. Limited edition, 180 pages of technical, practical information. Sent prepaid for *$1.00—cash or check must accompany your order.*

"BOLTS ARE IMPORTANT!"—24-page booklet of currently useful information for buyers of headed and threaded products, and describing Lamson & Sessions' specialty fastenings which have wide industrial applications *—now, and in the post-war period. Sent gratis.*

"THE LAMSON BLUE BOOK"—is our standard Catalog of standard products excepting our Aircraft products. *Sent gratis.*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks. *Sent gratis.*

HERE'S A COUPON FOR YOUR CONVENIENCE—

THE LAMSON & SESSIONS COMPANY • 1971 West 85th Street • Cleveland 2, Ohio

Please send us ☐ Lamson Blue Book ☐ Bolts, Nuts and Screws ($1.00) ☐ Bolts are Important! ☐ Simplified Stock Sizes

Send information on ☐ Cap Screws and Set Screws ☐ Cotters ☐ Bolts ☐ Machine Screws ☐ Lamson Lock Nuts ☐ CP,HP,SF Nuts ☐ Lock-washer Screws ☐ Thrd. Forming Screws

Name of Individual — Title or Kind of Work

Employed by (Name of Company)

Street Address

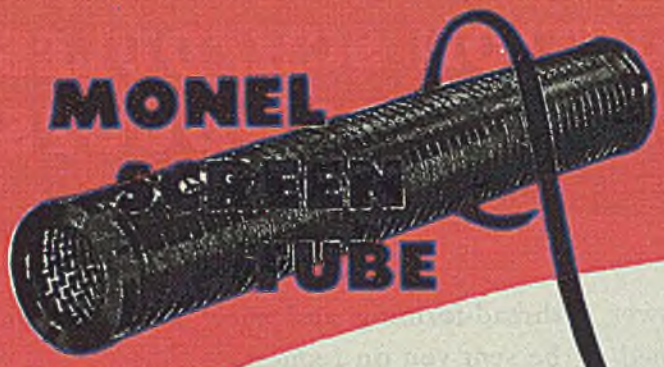
City and State

LAMSON & SESSIONS

BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line

ADAMS AUTOMATIC WATER FILTERS

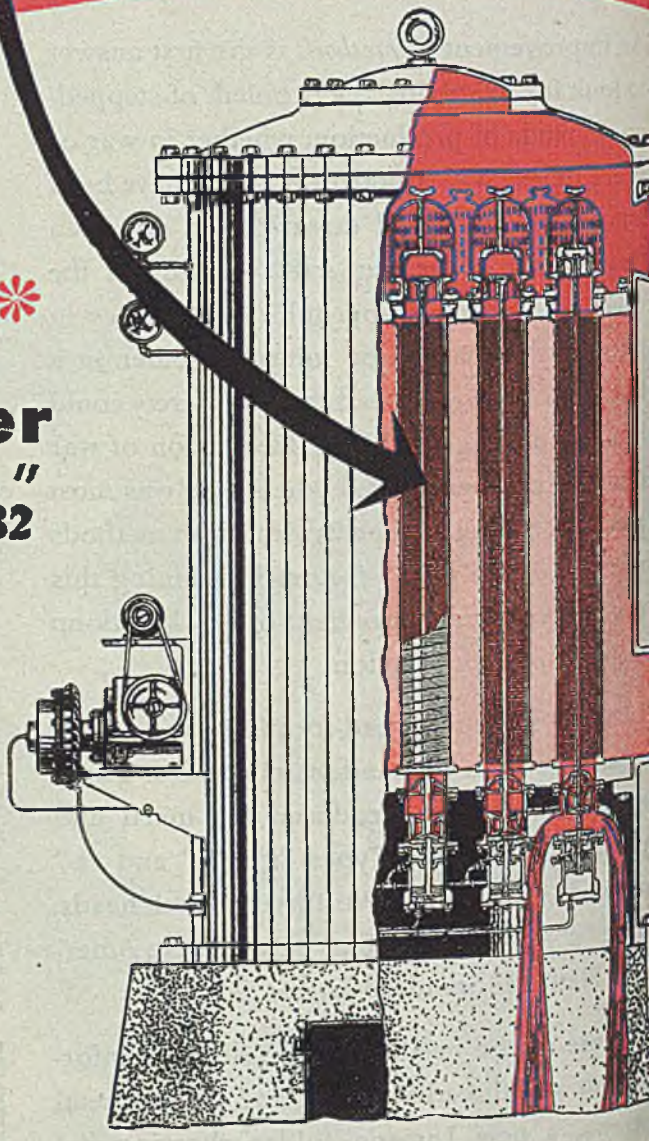


Remove GRIT and DIRT* from River Water

*15 times finer than 1/32"

Adams *Poro-Screen* Filters offer a practical answer to large-scale filtration of dirty river water for use in hydraulic equipment. Designed for continuous, automatic operation and requiring a minimum of attention, Adams Automatic Filters supply the required volume of clean water for your operations—water free of dirt and grit which damage bearings, rolls, valves and other equipment. Highly successful on water cooling installations of open-hearth and heat-treating furnaces.

Adams Automatic Filters provide low velocity filtration. Their multiple tube design has no moving clearances, is fully automatic. One tube is back washed at a time while filter is delivering full rated capacity. Adjustable control gives flexibility of back-washing—excessively dirty water more frequently, normal water less frequently. Built in four sizes from 300 gpm. to 2000 gpm. Write for Bulletin 901.



★ R. P. ADAMS COMPANY, INC.

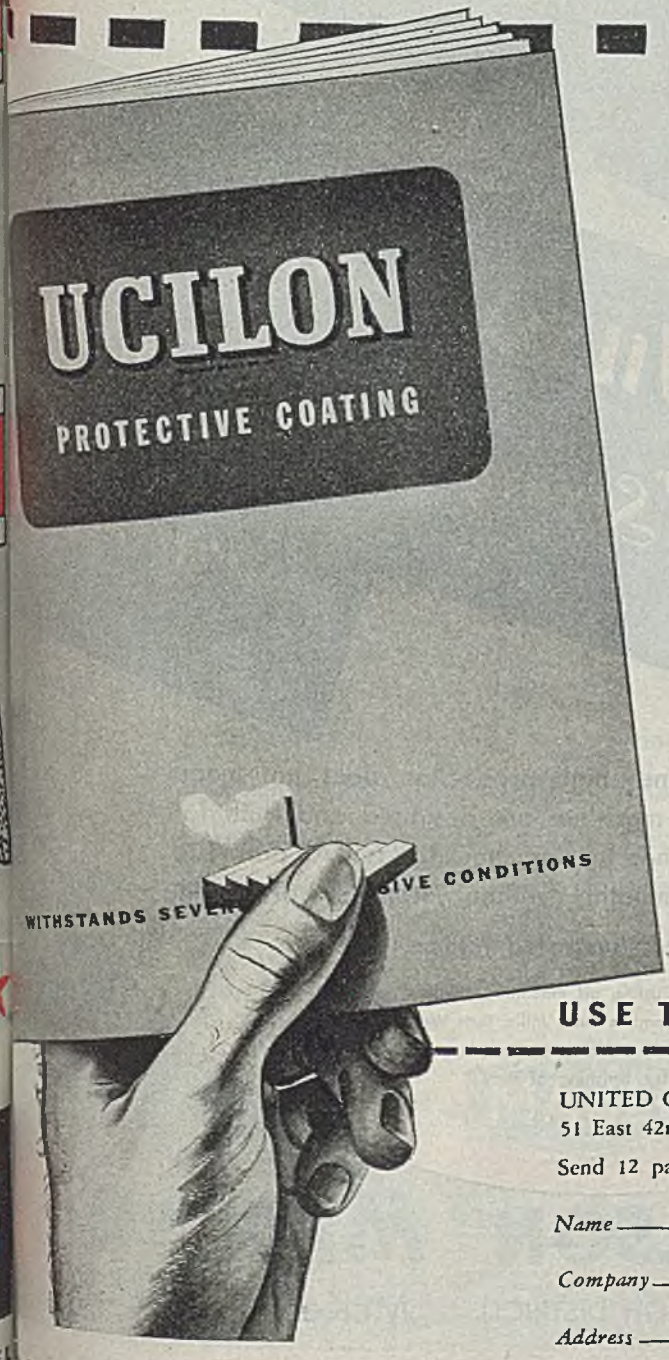
75 CHICAGO STREET, BUFFALO, N. Y.

ADAMS PORO-STONE AND PORO SCREEN FILTERS

HOW TO SAVE

TIME AND MATERIALS IN PROTECTING SURFACES

AGAINST CORROSION



UCILON *is a new plastic base material—applied like paint—that is more resistant to more corrosive elements than any coating you've ever tried.*

It resists *all* acids in commonly used concentrations. It resists *all* alkalies and salts at ordinary temperatures—as well as petroleum derivatives and natural oils. In addition, it is non-toxic, non-conductive. inhibitive to fungus.

Tests prove that even against the most destructive elements, Ucilon does a superb job of protecting surfaces. For equipment, walls, beams, duct work, tanks – wherever extra protection, extra service, extra sales appeal is desired—you can specify Ucilon. It produces an attractive glossy finish—white, black or in colors.

Our free booklet gives details to help in the solution of your corrosion problems. It's yours for the asking.

UNITED CHROMIUM, INCORPORATED

51 East 42nd St., New York 17, N.Y. • Detroit 7, Mich.
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USE THE COUPON FOR YOUR COPY

UNITED CHROMIUM, INC.
51 East 42nd Street, New York 17, N. Y.

Send 12 page illustrated Ucilon Booklet—without cost or obligation.

Name _____

Company _____

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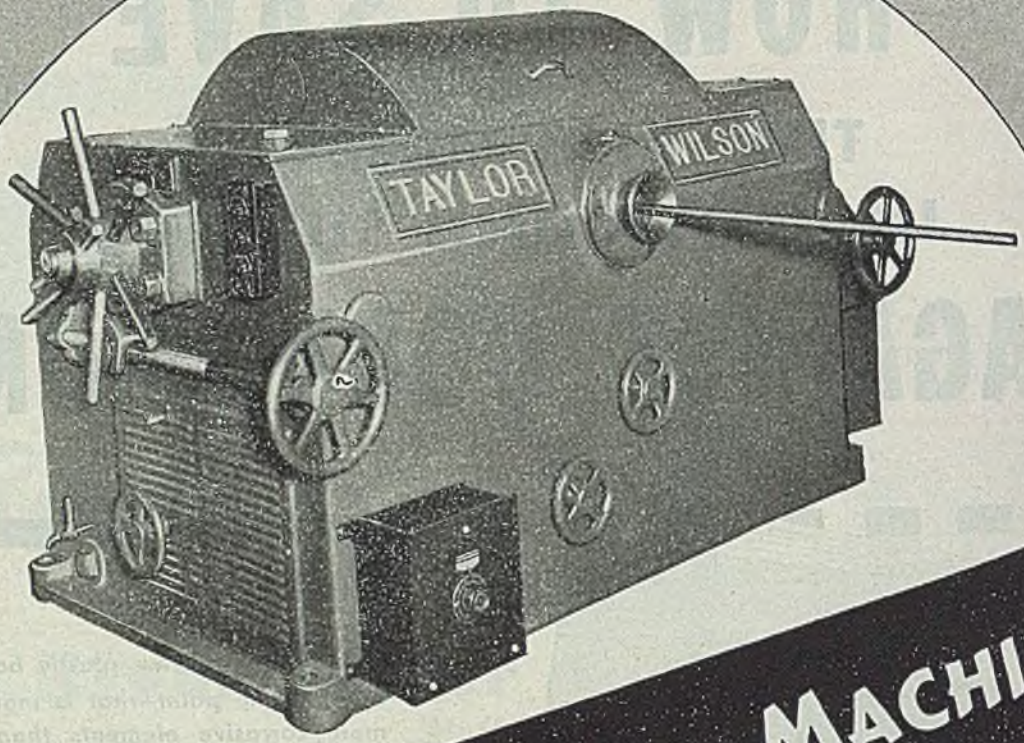


TAYLOR-WILSON MACHINES

for Straightening, Sizing

Burnishing

With Taylor-Wilson Machines high production does not mean *forced* production. These machines are designed and built for speed. The motor is cushioned against shock loads. All parts are over-built and operate smoothly without vibration or strain.

Write for illustrated folder

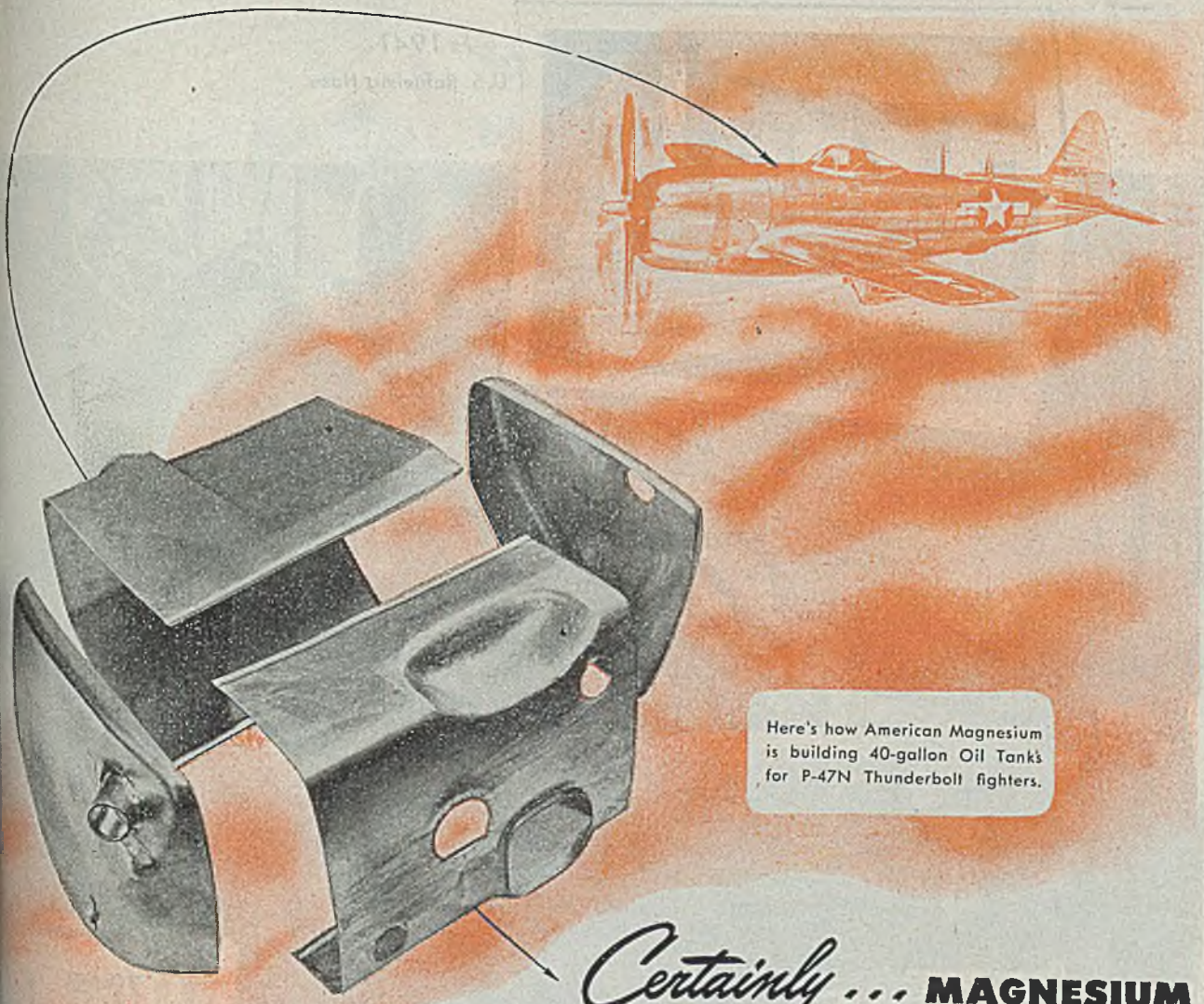
We also manufacture—Cutting off machines, Galvanizing Equipment for Pipe—Small Seamless Tube Mills, Butt Weld Pipe Mills, Tube Testing Machines, Test Benches, Complete line of equipment for finishing of Pipe.

Bar Capacity
1/16" to 2 1/2"

Tube Capacit
1/16" to 3"

TAYLOR-WILSON MFG. CO.

Thomson Ave. (PITTSBURGH DISTRICT) McKees Rocks, Pa.



Here's how American Magnesium is building 40-gallon Oil Tanks for P-47N Thunderbolt fighters.

Certainly . . . MAGNESIUM SHEET HAS FORMABILITY

It took a heap of squeezing, many humps and hollows to fit this 40-gallon oil tank into a former 28-gallon tank space. Magnesium sheet has the formability to do the job.

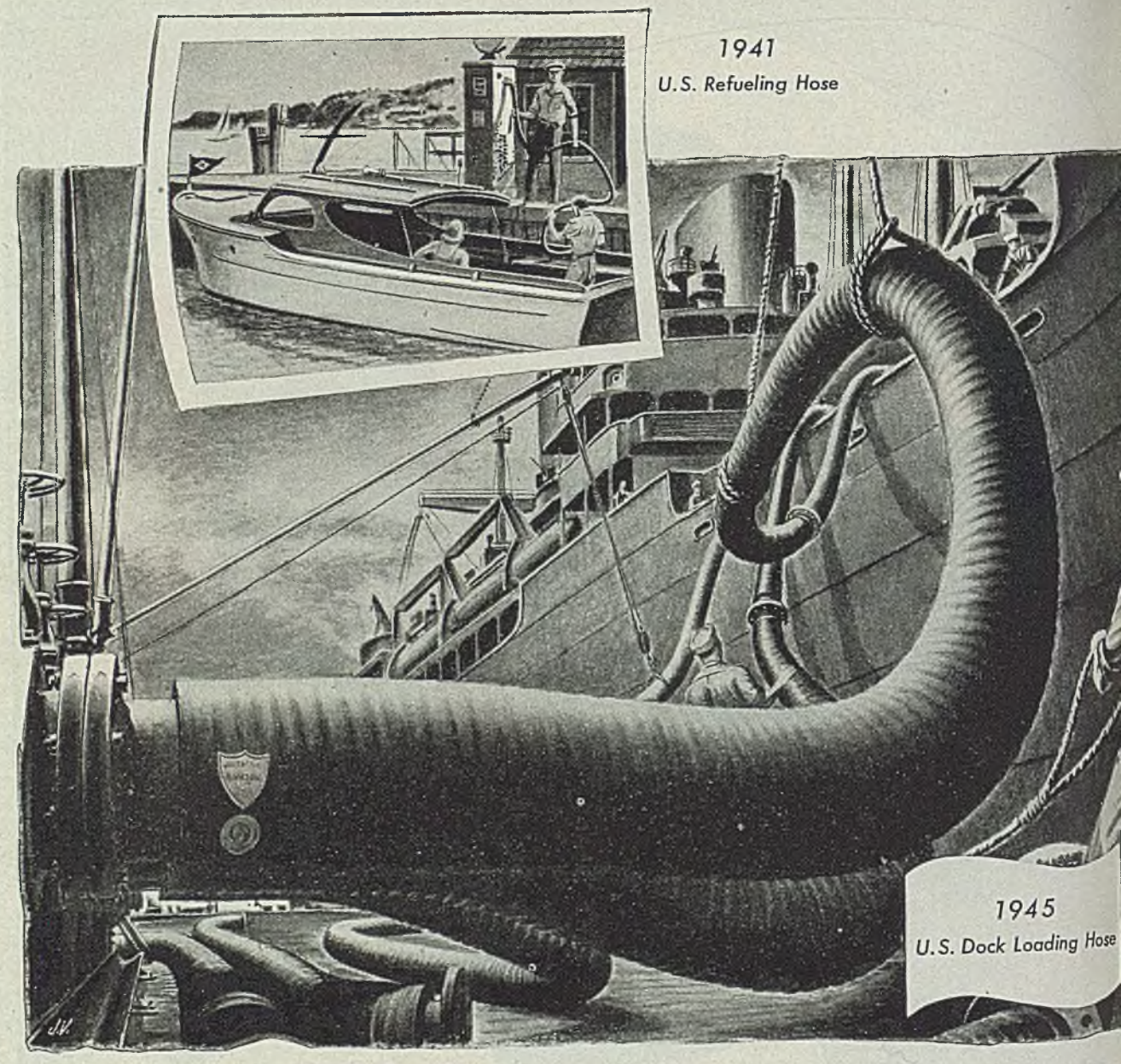
American Magnesium's more than twenty-five years' experience in working with magnesium provides real know-how. Mazlo Magnesium sheet can be successfully formed cold, warm or hot, depending upon the design of the part involved.

American Magnesium will gladly share the know-how gained through its many years of designing, manufacturing, and assembling magnesium parts. For this assistance we invite you to write Aluminum Company of America, Sales Agent for Mazlo Magnesium Products, 1721 Gulf Building, Pittsburgh 19, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA



Thirst . . .

More gasoline and oil is pouring into the tanks of ships than ever before in maritime history. Fuel that is quenching the thirst of our transports and freighters.

Tough, husky hose is delivering it...hose that can stand rough handling at busy wharfsides, or take the buffeting encountered in a refueling rendezvous at sea. This kind of hose is different...fabricated of special synthetic rubber compounds, developed years ago by United States Rubber Company scientists—compounds that far excel natural rubber for handling petroleum products.

During the war these compounds have been imp
not only for the handling of oil, but for carrying air,
steam, gases and chemicals.

As production for civilian consumption mounts,
hose will be extended...in your own plant, for ins
for high pressure hydraulic equipment or for carryin
rosive materials.

The United States Rubber Company technical s
prepared to meet these needs with specially engi
hose for particular purposes. Their experience and
counsel will be at your command.

Serving Through Science

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y.

ut UNIVAN stands up under SHOCK!

Some of us can stand just so much shock, and then w collapse. Some metals have the same failing. Bu UNIVAN—that tough Alloy Steel—is noted for it ability to withstand severe stresses and shock with notabl lack of fatigue.

If these characteristics are important to your product' performance, specify UNIVAN and take advantage o Union's long experience in producing intricate casting up to 60,000 pounds in carbon and alloy steels.

UNIVAN" That Tough Steel

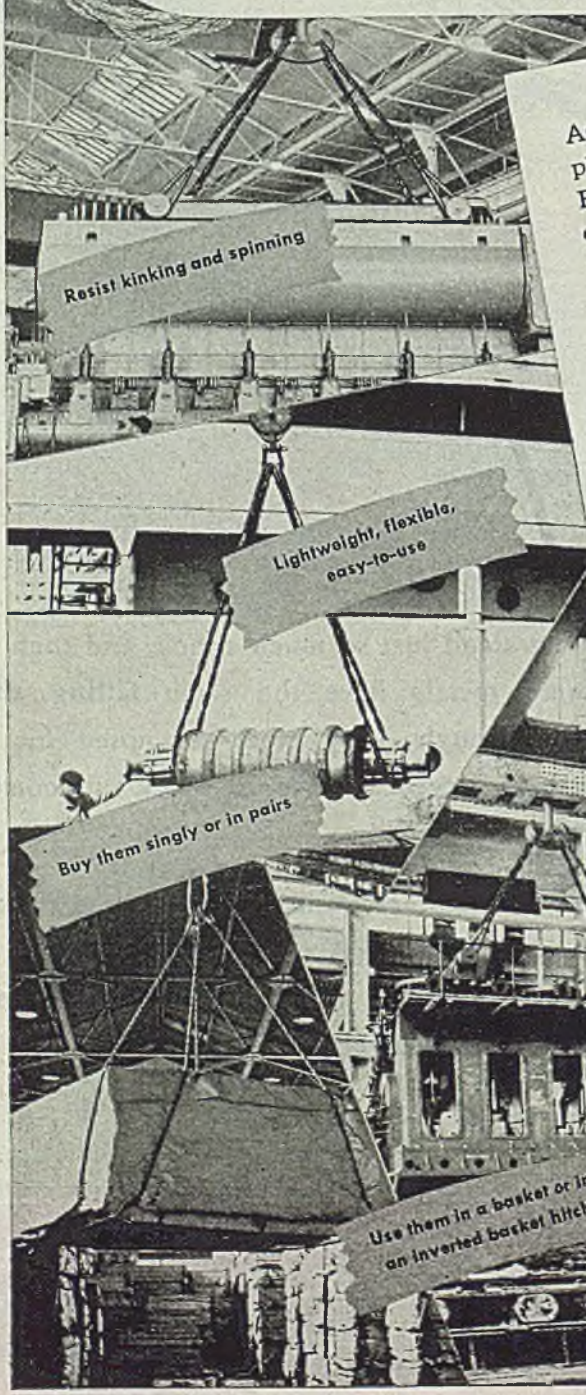
NION STEEL CASTINGS

DIVISION
BLAW-KNOX C
PITTSBURGH, P

ERS OF Driving Wheel Centers, All Types of Locomotive Castings, Pump Casings, Vault Doors and Frames, Annealing Box

Lick Production Lags! USE

MACWHYTE ATLAS BRAIDED WIRE ROPE SLINGS



As an aid to uninterrupted production, many plants are finding Macwhyte ATLAS Wire Rope Slings of invaluable service. These patented slings handle difficult loads easily, quickly, safely... enable more efficient utilization of both time and labor.

Patented BRAIDED Construction

Macwhyte Atlas Slings are braided from two Monarch Whyte Strand wire ropes—one right lay and one left lay. Each rope is spliced endless before the braiding operation. These ropes follow a continuous uniform spiral path throughout the entire body length. This produces a lightweight, flexible, kink-resistant round sling in which all ropes carry an equal share of the load.

Send for Sling Literature

Write on your company letterhead for Macwhyte Sling Catalog and pictorial literature. Address Macwhyte Company or any of our distributors or mill depots near you.

MACWHYTE COMPANY

2912 Fourteenth Avenue, Kenosha, Wisconsin

Manufacturers of the correct wire rope for your equipment
Left & Right-Lay Braided Slings • Aircraft Tie-Rods
Aircraft Cable • "Safe-Lock" Swaged Terminals
Mill Depots: New York • Pittsburgh • Chicago • Ft. Worth
Portland • Seattle • San Francisco
Distributors throughout the U. S. A.

NO. 817-B

Macwhyte Wire Rope Slings are made to meet the capacity of any crane built

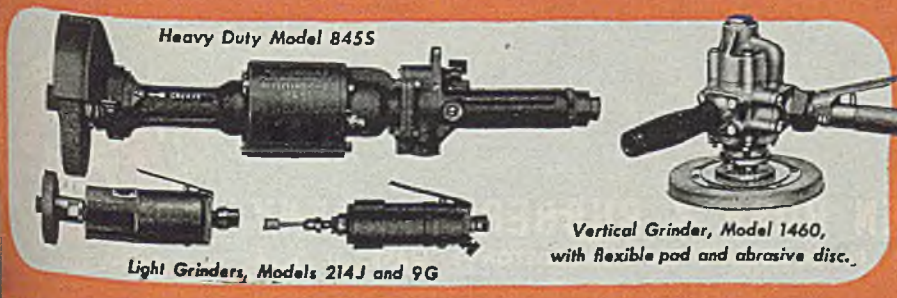
Member National Safety Council

ou get plenty of power from easily-held, mooth-running *CLECO GRINDERS*

FROM "snagging" in the cleaning room to light finishing on forgings, dies, etc., you will find *the right* model for *every* job in the extensive line of Cleco Rotary Grinders. These grinders feature rugged alloy steel rotors, heat treated and ground to exact size — insuring vibration free operation at all speeds. Governors efficiently control the speed, whether idling or under varying loads, providing ample power at all times plus utmost economy in air consumption. Highest grade ball bearings are used throughout. An efficient lubrication system helps increase the life of the tools. Bulletin 80 describes Cleco Grinders in detail and includes a large blueprint of construction details. *Ask for it!*

E CLEVELAND PNEUMATIC TOOL COMPANY • 3781 East 77th St. • Cleveland 5, Ohio

Branch Offices in all Principal Cities



BUY VICTORY BONDS

Light Grinder, Model 214

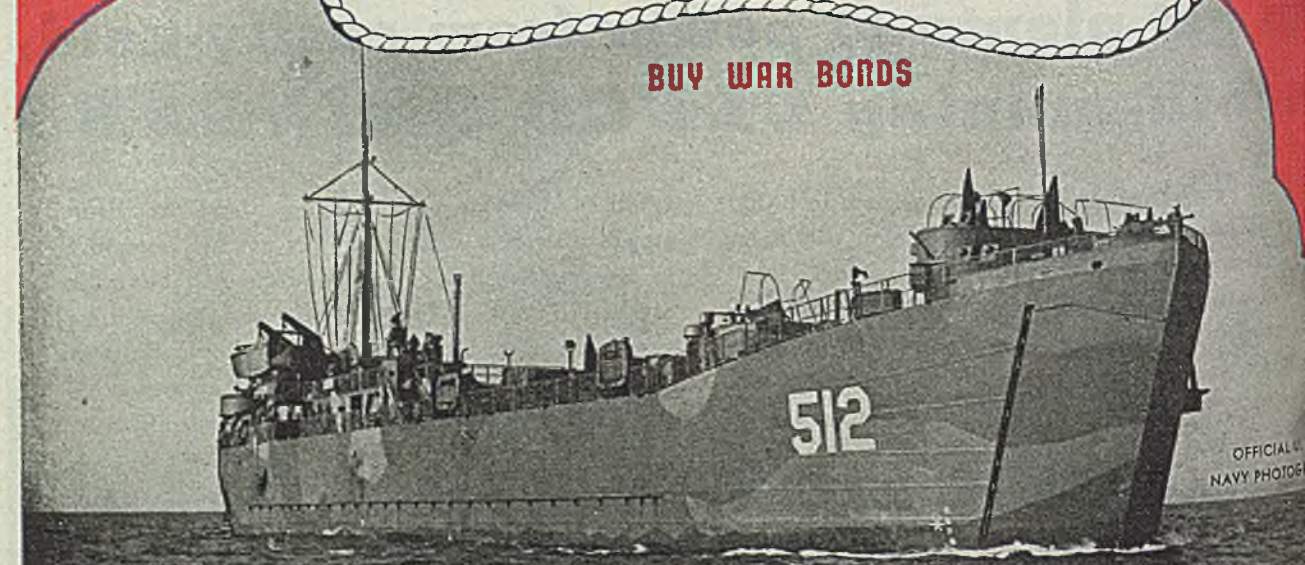
OUR PART IN A VICTORY SHIP . . .

Here is the LST-512, one of the millions of tons of fighting ships in history's greatest battle fleet. This invasion carrier, salvaged after being crippled in action off Normandy, has BWH hose and other products among its equipment and will cruise mid-west waterways from Duluth to New Orleans during the months from June to September. It will stop at many different cities along the Great Lakes and the Ohio and Mississippi Rivers for public demonstrations of amphibious warfare.

In March of 1944 she joined a convoy bound for England and since that time has crossed the Atlantic twice, crossed the English Channel a score of times, and was beached on the Normandy coast on D-Day and was in the midst of heavy bombing and shelling—though never struck—landing a large number of American, British and Canadian troops in France.

We are proud to have had a part in helping to equip this and other ships that have enabled American assault troops to overcome our German enemies and to punch their way to the very threshold of Japan's homeland.

BUY WAR BONDS



OFFICIAL U.S. NAVY PHOTOGRAPH

BOSTON WOVEN HOSE & RUBBER COMPANY

Works: CAMBRIDGE, MASS. Postal Address: Box 1071, BOSTON 3, MASS., U. S. A.

BOSTON WOVEN HOSE AND RUBBER COMPANY

GAS FUEL burned in an acid bath

courtesy Submerged Combustion Co. of America, Inc., Hammond, Ind.

BY YEARS

dvances metal pickling technique

lifying an old but important operation in metals cation, newly developed Gas equipment has advanced ears the process of metal pickling in an acid bath. Gas burner made of a highly acid resistant alloy is erged in the acid bath and through the use of ressed air, Gas fuel—burning right in the liquid —does three jobs at once. It heats, circulates and res the acid bath. The combustion unit can with- a temperature of 2900°F. and a concentration of lric acid ranging up to 100%.

e flow of compressed air clears the burner unit of tion and the Gas is then ignited. When the bath is heated to the desired temperature, the Gas automatically shuts off while the compressed air continues to agitate the acid. As the temperature goes down, the Gas is automatically reignited to maintain the pre-set temperature. The entire operation represents a degree of compactness and high efficiency that has long been wished for in this field.

Whatever treatment of metals commands your interest, you can be sure that modern Gas and modern Gas equipment will do a better job for you. The Industrial Engineer of your local Gas Company is available for consultation, and you incur no obligation.

THE TREND IS TO GAS

FOR ALL INDUSTRIAL HEATING

AMERICAN GAS ASSOCIATION
INDUSTRIAL AND COMMERCIAL GAS SECTION
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.

BUY AND KEEP WAR BONDS!

What it takes to get a Steel Man's OK

Only one thing really interests a steel man—and that's uninterrupted performance at the lowest possible cost.

Because Westinghouse has grown up with the steel industry—almost as a full partner—steel men have learned to rely on Westinghouse products.

Take Micarta Roll Neck Bearings for instance. These bearings last 10 to 15 times longer—hold the gauge better—require fewer screw-down adjustments, fewer test bars. Micarta bearings take 20 to 25% less power, and save *all* the lubrication cost because they are water-lubricated. And they eliminate roll neck scoring, resist electrolytic action.

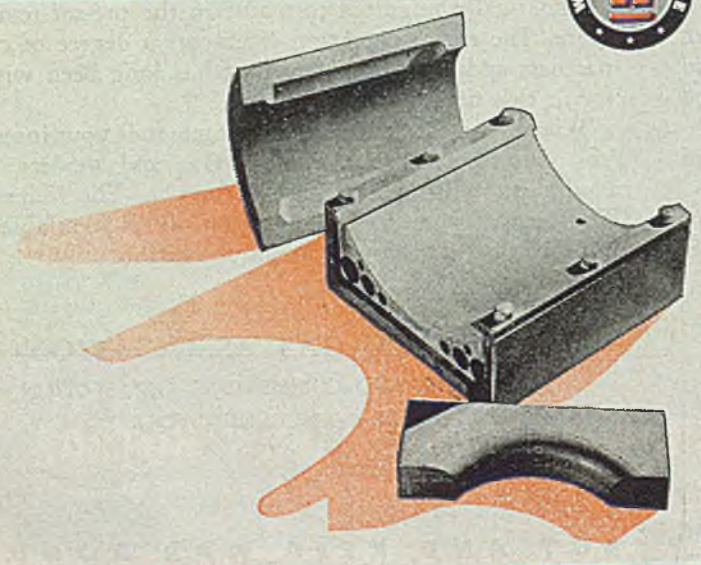
These things have been proved on more than 3,000 stands of rolls equipped with Micarta Roll Neck Bearings. It's one of the real economy stories of the whole steel industry.

We'll be glad to send you the Micarta Data Book. Address Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

J-06384

WESTINGHOUSE

Micarta



Micarta, a thermosetting plastic, is light, stro smooth and resilient . . . can be molded to sim or complicated shapes and machined, sawed, tap and threaded with ordinary machine tools— ideal material for bearings, bushings, gears and ot parts that have to withstand severe shocks in servi

CAN YOU SEE YOUR WIFE IN THIS PICTURE?

BACKS bending over the village stream . . . wooden paddles thudding against wet clothes. It's wash day in southern Europe!

You'd hardly expect to find your wife at a social gathering of this kind at the creek near Main Street! No, she'd rather let a machine handle your shirts and socks. And the machine *does it*—quicker, easier, better.

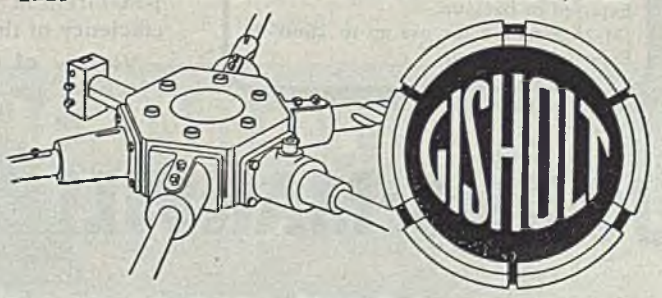
Washing machines weren't invented in this country. They were known in England as long ago as 1782. But, it remained for American manufacturers to produce them in numbers—to *popularize* them. In two short decades before the war, they put electric washing machines in 13,000,000 homes—and reduced the cost by two-thirds!

Other nations have craftsmen; other nations have materials. But it's *your* wife who gets the machine to end this drudgery—at a price you can't resist.

It has been Gisholt's privilege to work with many manufacturers of washing machines—providing the tools to machine many parts, and helping to devise more efficient machining methods. You'll find this true in almost every industry where the swift, accurate turning of metals is important to lower manufacturing costs.

GISHOLT MACHINE COMPANY

1217 East Washington Ave. • *Madison 3, Wis.*



Turret Lathes • Automatic Lathes • Balancing Machines • Special Machines

This *LARGE SIZE* J-M INSULATING FIREBLOK Speeds Installation— Cuts Bonding Costs

Over 5 times as large as ordinary fire brick, Fireblok goes into place quickly and economically. Not only is labor time saved, but costly shut-down time is decreased.

4 Fireblok types available

JM-1620 Fireblok for exposed temp. to 1600° F. As back-up to 2000° F.

JM-20 Fireblok for use up to 2000° F. Exposed or back-up.

JM-23 Fireblok for use up to 2300° F. Exposed or back-up.

JM-26 Fireblok for use up to 2600° F. Exposed or back-up

THE TWO WALLS shown above are approximately the same size. (The Fireblok wall is 1½" longer.) Yet you will note it takes more than five standard bricks to cover the same area as one J-M Fireblok. And, therefore, the brick wall requires about 40% more bonding.

Save time: One Fireblok can be set more quickly than 5 bricks. This not only reduces labor . . . but cuts furnace down-time to a minimum.

Cut bonding costs: Fewer joints also lower costs by reducing the amount of cement needed for bonding. (J-M 1626 cement was developed especially for this use.)

Fewer joints cut heat loss: The broader, uninterrupted surfaces of J-M Fireblok increase the thermal efficiency of the construction.

Variety of uses: J-M Insulating Fireblok are particularly recommended for industrial furnaces, stacks and similar equipment. for lining doors, suspended ar and, when tapered, for sprung a of exceptional stability.

For specific temperature ra Like J-M Insulating Fire Brick, blok come in four different . . . each especially develope its temperature range.

Easily cut and fitted: Fireblo easily shaped with saw, drill, rasp. Can be cut to fit irre shapes . . . making large sto special sizes unnecessary.

One of many—Fireblok is one member of the large J-M i trial insulation family—each fected through years of rese For details, consult your n J-M office or write Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JOHNS-MANVILLE *First in* **INSULATION**

-it takes EXPERIENCE, SKILL AND EQUIPMENT to make Good Heads

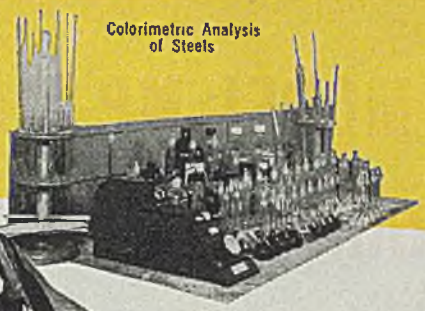
—and we here at *Worth*, have *all*,—plus a good location for shipment by land or water.

Complete Spinning Equipment (including 3 spinning machines) permit us to take care of Heads from 9½" to 216" O.D., and from 3/16" to 4" in thickness. Flanged and Dished Heads of any type, and in *very large sizes*—in Standard, A.S.M.E. and A.P.I. Elliptical and Shallow Dish specifications.

—also sheared STEEL PLATE

WORTH STEEL CO.
CLAYMONT · DELAWARE

Bulk Test for Coating Materials



Colorimetric Analysis of Steels

Automatic Welding Machine

CONTROLS FOR QUALITY

Eccentricity Test

THE HIGH QUALITY OF ARCOS ELECTRODES

IS NOT AN ACCIDENT

Viscosity Test

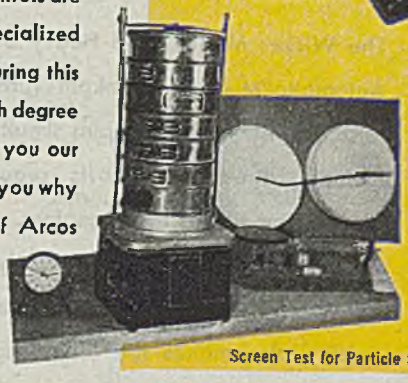
Ferro-Alloy Gassing Test

Mobilometer

IT'S the result of careful planning, the utilization of scientific methods, and a trained control personnel. If stainless and special alloy electrodes are to deposit a weld metal which is metallurgically and chemically right for the job, more rigid controls are required than for mild steel electrodes. Arcos has specialized in stainless and alloy electrodes for 14 years. During this period, it has developed its own processing to the nth degree of accuracy. When in Philadelphia, let us show you our plant. It will be a revelation to you. It will show you why our statements regarding the high quality of Arcos electrodes are true for every batch and for every run.

Be sure—Buy Arcos.

Sedimentation Test for Particle Size



Screen Test for Particle Size

ARCOS

ARCOS CORPORATION • 318 GULF BUILDING, PHILA. 2, PA.

Your Arcos Distributor is well informed. Your Arcos Distributor has Stock.

...Industrial Supply Co.
...Louisiana Welding Co.
...Hart Industrial Supply Co.
...N. Boker & Co., Inc.
...Root, Neal & Co.
...Machinery & Welder Corp.
...Williams & Co., Inc.
...Williams & Co., Inc.
...Williams & Co., Inc.

Detroit, Michigan....C. E. Phillips & Co., Inc.
Erie, Penna. .....Boyd Welding Co.
Fresno, Calif.....Victor Equipment Co.
Ft. Wayne, Ind..Wayne Welding Sup. Co., Inc.
Honolulu, Hawaii..Hawaiian Gas Products, Ltd.
Houston, Texas...Champion Rivet Co. of Texas
Kansas City, Mo..Welders Supply & Repair Co.
Kingsport, Tenn.....Slip-Not Belting Corp.
Los Angeles, Calif.....Victor Equipment Co.

Milwaukee, Wis.....Machinery & Welder Corp.
Moline, Ill. .....Machinery & Welder Corp.
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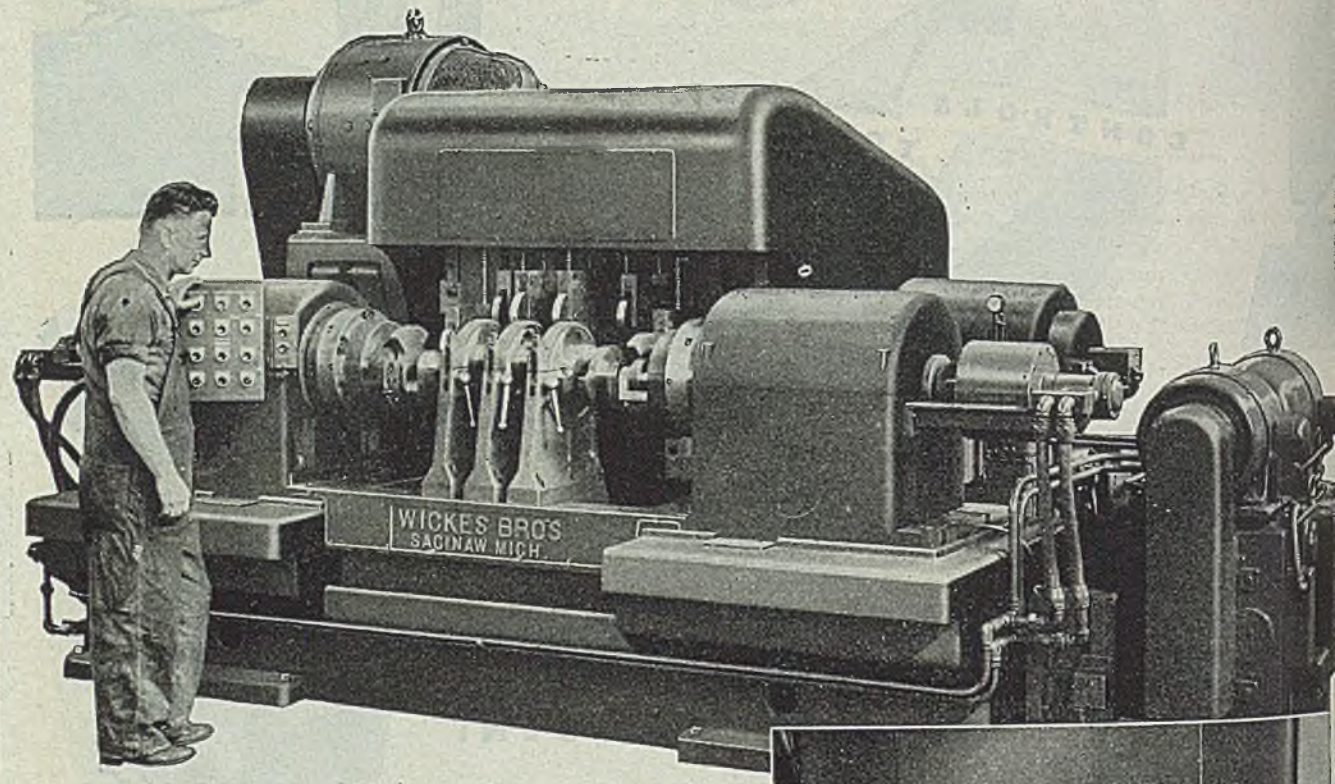
New Orleans 13, La...Gulf Welding Equip. Co.
New York, N. Y.....H. Boker & Co., Inc.
Oklahoma City, Okla..Hart Industrial Supply Co.
Pampa, Texas.....Hart Industrial Supply Co.
Pittsburgh, Pa.....Williams & Co., Inc.
Portland, Ore.....J. E. Haseltine & Co.

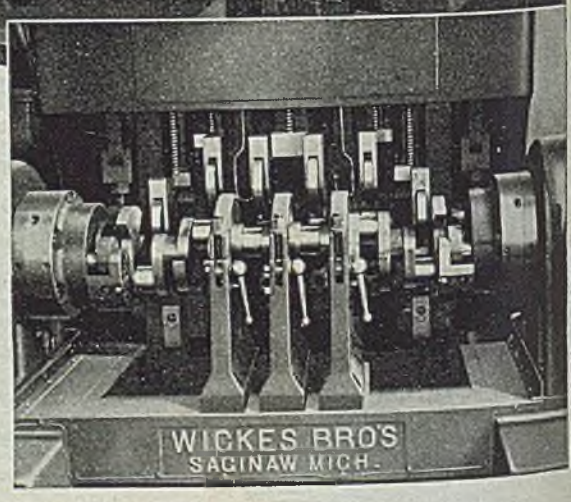
Rochester, N. Y.....Welding Supply Co.
San Diego, Calif.....Victor Equipment Co.
San Francisco, Calif...Victor Equipment Co.
Seattle, Wash.....J. E. Haseltine & Co.
Spokane, Wash.....J. E. Haseltine & Co.
St. Louis, Mo.....Machinery & Welder Corp.
Syracuse, N. Y.....Welding Supply Co.
Tulsa, Oklahoma...Hart Industrial Supply Co.
Wichita, Kansas.....Watkins, Inc.

WICKES MODEL MP-8 AUTOMATIC MULTIPLE CRANKPIN TURNING LATHE



Automatically Turns All Crankpins Simultaneously On Heavy Crankshafts

The Wickes Model MP-8 Heavy Duty Single Spindle Automatic Multiple Crankpin Turning Lathe cheeks, turns and fillets all crankpins simultaneously on heavy multiple throw crankshafts required for aircraft, marine and similar large engines. This lathe is of the very latest design and is extremely rugged making it suitable for the heaviest of roughing cuts. This same rigidity also makes the lathe capable of the very smoothest of finishing cuts with extreme accuracy in stroke, index, diameter and spacing of crankpins.



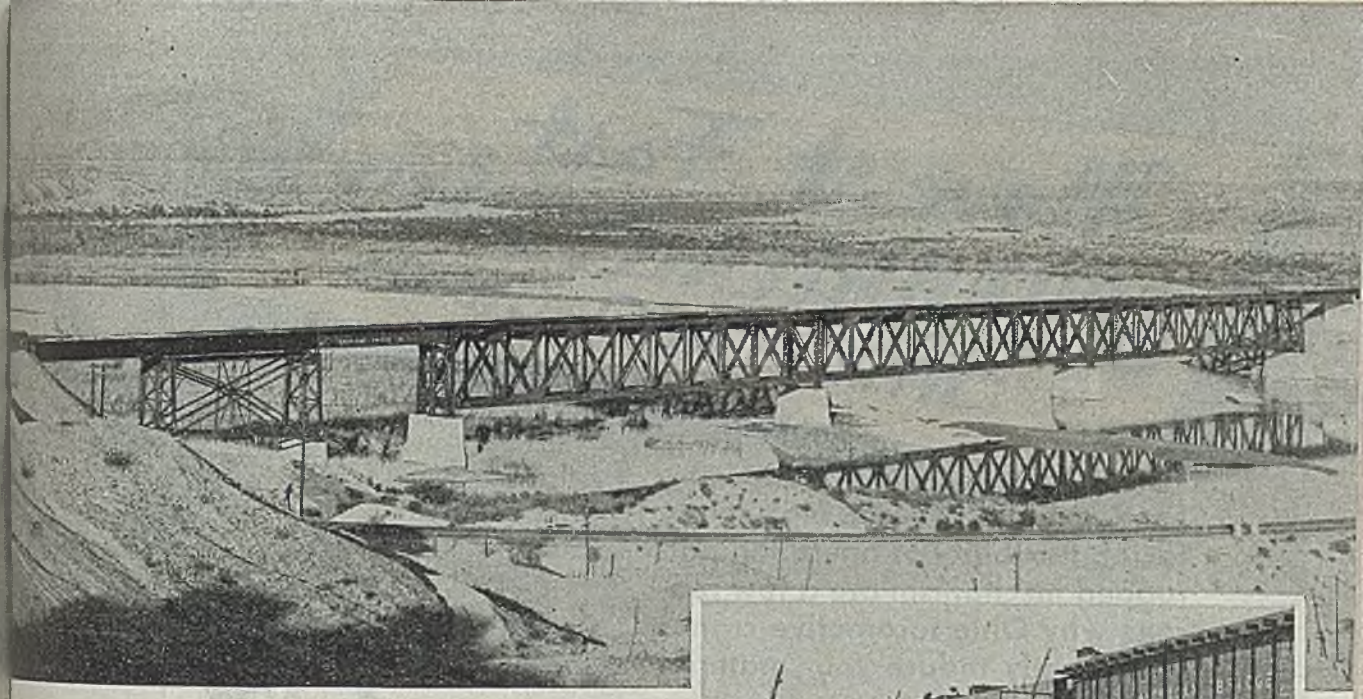
Inset shows tooling arranged for turning all crankpins on 6-throw aircraft crankshaft.

The control of the lathe is entirely automatic through electrical push button panel, it being necessary only for the operator to load crankshaft and depress electrical push button and machine goes through entire work cycle automatically and stops in unloading position. Write for complete information.

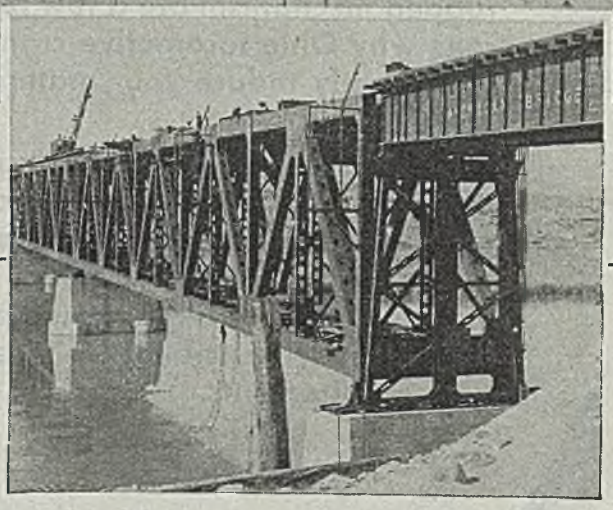
Wickes

WICKES BROTHERS • SAGINAW, MICHIGAN • RECOGNIZED QUALITY SINCE 18

CRANKSHAFT TURNING EQUIPMENT • DOUBLE-END BORING, HEAVY DUTY ENGINE, SPECIAL PRODUCTION LATHES • SIMPLEX BLUE PRI



It's new, high-level Topock Bridge replaces an old through-truss cantilever crossing Colorado River. The old bridge (not shown) is located at the extreme right end of the abandonment of the low-level roadbed in the foreground. The new, ballasted-deck structure consists of three, 350-foot deck truss spans over the main channel with plate girder approaches to the east and west, respectively 150 and 300 feet long. The steel superstructure was fabricated and erected by American Bridge Company.



IMPRESSIVE ENGINEERING FEAT . . . *removes a "bottleneck"*

THE new Colorado River Crossing of the Atchison, Topeka and Santa Fe near Topock, Arizona, is one of the outstanding bridge construction projects of recent years. This modern, double-track bridge, replacing a 55-year old single-track structure, now speeds vital traffic to California's ports of war.

Built in the days of lighter rolling stock and slower speeds, the "old-timer" was twice reinforced to meet progressive increases in loadings. But this single-track link in an otherwise double-tracked line, formed a "bottleneck" on a railroad which handles an important share of the record burden of transcontinental wartime traffic.

The new Topock Bridge eliminates the "bottleneck." Its design and construction embody engineering developments that contribute to permanence and to the strength and ruggedness necessary to meet today's and tomorrow's heavy power, traffic density and high speed operations. It is the major element of a greatly improved roadbed alignment which reduces by some 327 degrees in central angle the amount of total curvature inherent in the older line.

The developments and accomplishments of wartime "railroading" will be influencing factors of postwar competition. And transportation projects such as this Topock Bridge point the way to the coming job of roadbed rehabilitation. When the railroads' postwar jobs shape up, American Bridge will be prepared with vastly greater resources and experience, to meet their every structural need.

AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

District Offices in: Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* United States Steel Export Company, New York

UNITED STATES STEEL

OHIO LOCOMOTIVE CRANE COMPANY

DEPT. S, BUCYRUS, OHIO

TAYLOR-WINFIELD Portable Spot Welders

(AIR AND AIR-HYDRAULIC)

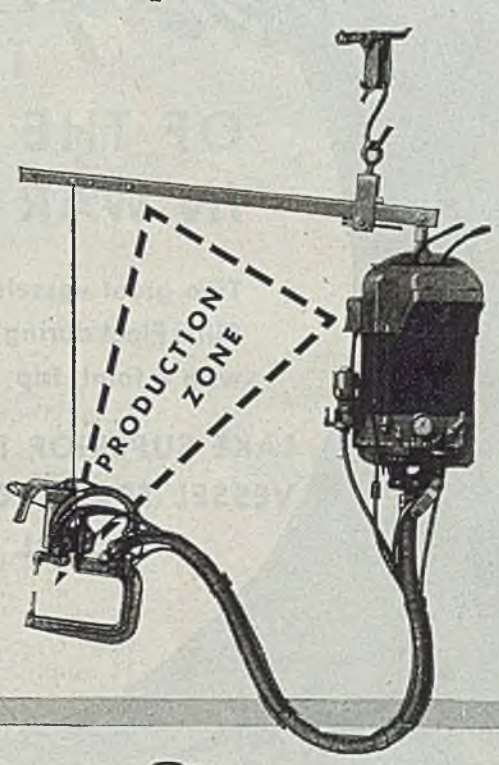
Which of these designs will help your production?

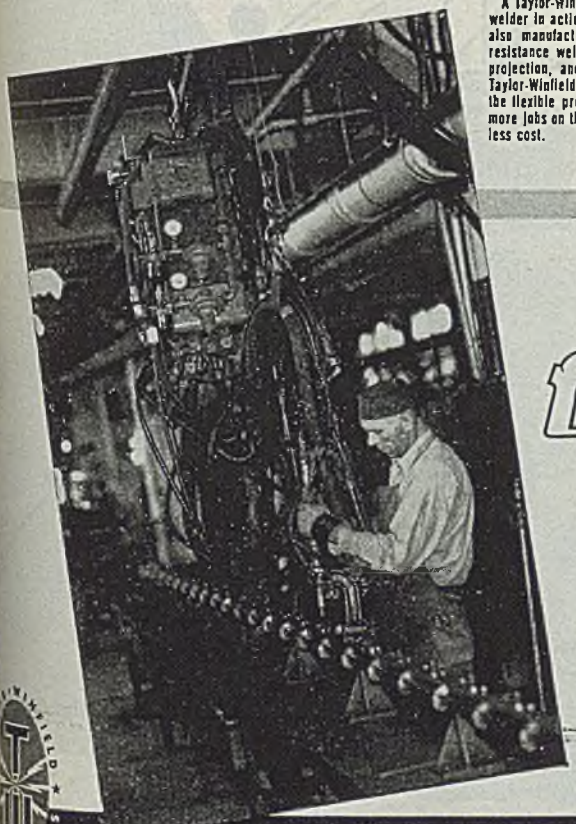
When a part is too bulky or too complicated to move to a resistance welding machine, take the welder to the part.

Taylor-Winfield makes a diversified line of portable spot welders, both air and air-hydraulic, many of which are illustrated here.

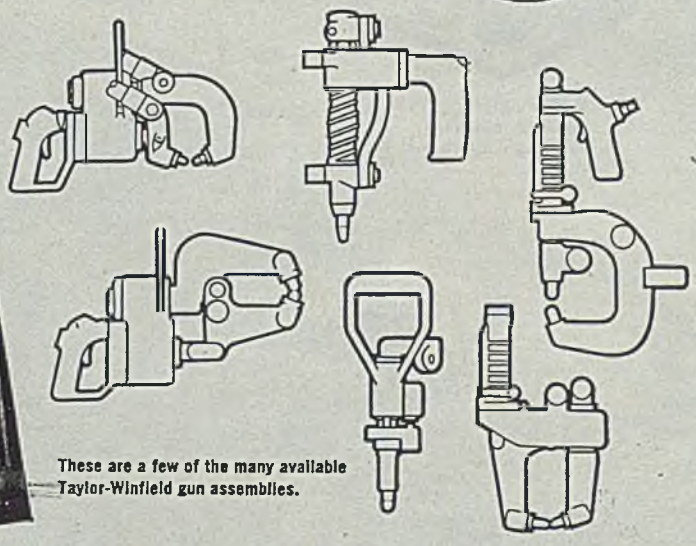
Because parts to be joined by resistance spot welding differ widely in size, shape, and weight, portable welders must be designed for specific work. Taylor-Winfield cuts the high cost of this procedure by standardizing on gun, *transformer and accessory designs.* With this unit principle of construction, many different combinations can be applied, without resorting to special designs.

Information on your requirements at your request.





A Taylor-Winfield portable spot welder in action. Taylor-Winfield also manufactures all forms of resistance welders (seam, spot, projection, and flash-butt.) All Taylor-Winfield welders feature the flexible production zone . . . more jobs on the same welder at less cost.



These are a few of the many available Taylor-Winfield gun assemblies.

The Taylor-Winfield Corporation

WARREN • OHIO

The Taylor-Winfield Corporation
Warren, Ohio

Send us Bulletin on Portable Spot Welders.

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Company _____

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GENERAL ELECTRIC

announces

A 12-PART TALKING SLIDEFILM COURSE in INDUSTRIAL ELECTRONICS

ISUALIZED for easy understanding, even by non-technical people

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RACTICAL up-to-the-minute subject matter, technically authentic

OW, an understanding of electronics as applied in industry can be built right within your organization, using the ingenious new techniques of *al instruction* that have proved so successful for wartime training. Every ence of this 12-part course has been put to test on groups of widely ent education levels. Educators have joined practical plant executives praising its combination of *easy understanding* and *technical accuracy.* s you follow the instruction manual, the sessions almost "conduct them-es," so that no great experience in organizing or instructing people is ssary. Everything essential is furnished except a sound slidefilm projector mm, 33⅓ rpm), screen, and a meeting place. Upon completion of the e, your people will have a well-rounded acquaintance with electronic ces, tubes, circuits, and applications.

ALL THESE WILL BENEFIT

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HERE'S WHAT YOU GET

12 Slidefilms and Recorded Talks — each about ½ hour long

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1 Carrying Case — attractive and strongly built, it holds records, films, and manuals

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GENERAL ELECTRIC

Buy all the BONDS you can—*and keep all you buy*

GENERAL ELECTRIC COMPANY
Apparatus Dept., Section L685-14
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☐ Enclosed is our order for.....complete INDUSTRIAL ELECTRONICS courses at $100 each.

☐ When could someone in our organization examine the complete kit?

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Company.....

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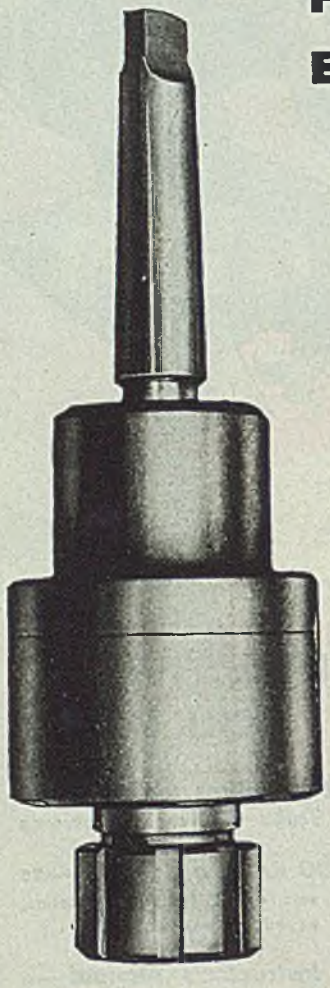
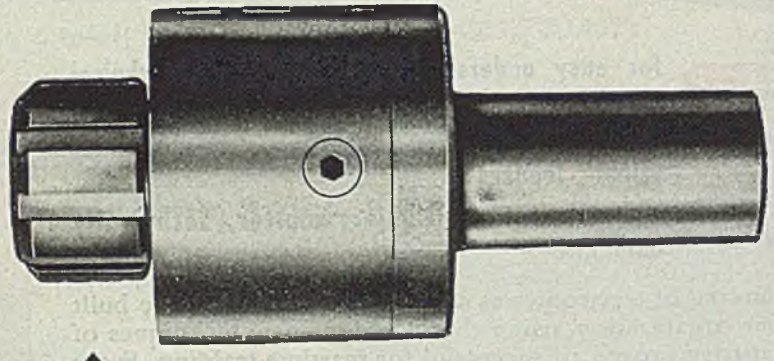
Announcing! NEW DESIGN OF UNIVERSAL FLOATING CHUCKS FOR BETTER BALANC EASIER CENTERING, SAVING IN TIME



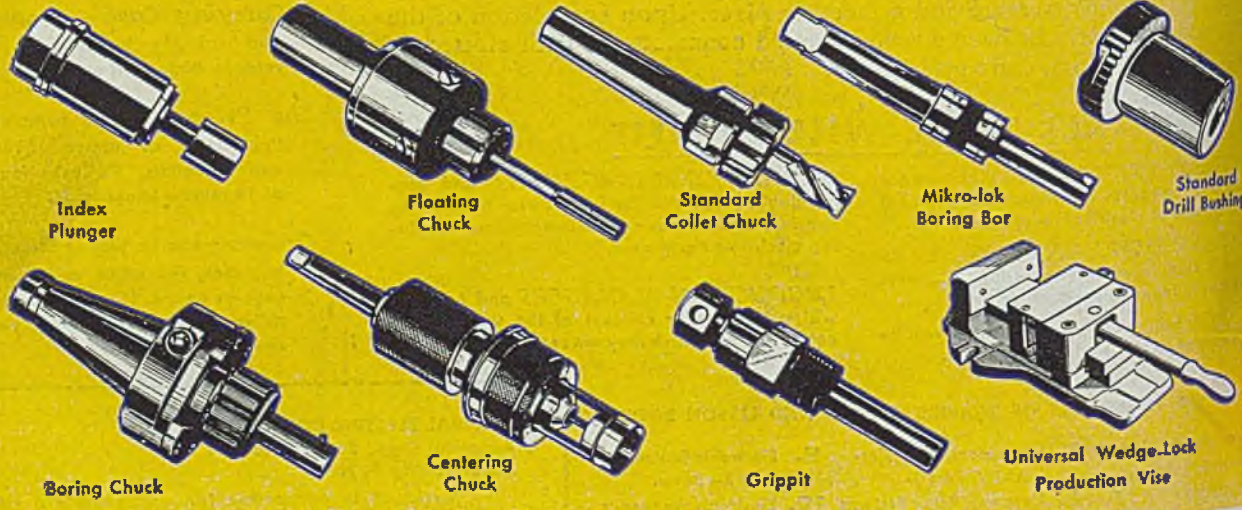
Two great advantages result from the new design of the Universal Floating Chuck. First, when the chuck is used in a horizontal position, a quick adjustment made through the flat springs counter-balances tool weight. Hence, chuck nose and tool can be brought to within a few thousandths of the center of work at high speed, saving considerable time. This quick adjustment is accomplished without restricting the floating action of the chuck. Since the frictionless bearings are radially ground in an interlocking assembly to carry both the driving and thrust load, there are no auxiliary bearings to increase friction or resistance. The second big advantage of the new Universal chuck is the seal which positively prevents the entrance of coolant into the assembly without restricting the floating action of the chuck. This means the chuck can be used at high speeds and heavy feeds where the use of coolant is required, without harming the efficiency of the mechanism. For counter drilling, reaming and counterboring round, straight, smooth holes, use the new Universal Floating Chuck—positively the most sensitive float on the market today. Write for complete information.



↑ FOR HORIZONTAL OPERATION

← FOR VERTICAL OPERATION

UNIVERSAL TOOLS THAT WILL INCREASE PRODUCTION AND ACCURACY IN YOUR PLANT



UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH, MICHIGAN — Fighter Plane Given by Employees — 20% Employee Bond Deduction

Select the right S/V Sova-Kote to

INSURE YOUR SHIPMENTS AGAINST RUST!

AS YOU KNOW, the fine craftsmanship that you put into your metal parts can be seriously affected in transit. Rust and corrosion are twin dangers that threaten all shipments of metal parts.

To help you meet this challenge, Socony-Vacuum has developed its complete line of 11 S/V Sova-Kotes to cover every conceivable rust-prevention need. It's necessary to select the correct Sova-Kote to fit your specific requirements. Here are a few factors to consider:

The type of part to be shipped, the degree of precision; the method of shipment (whether it's to be packaged or not); the time involved; the conditions to be met, heat, cold, handling, water, etc.; and finally, the appearance of the part when it reaches its destination.

Your Socony-Vacuum Representative is trained to help you consider these factors and select the right Sova-Kote. He's backed by our years of research and experience in this field. Get his expert advice and assistance.

SOCONY-VACUUM OIL CO., INC., Standard Oil of N. Y. Div. · White Star Div. · Lubrite Div. · Chicago Div. · White Eagle Div. · Wadhams Div. · Magnolia Petroleum Co. · General Petroleum Corp. of Calif.

SOCONY-VACUUM'S 5 Steps to Lower Production Costs:

1. Lubrication Study of Your Entire Plant
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STAINLESS STEEL

AUSTENITIC stainless steel exposed in fabrication or service to temperatures between 900° and 1500° F. must be stabilized to prevent intergranular corrosion embrittlement.

Titanium is the most economical of the several present methods of stabilizing stainless steel and the supply of titanium is unlimited.

For heat resistance, for tube piercing and for formability titanium stainless steel is the choice of experience.

If you are using stainless steel at high temperatures one of our technical staff will be glad to explain the advantages of titanium to you.

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ALLOY MANUFACTURING CO.

Executive Offices: 111 BROADWAY, NEW YORK, N. Y.
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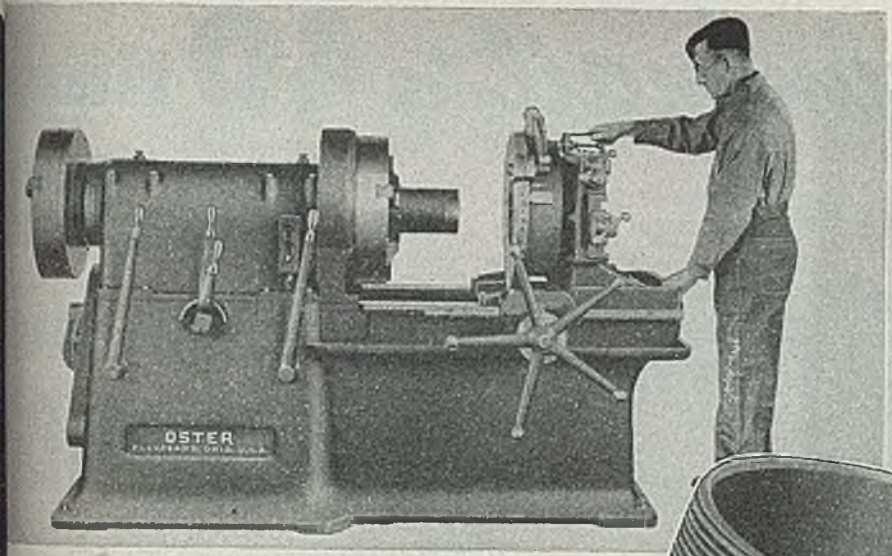
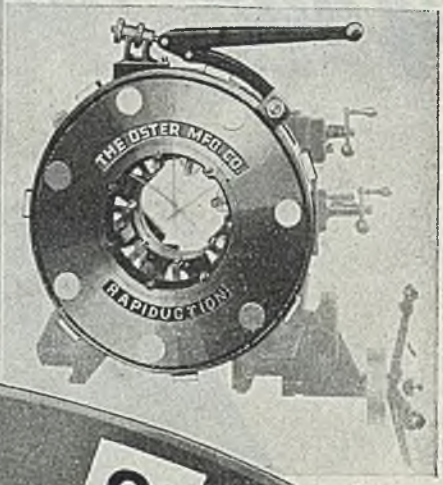
TAM
ZIRCONIUM AND TITANIUM PRODUCTS
Registered U. S. Pat. Off.



Oster "RAPIDUCTION" die-head adjusted to thread largest size of pipe within range of each machine.



One Die-Head

THREADS THEM ALL!

Movement of cam lever on the "RAPIDUCTION" die-head sets chasers for any size pipe to be threaded. Micrometer adjustment of lever sets chasers for any depth of thread desired.

Threading speeds of Oster "RAPIDUCTION" machines range from only 11.3 seconds on 1½" pipe to only 3 minutes, 10 seconds on the big 12" pipe. Those speeds are maintained on a continuous production basis.

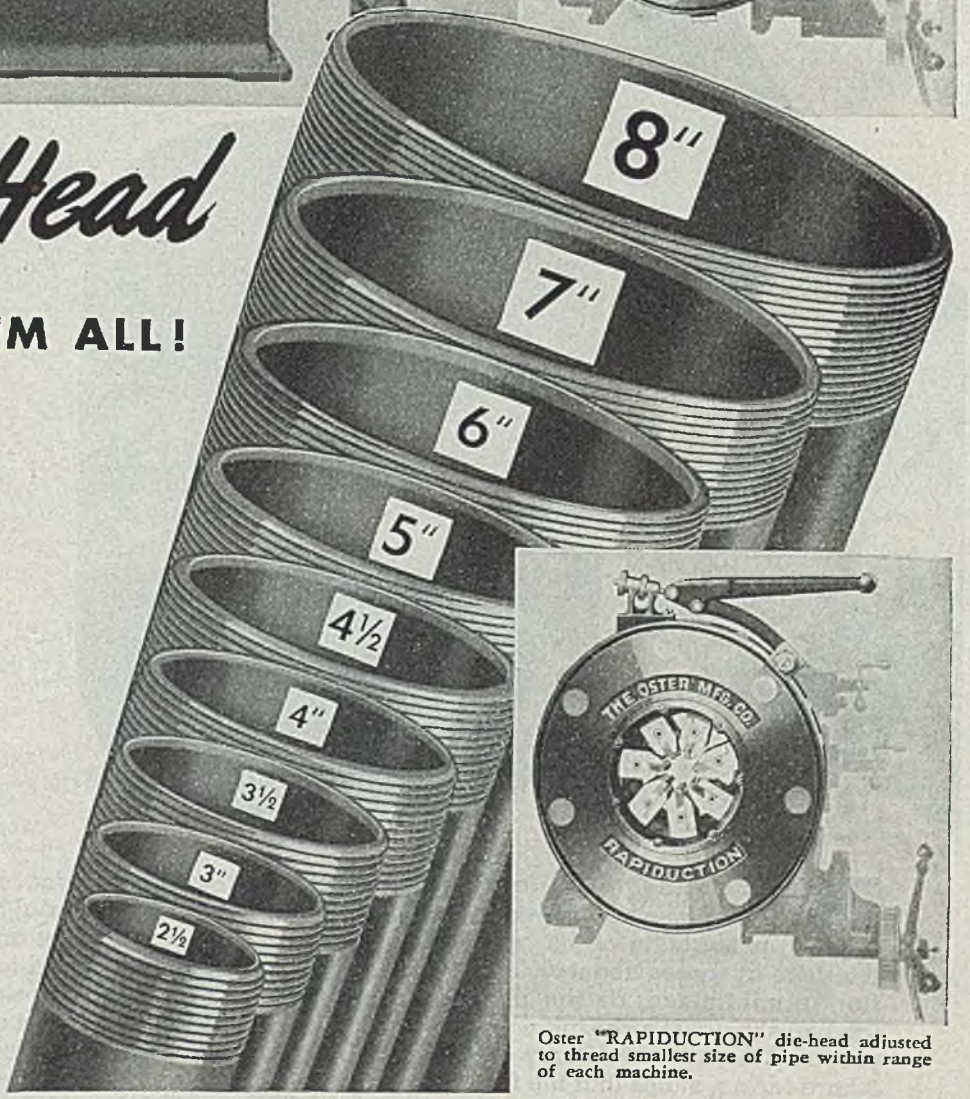
Three Models

No. 6-A "RAPIDUCTION." Standard range 1½" to 6" pipe. Bolt range 1" to 4".

No. 8 "RAPIDUCTION." Standard range 2½" to 8" pipe.

No. 12 "RAPIDUCTION." Standard range 3½" to 12" pipe.

If you have large quantities of pipe to thread, Oster "RAPIDUCTION" machines will prove to be a profitable investment.



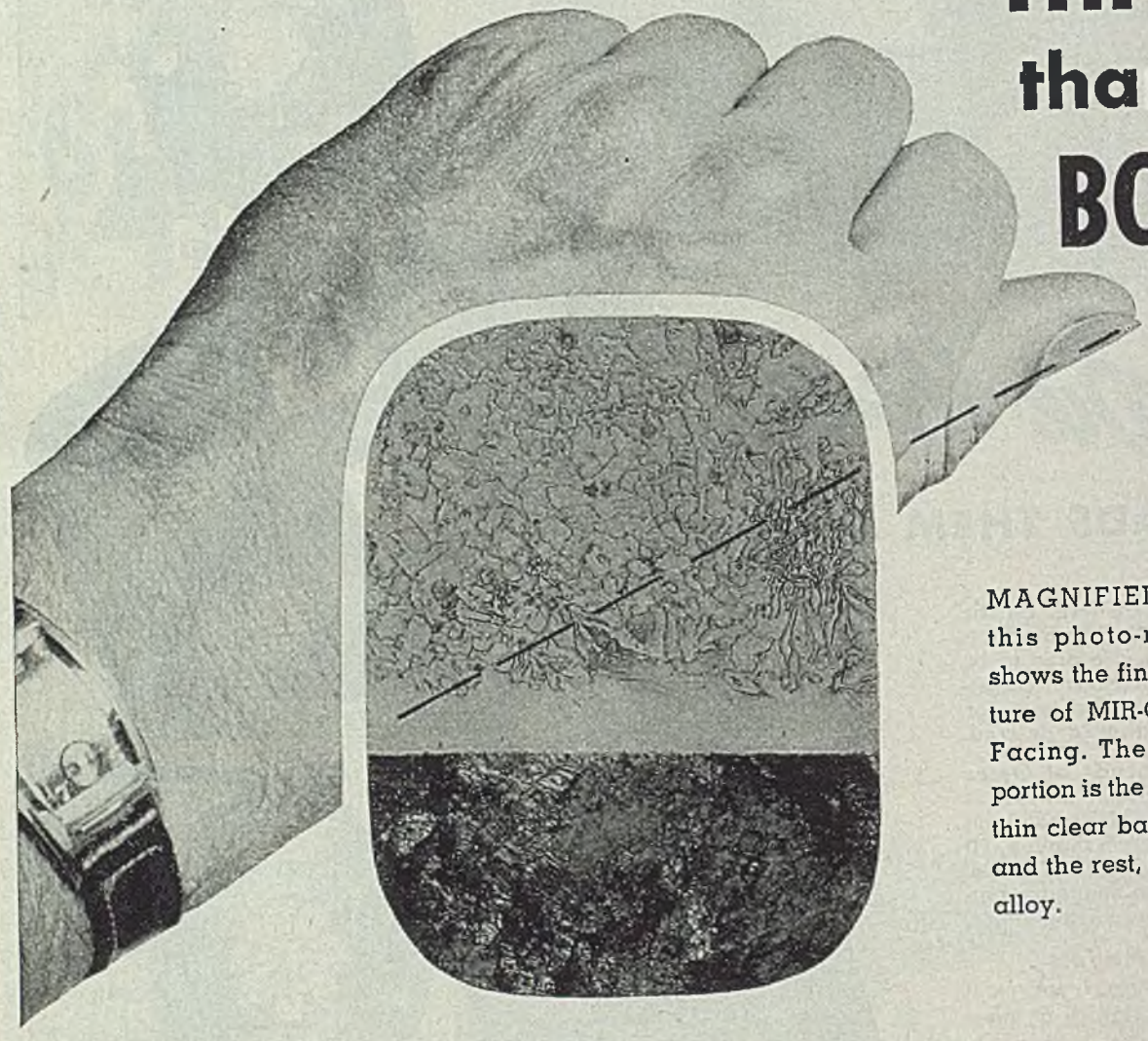
Oster "RAPIDUCTION" die-head adjusted to thread smallest size of pipe within range of each machine.

OSTER

"Rapiduction" PIPE MACHINES

THE OSTER MANUFACTURING COMPANY, 2037 EAST 61st ST., CLEVELAND 3, OHIO, U. S. A.

Your Thumbnail is 40 times THICKER than the BOND



MAGNIFIED 500 times, this photo-micrograph shows the fine grain structure of MIR-O-COL Hard-Facing. The heavy dark portion is the parent metal; thin clear band, the bond; and the rest, the deposited alloy.

BECAUSE MIR-O-COL Hard-Facing alloys flow readily when correct welding heat is applied, penetration of the parent metal at the interface averages about .0007 of an inch. Dilution is minimized, as the photo-micrograph (above) shows. The consulting metallurgist who prepared this impartial study of MIR-O-COL No. 2 hard-facing, states that the ferritic grain structure of the hard-facing (light area above) consists of cementite and martensite . . . which combine to give MIR-O-COL alloys their hardness. This hardness, fused at the moment of impingement of either electric or acetylene torch, can form a protective layer of high-alloy metal over wearing surfaces of your equipment. Scrapers, cutters, material-handling rollers and buckets—in fact, almost any type of apparatus or equipment subjected to constant wear from abrasion, erosion or corrosion—can be economically hard-faced. In almost every recorded instance, maintenance costs have dropped, production records gone up, and equipment capitalization minimized by using this dollar-saving MIR-O-COL Hard-Facing, applied easily to iron or steel. Learn more about hard-facing for profit. Write today for your FREE copy of "Weldors' Guide to Successful Hard-Facing." Address Department B-18.

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HARD-FACING RODS
ALLOY COMPANY
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STANDARDS and SPECIALS by the *Millions*

THE FERRY CAP & SET SCREW CO.

2159 SCRANTON ROAD • • • CLEVELAND 13, OHIO

"SHINYHEADS"

America's Best Looking Cap Screw

Made of high carbon steel—AISI C-1038—to standards for full finished hexagon head cap screws. Heads completely machined top and bottom. Hexagon faces clean cut, smooth and true, mirror finish. Carried in stock.

HEXAGON HEAD SCREWS

HEAT TREATED

Made of high carbon steel—AISI C-1038. Furnished with black satin finish due to heat treatment. Hexagon heads die-made, not machined. Point machine turned; flat and chamfered. Tensile strength 130,000-160,000 p.s.i. Carried in stock.

FILLISTER CAP SCREWS

Heads completely machined top and bottom. Milled slots —less burrs. Flat and chamfered machine point. Carried in stock.

FLAT HEAD CAP SCREWS

Heads completely machined top and bottom. Milled slots —less burrs. Flat and chamfered machine point. Carried in stock.

SET SCREWS

Square head and headless—cup and oval point—case hardened. Carried in stock.

MILLED STUDS

All studs made steam-tight on tap end unless otherwise specified, with flat and chamfered point. Nut end, oval point. Carried in stock.

"SHINYTHREADS"

AIRCRAFT ENGINE STUDS

Made of highest aircraft quality alloy steel, finished to extremely close thread and body tolerance, with precision rolled threads—both straight and step types.

CONNECTING ROD BOLTS

Made of alloy steel—heat treated—threads rolled or cut —finished to extremely close thread and body tolerances—body ground where specified.

SPRING BOLTS

Case hardened to proper depth and ground to close tolerances. Thread end annealed. Supplied in various head shapes, with oil holes and grooves of different kinds, and flats accurately milled.

VALVE TAPPET ADJUSTING SCREWS

Hexagon head style—to blueprint specifications—hexagon head hard; polished if specified—threads soft to close tolerance.

FERRY PATENTED ACORN NUTS

For ornamental purposes. Steel insert—steel covered. Finish: plain, zinc plated, cadmium plated. Size: 9/16", 3/4", 15/16" across the flats. Tapped 1/4" to 3/4" inclusive.

Cross section of Ferry patented acorn nut, showing how steel hexagon nut fits snugly into shell.

Pioneers and Recognized Specialists, Cold Upset Screw Products since 1907

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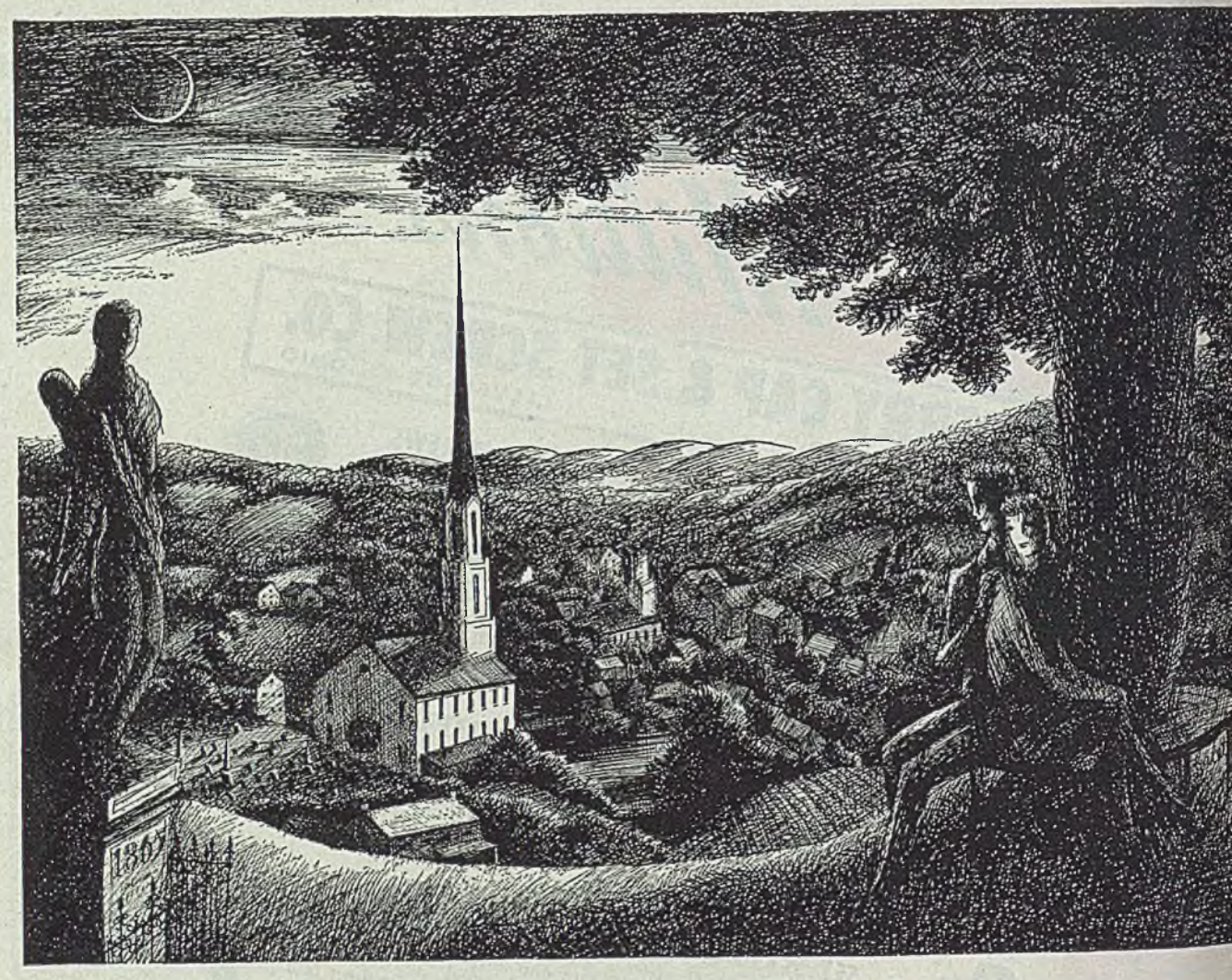
SPECIALS furnished to BLUE PRINT SPECIFICATIONS



The bells of Pleasant Valley

The story is told about the bells that ring in a little village in the foothills of the Alleghenies. In the Year of Our Lord 1865, the folk of Pleasant Valley created an inspiring memorial to their loved ones lost in the Civil War.

Into one mighty heap they piled the relics of the war's bitter battles. The old brass cannon, the battered muskets, the broken swords and rusted bayonets. They melted them all down, and from this litter of war the gentle bells of Pleasant Valley were cast, to ring out over green fields and fertile farms throughout the years of tranquillity and peace.

The time will come when something like that will happen to the mountainous litter of munitions for World War II. Olin Industries, too, will take their skill and knowledge and experience, their big stock pile of scientific research—all they have learned from fifty years of skillful operation through peace and war—and "melt them down" into things for peace. Instead of munitions for soldiers, there will be guns and ammunition for sportsmen. Instead of powder for bombs, there will be explosives for miners, farmers and builders. Instead of carbines soldiers, there will be roller sk for kids—and there will be br bronze and other metals for rac refrigerators, irons—a thous peace-time uses.

It will be a great day, when can all "down tools" on the war and pick up the tools for the jo peace once more. Then the song scores of machines making thi to make life better, be as joyful as the bell Pleasant Valley.

OLIN

OLIN INDUSTRIES, I
East Alton, Illinois

Divisions, Subsidiaries, Affiliates

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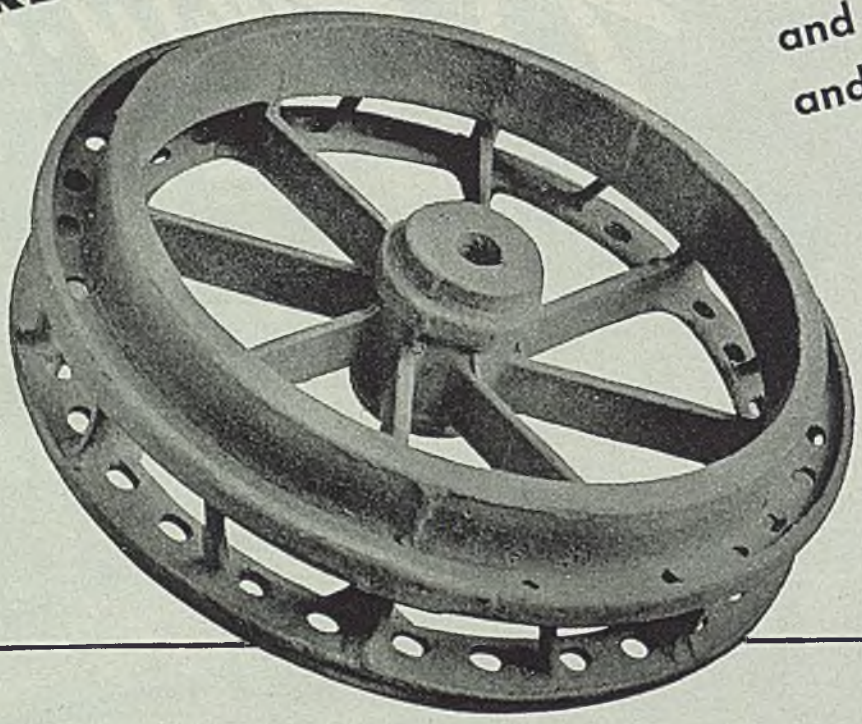
STE

ARE YOU LOOKING FOR ECONOMY?

and Strength
and Wear Resistance



• Then here is a typical example of what you can do with steel castings.

This baggage truck wheel formerly was made up of 76 pieces, requiring 115 machine operations, plus a complicated assembly job.

Now, it is a one-piece steel casting, requiring only four machine operations, with no assembly cost at all! That's a real saving

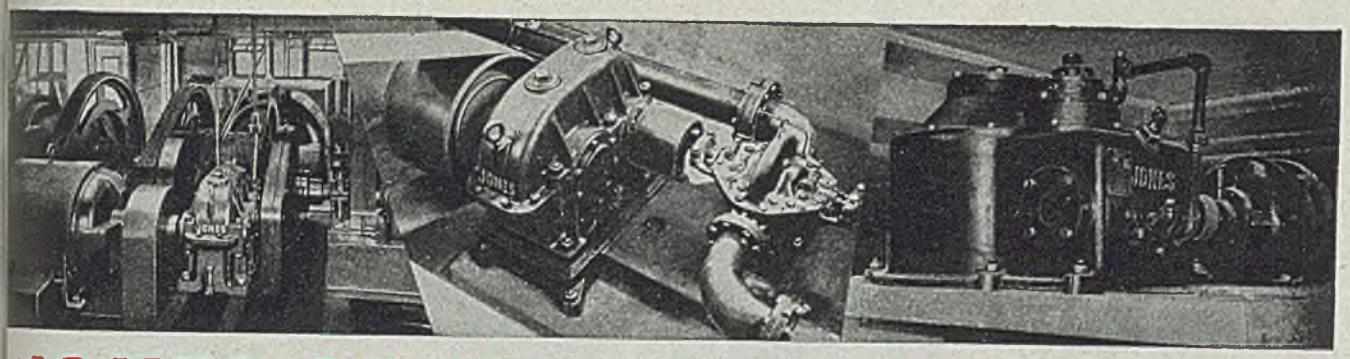
Consider the advantages steel castings offer you—strength, rigidity, scientific weight distribution, low finishing and assembly time, plus any combination of steel properties you can secure by any other method of fabrication.

Whatever you make, or plan to make, this is something for you to look into. Careful research and broad experience enable steel foundries to help you make a better product. And it can be proved!

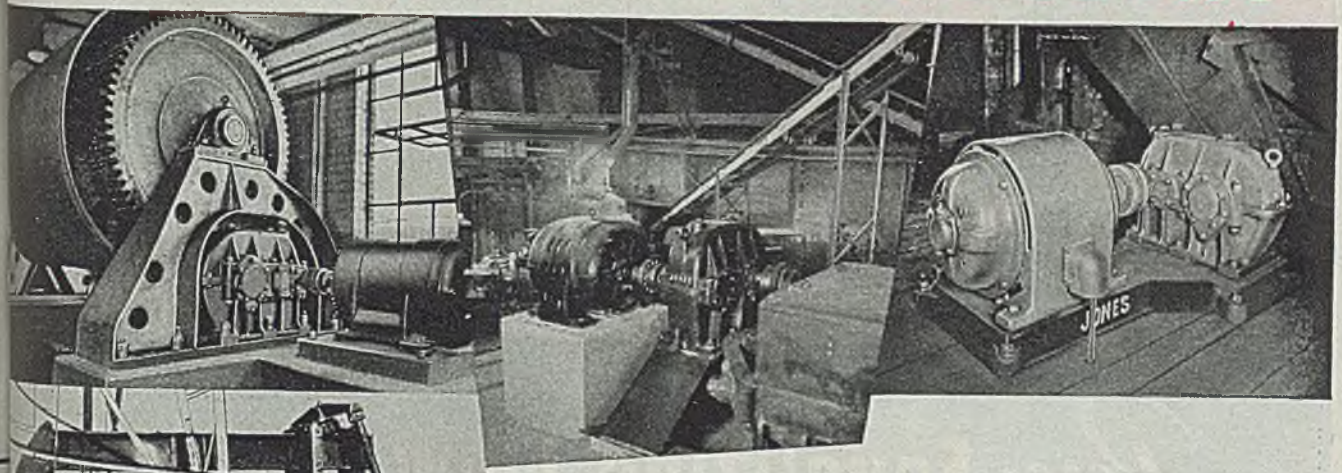
Ask your steel foundryman, or write for information to Steel Founders' Society, 920 Midland Bldg., Cleveland, Ohio.

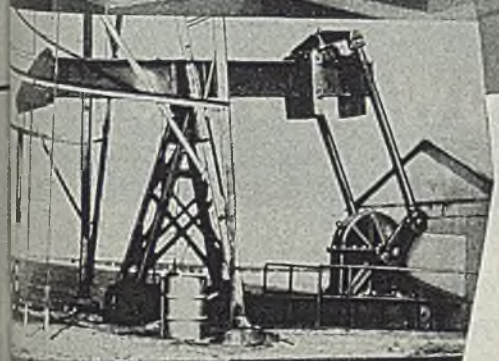
MODERNIZE AND IMPROVE YOUR PRODUCT WITH

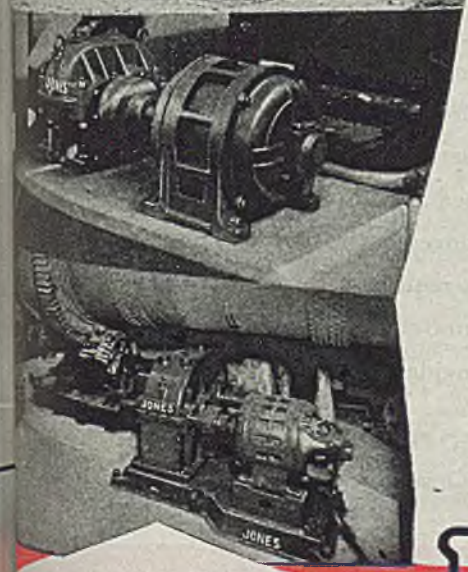
STEEL CASTINGS



JONES DRIVES FOR INDUSTRY







• These illustrations show application of Jones drives to solve a wide range of industrial power transmission problems.

★ For many years the W. A. Jones Foundry & Machine Company has been called upon as a consultant, to help solve a great variety of difficult drives involving the use of speed reducers, gears and other transmission machinery. In many cases these installations have called for the development of special equipment, designed and built to suit the specific requirements of the project.

As a result of these years of experience, involving numerous special problems in the mechanical transmission of power, the Jones organization has collected a vast amount of technical data relating to work in various fields.

Specific bulletins and catalogs are available on the products listed below and a general 20 page bulletin "Jones Drives for Industry" presents a broad picture of Jones products, engineering services and manufacturing facilities.

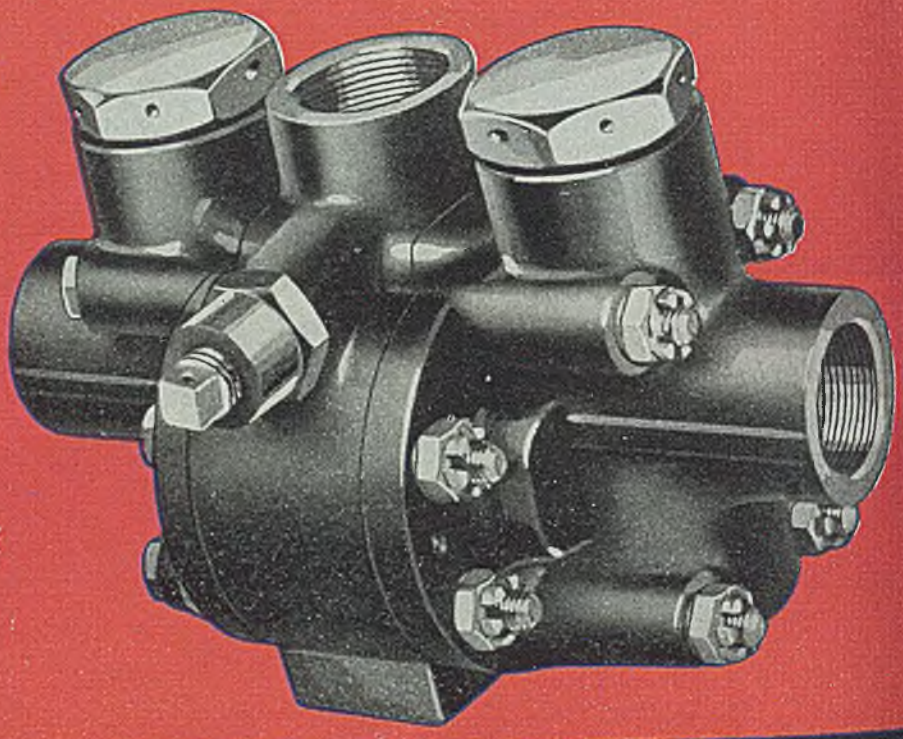
W. A. JONES FOUNDRY & MACHINE CO.
4437 Roosevelt Road, Chicago 24, Illinois

JUST ASK FOR BULLETIN NO. 80

Jones

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • CUT AND MOLDED TOOTH GEARS • PULLEYS
ANTI-FRICTION PILLOW BLOCKS • V-BELT SHEAVES • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

Another PESCO precision aircraft development now ready to work for industry



Pesco Equalizing Flow Divider

Pumps and control equipment for hydraulic systems, perfected by PESCO for wartime aviation, today open the way for many new and more efficient uses of Pressurized Power.

PESCO Equalizing Flow Dividers are among the equipment that now makes possible new Pressurized Power applications. These precision equalizers were perfected to synchronize the operation of wing flaps and landing gears. They divide a single hydraulic flow into two or more outlet flows of equal or proportional volume. They feature a highly efficient gear-type design with simplified construction. Pressure limits range up to 2000 p.s.i. in models that vary from 3.8 to 7.7 pounds in weight.

For industry, the PESCO Equalizers are ideally suited for any application where synchronous movement of two or more hydraulic cylinders is required.

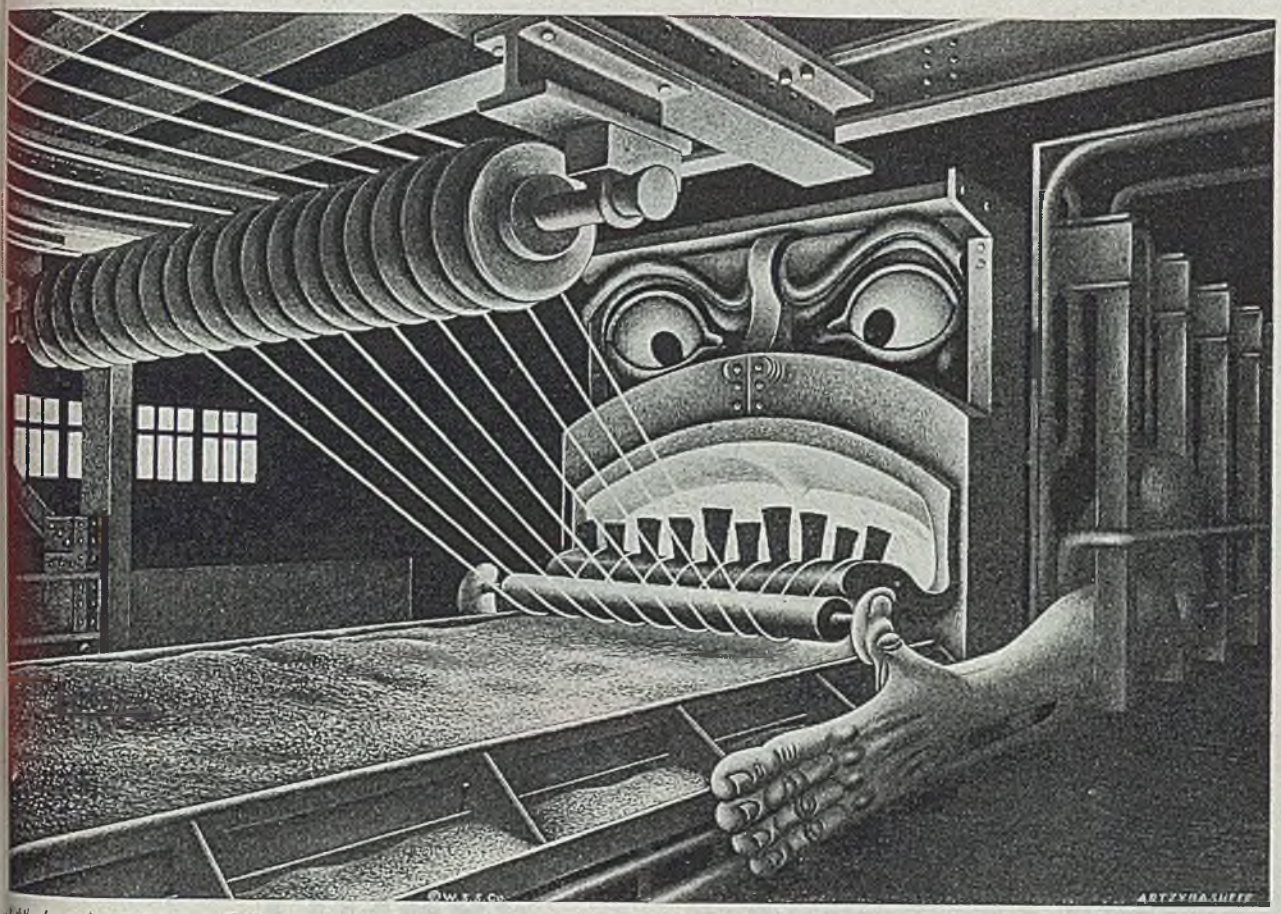
Also, units can be furnished with a fixed ratio to provide proportional flows.

Write today for descriptive folder No. 10-1. PESCO PRODUCTS CO., (Division Borg-Warner) 11610 Euclid Avenue, Cleveland 6, Ohio.

PESCO BORG-WARNER

In Aircraft Hydraulics, Fuel Pumps, Air Pumps, Related Accessories . . .

PERFORMANCE POINTS TO Pesco FIRS



Eighth of a series of Artzybasheff's impressions of the manufacture of steel wire products

Enlarged reproduction free on request

WIRE HELLFIRE

Coming from the mouth of a fiery furnace that looks not unlike a legendary dragon; hot, high carbon steel wire is being "patented"—heat treated under carefully controlled temperature conditions to remove the effect of cold drawing and to permit further processing.

This patenting method is one of several used by Wickwire Spencer to produce exceedingly strong, tough wire. Annealing and spheroidizing, which also remove the effects of cold drawing, are softening processes used for steel wire that must withstand severe forming operations.

These processes require skilled craftsmanship, for uniform wire is dependent not alone upon accurate drawing but upon careful attention to heat treating temperatures.

Learning how to handle wire is a skill Wickwire Spencer has been developing for the past 124 years. Our metallurgists are often called upon to develop special formulae for differing wire needs. This knowledge can help you in finding the answer to *your* wire problems. And our complete control of manufacture, from the making of the steel through processing of the wire, is carried out in our own plants to make certain that the wire is uniform in size, tensile and stiffness . . . and therefore easier on your wire working machines.

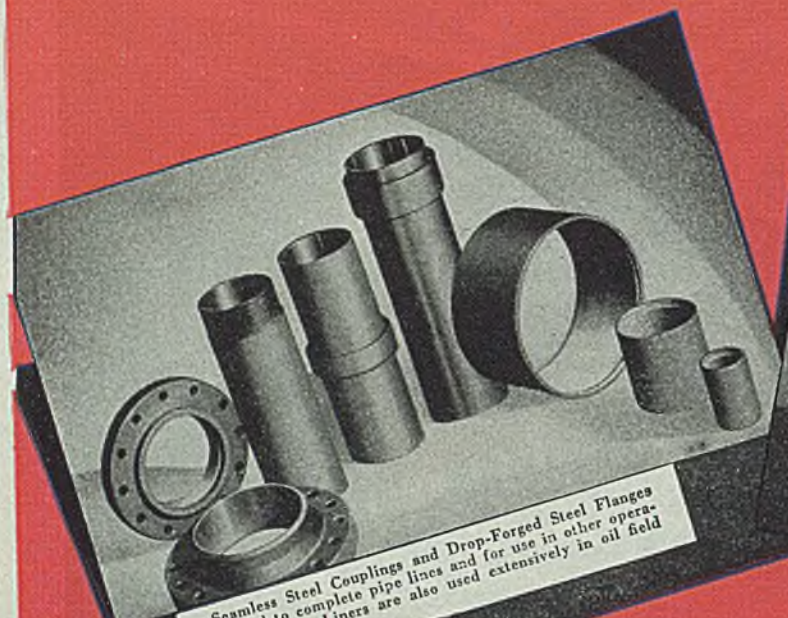
We can supply high or low carbon steel wire; round or shaped; in a wide variety of sizes, tempers, grades and finishes. Let us know your requirements.

Send your wire questions to

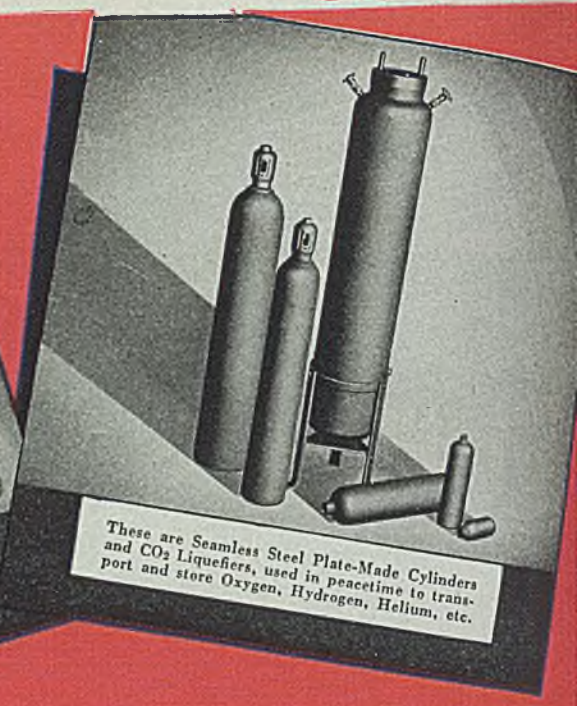
WICKWIRE SPENCER STEEL COMPANY

EXECUTIVE OFFICES—500 FIFTH AVENUE, NEW YORK 18, N. Y.

(Tex.) • Boston • Buffalo • Chattanooga • Chicago • Clinton (Mass.) • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester



Seamless Steel Couplings and Drop-Forged Steel Flanges needed to complete pipe lines and for use in other operations. Pump Liners are also used extensively in oil field operations.



These are Seamless Steel Plate-Made Cylinders and CO_2 Liquefiers, used in peacetime to transport and store Oxygen, Hydrogen, Helium, etc.

A group of Drop Forgings that require the utmost skill to produce. Intricate in design, with tolerances to a thousandth of an inch.

We suggest that you send for the 192-page Harrisburg Catalog now. It is a well organized source of buying information and related engineering data on everything we manufacture. Your engineering and purchasing departments can make good use of it.

HARRISBURG

QUALITY CONTROLLED PRODUCTS

The dependable quality of Harrisburg products is traditionary in the railroad, automotive, oil and other industries. There are two distinct contributions to this recognized standard of excellence.

1. All products are manufactured completely within the Harrisburg plants where supervision and inspection can be positively controlled from pig to finished product.
2. Progressive research by our own specialists is continually checked by engineering institutes of the highest standing.

Harrisburg Steel Corporation is the largest manufacturer of Seamless Steel Cylinders for high pressure, compressed gases. The plate-made process provides cylinder walls so uniform in thickness that strengths are equalized, hence more dependable in meeting severe service. This knowledge has been applied to the seamless steel processing of the CO_2 Liquefiers, Pipe Couplings, Pump Liners and Deep Drawn Products. Quality in volume production is the result.

HARRISBURG STEEL CORPORATION

HARRISBURG, PENNSYLVANIA

Harrisburg Makes: Alloy and Carbon Steel; Seamless Steel Cylinders, Liquefiers, Pipe Couplings and Slush Pump Liners; Drop Forgings and Drop-Forged Steel Pipe Flanges; Coils and Bends.

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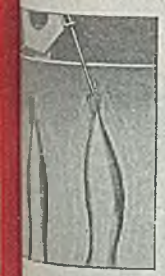
against "AIR RAIDS"

Dust takes no time out for its damaging attack on production equipment. Every hour — every minute, dust strikes at your pocketbook.

Dust control, however, can be effected easily, at a cost that makes it a wise investment. Effective control depends upon two main conditions: *First:* hood design at the dust source is of vital importance. Proper air volume and velocity are necessary to gather the dust into a correct piping system. Second, efficiency of dust collector operation must be considered such as horsepower consumed by pressure loss through the collector, and the increase in pressure loss during operation. Likewise, maintenance cost must be considered.

Through simplified and efficient design, Dustubes have set new high standards for controlling dust. Tests on past installations have shown a collecting efficiency of more than 98% by weight, and Dustubes are extremely inexpensive and easy to operate and maintain.

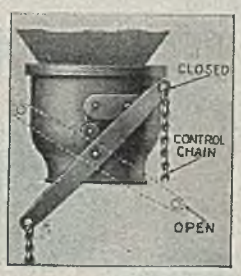
An American engineer can apply the many advantages of Dustube Collectors for an efficient, practical answer to your dust problem. Write for further information.



…G DEVICE— …ated dust on … completely re- …by the whipping …imparted by the … mechanism …e tubes are de-

HIGH EFFICIENCY — Extremely fine dusts, particularly those within the low micron size range are trapped with nearly 100% efficiency by weight.

…CITY OF DE- …Except for an … inexpensive …placement, little …ce of a Dus- …ner required.



EASY DISPOSAL — Trapped dust shaken from tubes is discharged from storage hopper through a specially designed outlet valve.

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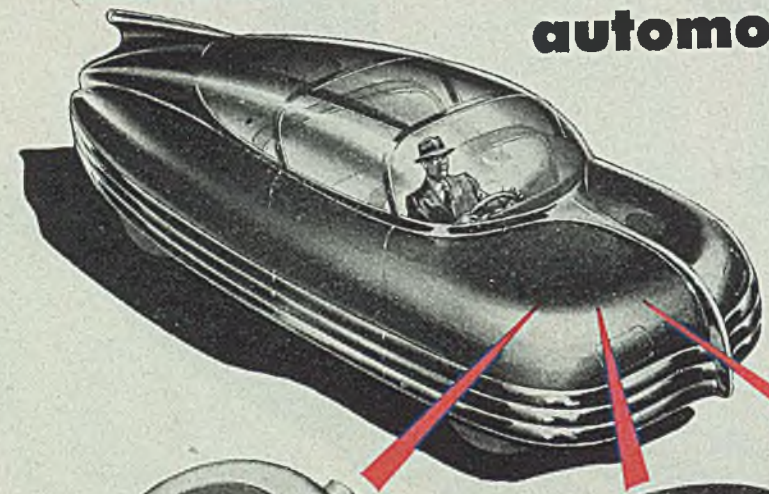
ARMY NAVY

AMERICAN dustube dust collectors

graphitar parts prove their efficiency in automotive installations

(CARBON-GRAPHITE)



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With one lubrication, Graphitar clutch release bearings last the life of the average car.

Graphitar seals do not gall or leak and retain hot oil under pressure in fluid couplings, torque converters, and hydraulic transmissions.

Graphitar liquid pump seals are drop tight against water, anti-freeze, hydro carbons etc.

graphitar parts fill needs in scores of industries . . . .

(CARBON-GRAPHITE)

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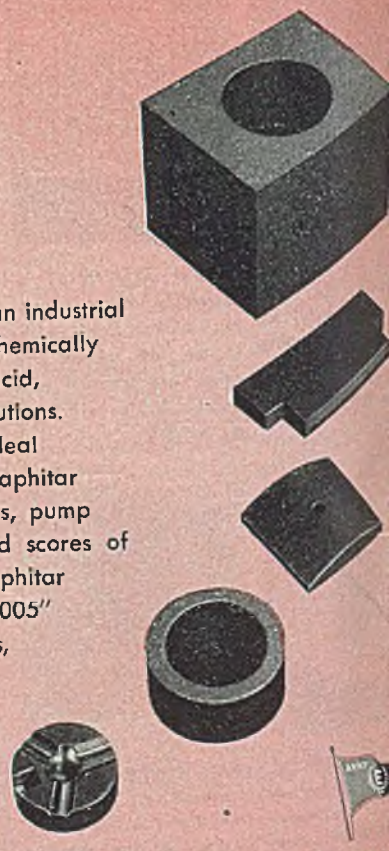
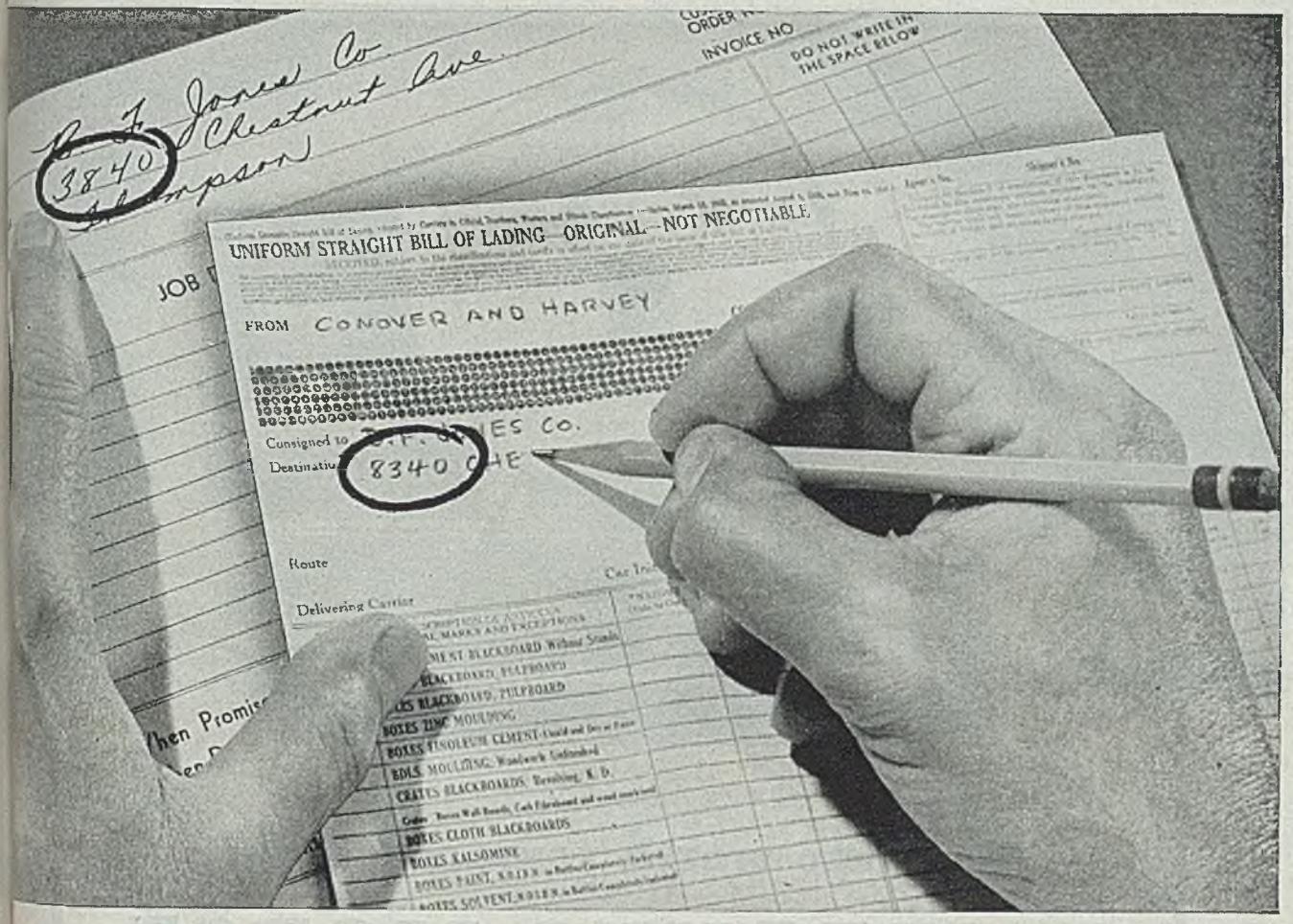


THE UNITED STATES GRAPHITE COMPANY • SAGINAW, MICHI



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Most likely, you have run across errors of a similar nature—a hurried glance, the pencil mistaking the position of the 8 and 3. Errors that mean costly checking and re-checking to find the cause later on—a job that costs in time and money.

Yet such errors are needless—can easily be eliminated by the use of the right forms. Forms that allow *one* person at *one* time to write all the needed copies—forms with fresh interleaved carbons that assure instant readability—forms such as those Uarco brings to the business world.

Creating better forms is Uarco's business—scientifically designing forms that keep business procedure moving smoothly—prefabricating paper and carbons into forms that mean time and money saved.

Have a Uarco representative call on you today. It will cost you nothing and may well result in cutting the number of errors in your business records. Or for detailed information—write us today.

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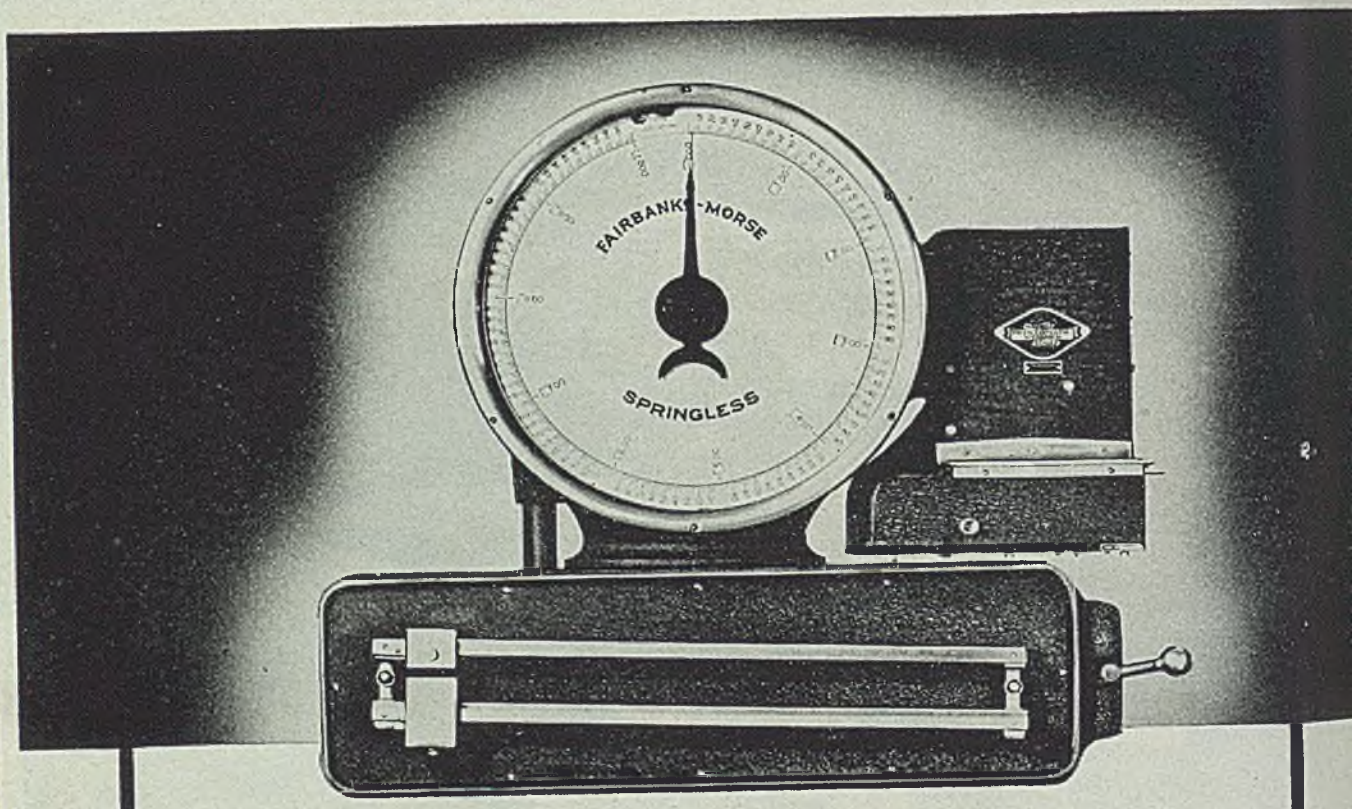
UARCO

BETTER BUSINESS FORMS



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Fairbanks-Morse is the name to think of first when you need scales. For 115 years Fairbanks-Morse Scales have met the varied and increasing needs of business. They have won the confidence of buyers and sellers . . . labor and management, because Fairbanks-Morse has always built accurate scales and is constantly working to improve them.

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The Magazine of Metalworking and Metalproducing

VOL. 117, NO. 12 SEPT. 17, 1945

NEWS

TECHNICAL

FEATURES

MARKETS

NEXT WEEK...

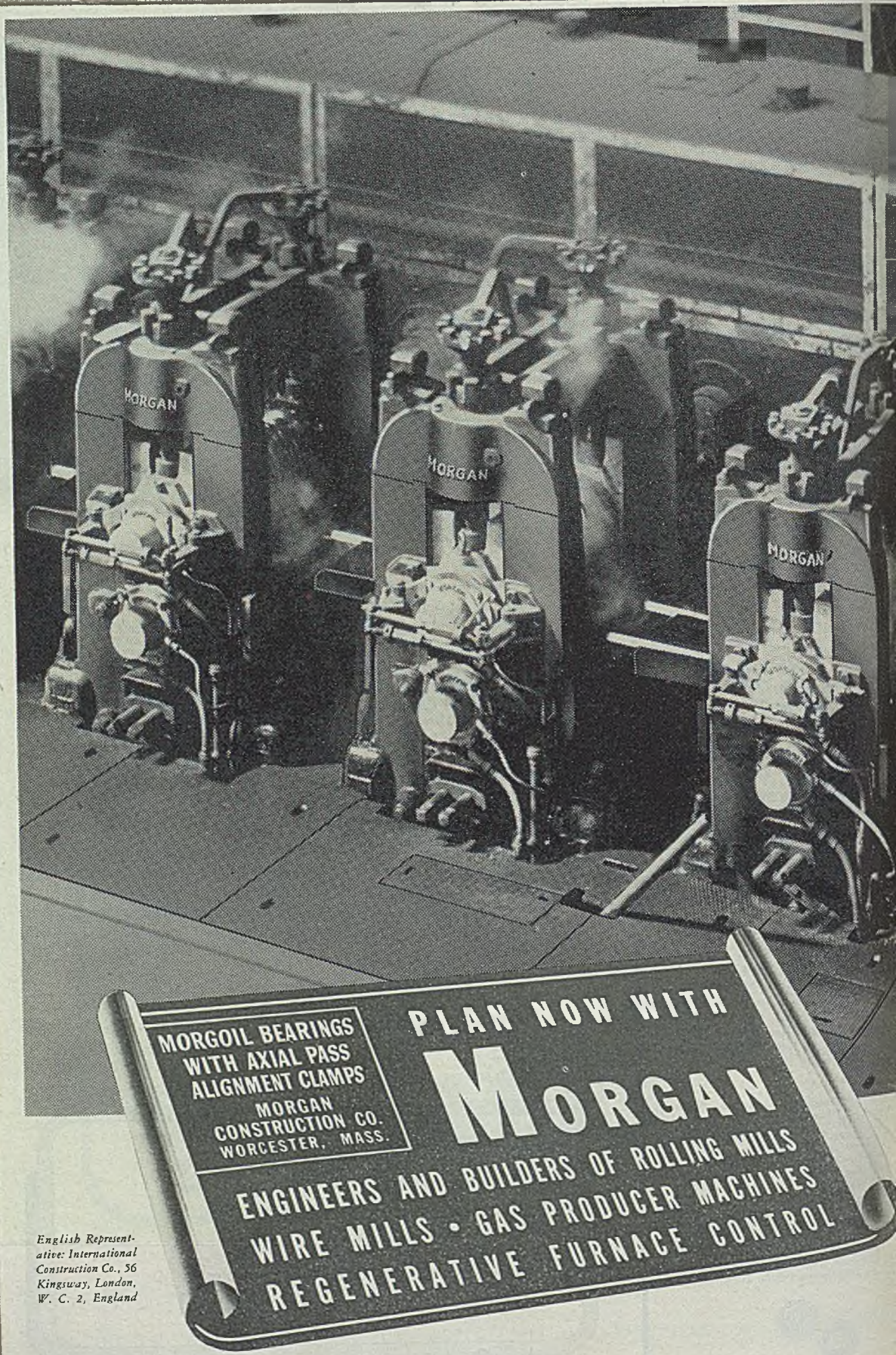
Carburizing and Nitriding in Muffle-Type Furnaces

Silver Brazing Steel Parts for High Strength

German Tool and Special Steels Industry

Agglomeration of Fine Taconite Concentrates

Check List of Methods of Stress Determination



English Representative: International Construction Co., 56 Kingsway, London, W. C. 2, England

STEEL
September 17, 1945

Lifting Our Sights

In analyzing President Truman's message to Congress, in scanning Secretary Wallace's "Sixty Million Jobs" and in listening to those who presume to speak for labor, one gets the impression that much of the official and most of the pseudo-official thinking about the nation's internal postwar problems is faulty as to timing and emphasis.

For instance, the President's message explains what should be done to facilitate the shift from a wartime to a peacetime basis. His emphasis upon social security, minimum wages and retaining certain wartime controls, coupled with his warning not to reduce the tax burden too sharply, indicates he is concerned almost exclusively with the problems of 1945 and 1946.

In Mr. Wallace's book, he contends that in order to assure the common man a better life we must produce—somehow and regardless—a national output of goods and services valued at $200 billion a year, providing 60,000,000 jobs, by 1950. The secretary is concerned with manipulating affairs so that by 1950 the nation will have attained the goal he has set.

As for labor leaders, they cry to high heaven that unemployment will climb to fantastic heights in the next six to nine months. Obviously they are not looking ahead beyond the ensuing year.

The one thing in common in all three views is the absence of concern over what will happen five or more years from now. Almost all economists agree that the transition period will be followed by four or five years of business prosperity. The pent-up demand now existing at home and the pressure for reconstruction abroad almost automatically guarantee this period of activity at high levels.

But what will happen when this accumulated demand has been satisfied? Will the normal volume of purchases be sufficient to sustain production activities continuously on a high plane? Will this nation be able to stimulate consumption to the point where it can remain in a reasonably satisfactory balance with our known great capacity to produce? Are we prepared to make adjustments to allow for the effects of tremendous technological progress?

These and many similar questions, in our opinion, should be of even greater concern than the questions pertaining to the problems of the immediate future. Unless we can find good answers far in advance of the time when production catches up with accumulated demand, we run a grave risk of experiencing a serious depression.

It is not too early to be lifting our sights to the long-range view.

FOR BETTER BALANCE: It is safe to assume that the production of American industry during the war exceeded the expectations of practically every qualified expert. Mass production, coupled with many other factors, enabled the nation's workshops to accomplish much more than anyone could have anticipated.

With this proof of our great productive potentialities so fresh in our minds, should we not realize that during the early years of peace ahead we are likely to produce more goods than we now think possible? Already some industrialists are revising their figures on expected output upwards. In Detroit some automobile manufacturing executives now thoroughly believe that "in three or four years at the outside, automobile production capacity will have far outstripped demand and builders will be begging for new business, that is, for new business to justify a 6,000,000-car year output."

It will not be long before we will hear similar statements from the manufacturers of washing machines, electrical refrigerators and other mass pro-

(OVER)

duced equipment. We are a nation in which ability to produce has outstripped progress in almost every other field of activity.

Isn't it time for us to concentrate more attention upon markets, consumption, selling and distribution? We must, if we are to have the balance necessary for a sound economy. —p. 103

• • •

NATIONAL LIABILITY: Many industrialists will be surprised at the report of C. F. Newpher and R. H. Smith on the condition in which they found the German fastener industry. Their painstaking investigation shows clearly that in the manufacture of bolts, nuts, rivets and screws, Germany is 30 years behind the times.

No methods were found in use to determine machineability. No evidence was found that spheroidizing had been employed. Age hardening of cold-heading wire had not been recognized. No recessed head screws were in use. Seams were prevalent in wire received by the industry. Induction heating had not been used in heating bolt blanks.

This seems almost incredible when one considers how efficient Germany is in many other respects. This evidence of the backwardness of an important industry in Germany, coupled with the sad picture in the coal and textile industries in England, suggests that henceforth every nation will realize more clearly that a sick industry is a national liability. —p. 122

• • •

NEW IDEAS BREWING: Machine Tool Editor Guy Hubbard finds evidence that many machine tool builders are rebuilding their engineering and selling departments "literally from the ground up." He believes that as a result of this tendency, the postwar period will witness more salesmen possessing an engineering background and more engineers who are salesminded

Also, in the reorganization of engineering departments, machine designers, tool engineers and electrical engineers may rank on a more equal basis than heretofore. Likewise patternmakers, foundrymen, welding experts and metallurgists are likely to be much more conspicuous in engineering.

New ideas in sales and service may be developed. Some builders see in improved commercial air transport possibilities of spreading the activities of ace sales and service men over larger areas and also of shipping repair parts from the home plant by air instead of attempting to carry complete stocks at various points throughout the country.

These indications of the search for newer and better methods spell progress. —p. 120

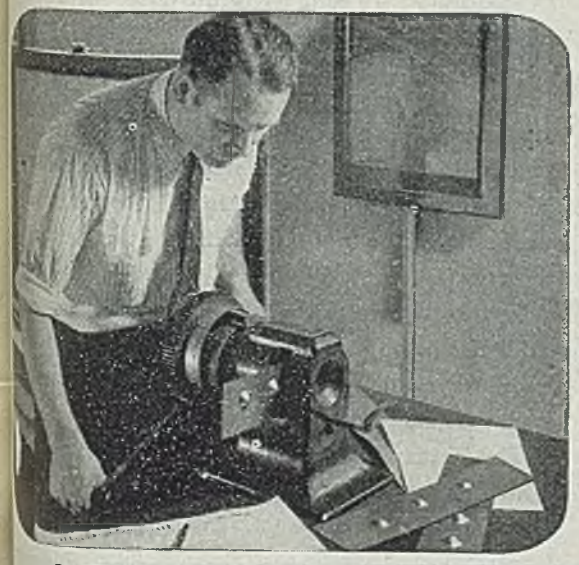
POSTWAR POSTSCRIPTS: The secretaries of War and Navy have established an Army-Navy Joint Specifications Board as a permanent activity (p. 96) to succeed the wartime Joint Army-Navy Committee on Specifications. This latter body, organized in 1942, made marked progress in unifying specifications. The new board will review and keep up-to-date existing joint specifications and formulate new ones. This is an important undertaking and one which industry will endorse heartily . . . . Electric power output is beginning to decline moderately (p. 192) and may drop more sharply in the next month or two. The private power companies did a wonderful job of meeting the wartime demand. Power shortages were almost unheard of and the companies provided the extra facilities required with little assistance from outsiders . . . . American servicemen entering Tokyo found that in some areas almost every house had a lathe, drill press or other machine for doing war work (p. 109), indicating that the enemy had tried a crude system of "backyard factory" subcontracting . . . . Germany, equally hard pressed to move war plants out of reach of Allied bombs, had a more elaborate scheme. It constructed large airplane plants and even oil refineries underground (p. 106) and it was estimated that just before V-E Day 30 per cent of the nation's most essential war production was underground . . . . A new method of metal fabrication is commanding attention. Called tangent bending (p. 124), it is a cross between press forming and straight bending in which the metal flows during the bending operation and its shape is controlled by a die . . . . A number of new basing points for stainless steel (p. 90) have been announced . . . . OPA has granted a 10 per cent increase in the selling price of certain gray iron castings (p. 89), which helps to correct an inconsistency that had plagued many gray iron foundrymen . . . . Some questions which arose in industrial circles when United States Steel Corp. acquired Gunnison Homes, Inc. in 1944 are answered in the current announcement by Gunnison (p. 95) that it will build a $1 million plant at New Albany, Ind., capable of turning out 1650 prefabricated houses per year on a single shift basis . . . . Roy A. Hunt, president of the Aluminum Co. of America, states that the steel industry's peacetime consumption of aluminum (p. 95) may be about 10 times greater than it was before the war.

E. L. Shaner

EDITOR-IN-CHIEF

Careful handling and storing insures perfect condition of Allegheny Stainless from Ryerson stocks.

Ryerson stainless service includes Allegheny Stainless tubing and pipe ready for prompt shipment.



Ductility determinations of stainless sheets are made on the Erichsen machine in a Ryerson laboratory.

Which Allegheny Stainless Will Serve You Best?

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Ryerson Offers Diversified Stocks, Technical Assistance, Prompt Shipment

25 types of Allegheny Stainless . . . a wide range of sizes in sheets, plates, bars, tubing, pipe, etc. . . . are ready at Ryerson for your present production and postwar planning.

To help determine the best types for your use and how best to fabricate or apply them, technical help is available on small orders as well as large. Ryerson has stocked Allegheny Stainless exclusively since 1925 as the finest of stainless steels. The rich experience gained since that time is at your disposal.

11 conveniently-located Ryerson plants bring this complete service on Allegheny Stainless as close as your telephone. Contact the plant nearest you.

Joseph T. Ryerson & Son, Inc., Steel-Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

Write for the Ryerson Stock List describing 25 types of Allegheny Stainless and other steels in stock.

RYERSON STEEL

12 years and the share of the steelmaking dollar going to labor has increased steadily.

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More Than 100,000 Idle In Scattered Strikes

Despite widespread concern over the number of people made idle by war contract cancellations, more than 100,000 workers were idle through voluntary strikes throughout the country last week.

Between 25,000 and 40,000 were idle in the Detroit district during the week. A strike at the Kelsey-Hayes Wheel C involving 4500 persons was reflected employment at Ford Motor Co. wh as high as 22,000 were made idle when company was unable to obtain pa from Kelsey-Hayes. A strike at Hud involved 6000 and another at Mur Body Corp. about 3000. Twelve th sand white collar workers at Westinghc Electric Corp.'s various plants w staging a strike in a bonus dispute.

Steel Mills Undermanned Despite War Plant Layoffs

In the face of mounting claims unemployment compensation, thousa of well paid jobs are going begging many plants struggling to provide terials for reconversion are handicap by a serious labor shortage.

Although War Manpower Commis figures show 2,100,000 persons were off from war plants in August, s plants generally are undermanned.

Carnegie-Illinois Steel Corp. rep its Chicago plants are experiencing t worst labor shortage since Pearl Har and that 3500 workers are needed bring the South Chicago and G plants to the desired level of operatio

Republic Steel Corp., Cleveland, carrying on a vigorous recruiting p gram in an effort to employ an ad tional 5700 men. The company's quirements include 640 men at Cle land, 1200 at Youngstown, 600 at W ren, O., 800 at Buffalo, 275 at Chica 800 at Birmingham and Gadsden, A and smaller numbers at other mills.

Youngstown district steel mills seeking at least 3300 men. Youngsto Sheet & Tube Co. needs 700; Carne Illinois wants 500; and Sharon S Corp. needs 100.

Officials of the Gray Iron Founders' Society met with John W. Snyder, OWMR, to bring to his attention the problems of manpower and price ceilings which, the group maintains, is impeding industrial reconversion by restricting production of gray iron castings. Picture, taken on steps of White House, show, left to right: William Haber, director, Manpower Liaison and Coordination Division, OWMR; H. S. Washburn, Plainville ing Co., Plainville, Conn.; E. C. Hoenicke, Eaton Mfg. Detroit; C. R. Culling, Carondelet Foundry Co., St. Loui L. Edinger, Barnett Foundry & Machine Co., Irvington, John W. Snyder; W. L. Seelbach, Forest City Foundries Cleveland; E. L. Roth, Motor Castings Co., Milwauk

Steel Price Increase Under Study

Office of Price Administration reported considering recent industry request for $7 per ton advance. Delay seen pending outcome of new wage demands of workers

OFFICE of Price Administration execu-es continue to study the recent request the General Steel Products Advisory mmittee for an across-the-board in-ease of $7 a ton on all steel products, t have not yet made a policy decision to what procedure to follow in measur-g the need for a steel price increase.

OPA's general reconversion formula STEEL, Sept. 3, p. 88), they feel, does t exactly fit the steel industry. They also el that past cost studies furnish no ide to future earnings of the industry ause of the difficulty of forecasting h factors as product mix and operat-g rates.

Recent recommendation for a price in-ease made the OPA by the Steel In-stry Advisory Committee was based on continued rising costs in the in-stry, as well as shrinking profit margin companying the ending of the war and cutting off of lucrative war business. r many months past steelmakers have sted that without the profitable war ume they would have operated at a s since prices on the general run of on steel products was too low to cover duction costs.

Just what action OPA will take on steel ces is uncertain. However, in view of renewed demands of United Steel-kers of America for sharply increased it is thought definite action on prices be delayed until the outcome of wage negotiations is known.

While the report is unconfirmed, pro-ers of pig iron are said to be giving siderable thought to their price posi-. A formal request to OPA for an in-se would not be surprising, it is said.

ce Increase Allowed r Gray Iron Castings

Maximum prices for gray iron cast-s which are frozen at base-period s may be increased 10 per cent er provisions of amendment 10 to imum price regulation 244, issued week by the Office of Price Adminis-on.

This action was deemed necessary to rect the maladjustment in ceiling es which had been brought about by disparity between the base-period es and the so-called "formula" prices. increase in gray iron castings costs ce the base-period prices were estab-ed had reached a point where pro-ction of many castings by producers ing base-period prices for them is g seriously discouraged while pro-ction of the same or other castings at the higher formula prices is being stimulated.

Costs have risen from 15 to 20 per cent since 1941, or more than the industry's average profit on sales of 8 per cent in 1941 when most base-period prices were set. The cost increase has been accounted for largely by increases in labor costs which now represent about one-half total costs. Labor costs have been increased as a result of a 40 per cent increase in straight-time hourly earnings since Jan. 1, 1941, and augmented by a 4 per cent increase reflecting overtime.

The price problem is significant from the standpoint of reconversion because many castings which are now returning to production for use in reconversion products were sold during the base-period and thus have base-period prices. OPA believes that the general level of castings prices will not be increased by the granting of the increase but rather that there will be a net reduction in prices paid to buyers because the castings will be more generally made by companies which have the necessary experience and equipment to do the particular job. The amendment is designed mainly to diminish pattern migration.

Adjustable Pricing Allowed On Ferrous Forgings

Producers of ferrous forgings, screw machines and stampings have been authorized by the Office of Price Administration to bill their customers on an adjustable pricing basis, pending a revision of maximum prices to meet reconversion needs. Increases over former ceilings that may be quoted, however, are limited to 8 per cent.

All sales made on an adjustable pricing basis must be adjusted later to reflect actual new ceiling prices when the current review of ceilings is completed and the amount of price increases to be authorized is determined.

An upward adjustment in prices for these products appears necessary, OPA said, because of increases in labor and material costs which cannot be absorbed in the narrow margin of profit which these industries had in effect on their civilian production.

Present, Past and Pending

■ EXPORT CONTROLS RELAXED BUT RETAINED ON STEEL

WASHINGTON—Export controls have been relaxed, including the freeing of licensing of about 80 per cent of those commodities formerly requiring it, Foreign Economic Administration announced last week. Steel mill products, fuels and lead, tin, brass and bronze manufactures are among commodities still requiring export licenses.

■ ODT TO REMOVE BAN ON CONVENTIONS OCT. 1

WASHINGTON—Ban on conventions, group meetings and trade shows will be removed Oct. 1, Office of Defense Transportation announced last week.

■ IMPROVED AIRCRAFT CONTROL CABLES DEVELOPED

CLEVELAND—American Steel & Wire Co. has developed improved aircraft control cables made of high nickel manganese alloy having the same coefficient of expansion as duralumin, of which frames of most planes are constructed.

■ ANDREWS LEASE ON GOVERNMENT PLANT CANCELED

NEWPORT, KY.—Charles H. Stamm, president, Andrews Steel Co., last week announced that the company's lease on the government-owned shell steel plant at Newport had been canceled by the Reconstruction Finance Corp., effective Oct. 1.

■ REFRESHER COURSE OFFERED RETURNED VETERANS

CLEVELAND—Returning veterans who entered the service from the metals industries are being offered an extensive program of free refresher courses by the American Society for Metals. Objective is to bring individuals up-to-date on all new developments and processes that have taken place during the war.

■ METAL TOYS TO BE SCARCE THIS CHRISTMAS

NEW YORK—Although metal restrictions have been removed, less than 8 per cent of the toys available this Christmas will be of metal, according to James L. Fri, managing director, Toy Manufacturers of the United States, reporting on a nation-wide survey of manufacturers and store buyers just completed.

■ LEAD PRODUCTION IN JULY SMALLEST IN YEAR

WASHINGTON—Lead production from domestic mines was 29,756 short tons in July, a decrease of 1771 tons from the June output and smallest production since July, 1944, according to the Bureau of Mines.

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More Than 100,000 Idle In Scattered Strikes

Despite widespread concern over the number of people made idle by war contract cancellations, more than 100,000 workers were idle through voluntary strikes throughout the country last week.

Between 25,000 and 40,000 were idle in the Detroit district during the week. A strike at the Kelsey-Hayes Wheel Co. involving 4500 persons was reflected in employment at Ford Motor Co. where as high as 22,000 were made idle when the company was unable to obtain parts from Kelsey-Hayes. A strike at Hudson involved 6000 and another at Murray Body Corp. about 3000. Twelve thousand white collar workers at Westinghouse Electric Corp.'s various plants were staging a strike in a bonus dispute.

Steel Mills Undermanned Despite War Plant Layoffs

In the face of mounting claims for unemployment compensation, thousands of well paid jobs are going begging and many plants struggling to provide materials for reconversion are handicapped by a serious labor shortage.

Although War Manpower Commission figures show 2,100,000 persons were laid off from war plants in August, steel plants generally are undermanned.

Carnegie-Illinois Steel Corp. reports its Chicago plants are experiencing their worst labor shortage since Pearl Harbor and that 3500 workers are needed to bring the South Chicago and Gary plants to the desired level of operations.

Republic Steel Corp., Cleveland, is carrying on a vigorous recruiting program in an effort to employ an additional 5700 men. The company's requirements include 640 men at Cleveland, 1200 at Youngstown, 600 at Warren, O., 800 at Buffalo, 275 at Chicago, 800 at Birmingham and Gadsden, Ala., and smaller numbers at other mills.

Youngstown district steel mills are seeking at least 3300 men. Youngstown Sheet & Tube Co. needs 700; Carnegie-Illinois wants 500; and Sharon Steel Corp. needs 100.

Officials of the Gray Iron Founders' Society met with John W. Snyder, OWMR, to bring to his attention the problems of manpower and price ceilings which, the group maintains, is impeding industrial reconversion by restricting production of gray iron castings. Picture, taken on steps of White House, show, left to right: William Haber, director, Manpower Liaison and Coordination Division, OWMR; H. S. Washburn, Plainville Casting Co., Plainville, Conn.; E. C. Hoenicke, Eaton Mfg. Co., Detroit; C. R. Culling, Carondelet Foundry Co., St. Louis; H. L. Edinger, Barnett Foundry & Machine Co., Irvington, N. J., John W. Snyder; W. L. Seelbach, Forest City Foundries Co., Cleveland; E. L. Roth, Motor Castings Co., Milwaukee

Steel Price Increase Under Study

Office of Price Administration reported considering recent industry request for $7 per ton advance. Delay seen pending outcome of new wage demands of workers

OFFICE of Price Administration execu-es continue to study the recent request the General Steel Products Advisory ommittee for an across-the-board in-ease of $7 a ton on all steel products, t have not yet made a policy decision to what procedure to follow in measur-g the need for a steel price increase.

OPA's general reconversion formula STEEL, Sept. 3, p. 88), they feel, does ot exactly fit the steel industry. They also el that past cost studies furnish no ide to future earnings of the industry ecause of the difficulty of forecasting ch factors as product mix and operat-g rates.

Recent recommendation for a price in-ease made the OPA by the Steel In-stry Advisory Committee was based on continued rising costs in the in-stry, as well as shrinking profit margin ompanying the ending of the war and e cutting off of lucrative war business. many months past steelmakers have sted that without the profitable war nage they would have operated at a ss since prices on the general run of rbon steel products was too low to cover oduction costs.

Just what action OPA will take on steel ces is uncertain. However, in view of e renewed demands of United Steel-kers of America for sharply increased y it is thought definite action on prices l be delayed until the outcome of wage negotiations is known.

While the report is unconfirmed, pro-ers of pig iron are said to be giving siderable thought to their price posi-. A formal request to OPA for an in-ase would not be surprising, it is said.

rice Increase Allowed r Gray Iron Castings

Maximum prices for gray iron cast-s which are frozen at base-period els may be increased 10 per cent r provisions of amendment 10 to ximum price regulation 244, issued week by the Office of Price Adminis-tion.

This action was deemed necessary to rect the maladjustment in ceiling ces which had been brought about by disparity between the base-period ces and the so-called "formula" prices. e increase in gray iron castings costs ce the base-period prices were estab-hed had reached a point where pro-uction of many castings by producers ing base-period prices for them is ing seriously discouraged while pro-uction of the same or other castings at the higher formula prices is being stimulated.

Costs have risen from 15 to 20 per cent since 1941, or more than the industry's average profit on sales of 8 per cent in 1941 when most base-period prices were set. The cost increase has been accounted for largely by increases in labor costs which now represent about one-half total costs. Labor costs have been increased as a result of a 40 per cent increase in straight-time hourly earnings since Jan. 1, 1941, and augmented by a 4 per cent increase reflecting overtime.

The price problem is significant from the standpoint of reconversion because many castings which are now returning to production for use in reconversion products were sold during the base-period and thus have base-period prices. OPA believes that the general level of castings prices will not be increased by the granting of the increase but rather that there will be a net reduction in prices paid to buyers because the castings will be more generally made by companies which have the necessary experience and equipment to do the particular job. The amendment is designed mainly to diminish pattern migration.

Adjustable Pricing Allowed On Ferrous Forgings

Producers of ferrous forgings, screw machines and stampings have been authorized by the Office of Price Administration to bill their customers on an adjustable pricing basis, pending a revision of maximum prices to meet reconversion needs. Increases over former ceilings that may be quoted, however, are limited to 8 per cent.

All sales made on an adjustable pricing basis must be adjusted later to reflect actual new ceiling prices when the current review of ceilings is completed and the amount of price increases to be authorized is determined.

An upward adjustment in prices for these products appears necessary, OPA said, because of increases in labor and material costs which cannot be absorbed in the narrow margin of profit which these industries had in effect on their civilian production.

Present, Past and Pending

■ EXPORT CONTROLS RELAXED BUT RETAINED ON STEEL

WASHINGTON—Export controls have been relaxed, including the freeing of licensing of about 80 per cent of those commodities formerly requiring it, Foreign Economic Administration announced last week. Steel mill products, fuels and lead, tin, brass and bronze manufactures are among commodities still requiring export licenses.

■ ODT TO REMOVE BAN ON CONVENTIONS OCT. 1

WASHINGTON—Ban on conventions, group meetings and trade shows will be removed Oct. 1, Office of Defense Transportation announced last week.

■ IMPROVED AIRCRAFT CONTROL CABLES DEVELOPED

CLEVELAND—American Steel & Wire Co. has developed improved aircraft control cables made of high nickel manganese alloy having the same coefficient of expansion as duralumin, of which frames of most planes are constructed.

■ ANDREWS LEASE ON GOVERNMENT PLANT CANCELED

NEWPORT, KY.—Charles H. Stamm, president, Andrews Steel Co., last week announced that the company's lease on the government-owned shell steel plant at Newport had been canceled by the Reconstruction Finance Corp., effective Oct. 1.

■ REFRESHER COURSE OFFERED RETURNED VETERANS

CLEVELAND—Returning veterans who entered the service from the metals industries are being offered an extensive program of free refresher courses by the American Society for Metals. Objective is to bring individuals up-to-date on all new developments and processes that have taken place during the war.

■ METAL TOYS TO BE SCARCE THIS CHRISTMAS

NEW YORK—Although metal restrictions have been removed, less than 8 per cent of the toys available this Christmas will be of metal, according to James L. Fri, managing director, Toy Manufacturers of the United States, reporting on a nation-wide survey of manufacturers and store buyers just completed.

■ LEAD PRODUCTION IN JULY SMALLEST IN YEAR

WASHINGTON—Lead production from domestic mines was 29,756 short tons in July, a decrease of 1771 tons from the June output and smallest production since July, 1944, according to the Bureau of Mines.

Multiple Basing Points Established

Consumers in many areas will get substantial saving in freight charges. Cleveland and Chicago named basing points by U. S. Steel subsidiaries for products made in those areas

SUBSTANTIAL savings in freight charges for stainless consumers in many areas will result from a multiple basing point system established by a number of stainless producers.

Formerly all stainless was priced on a Pittsburgh base, regardless of where it was produced. Recently three United States Steel Corp. subsidiaries formally announced the establishment of bases at points of production. Several other producers likewise have set up bases at their producing mills. Other stainless producers who have not yet announced new bases are expected to meet the competition of those that have.

Carnegie-Illinois Steel Corp. has designated Chicago a basing point for stainless steel ingots, blooms, billets, slabs, hot and cold-finished bars, shapes, hot-rolled strip, sheet and forging billets of sizes and finishes produced in company mills there. Company's former Pittsburgh basing point structure on stainless steel ingots, blooms, billets, slabs, hot and cold-finished bars, plates, sheets and forging billets remains unchanged.

American Steel & Wire Co. has made Cleveland a basing point for stainless cold-drawn wire, cold-rolled flat wire, cold-finished bars and cold-rolled strip.

National Tube Co. Names Chicago

National Tube Co. has established a basing point at Chicago to apply to its price schedule M, covering stainless steel seamless tubing for mechanical and pressure purposes for the range and sizes produced at Chicago. Pittsburgh will continue to be a basing point for similar products.

All changes for these three companies were made effective Sept. 7 and are subject to Office of Price Administration ceilings.

Sharon Steel Corp. has established basing points at Youngstown (because Sharon is in the Youngstown switching district) on stainless steel ingots, blooms, billets, slabs and hot and cold-rolled strip.

Allegheny Ludlum Steel Corp. has set up a basing point at Dunkirk, N. Y. for forging billets, hot and cold-finished bars and cold-drawn wire, and at Watervliet, N. Y., on hot and cold-finished bars.

Midvale Co. has set up a basing point at Philadelphia for ingots, blooms, billets, slabs, and hot and cold-finished bars.

NO LONGER SECRET: This combat unit, hitherto on the secret list, is a 155-mm howitzer motor carriage M-41 which was just getting into production at Massey-Harris Co., Racine, Wis., when the end of hostilities halted the project. The gun is mounted on the chassis of a light M-24 tank. The vehicle is powered by dual Cadillac V-8 engines, and carries a five-man crew

Last June Carpenter Steel Co. set up a basing point at Reading, Pa., on stainless ingots, blooms, billets, slabs, forging billets, hot and cold-finished bars, hot and cold-rolled strip, cold-drawn wire and cold-rolled flat wire.

The Steel & Tube Division of Timken Roller Bearing Co. announced it has established Canton, O., as a new basing point for stainless steel ingots, blooms, billets, slabs, hot-rolled bars, cold-finished bars and forging billets. All tool steel products of the Timken Steel & Tube Division were also placed on the Canton, O., basing point. Recently Timken announced that carbon, alloy and stainless steel pressure tubing and stainless steel mechanical tubing would be sold on a Canton basing point.

Another producer, the American Rolling Mill Co., announced it has established Middletown, O., as a basing point for the various grades and sizes of stainless steel sheets and plates made at its Middletown plant.

Crucible Steel Co. of America has established new basing points on stainless steel at Syracuse, N. Y., and at Newark, N. J., effective Sept. 17. Syracuse base is applicable to billets, hot-rolled bars, cold-finished bars, hot-rolled rods and cold-finished wire within the ranges manufactured by the company. The Newark base has been established to cover products manufactured by Crucible at its Atha, Spaulding and Jennings works. The products on this base include billets, hot-rolled and cold-finished bars, hot-rolled rods, cold-finished wire and cold-rolled strip. Products quoted on a Pittsburgh base by Crucible comprise stainless steel blooms, billets, hot-rolled bars, cold-finished or polished sheets and cold-finished strip within the range of sizes manufactured in its Pittsburgh area plants.

Rustless Iron & Steel Corp., Baltimore, announced it has established Baltimore as a basing point on its products, effective Sept. 12. Main products include stainless ingots, hot-rolled and cold-finished bars, cold-finished wire and cold-rolled flat wire.

Previously a consumer anywhere in the country paid the Pittsburgh base price plus rail freight charges from Pittsburgh to the point of delivery. That applied even if the consumers bought steel produced next door and delivery involved no rail charges.

With the establishment of basing points at producing mills, buyers

Chicago and Cleveland, for example, will be saved rail charges from Pittsburgh.

Freight charges from Pittsburgh to Chicago are $7.40 a ton and from Pittsburgh to Cleveland, $4 a ton.

Steel Corp. Shipments Show Drop in August

Finished steel shipments by the United States Steel Corp. in August totaled 1,332,180 net tons, a decrease of 276,314 tons from the 1,608,994 tons shipped in July and 411,305 tons less than in August, 1944. For eight months ended Aug. 31 shipments totaled 13,066,133 tons, against 14,130,864 tons in the comparable period last year.

(Inter-company shipments not included)

	Net Tons			
	1945	1944	1943	1942
Jan.	1,579,115	1,720,787	1,658,992	1,738,893
Feb.	1,562,488	1,755,772	1,691,592	1,616,597
Mar.	1,869,642	1,874,795	1,772,397	1,780,978
Apr.	1,722,845	1,756,797	1,630,828	1,758,891
May	1,797,987	1,776,931	1,706,513	1,804,127
June	1,602,882	1,737,769	1,552,663	1,774,068
July	1,608,994	1,754,525	1,660,762	1,765,749
Aug.	1,332,180	1,743,485	1,704,289	1,783,650
Sept.	.....	1,733,602	1,664,577	1,703,570
Oct.	.....	1,774,969	1,791,968	1,787,501
Nov.	.....	1,743,753	1,660,594	1,665,545
Dec.	.....	1,767,600	1,719,624	1,849,635
Total	.....	21,150,788	20,244,830	21,064,157
Adjustment	.....	*98,609	*97,214	*449,020
Total	.....	21,052,179	20,147,616	20,615,137

*Decrease.

August Steel Production Lowest Since June, 1940

Steel production in August fell to the lowest point in 62 months, according to a report released last week by the American Iron & Steel Institute.

Total output of ingots and castings in August was 5,712,770 tons, compared with 6,987,008 tons in July, and 7,498,983 tons in August, 1944.

August production was the lowest since June, 1940 when output was 5,657,443 tons. However, actual tonnage produced in August exceeded output in all but two months of 1929, the best peacetime steel production year on record.

Coverage of Price Adjustment For Individual Firms Extended

New supplementary order 133 provides for individual price adjustments of specified items for manufacturers who face production at a loss under existing ceiling prices. List of eligible items ranges from raw materials to consumer items

SUPPLEMENTING a general announcement of a new order, No. 133, effective Sept. 15, for individual price adjustments of specified items for manufacturers who can show they face production at a loss under existing ceiling prices, the Office of Price Administration last week said no adjustment will now be made under this action that could be made under supplementary orders 118 and 119 (STEEL, July 30, p. 60), the reconversion individual adjustment orders.

The list of eligible items, contained in an appendix to the action, contains a wide variety of goods, from raw industrial materials to consumer items.

Supplementary order 133 applies to numerous orders, among them the general maximum price regulation and the following price schedules: No. 2, Aluminum scrap and secondary aluminum; 3, zinc scrap and secondary slab zinc; 6, iron and steel products; 8, pure nickel scrap, monel metal scrap, stainless steel scrap; 10, pig iron; 12, brass mill scrap; 15, copper; 17, tin; 41, steel castings and railroad specialties; 69, primary lead; 70, lead scrap and secondary lead; 71, cadmium; 77, beehive oven coke; 81, slab zinc; 93, mercury; 124, rolled zinc products; 138, ferromanganese and manganese alloys and metal; 147, bolts, nuts, screws and rivets; 159, fabricated concrete reinforcing bars; 188, manufacturers' maximum prices for specified building materials and consumer goods: 198, silver; 199, lead bullet rod; 202, brass and bronze alloy ingot and shot; 214, high alloy castings; 235, manganese steel castings and manganese steel castings products; 241, malleable iron castings; 244, gray iron castings; 302, magnesium scrap and remelt magnesium ingot; 309, platinum group metals and their products; 314, magnesium and magnesium alloy ingot; 377, die castings; 405, ferrosilicon and silicon metal; 407, ferrochromium and chromium metal; 416, basic refractories products; 489, tungsten, molybdenum, vanadium, cobalt and certain other alloys and metals; 497, antimony; and 575, chromium chemicals.

An applicant for relief must be a manufacturer of one or more of the products listed in the appendix and in addition he must be able to show that both the following conditions exist:

(1) In the last three or more months, his business operations as a whole have been conducted at a loss, or will be so immediately, as a result of recent changes in the industrial picture, and

(2) the existing or prospective loss is for some basic or persisting cause, and is not due to: (a) Seasonal, non-recurring or temporary factors affecting operation; (b) a reduction in volume of production below the normal economic capacity of the plant; (c) the payment of unlawful wages or excessive salaries or of similar unjustified prices for materials; (d) the payment of voluntary wage increases under the executive order of Aug. 18, 1945; (e) current overhead costs that are abnormally high relative to sales volume, except where these costs can be shown to be unavoidable; (f) transactions with affiliated corporations or businesses that are different from transactions resulting from arm's length bargaining, or from customary transactions with such businesses; (g) the setting aside of funds for war reserves or other contingencies.

Increases may be in the form of uniform percentage increases for all products eligible (that is, those included in the appendix), or the increases may be unequally distributed among the eligible products, raising some prices more than others, OPA said.

If all the products manufactured by an applicant are eligible products, then the applicant may expect to receive an adjustment up to the amount necessary to compensate him for the loss he has established in his application, OPA said. However, if a manufacturer produces both eligible and ineligible products, and if his overall loss on both types of products is, say, five per cent of sales, then OPA will in general grant a five per cent increase on eligible products only, the agency explained.

STEEL INGOT PRODUCTION STATISTICS

	Estimated Production—All Companies								Calculated weekly	Number
	—Open Hearth—		—Bessemer—		—Electric—		—Total—			
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	production, all companies Net tons	of weeks in mo.
Based on reports by companies which in 1944 made 97.9% of the open hearth, 100% of the bessemer and 86.7% of the electric ingot and steel for castings production										
1945										
Jan.	6,468,815	90 5	379,062	76.0	358,346	77.3	7,206,223	88 8	1,626,687	4.43
Feb.	5 967 812	92 4	347 227	77.1	339,520	81 1	6,654,589	90 8	1,663 617	4 00
Mar.	6,927,377	96 9	398,351	79 8	382,237	82 4	7,707 965	95 0	1,739 947	4 43
1st qtr.	19,364,034	93.3	1,124,640	77.6	1,080,103	80.2	21,568,777	91.6	1,677,199	12.86
Apr.	6,541 097	94 4	372 952	77 2	377 877	81 4	7,291 926	92 8	1 699 750	4 29
May	6,663,577	93.2	402.100	80.6	386,075	83.3	7,451,752	91.8	1,682,111	4 43
June	6,129,266	88.5	379,807	78.6	333,217	74.2	6,842,290	87.1	1,594,939	4.29
2nd qtr.	19,333,940	92.1	1,154,859	78.8	1,097,169	80.6	21,585,968	90.6	1,659,183	13.01
1st hlf.	38,697,974	92.7	2,279,499	78.2	2,177,272	80.4	43,154,745	91.1	1,668,139	25.87
July	6,318,463	88.6	381,832	76.7	286,713	61.9	6,987,008	86.3	1,580,771	4.42
Aug.	5,156,693	72.1	347,047	69.5	209,030	45.1	5,712,770	70.4	1,289,564	4.43

For 1945 percentages are calculated on weekly capacities of 1,614,338 net tons of open hearth, 112,658 tons of bessemer and 104,640 tons of electric ingots and steel for castings, total 1,831,636 tons; based on annual capacities as of Jan. 1, 1945 as follows: Open hearth 84,171,590 net tons, bessemer 5,874,000 tons, electric 5,455,890 tons.

Industry's Transition Pace Rapid

Encouraging progress reported in shifting facilities to production of peacetime goods. Raw materials supply improving

President Truman discusses pending legislative matters with leaders of Congress as that group resumed its session to consider reconversion problems. Left to right: Speaker of the House Sam Rayburn; the President; Senate Majority Leader Alben Barkley; and Sen. Kenneth McKellar, president pro tem of the Senate. NEA photo

INDUSTRIAL reconversion is moving into high gear. Transition from a war-controlled and war-supported economy is proving less difficult than had been expected in many quarters, though a great many obstacles to an open road remain to be cleared away.

For instance, labor is showing signs of kicking over the traces. This can retard reconversion greatly. Then, government economic policy is not clear, in fact is so foggy in some directions it is highly disturbing to equanimity in business circles. President Truman has made his postwar recommendations to Congress in an 18,000-word message but it will be some time before action can be expected on a number of highly controversial measures which the President has propounded. Also the matter of high production costs and frozen price ceilings under continued strict government control make it difficult for business to move ahead with a great degree of confidence in its ability to carry on profitably.

These are only a few of the factors which cloud the outlook. There are more, some of them of major import, and there are some yet to appear. Nevertheless, things are shaping up sufficiently well to encourage the view that many lines of production will be over the reconversion hump by yearend.

Since V-J Day more than $35 billion in war contracts have been canceled. Munitions production has been cut back 60 per cent. A start has been made toward clearing some $14 billion worth of government-owned machinery and equipment from thousands of privately owned plants. Reconversion Director John W. Snyder in his report to Congress said that since Aug. 15 the War Production Board has canceled 229 orders which had pre-empted materials and that only those controls are being kept which will be required to assure orderly and equitable distribution of available supplies and prevent inflationary bidding.

At the same time the government is beginning to move aggressively toward the disposal of surplus war goods and plants.

With few exceptions raw materials are in improving supply for civilian goods production. Most steel products can be had fairly promptly and the steelmakers are booking business in large volume. Steel ingot operations have staged a remarkable upturn since the sharp slump in production which followed immediately the end of the war with Japan.

Ingot Rate Recovering

Currently ingot operations are placed around 80 per cent of capacity, a rise of almost 7 points in the past week. This is considerably under the level which prevailed prior to V-J Day, but 80 per cent operations on present capacity of over 95 million ingot tons is something to marvel at when it is considered current output when rated against prewar capacity of 81 million tons is equivalent to a prewar operating rate of 93 per cent.

When the Controlled Materials Plan passes out Sept. 30 virtually all business will be on an unrated basis. Three priority ratings will be continued in effect but they will apply only on a relatively small volume of business. The AAA rating will be continued for critical projects. Also there will be an MM rating for military procurement, and a CC rating to be used as a civilian goods production bottleneck breaker. This latter rating will be used very sparingly, only when resort to other means for eliminating chokepoints is impossible.

Reconversion progress is reported generally throughout the country. Experience in the individual industries varies but on the whole noteworthy gains are being scored. In the domestic washing machine industry, for example, manufacturers now expect to turn out 25,000 more washers in the present quarter than had been previously planned. The previous forecast, made early in August, had been for production of 50,000 machines, or 10 per cent of the prewar production rate. The 75,000 washers now expected in the quarter represent 15 per cent of the prewar rate. In the October-November-December period, it is expected the peacetime production rate of 500,000 machines a quarter may be reached.

Because of the desirability of getting into production as quickly as possible early models will be much like the types produced in the immediate prewar period. For a three-year period, May 15, 1942, to June 7, 1945, manufacture of domestic washing machines, ironers and driers, was prohibited. During this time the industry converted 100 per cent to the production of war material.

Shortly after the victory in Europe the production limitation was liberalized and WPB assistance given the industry in starting to reconvert. This assistance was of two kinds. First, priorities were granted to individual manufacturers to obtain tools, equipment and construction materials needed to reconvert. At present about 25 per cent of the new construction approved by WPB has been completed, and approximately 50 per cent of the bottleneck tools and equipment have been installed. Additional assistance granted consisted of the setting

aside of a pool of critical materials from which allocations were made to manufacturers to produce specified quantities of washers in third quarter of this year. This set-aside of materials was achieved through the adoption of a program for production of washers of which the country was in great need. The effect of this program has been to give individual manufacturers in the industry an early lift on the reconversion road.

Twenty-nine manufacturers had received authorization to produce specified quantities of washers and priorities assistance in obtaining materials before the surrender of Japan. On Aug. 20 the limitation order, L-6, affecting production of domestic washers, was abolished. Production is now controlled only by the rate at which the individual plants can swing into full-scale operation.

As sufficient labor is available in the industry the major problem now confronted concerns the speedy acquisition of materials, such as sheet steel, gray iron and malleable iron castings, zinc die castings, motors, wringers and quick drying protective coatings. By the end of the year it is believed the industry will be operating at its full peacetime rate, and by next spring may be producing at a rate above prewar level.

Lend-Lease Repayments In Bauxite Recommended

Recommendation that the United States ask its lend-lease debtors to repay part of their obligation in bauxite was made last week by a Senate subcommittee on small business surplus war property headed by Sen. Tom Stewart (Dem., Tenn.).

The committee also recommended the Reconstruction Finance Corp. continue the operation of government-owned aluminum plants "until private enterprise determines which plants, if any, it will take over and that the remaining plants be turned over to the Bureau of Mines for operation, expansion, or maintenance, according to the best interests of national defense."

High-grade bauxite ores in this country are limited, the committee pointed out, while France, French, British and Dutch Guiana, the Netherlands and British Malaya have substantial deposits.

Use of government-owned stockpiles of bauxite at Hurricane Creek, Ark., should be made to supply American aluminum producers until they can arrange for their own supplies, committee members said. They suggested that aluminum prices can be reduced so as to yield an operating profit of not more than 5 per cent.

The committee also recommended that overseas battle scrap should not be abandoned but should be "returned to the United States to whatever extent gathering and transportation costs will economically justify."

New Regulation Aims To Speed Up Disposal of Surplus War Plants

Preferential treatment withheld from contractors in possession of plants but is accorded veterans and small business. Pricing policy is described by Surplus Property Board as flexible and designed to encourage quick disposal and utilization

SPEEDY integration of surplus industrial plants into the peacetime civilian economy is the aim of regulation No. 10 relating to the disposal of industrial property, issued last week by the Surplus Property Board.

No preference is provided for contractors in possession who have been operating the plants for the government during the war.

Speed in disposal is emphasized by the policy contained within the regulation. Veterans and small business are given preferential treatment. The regulation gives effect to the policy of SPB that industrial facilities, particularly medium-sized and small plants, be sold or leased to local or small firms, "preferably those owned or controlled by veterans."

As previously announced by SPB, the Reconstruction Finance Corp. is directed to accept offers from responsible local groups with adequate working capital and other necessary qualifications and to extend liberal credit terms over a period of years, in preference to a cash offer from a firm or group that would tend to concentrate economic power.

Designed for Quick Disposal

The pricing policy is flexible, designed to encourage quick disposal and utilization. The selling price shall be arrived at by negotiation and shall be determined by actual proposals received and by a consideration of the use of the property most desirable in the light of the objectives of the Surplus Property Act. In appropriate cases sales by sealed bid are permitted. Transfers of industrial property to government agencies, in accordance with the Surplus Property Act, are to be made at "fair value." To carry out this provision, the board also issued a special order No. 19, which gives the formula for determining the so-called fair value. This is defined as the price that a well-informed typical buyer would pay if he were purchasing the property for a profit-making purpose. In estimating the fair value, only such rights in land, building, and equipment that would be of use to such a buyer shall be considered. In sales to other than government agencies, the "fair value" need not necessarily be obtained, however.

In the case of facilities in which the government owns only a part of the plant or equipment, the possibility of converting the government-owned share into a unit capable of independent operation must be studied. The feasibility of subdividing plants for multiple tenancy or joint use by more than one small business will also be considered.

Further aid is given to small business and to veterans by granting to the Smaller War Plants Corp. the power to purchase plants under its priority for resale or lease. First priority is granted to all government agencies and second to state and local governments.

No plant costing more than $500,000 and classified as aluminum, magnesium, synthetic rubber, chemical, aviation gasoline, iron and steel, aircraft, or shipyard can be sold or leased without approval by SPB. The sale of plants costing more than $1,000,000 must be submitted to the Department of Justice for clearance.

Regulation No. 10 sets up certain safeguards against buying by speculators. Each purchaser must certify that he is acquiring property for his own use and not for resale or lease. No plant or part of a plant, excepting the government-owned portion thereof, can be dismantled or moved without first giving 30 days' notice to the government of the state and municipality in which the property is physically located. This is intended to protect local communities against the loss of employment from removal of war-acquired industry.

To be disposed of under this regulation of SPB are industrial plants representing 20-25 per cent of the country's industrial facilities, or roughly one-third more than the country's productive capacity before the war.

In certain categories, the government holdings represent the dominant part of entire industries. Synthetic rubber plants, for instance, represent 98 per cent of that industry's capacity. The government also owns 90 per cent of aircraft, 90 per cent of magnesium, and 55 per cent of aluminum productive capacity.

CMP Control of Sales by Warehouses To End Sept. 30

Steel, copper and aluminum warehouses and distributors have been informed by the War Production Board that Controlled Materials Plan regulation No. 4, which governs their sales, will be revoked automatically by the expiration of CMP on Sept. 30.

Fabricators of Steel Products on Coast Optimistic for the Future

Manufacturers, shifting from war to peacetime production rapidly, see bright outlook. Many planning expansion of normal activities with reconversion problem one largely of adjustment of customer lists

WHATEVER the final decision on the steel producing plants at Geneva and Fontana, West Coast fabricators of steel products are optimistic for the future.

All district fabricators appear to be making the shift from war to peace rapidly. For most of them it is a readjustment of customers rather than reconversion of products.

Several companies, normally manufacturers of general lines of heavy steel products, were engaged in shipbuilding during the war. At present they either have completed or are finishing ship contracts but meanwhile they have shifted at least a part of their operations to ship repair and ship conversion. This work has minimized the reconversion shock greatly and it will continue to bolster these companies' fortunes for some time to come.

For example, Consolidated Steel Corp. definitely plans to make ship conversion a permanent department of its business. Consolidated still is working on new ship contracts. This company plans to be a bigger factor in the peacetime shipbuilding industry. Currently it is building 150-ft steel boats for tuna fishing, and is looking for larger-type coastal vessel contracts.

However, ship work will be only one phase of Consolidated's postwar program. It foresees acquisition of a bigger share of the market for structural products, for bridges, factory and office buildings. A promising field is in new installations for the oil industry.

Many Projects in Experimental Stage

Several of Consolidated's postwar projects still are in the experimental stage. Among these is a new type refrigerator car, on which it is working now. It is testing models of alloy steel and aluminum. Another project is an experimental hydraulic pump jack for oil wells.

Consolidated Steel's volume in 1944 was $379 million compared with $12,500,000 in 1940. Currently it has an order backlog of $59 million.

Western Pipe & Steel Co. is another West Coast fabricator which definitely plans to carry over its wartime shipbuilding business into peacetime. The firm soon will finish its new vessel contracts, and currently is engaged primarily in ship conversion and ship repair in that department. It has not disclosed final plans, but has indicated it intends to stay in the ship business.

Even before the war ended Western Pipe had made rapid progress in moving toward its prewar manufacturing lines. These include oil well and refinery equipment, piping, tankage, structural steel and general industrial metal work. It was actively engaged in many of these lines during the war, producing them for essential purposes.

Western Pipe has plants at South San Francisco, Los Angeles, Fresno and Taft, in California, and in Phoenix, Ariz., in addition to the shipyards on San Francisco Bay and at San Pedro near Los Angeles.

Another western company with broad expansion plans and a bright prospect is Rheem Mfg. Co. It anticipates a volume of about $40 million in the first full peacetime year which would compare with about $74 million in 1944 when a large part of its business was in war lines.

Rheem sees increased peacetime demand for steel shipping containers, one of its basic products.

The company's Appliance Division is planning to broaden its field with new devices such as water heaters, wall heaters, furnaces, tanks and boilers. It also is planning a nationwide market for its domestic and industrial coal stokers.

By the end of this year Rheem expects to be operating 12 plants located as follows: Richmond, South Gate and Stockton in California; Portland, Oreg.; Salt Lake City, Utah; Houston, Tex.; New Orleans; Birmingham; Sparrows Point, Md.; Bayonne, N. J.; and two plants in Chicago.

These three fabricators are far from a complete list of similar manufacturers on the West Coast, of course. But in one way or another they are typical of what such companies are planning and expecting for postwar.

Meanwhile, U. S. Steel Corp. and Bethlehem Steel Co., well established in the Pacific Coast field, are looking forward to an increasing volume of business.

U. S. Steel plans a $25 million strip mill at its Columbia Steel Co. plant at Pittsburg, Calif. It is believed that there is better than an even chance the corporation also will construct a tube mill, to supply the oil fields, at its Columbia plant at Torrance, near Los Angeles.

Bethlehem has been rumored to be considering expansion of its fabricating facilities on the West Coast, but no definite announcement has been made as yet.

For the most part, steel fabricators are troubled by only one big worry—bringing down the cost of western steel. They think there will be a readjustment eventually, but realize it may not come soon.

Spring and Bumper Firm To Expand Peacetime Output

United States Spring & Bumper Co. last week announced a $1,250,000 program, including construction of three class A steel buildings, machinery installations and other activities for expanded peacetime production in the Los Angeles area.

A company official said that despite cancellations of some war contracts the concern will rush production of springs and bumpers for new cars and will be enabled to maintain employment at virtually wartime levels.

Metalworking Plants Reconverting Rapidly To Peacetime Products in Los Angeles Area

LOS ANGELES

CHECK-UP of representative manufacturers in Los Angeles last week indicated civilian production well underway in the great majority of plants. In the metal trades, company officials indicated the following activities as marking current changeover from war to peace:

Euclid Machine Works, Santa Monica, subcontractor for rocket development, reconverted to automobile rebuilding and repair.

Simpson Steel Co., war production concentrated in merchant ship deck fittings, now turning out farm machinery.

Timm Aircraft Corp., now producing vacuum cleaners and other articles.

Weber Showcase & Fixture Corp., deep freeze units and allied goods.

Norris Stamping & Mfg. Co., stampings in variety, including bottle tops, holders, kitchenware.

Kinney Aluminum Co., permanent mold castings of aluminum-ware for cooking.

A. & V. Stove & Mfg. Co., commercial griddles and hot plates.

Adel Precision Co., spoons, fly swatters, cake turners, film viewers and other articles.

Serv-All Mfg. Co., garden tools.

Warner Mfg. Co., cigarette lighters.

F. & W. Foundry, radiator grilles.

Aluminum Use by Steel Industry Seen Increased

Aluminum company head says use of light metal by steelmakers may increase as much as 10 times prewar average

THE STEEL industry will become one of the principal consumers of aluminum in the postwar world, perhaps expanding its consumption as much as ten times its prewar average, Roy A. Hunt, president, Aluminum Co. of America, asserted in a radio address in Pittsburgh last week.

He said it is possible that within the next five years, the United States market as a whole will be consuming 1250 million pounds of aluminum a year, five times the prewar average. Should this prove true, the aluminum industry would give employment to about 100,000 people, as against the prewar level of about 33,000.

"Steel and aluminum will often battle for the same piece of business in the future as they have in the past, said Mr. Hunt, but both metals make markets for each other. The steel industry will use aluminum as a deoxidizing agent in production of steel, as a coating for thin sheets of steel, and as a covering for steel sheet to produce plymetals.

"Field research by independent economists indicates that the iron and steel industry might expand its yearly consumption of aluminum tenfold over prewar," Mr. Hunt declared. "Likewise, the use of aluminum means increased use of steel. In electrical transmission, for instance, the aluminum cable has a steel core and is supported on structural steel towers."

The aluminum industry's principal reconversion problem is to find enough uses of the metal to employ a substantial portion of the nation's expanded productive capacity, Mr. Hunt stated. But the industry has four reasons for facing the problem with optimism. Because of lower prices for aluminum, greater consumer knowledge, new and high-strength alloys, and increased manufacturing facilities, the industry feels it can more than hold its own in peacetime competition.

Prefabricated Homes To Be Built on Production Line

Plans for construction of a million dollar plant at New Albany, Ind., for production of prefabricated homes on a production line basis were announced last week by Gunnison Homes Inc. In making the announcement, Foster Gunnison, president of this United States Steel Corp. subsidiary, said the plant would have a capacity of 1650 houses per year when operating on an eight-hour day. It is estimated the plant will be capable of producing 3200 units on a double-turn basis.

Mr. Gunnison's announcement marked the first disclosure of the postwar plans of his company since it became a part of United States Steel on July 1, 1944. It is expected the new plant will be completed by the middle of 1946. In the meantime, Gunnison Homes Inc. will continue to operate its present plant at New Albany, Ind.

Butler Co. Acquires Steel Prefabrication Patents

Merging of two important prefabricated steel building concerns has taken place with the acquisition by Butler Mfg. Co., Kansas City, Mo., of all patents and manufacturing rights of Steel Building Division of Globe-Wernicke Co., Cincinnati.

Butler will combine several of the features patented by Globe-Wernicke with its own designs for "Boulevard Buildings," widely used prior to the war for filling stations, drive-in establishments, and deluxe roadside restaurants. The Globe-Wernicke double steel panel, for instance, is reversible for adaptation of a porcelain exterior or wallboard interior and can be used in flooring or roof decks.

Butler is now tooling up for quantity production by year's end.

RFC Offers for Sale Eight More Industrial Plants

Reconstruction Finance Corp. is offering for sale eight industrial plants that have terminated their war production jobs. These include the Alan Wood Steel Co. plant at Ringwood, N. J., that occupies a site of about 878 acres containing two ore deposits for production of lump ore and magnetic iron concentrates. There are 27 plant buildings and 67 dwellings. The crushing plant contains 20,517 square feet of floor area and the concentration plant, 27,456 square feet. The equipment includes mining locomotives, cars, and miscellaneous machinery.

The other plants offered for sale are: Revere Copper & Brass Co. plant at Baltimore; Howard Aircraft Corp. plant (16 main and 12 smaller buildings) at St. Charles, Ill.; Studebaker Corp. plant at Fort Wayne, Ind.; Consolidated Vultee Corp. plant (13 main buildings) at Miami Springs, Fla.; American Broach & Machine Co. plant (including production equipment used in metal machining and forming operations) at Ann Arbor, Mich.; Republic Aviation Corp. plant (26 buildings and two hangars) at Evansville, Ind.; and Oilgear Co. plant at Milwaukee.

TRANSITION TOPICS

WAGES— Outcome of steelmakers' demand for $2 per day wage increase to offset drop in take-home pay resulting from loss of overtime and shorter work-week, may pattern postwar national wage policy. See page 87.

STEEL PRICES— Office of Price Administration studying request of steelmakers for higher prices. Decision seen delayed pending outcome of new wage negotiations. See page 89.

STAINLESS STEEL— Establishment of numerous new basing points for pricing stainless steel products marks first major steel market development of postwar period. See page 90.

SURPLUS GOODS— New regulation of Surplus Property Board aims at speedy disposal of government-owned war plants. No preference provided for contractors operating plants, but veterans and small business will be accorded preferential treatment. See page 93.

RADAR—Tail warning radar device that served as "rear vision mirror" for fighter pilots said to have great postwar value. See page 110.

FABRICATION—Cement used in manufacturing rotor blades for helicopters seen as having further use in peacetime manufacturing of aircraft which ascend and descend vertically. See page 112.

MACHINE TOOLS—Study of expectations of customers provides machine tool builders with "tip sheet" on developments most keenly desired. See page 119.

TANGENT BENDING—New method of metal fabrication shows great promise in difficult forming operations. Machine will simplify tooling problems. See page 124.

Permanent Joint Specifications Board Established by Army, Navy

Will review existing specifications, formulate new ones with view of avoiding overlapping and confusion. Replaces joint committee set up in 1942. Extensive programs to co-ordinate requirements already initiated

AN ARMY-NAVY Joint Specifications Board has been established by the secretaries of War and Navy as a permanent activity to succeed the wartime Joint Army-Navy Committee on Specifications. The latter body was organized in 1942 when each technical service and bureau, and frequently each procuring activity, wrote its own specifications.

Result was a great deal of unwarranted diversity in specifications which complicated procurement, production and inventory problems. For example, the Army had one set of identification numbers for radio tubes, and the Navy had another. Each Army service and Navy bureau wrote its own wire specifications. The government ordered binoculars under five separate specifications. On the other hand, there were many items for which the Army and Navy bureaus had written no specifications at all; for example, it was customary to purchase 16-mm photographic equipment as it was available for civilians.

In the three years of its existence, the Joint Army-Navy Committee on Specifications has made considerable progress in evolving joint specifications for radio tubes and other electronic components, photographic equipment, gun forgings, ammunition components, military explosives, airfield accessories such as steel landing mats, military textiles, plastics, certain chemicals, meat cans, and for containers for shipping military supplies overseas into areas with varying climatic conditions.

The new Army-Navy Joint Specifications Board is charged not only with the duty of reviewing these existing joint specifications continuously, to keep them alive and up-to-date, but with the formulation of many additional joint specifications. Already extensive programs have been initiated to co-ordinate requirements for advance base equipment, fuels and lubricants, clothing and textiles, and shipboard items. Ultimately, joint specifications will be formulated for metals, both ferrous and nonferrous.

Navy Sets Up War Contract Termination Timetable

The Navy last week announced a timetable for settling most of its terminated war contracts by New Year's Day.

H. Struve Hensel, assistant secretary of the Navy, said the Navy wants to clear up the bulk of contract negotiations promptly, not only to facilitate plant clearance and reconversion to civilian production, but also to speed the return to civilian life of Naval Reserve contract termination personnel.

Mr. Hensel pointed out that contract settlement must be initiated by the contractor. Of the 50,000 contracts terminated since V-J Day, it is estimated that 15,000 will involve claims against the government for termination costs.

"If the contractors will file their claims by Oct. 15," the assistant secretary said, "the Navy will undertake to have them reviewed by inspectors of material and forwarded to the contracting officers by Nov. 15. The goal of contracting officers for final settlement is set as 30 days after they receive the claims.

"This will make enormous demands upon contract termination activities, but we believe our goal can be met if—and this is a big 'if'—the Navy's contractors file their claims quickly. Therefore we ask them and urge them to exert their maximum efforts toward this end.

"The Navy is prepared to handle a rush of termination claims. Orders have gone out to the staff of over 6500 termination personnel to do everything within their power to meet the timetable of settlement and thus to speed up the clearance of plants and reconversion.

"Procedures are in effect to make liberal partial payments in advance of settlement within 30 days after the contractor applies. Material inspectors and inventory disposal experts are ready to help contractors with termination problems."

In co-operation with the Army, the Navy has sponsored training programs for contractors to prepare them for the problems of settlement. Contractors who are unfamiliar with settlement procedures should communicate immediately with their government contracting agency, or with one of the 20 regional Termination Co-ordination Committees.

Census Bureau To Make More Current Surveys

In planning its statistical service to United States business and industry in the peacetime period, the Bureau of the Census will bear in mind a lesson it learned during the war. That is that current surveys are of more immediate help to business planners than historical studies.

During the war the bureau conducted

JOURNEY'S END: Twenty-six once proud Great Lakes ships built around the turn of the twentieth century are moored at Erie, Pa., awaiting the junkman's cutting torch. At one time, they formed the backbone of the Great Lakes shipping fleet. They were consigned to the scrap heap when the U. S. Maritime Commission built 16 huge carriers to speed deliveries of war materials from the mines to the hearths. NEA photo

many of these spot surveys at the request of the War Production Board, and the results of those surveys were of great assistance to the WPB in controlling war production. In particular, the bureau conducted monthly surveys revealing the quantities of scarce materials, particularly the metals, wood and paper and natural rubber, in the many different inventories that comprised the national stockpile. Much of this information was secret at the start, but all of it since has been printed in the bureau's "Facts for Industry" series.

Statistical information compiled in these surveys—usually made at monthly or quarterly intervals—has provided a measure of expansion of war plants, general industrial expansion, expansion of war housing, production of construction machinery, fans, blowers and exhausters, steel, gray iron and malleable castings, steel forgings, machine tools and metalworking equipment including foundry equipment, etc. The Facts for Industry series also revealed production, shipments and inventory of many products, particularly made from steel and other metals.

When Japan surrendered, Census Bureau officials were loath to discontinue this wartime statistical work too suddenly and decided to proceed with all these surveys as scheduled—at least for a period of 90 days. In the meantime, the bureau has undertaken a check with numerous companies in the industries concerned with these surveys; it is seeking to determine whether the results of these surveys will have sufficient peacetime importance to warrant permanent continuation of the work.

SEC Report of Corporate Balance Sheet Data Issued

A survey of corporate balance sheet data for 1939-1943, inclusive, has been released by the Securities & Exchange Commission, Philadelphia.

The five-year survey covers 118 industry groups with total assets of approximately $62 billion in 1943. Parts 1 and 2 of the survey contain data on 1120 companies in 76 manufacturing industry groups. Total assets of those 1120 companies in 1943 amounted to approximately $53 billion, estimated to be more than half the assets of all manufacturing enterprises in the United States.

Of the 36 industry groups covered in Part 2, oil refining reported the largest total assets in 1943. They amounted to $9,782,563,000. Showing the second largest total assets in 1943 were steel producers with blast furnace facilities, with 14 companies reporting in each of the years covered. Total assets rose from $4,235,334,000 in 1939 to $5,137,894,000 in 1943. The automobile industry group reported the third largest total assets in 1943, with 10 companies reporting in each of the five years. Total assets of that group in 1943 were $3,155,851,000.

RFC Terminates Lease Agreements with Alcoa for Alumina and Reduction Plants

RECONSTRUCTION Finance Corp. has terminated its lease agreement with the Aluminum Co. of America, effective Oct. 31, with respect to the aluminum reduction plants and related facilities at Jones Mills, Ark.; Los Angeles; Massena, N. Y.; Spokane; Troutdale, Oreg. and the alumina plants at Hurricane Creek, Ark.; and Baton Rouge, La.

This action, it was stated, was taken on the recommendation of the Surplus Property Board. Under the lease, Alcoa would have been in control of the plants until various dates late in 1947 and throughout 1948. It would, therefore, have been impossible to make immediate arrangement for the sale or lease of the plants to others so long as the lease was in effect. The lease was terminated for the purpose of freeing the plants from the Alcoa agreement so that they could be disposed of in a manner which would create competition in the aluminum industry. The government agencies concerned have taken this course in an effort to conform to the recent decision of the United States Circuit Court of Appeals for the Second Circuit and to provide additional sources of supply of this material so essential to the national security.

The notice of termination sent to Alcoa offered to make an arrangement whereby Alcoa would be permitted to continue to operate any or all of the plants for one year, commencing Sept. 1, 1945, upon the terms and conditions of the existing lease, except that the arrangement could be terminated on 60 days' written notice of either party. This offer was made in the hope that in the interests of maintaining employment it would be possible to arrange for the operation of the plants by Alcoa on a temporary basis. Alcoa has informed representatives of the RFC that it is not interested in making an arrangement of any kind for the temporary operation of these plants.

GEORGE ATCHESON JR.

Appointed political advisor to Gen. Douglas MacArthur in the administration of defeated Japan. Mr. Atcheson is a career diplomat with 35 years' experience in the Far East. He is reported to be the next American minister to Thailand. NEA photo

SWPC Plans To Open Alaskan Branch Office

To help develop Alaska in the interest of the nation—economically and from a military point of view, the Smaller War Plants Corp. will establish a district office in that territory.

While Alaska is one-fifth as large as the United States proper its population is only 80,000, less than St. Joseph, Mo., says Maury Maverick, chairman and general manager of SWPC, and its development should be undertaken on a large scale as soon as possible. While there are hazards involved, such as transportation, these can be reduced.

"People in Fairbanks, for instance," says Mr. Maverick, "which is very cold in winter, live in as much comfort as do people in Minnesota, for the reason that the city is organized, has heat and light, and is like any other American city. Many areas can be made livable the year round. These lands now furnish reasonable support—as good as or better than in the United States proper. The southeastern area has a temperate climate without extremes of either heat or cold, although there is a high rainfall. There are some regions with a greater range of temperature, but they do not have as cold weather as do some of our northern states."

After studying Alaska for a year and a half, the SWPC is convinced that there is a real need in the territory now for little business loans, technical advice and other SWPC services.

Applications already have been received for small business assistance in Alaska, says Mr. Maverick, and there is real merit in many of the proposals. For instance, applications have been received from several seacoast towns for aid in expanding or establishing boat building and repair shops. At present, local fishermen do not have adequate local facilities and frequently must send all the way to Seattle or Prince Rupert to get their boats repaired. Tanning of salmon skins holds potentialities for a new industry in Alaska, says Mr. Maverick; salmon skin, properly treated, can be used for making shoes, belts, handbags and other items. Every Alaskan town needs cold storage and food processing plants.

MEN of INDUSTRY

WILLIAM M. ALLEN

GEORGE E. McGUIRE

C. S. HEGEL

William M. Allen, Seattle, attorney d director of the Boeing Aircraft Co., ttle, for the past 14 years, has been cted president of that company.

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Frank J. Emerick, formerly of De- it, has been appointed resident rep- entative, Bethlehem Steel Co., Beth- em, Pa., and will have headquarters St. Paul. He succeeds Arthur Lehr resigned to become vice president in rge of sales, St. Paul Engineering & g. Co.

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Peer Nielsen has been appointed vice sident and general superintendent, ver Co. Inc., Oakland, Calif., in rge of operations at the company's el plant at Fontana, Calif. Frank ckman remains as general superin- dent in charge of new construction. Nielsen until recently was general perintendent of the government-owned el plant at Geneva, Utah. Mr. Niel- is an engineering graduate of Lehigh versity, Bethlehem, Pa., and has held sitions of responsibility with subsid- ies of U. S. Steel Corp. for the past years.

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George L. Miller, formerly sales man- r, Michigan Steel Tube Products Co., troit, has been named vice president charge of sales. F. W. Sexauer, merly assistant sales manager is now s manager. R. O. Berg is vice presi- t in charge of research and engineer- J. C. Thrasher, vice president in rge of operations: Harry J. Longeway, ntroller and office manager; and E. Hobart, secretary-treasurer.

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W. J. Ehlers, formerly sales manager, s been appointed plant manager, e Structural Steel Co., Chicago.

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W. R. Mehler, assistant general man- er of sales, Sharon Steel Corp., Sharon, a., has been appointed district manager sales, New York territory with head- arters in New York. T. M. MacBain s been transferred from the Cleveland territory to the New England district and will be located in Connecticut.

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George E. McGuire has been appointed director of foreign sales, Carborundum Co., Niagara Falls, N. Y. He has been sales manager of the export department for the past nine years. Mr. McGuire joined the company in 1911 as a member of the New York district sales office.

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William C. van Cleaf has been appointed director of industrial relations, Allis-Chalmers Mfg. Co., Milwaukee, succeeding Lee H. Hill. Mr. van Cleaf is a veteran Allis-Chalmers employee, joining the company in 1912 as an electrical apprentice. He has served as general supervisor of apprentice training, employment manager and later assistant to Mr. Hill.

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Raymond H. Gaver has been appointed chief engineer and Jonas D. Bigelow, development engineer of the newly established Railway Equipment Division, American Welding & Mfg. Co., Warren, O. Mr. Gaver, who will head the division, has been with the company since 1944.

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Robert P. Russell of the methods engineering department, Oldsmobile Division, General Motors Corp. at Janesville, Wis., has been transferred to similar work at that division's plant in Lansing, Mich.

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Max J. L. Schulte has resigned as vice president, secretary-treasurer and general manager, Rawlplug Co. Inc., New York, after 21 years' association with that organization.

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F. W. Elya has been appointed district manager of the newly created northeastern district, Abrasive Division, Norton Co., Worcester, Mass. Mr. Elya's headquarters will be in Worcester and the territory includes: Massachusetts Rhode Island, Vermont, New Hampshire, Maine and northern New York state. R. J. Forkey succeeds Mr. Elya as abrasives engineer serving the western New York area and Robert Cushman succeeds Mr. Forkey in the Syracuse, N. Y. territory.

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C. S. Hegel recently was appointed manager in Chicago, special steels department, Joseph T. Ryerson & Son Inc., Chicago. Mr. Hegel joined the Ryerson Chicago special steels department in 1928 and in 1932 was transferred to Milwaukee as a special steel representative.

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Henry K. Patjens has been elected president, Economy Arch Co., St. Louis. He formerly had been associated with the engineering department, Baldwin Locomotive Works, Eddystone, Pa., where for 17 years he served as a design and analytical engineer. In 1937 Mr. Patjens was transferred to the sales department as a sales engineer serving in Chicago and St. Louis.

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Harold D. Hornbeck has been appointed sales promotion manager, Nash Motors Division, Nash-Kelvinator Corp., Detroit, succeeding N. F. Lawler who now is advertising manager.

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Donald Williams has been appointed general sales manager, and Donald K. Ballman, assistant general sales manager, Dow Chemical Co., Midland, Mich. Mr. Williams has been assistant general sales manager since 1933, and Mr. Ballman has been manager of the Technical Service and Development Division which he organized in 1943.

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E. M. Cotter, formerly a merchandising manager with Crosley Corp., Cincinnati, has been appointed general sales manager, Norman Young Appliance Co., Dallas, Tex.

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P. D. Fahnestock has been named director of information, Committee for Economic Development, succeeding

Anthony Hyde who now is in charge of public relations, Office of War Mobilization and Reconversion, Washington. Mr. Fahnestock has been serving as acting director of information for the past four months.

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William R. Ellis and **Mahlon G. Milliken** have been elected vice presidents, Hercules Powder Co., Wilmington, Del. Mr. Ellis formerly was general manager, explosives department and Mr. Milliken, general manager, cellulose products department. **Philip B. Stull**, together with Mr. Ellis and Mr. Milliken, was elected to membership on the executive committee Succeeding Mr. Milliken, **John J. B. Fulenwider** has been named general manager of the cellulose products department and **J. B. Johnson** succeeds Mr. Ellis as general manager of the explosives department.

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Maurice C. Libert has been appointed manager of the San Francisco office, New Departure Division, General Motors Corp. Mr. Libert for 17 years was sales engineer in that division's Detroit office.

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Wilbur F. Campbell is resigning as assistant to the president, Pioneer Engineering & Mfg. Co., Detroit, to re-enter private law practice.

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H. A. Stevenson, who served as a lieutenant colonel with the Army Service Forces, has been retired to inactive duty and has returned as distributor in the Michigan territory for Baker Industrial Truck Division, Baker-Raulang Co., Cleveland.

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Paul H. Puffer, former general sales manager, Norge Division, Borg-Warner Corp., Chicago, has become president, Creo-Dipt Co., North Tonawanda, N. Y.

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Joseph T. Sullivan has been appointed technical sales representative for northern Massachusetts, Maine, Vermont and New Hamphire, MacDermid Inc., New Haven, Conn. Mr. Sullivan was graduated from Yale University in 1934 and in 1935 he joined the New Haven Clock Co. as assistant chemist, later being made chief chemist in charge of all metal finishing departments.

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James Douglas has resigned as deputy vice chairman for metals and minerals, War Production Board, Washington. He formerly was director of the Zinc Division. Mr. Douglas will be affiliated with the Phelps-Dodge Corp., New York.

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Christian Pretz, assistant to the vice president, Studebaker Corp., South Bend, Ind., has resigned after 32 years with that company, and has become associated with the Durham Mfg. Co., Muncie, Ind., as vice president.

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Gaston F. duBois, vice president and member of the executive committee, Monsanto Chemical Co., St. Louis, retired Sept. 1. He will continue as a director and also will serve as a consultant. He joined the company in 1904, and was awarded the Perkin medal in 1943 by the American section, Society of Chemical Industry, for his outstanding work in applied chemistry.

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Lewis A. Belding has been named president, Harlan & Hollingsworth Corp., Wilmington, Del. His previous connections included Henry J. Kaiser Co., General American Transportation Corp., and American Car & Foundry Co., New York.

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Walter H. Bodle has been appointed assistant to the merchandise sales manager, Square D Co., with headquarters in Detroit. **Ernest R. Walton** has succeeded Mr. Bodle as manager of the company's assembly plant at Seattle.

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William E. Hoard, former assistant to the sales manager, Western Gear Works, Seattle, has been appointed area sales manager, San Francisco, for that company and its associate, Pacific Gear & Tool Works. Mr. Hoard joined the company in 1942, previously having completed a post-graduate course in works management given by Westinghouse Electric Corp., Pittsburgh.

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Arthur H. Moran has been appointed price executive, Machinery Price Branch, Office of Price Administration, succeedingWalter Shoemaker who has resigned to become associated with Bravo-Doyle Co., Pittsburgh, distributor of construction machinery.

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W. E. Dueringer has been named assistant sales manager and **H. E. Weaver**, proposition department manager, Bailey Meter Co., Cleveland.

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V. D. Hanna, secretary-treasurer, Wolverine Tube Co., Detroit, has been elected vice president of the Detroit Control, Controllers Institute of America.

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C. G. Wollaeger has resigned as vice president in charge of sales, Milcor Steel Co., Milwaukee, and has organized the Wollaeger Co., Milwaukee, to distribute interior metal trim for buildings and other metal specialties.

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H. C. McCaslin, former chief engineer of Willys-Overland Motors, has joined Graham-Paige Motors Corp., Detroit, as chief engineer. He will direct engineering on the new Frazer automobile.

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Robert A. Morris has been appointed advertising manager, Acme Steel Co., Chicago. Mr. Morris has been with the War Production Board, Washington, for the past three years and recently resigned as deputy director, Containers Division.

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Francis M. Hoben, manager, x-ray department, Westinghouse Electric Corp.'s government office, Washington, and **Edwin L. Harder**, central station engineer, industry engineering department of the company's East Pittsburgh works, have been awarded the Order of Merit.

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Allan L. McKay has been elected president, Kaukauna Machine Corp., Kaukauna, Wis. He is continuing in the capacity of general manager, which position he has held since June, 1942, when he was elected vice president. He succeeds Ralph J. Kraut, who resigned to devote all of his time as president and general manager of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.

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Aubrey M. Callis has been appointed sales manager of the Whiting, Ind. and Detroit plants, Federal Metal Division, American Smelting & Refining Co., New York. Mr. Callis will have his headquarters at Whiting. He formerly was assistant general manager of the

J. T. SULLIVAN

W. E. HOARD

A. D. SHANKLAND

...is engineer of tests, Bethlehem, Pa., ...ent, Bethlehem Steel Co., as noted in STEEL, Aug. 27 issue, p. 88.

WILLIAM T. ADAMS

Who recently was named general purchasing agent, Republic Steel Corp., Cleveland, STEEL, Sept. 3 issue, p. 104.

R. L. VAN CLEVE

Who is general purchasing agent, Carnegie-Illinois Steel Corp., Pittsburgh, as noted in STEEL, Sept. 3 issue, p. 104.

...cific Coast department with headquarters at Los Angeles and has been associated with the Federated Metals Division since 1928. Frank H. Eicher has been named to succeed Mr. Callis at Los Angeles.

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Paul H. Fox has been appointed division manager for Washington, Oregon, Wyoming, Montana and Idaho, Aluminum Division, Reynolds Metals Co., Louisville, Ky. Mr. Fox joined the company in 1941 as scheduling supervisor in the company's Listerhill, Ala., rod and structural mill.

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Harry G. Howell has been appointed vice president in charge of production, Tube Turns Inc., Louisville, Ky. Mr. Howell had been associated with General Motors Corp., Detroit, for 22 years.

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Sidney D. Kirkpatrick, editor, *Chemical & Metallurgical Engineering*, New York, has been awarded the chemical industry medal for 1945 by the American Section, Society of Chemical Industry, Brooklyn, N. Y. Mr. Kirkpatrick will receive the medal, which is awarded annually, in November.

—o—

Alexander M. Wright has been appointed assistant general mangaer and Floyd C. Gustafson, sales manager, Chandler-Evans Corp., West Hartford, Conn. Mr. Wright has been manager of the corporation's Dayton, O. plant since its construction in 1942. Mr. Gustafson joined the company in 1938.

OBITUARIES . . .

Charles N. Hickok, 66, executive of the M. A. Hanna Co., Cleveland, and director of many affiliated mining companies, died Sept. 11 at his home in that city. In 1900 Mr. Hickok became connected with Latrobe Steel & Coupler Co., Chicago, and in 1903 went to Dayton, O., as manager of railroad sales, Dayton Malleable Iron Co. He became associated with the Hanna company in Cleveland in 1905.

—o—

Arthur T. Seyler, 62, retired purchasing engineer, Consolidated Steel Corp. Ltd., Los Angeles, died recently at his home in that city.

—o—

Lou R. Conger, 70, general traffic manager, Milcor Steel Corp., Milwaukee, until his retirement in 1939, died recently at his home in Grand Haven, Mich. Mr. Conger had been with the company 25 years.

—o—

A. H. Heimbach, 63, former president, Heimbach Incinerator Mfg. Co., St. Paul, died recently at Allentown, Pa.

—o—

Fred A. Pawsey, 63, chief engineer, Ohio Locomotive Crane Co., Bucyrus, O., died Sept. 3 in that city. Mr. Pawsey had been associated with the company since July, 1919.

—o—

William J. Ralston, 75, first chief engineer of the Cuyahoga works, American Steel & Wire Co., Cleveland, and a veteran of 30 years with that company, died Sept. 9 in that city. Mr. Ralston retired 10 years ago.

—o—

Edgar A. Eckhouse, chairman, Central Brass Mfg. Co., Cleveland, died Sept. 11 at his home in that city. Mr. Eckhouse, former president of the company, resigned from active business a few years ago because of ill health.

—o—

William J. H. Miller, 56, for the past 10 years sales manager, Safety Valve Division, Manning, Maxwell & Moore Inc., Bridgeport, Conn., died Sept. 8 in that city.

—o—

Malcolm Fleming, 60, who resigned July 1 as vice president and district manager, Hickman, Williams & Co., Cincinnati branch, died recently in that city.

—o—

Edward S. Evans, 66, president, Evans Products Co., Detroit, died in that city Sept. 6. In earlier years he was president of the Lockheed Co., and is credited with installing the first retractable landing gear on an airplane.

—o—

Leonard Ruegg, 55, owner, National Brass Works, Los Angeles, died recently in that city.

—o—

Peter J. Weigel, 82, connected with Buffalo iron foundries 32 years, died recently in that city. He was secretary of the W. P. Taylor Co. until his retirement in 1930.

—o—

Grant B. McLaughlin, 66, president, Yates-McLaughlin Inc, Buffalo, coal firm, died recently in that city.

—o—

William Hill, 85, former president, Collins Co., Collinsville, Conn., died recently on Little Diamond Island near Portland, Me.

—o—

Barclay Perry, district sales manager in Richmond, Va., for the Metal Specialty Co., Cincinnati, died recently in Richmond.

—o—

William Dunham Martin, 69, formerly assistant manager, at Kenosha, Wis., American Brass Co., Waterbury, Conn., died recently at his home in Kenosha. He retired from that position in 1931.

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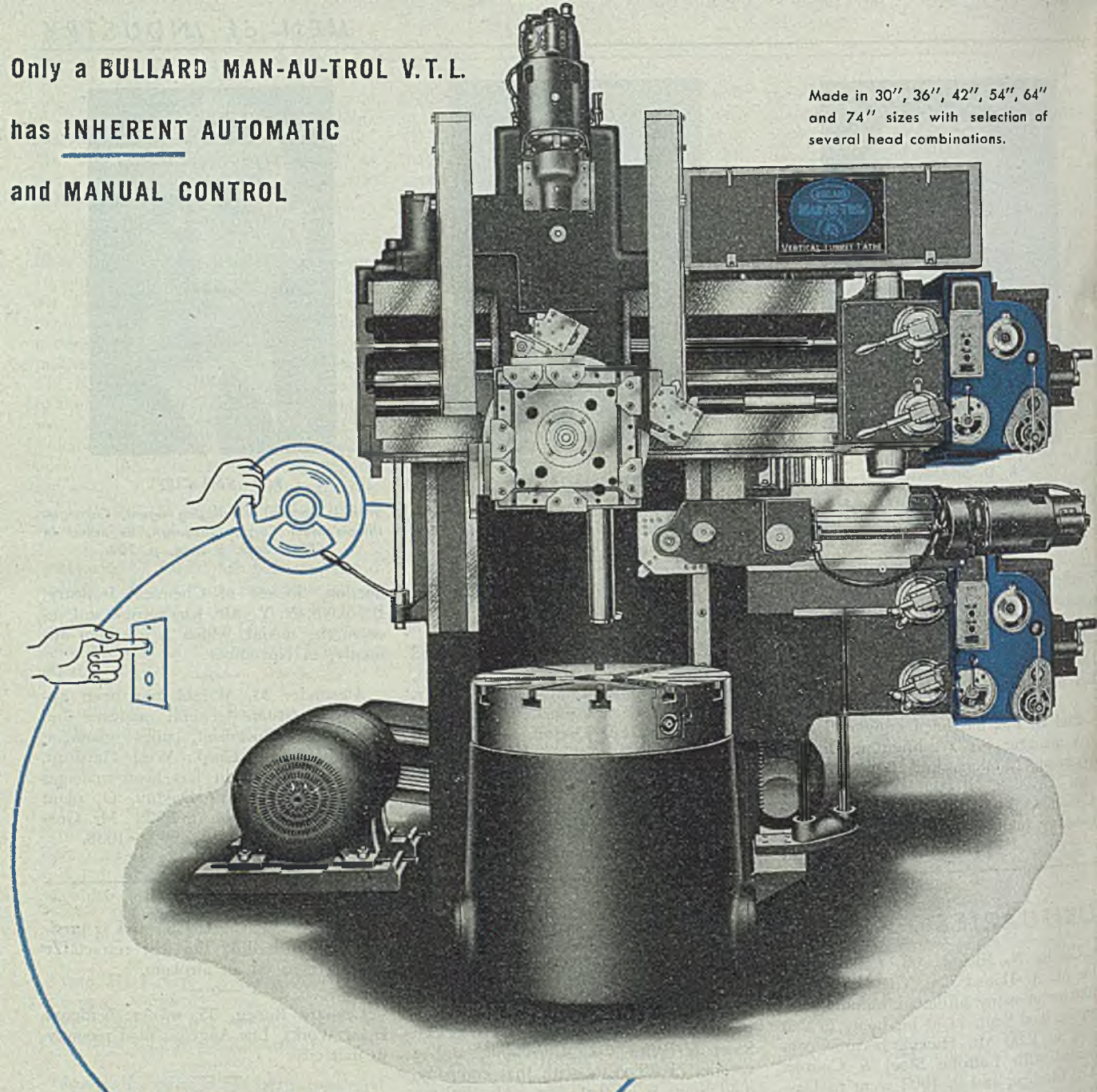

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BULLARD CREATES *NEW METHODS* TO MAKE MACHINES DO MOR

STEE

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Human reconversion lags behind plant changeover as delaying factor in quantity production of new passenger cars. Labor inclined to take it easy. Auto output expected to outstrip deferred demand within three or four years

DETROIT

HUMAN reconversion continues to rank the actual physical reconversion of plants as the stumbling block in the road to resumption of civilian production, whether it be steel or automobiles, and this applies not only to the men who run the machines and assembly lines but also on up the line through supervisory forces, buyers, follow-up staffs and even some administrative personnel. It has not been possible yet to shake off the weariness and short tempers resulting from long months of overtime war production.

Plant labor is inclined to take it easy for the time being, preferring to take vacations and finance them with unemployment compensation or to stay off the job in protest against thinner pay envelopes occasioned by elimination of overtime pay and other war bonuses. Steel rolling mills are returning to 15-turn weeks in place of the former 18 and 20-turn weeks, and at the same time are confronted with much longer processing time in finishing the sheets, strip and wire required for automotive plants as against plates and other heavy sections which could be whipped out in short order for war contracts. This means more help required in the mills and reductions in tonnage bonuses. Still, despite extensive layoffs in war plants, few recruits can be found to take these waiting jobs.

Auto Steel Shipments Low

Meanwhile, automotive buyers are raising on the heat for shipments of cold-rolled sheets and strip, wire and forging bars, but about all they are getting is an assortment of promises and alibis, little steel. Suppliers of steel report it may be well into the fourth quarter before automotive steel shipments of any consequence can be scheduled. Theoretically at least, they are still operating under CMP directives and will continue to be until Sept. 30, yet this is a weak excuse with the national steel operating rate at 75 per cent. The true explanation goes back to manpower.

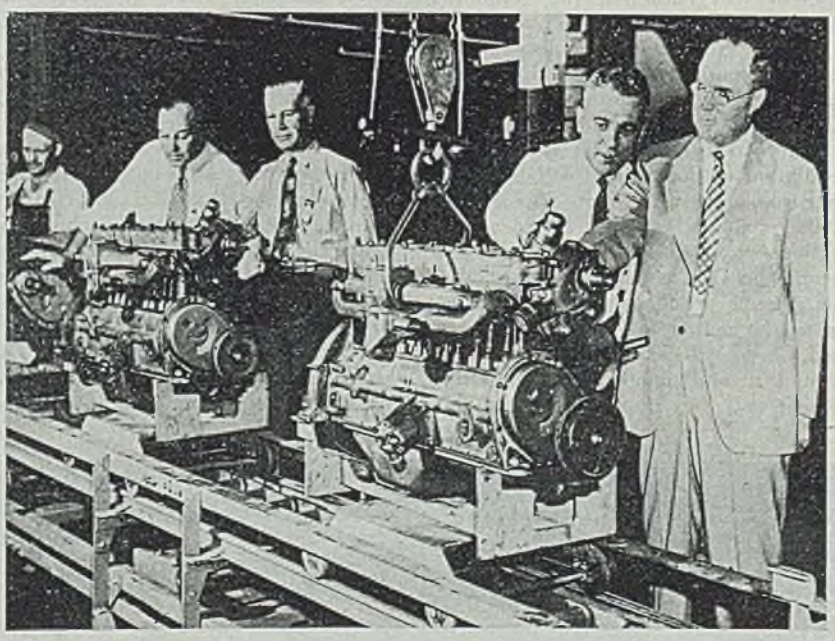
Automotive purchasing departments could stand a little reconversion themselves. Too many of them continue to follow the wartime pattern of threats and pressure where there is actually no call for such tactics. If you take a cross section of the suppliers of, say, a dozen different products required by motor plants, including such diverse items as steel, upholstery, glass, rubber, castings, bearings, whatnot, each one will tell you that, as far as purchasing agents in the car plants are concerned, the suppliers' failure to ship is the sole reason why automobile assemblies are not under way today. This is of course absurd, but it is typical buyers' technique and is not without its persuasive effect.

More and more it is being realized that the job of dismantling a huge war production machine and regearing it to the 1941 production pattern is one of the biggest jobs industry around here has tackled, even more complex perhaps than the conversion to war production in 1942 when the path was somewhat smoothed by a fervor of patriotic and cooperative effort. Yet the job will be done and the current expressions of impatience are typically American and no occasion for any great concern on the part of anyone.

They certainly do not justify the dour predictions being spread on the public's bread by a number of the metropolitan automobile clubs, including those in Buffalo, Cleveland and Chicago. Gist of these forecasts, which apparently emanated from the same original source, is that the average car buyer may be unable to purchase a new automobile before 1951. Supporting charts compare alleged production against alleged demand annually from 1945 through 1951. Production forecasts are for 215,000 this year, 2,000,000 next year, 4,500,000 in 1947, 5,000,000 in 1948 and 6,000,000 annually thereafter. These guesses are felt to be far off from what the record will eventually show. For example, it is confidently expected in many quarters passenger car production during the coming year may hit 5,000,000.

As far as the demand factors are concerned, the forecast seems to push them far out of conceivable range. Next year, for example, the prognosticators chart a demand for 6,000,000 cars from "essential" users and 12,000,000 more from the general public. That is a total demand for 18,000,000 new cars, and there are less than 30,000,000 on the road now. These new car demands are projected on up into the stratosphere until by 1951 it reached about 20,000,000, and by then production will have caught up so that everyone who wants to buy can do so.

Two principal reasons explain the fallacy of these forecasts. First, they were prepared before the Japanese surrender, which changed the complexion of the automotive production outlook completely, and second the estimates



READY FOR PRODUCTION: Volume production of 1946-model Oldsmobiles at Lansing, Mich., is nearer, now that a new assembly line has been completed at the Oldsmobile plant and the first of the 1946 engines produced by progressive assembly methods has been built. Examining the motor and another one following it are: Left to right, R. A. Fishel, motor plant superintendent; E. J. Martin, general foreman; John Dykstra, manufacturing manager; and D. E. Ralston, general sales manager

on numbers of cars which will be junked each year are based on a historical pattern which does not apply at all when the supply of new cars has been shut off or is limited.

There is plenty of support for the belief around Detroit that in three to four years at the outside, automobile production capacity will have far outstripped demand and builders will be begging for new business, that is, for new business to justify a 6,000,000-car year output.

Dissolution of the Automotive Council for War Production will be formalized Oct. 1, and the organization of 654 manufacturing companies will revert to something like its original status under the name of the Automobile Manufacturers Association. The council was organized on Dec. 31, 1941, after co-operative industry "defense" efforts during the summer of 1940 had proved so effective. Actual genesis of the council idea occurred at an industry meeting in a vacated grocery store in the New Center Building, Detroit, on Oct. 25, 1940, when plans were drawn up for co-operative efforts in the production of bomber parts for the aircraft industry.

The virtue of the wartime co-operative method was its flexibility. When a need arose, or frequently, when someone sensed an approaching need, a committee of experts on the subject was formed, drawing on the talents of various companies in the council, and a program of action, not debate, initiated. If the problem was mastered, the committee was allowed to lapse into a standby capacity. Production committees, information committees, salvage committees, manpower committees and dozens of others were constituted for special tasks.

A formal ceremony to signalize the dissolution of the ACWP will be scheduled sometime after Oct. 1, "as soon as the members can find sufficient time in their crowded working schedules to permit them to assemble," according to the council president, Alvan Macauley. As to the actual internal structure and staff, there will likely be small change beyond a realignment of membership. Present activities appear as essential in peacetime as in wartime, although the co-operative effort now probably will be concentrated within the motor car companies, excepting Ford, to the exclusion of parts suppliers and tool and die companies.

A $300 million sale of new automotive parts, covering everything from cotter pins to engine blocks, transmissions and axles, and including parts for practically every make and type standard car and truck built in this country from 1939 to the present, is being held by the surplus property office of the Department of Commerce's Automotive Division. A new sales procedure, instituted last week, provides for sale of all parts on a standard price list basis instead of on a bid basis. Trade discounts apply at all levels of distribution, full freight costs are allowed anywhere in the U. S., no deposit is required, minimum net order is $500. Prospective buyers must obtain qualification blanks by applying in writing to the division's regional offices in Boston, New York, Philadelphia, Cincinnati, Chicago, Atlanta, Fort Worth, Kansas City, Denver, San Francisco or Seattle.

Only Six Months' Supply

The total of $300 million in surplus parts sounds like a formidable supply and one wonders why government procurement agencies should have found it necessary to buy parts for every make of car and truck built since 1939, as a part of the war effort. On the other hand, the total is less than six months' wholesale valuation of replacement parts sales in 1941.

Studebaker made cursory announcement of introduction of its 1946 Champion model over the week-end. Four body styles will be produced this year, and it is hoped to make a complete sampling of dealers by Oct. 15. Principal new features include a new radiator grille extending virtually full width across fenders and radiator, more rugged bumpers and guards, and the inclusion of former deluxe appointments as standard equipment. Springs have been redesigned with tapered-end leaves and full-length oil-impregnated inserts to reduce interleaf friction.

Nash has announced its 1946 version of the 600 model will incorporate parallel arm-type front wheel suspension, similar to the design used on large model, to replace the former "knee-action" type.

A hint of the explanation for this suspension change is furnished by an article in the current issue of *Fortune* which explains that the good name of the 600 model was "untouched by an engineering bug, now corrected, in its front wheel springing." Further, Nash is reported readying plans for a light truck, station wagon and convertible bodies to install on the 600 chassis.

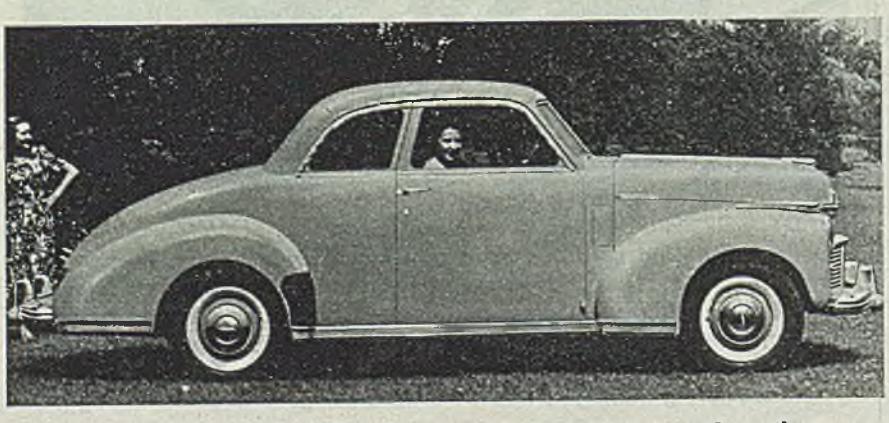
Nash engine and assembly plants in Kenosha, Wis., are being expanded to the tune of $4 million, while a third merry-go-round 16-station body assembly conveyor is planned to supplement the present two at the Milwaukee body plant as a part of a $2¼ million expansion there next year. These units have capacity of 25 bodies an hour.

According to *Fortune's* estimate, Nash will be in the market for 665,000 tons of steel a year if it attains its projected goal of 360,000 cars annually. And it is the intention to place this business with a single mill, buyers being much interested in the "price possibilities of this pattern."

Slick addition to the Ford line is a model known as the Sportsman's convertible, using a station wagon type of wood body mounted on a convertible coupe chassis. Doors, rear quarters and deck comprise wood panels and a wood framing bolted to a back steel frame, claimed to provide a stronger type of construction than the usual all-wood design used in station wagons.

Chrysler's Plymouth Division expects to be assembling passenger cars at its Evansville, Ind., plant at the rate of around 400 a day before the end of the year, the same rate as that prevailing before the war. Other assembly facilities at Detroit and Los Angeles likewise will be operated at the prewar pace, according to company officials.

General Motors' voluntary wartime profits limitation policy, instituted in 1942, resulted in holding the amount of profits earned for every dollar of sales to approximately one-half of what it was in 1941. The limitation was maintained in a period when more than twice as much business was done, average payrolls were 2½ times as large, almost twice as many people were employed and more money was invested in the business. Profits during the war averaged 4.7 cents per sales dollar, of which 3.2 cents were paid to stockholders and 1.5 cents retained for modernization and plant expansion. Recognition of this profit limitation policy by the government resulted in three successive years of approval without change in renegotiation proceedings.



This is the first 1946 Studebaker Champion which now is in its early production. Four body types will be made

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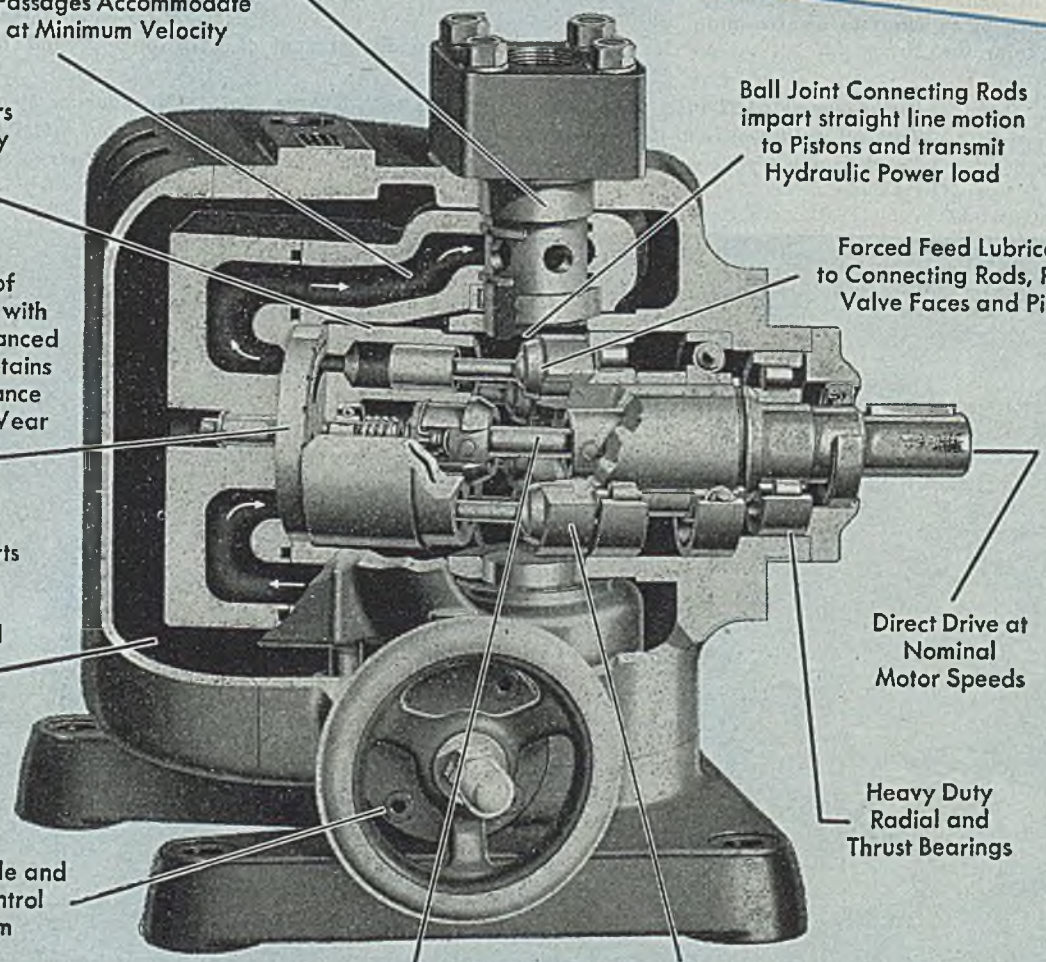

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Germans Successful, but Late, in

Even oil refineries operated under the earth, safe from Allied bombings. Thirty to 40 per cent of most essential war production transferred to buried plants late in war. Nazis planned to build subterranean blast furnaces and steel plants

By GEORGE R. REISS
Editorial Correspondent, STEEL

THE NAZIS tried a neat wartime industrial innovation—burying important factories and industrial plants to escape strategic air bombing—and nearly got away with it.

They clawed frantically into solid rock to hollow out enormous mountains for factories, they built "bombproof" shelters of concrete and steel and earth over others, in an effort to escape annihilation from the air.

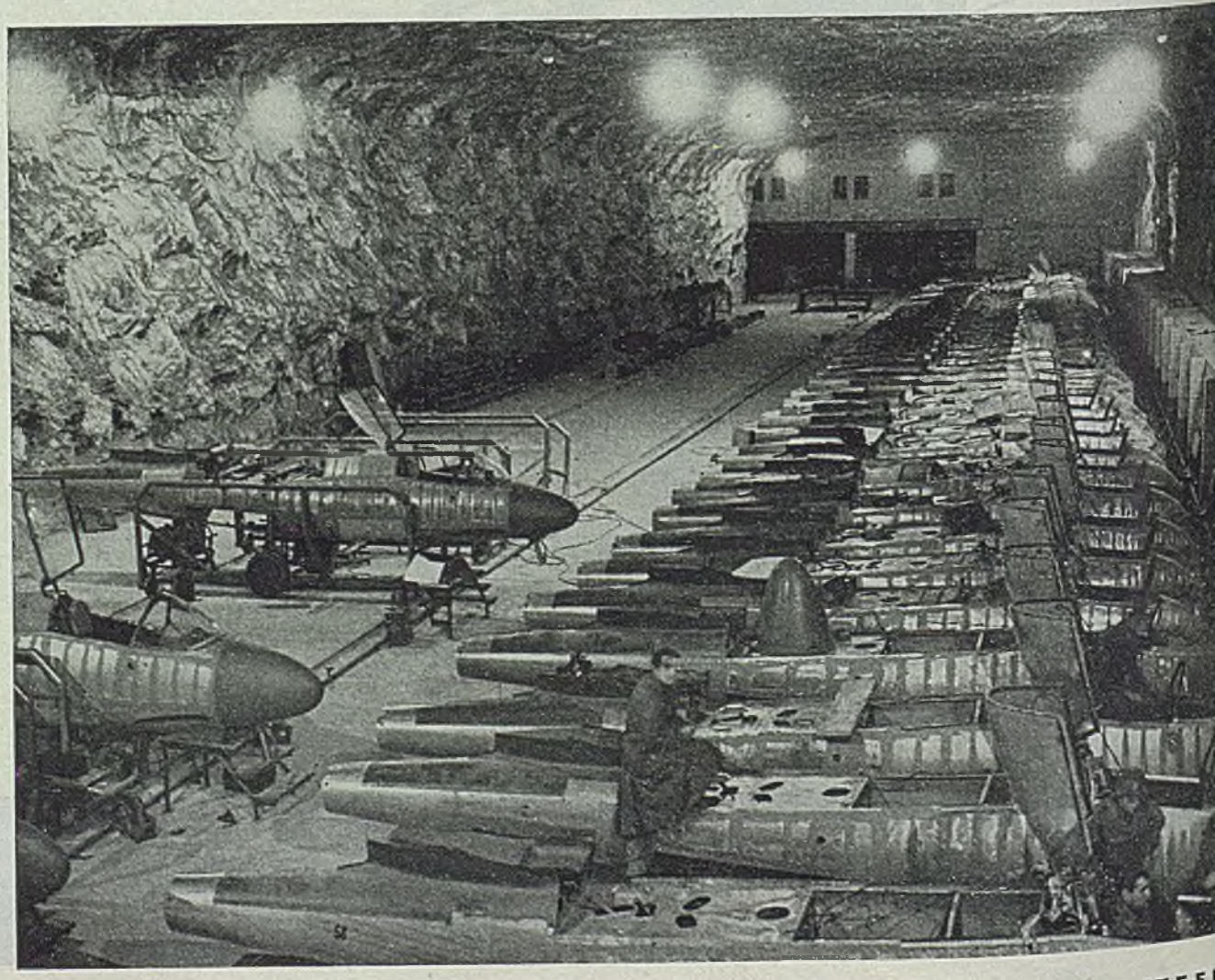
Luckily for us, the Nazis hit on this scheme just a little bit too late and overestimated the power of their own air power to hold off the Allied bombers, to give them time to complete the job.

Given more time to go underground industrially—V-E Day and V-J Day could easily still be far off; the job of achieving victory could have cost many more thousands of Allied lives, many more months and possibly years of precious time, and many more billions of dollars.

It is estimated 30 to 40 per cent of Germany's most essential war production went underground before V-E Day. These included some of the oil refineries which were the No. 1 air target of Europe, some jet aircraft assembly factories, and those manufacturing the V-1 and V-2 flying bombs which nearly knocked out London and were considered, by military experts, as the greatest weapon to come out of World War II until the atomic bomb came along.

A lot more factories could have gotten underground had the Allies been

Partly completed Heinkel 162s, single jet planes with a speed up to 650 miles an hour, are lined up in fuselage and assembly room of an underground factory which United States forces found in a salt mine near Engels, Germany. A large elevator lifted the planes 300 meters to the surface. NEA photo



aking Factories Underground

ld off only a few days or a few weeks nger; and it is a pretty well admitted ot in Europe—although you'll still nd an occasional doubting Thomas or wo—that strategic air bombing is what ally did the trick of smashing Ger- ny out of the war by strangling her dustrially, by knocking out her fac- ies, smashing the railroads and other es of communication, thus leaving ghter planes on the ground without soline or oil, her armies in the fields thout gasoline or supplies.

The development of the underground, mbproof factory affected the strategy World War II; it also presents some te new and interesting problems for any great war of the future. What would be the effects of this new-fangled atomic bomb on these bomb-proof underground factories? Well, it's never been tried and it's anyone's guess.

On a recent air tour of defeated Germany which took me into many of the areas which provided most of the Nazis' industrial strength, I visited three of these fantastic subterranean factories, two in a hollowed-out mountain, the other under a bomb-proof shelter.

One was an industrial installation which experts said couldn't be put underground successfully—an oil refinery, the biggest in all Europe, with a capacity of 357,142 barrels of crude oil per month—it's probably the world's only refinery virtually invulnerable to air attack and, to the experts' chagrin, it is operating successfully. Now it is supplying much of the gasoline, lubricating oil, diesel oil, fuel oil and other refinery products being used by the American occupational forces in Europe; and it's using crude being obtained from newly-developed oil fields.

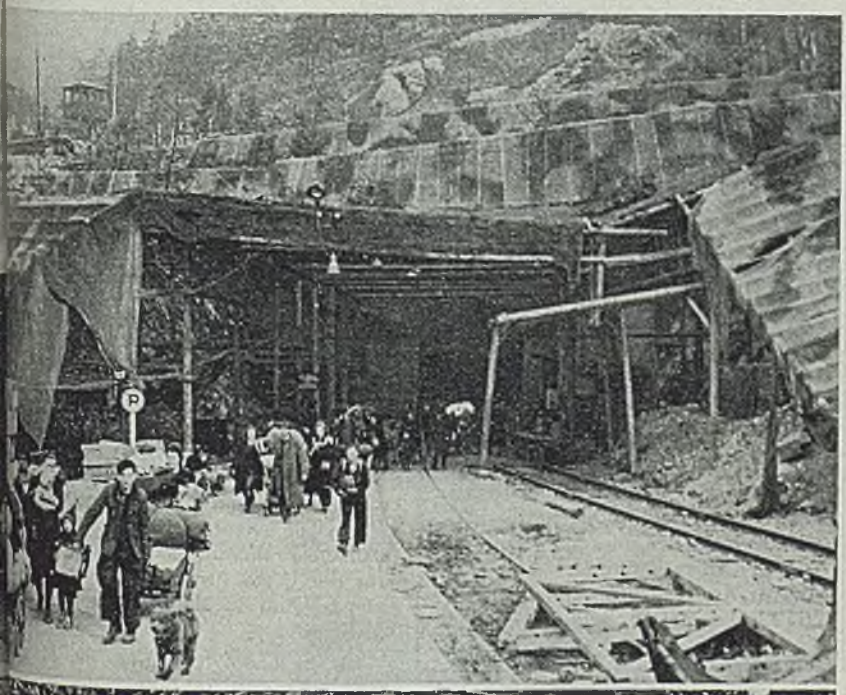
The other two plants were intended as assembly plants for jet fighter planes, those fantastic flying machines which, if they would have become available in large numbers, probably would have played havoc with the American bombers and their fighter escorts.

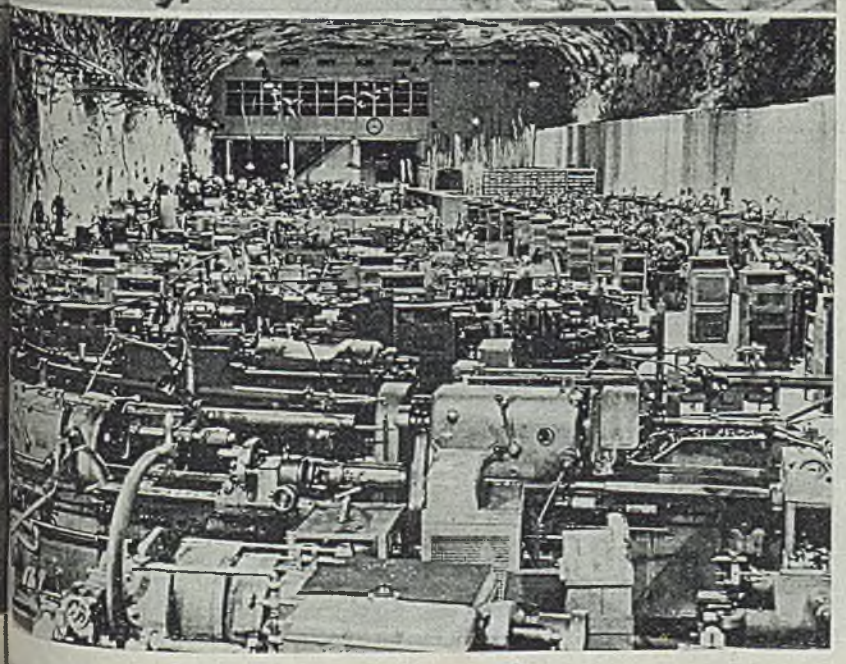
You'll find two of these factories—the refinery and an assembly plant—in a hollowed-out mountain near the tiny and picturesque village of Ebensee, Austria, in the heart of the Tyrolean Alps, a world of fantastic and breath-taking scenery.

That Ebensee refinery was another one of those "slave labor" projects only the fantastic Nazis, with their warped minds, could have cooked up; it started in August, 1943, when 8000 slave laborers—those wretched and unfortunate Russians, Poles, Czechs, Italians, French and Hollanders impressed into labor gangs from conquered countries—began delving into the great rock chambers. They worked under German bosses and engineers, with a tough gang of Gestapo guards to force them on.

The slave workers lived under prison conditions, crowded into some filthy, unheated, frame barracks beside the mountain. A high barbed wire fence surrounded the whole lay-out. They slept on sacks of straw on the floor; meals consisted chiefly of black bread, potato or turnip soup, occasionally a bit of sausage. And the mortality rate among the slaves was incredibly high—but that made little difference to the Gestapo guards. They forced the slaves to burn the dead bodies, imported more slaves.

The plant was originally intended as an ME-262 assembly plant, but the Nazis, desperate for gasoline as a result of the air attacks on refineries, decided to switch it when the chamber was nearly finished; they brought in Dr. Fritz Staiger, a leading German re-





Underground V-2 factory, upper left, at Kleinbodungen was housing refugees when captured by Americans. Note camouflaged roof and tunnel entrance. Lower left, machine room in salt mine plant near Schonebeck on the Elbe, where parts for airplane fuselages were made. NEA photos

finery engineer, put him in charge—and he still is in charge, now directing the plant for the Americans.

It was intended at first to build 12 separate refinery units in the mountain; the first was completed Feb. 10, the second a few days later, and two others were completed since then—and the Nazis never got around to the others.

When you step into the refinery, you enter through a well-camouflaged hole, the entrance; a "fake" house built high on the mountain side serves as camouflage for the refinery's exhaust stacks.

Inside a few dim electric lights—and some dim miners' lamps carried by German guides—reveal an enormous main chamber, 35 feet wide and 102 feet high; it's crowded with huge oil stills, roaring boilers and oil storage tanks—until there's hardly room to move. It's hot outdoors, but cool inside, in spite of the roaring boilers; and there's a constant drip of cool water from the high ceilings, to make walking a dirty and precarious job.

Dr. Staiger led the way back into the chamber, through narrow passageways; the chamber extends back 700 feet into the mountain. All of the chamber had been blasted out of solid rock by workmen driven at top speed by the Gestapo guards.

Back outdoors in the sunlight where pipelines from the underground storage tanks load the peculiar little European railroad tank cars, Dr. Staiger explained that a main problem of the operation had been in getting sufficient crude oil to keep operating at full capacity; Germany was short of crude and short of transportation.

"But," Dr. Staiger was told, "we were informed that an oil refinery couldn't operate successfully underground."

Dr. Staiger laughed.

"Some people say a steel plant can't be put underground either," he commented, "but the Nazi engineers didn't believe that, either."

It appears that the Nazis had even planned eventually to locate blast furnaces and steel plants underground, keeping the raw materials storage yards and rail yards outdoors.

The Ebensee ME-262 plant was yet unfinished, merely a big hollowed-out chamber, when the war ended. But the Nazis had intended to cram it with machinery and other equipment, affording a safe indoor factory of great dimensions.

The other underground plant we visited also was unfinished, but it was intended as "the Willow Run" of Germany, a bigger plant than virtually any you'll find in the United States outside of those enormous war-time factories such as the Willow Run plant, the Consolidated-Vultee factory at Fort Worth, Tex., or the Douglas Aircraft Corp. assembly plant at Tulsa, Okla.

This one was at Muhldorf, a tiny and obscure Bavarian village about 40 miles east of Munich, and its idea was entirely different. In building this factory, the Nazis had merely taken an old gravel pit, put in footers, piled up a huge heap of gravel, then covered the whole mass with a 10-foot-thick layer of steel-reinforced concrete.

Then they scooped out the gravel from beneath—and they had a fine arched-roof building, 1360 feet long, 260 feet wide, and 80 feet high at the center line. Room for administrative offices was located in the footers.

They hadn't gotten that far yet, but they had planned to cover the roof with a thick layer of earth, setting in pine trees to blend with the huge pine forest surrounding the gravel pit—and then let the Allied air forces bring on their bombs. The plant would have provided 1200 foot assembly lines.

Allied air officers, accompanying us on the tour, said even the biggest block-busters used by the British Royal Air Force would have been unable to penetrate that thick reinforced roof.

GERMAN STEEL INDUSTRY

How badly damaged was the German iron and steel industry by American and British bombing? Next week, STEEL's editorial representative, George R. Reiss, will discuss this subject in the third of a series of articles on the condition of European industry as viewed by him on a 20,000-mile tour which he recently completed.

Just to arouse your curiosity, Mr. Reiss starts out his third article by stating: "Defeated Germany's big steel mills could easily grab a hefty chunk of the world's postwar steel business—if the victorious Allies permit it." The first of Mr. Reiss' articles appeared in STEEL, Sept. 10, page 88.

In building the Muhldorf factory, the Nazis had used thousands of Jewish laborers, those Germans who had been thrown into concentration camps for no other offense than that they were Jews; these were given thin striped suits, wooden-soled shoes, barely enough to eat, and then they were driven to death. Allied intelligence reports indicated 2700 Jews died at work on this plant.

The miracle of these factories is that the Nazis were able to get any worthwhile production from their unwilling, unskilled, hungry and sick slaves.

Scores of underground factories—some under construction, others in various stages of operation—were found by the Allies scattered throughout Germany and the occupied country; some were in the mountains, others in underground tunnels and even in caves. Many were well equipped. In some plants up to 5000 workers were engaged with the finest of machines and tools—some of them coming from the United States, France, Britain and other nations—in making various types of war materials. One was even producing up to 100 V-1 bombs a day when the Germans hastily abandoned it before advancing Allied forces.

These underground factories, from the Nazi point of view, had two main values. The first and greatest was that the underground factory was out of reach of the strategic air bomber.

The second main value, to the Nazis, of these underground factories was an enormous saving of manpower and therefore of production when they no longer had to shut up factories and send workers to air raid shelters when air raids were threatened.

Because they had no way of knowing where the raids were to strike—and the U. S. Strategic Air Forces and Royal Air Forces made the most of this—they had to send workers to air raid shelters and black out at night throughout Germany.

Army intelligence reports and studies show that some factories lost up to 25 or 30 per cent of their production because of time spent by workers in air raid shelters or absenteeism resulting from the workers being injured in their homes, getting insufficient sleep as a result of air raids, or being unable to find transportation to or from work as a result of air-raid destruction of communities.

However, a sour note in the value of underground factories is injected by Maj. Alexander P. de Seversky, the noted American aircraft designer, builder, pilot and air strategy expert. Maj. de Seversky recently toured Germany and other European countries to make a bomb-damage evaluation and air strategy study for the U. S. Army Air Forces. I interviewed him in Rome near the end of his trip.

De Seversky feels that the big Nazi mistake wasn't in failing to go underground sooner to escape the Allied bombs, but in failure to recognize the value of air power and building a better balanced air force sooner.

"Air power could have done the job cheaper—much cheaper—in protecting German industrial production," he contended. "Your underground factory really isn't worth much—not unless you can make your entire underground factory self-contained, so you can produce virtually all your parts and assemblies in the same factory, can house your workers underground, too. For even the underground factory is vulnerable to air attack. It's got to have communication lines—railroads, power lines, highways—and these can be attacked from the air; if it's merely an assembly plant, its supplies of parts coming from factories producing the components can be cut off by air attack—and possibly even some of those factories making the components can be destroyed."

Many Jap Homes Made War Goods

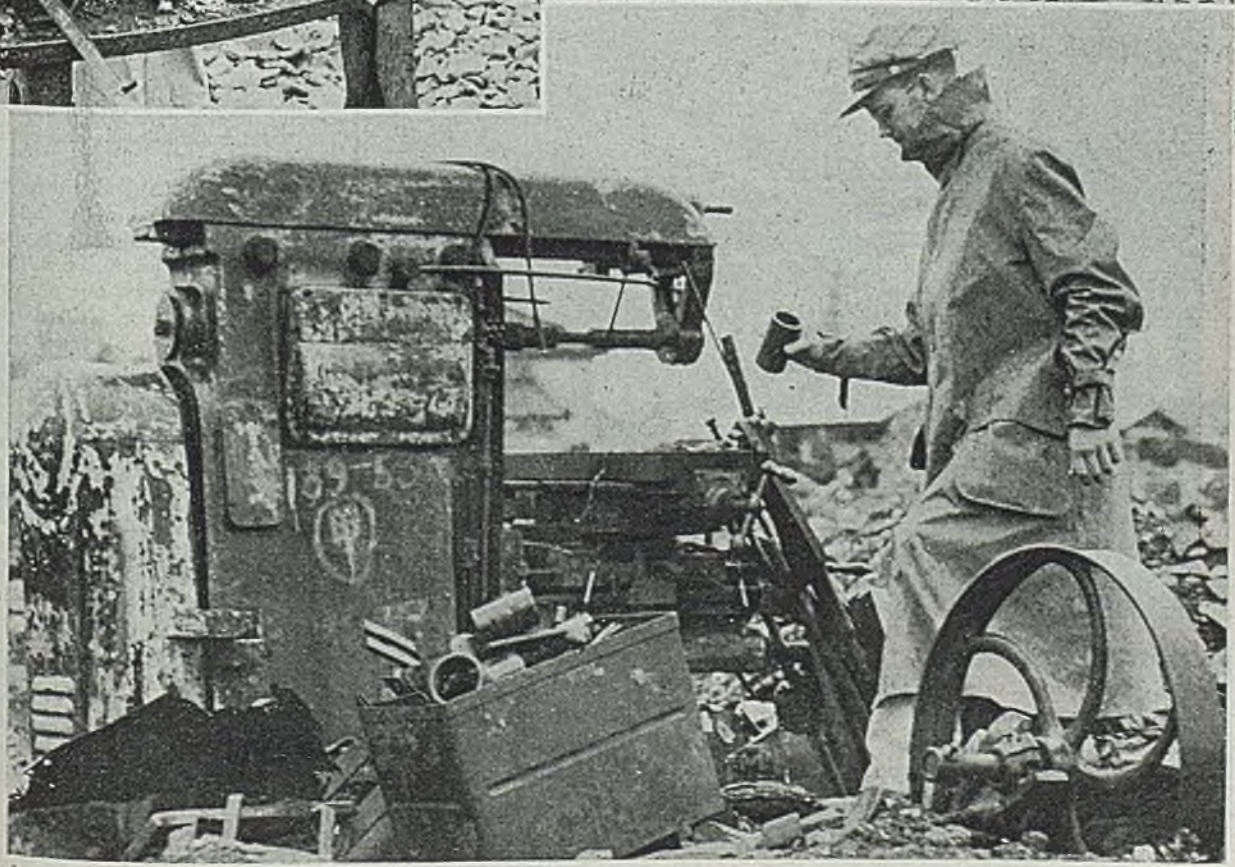
EVIDENCES of a crude system of subcontracting, or farming out of war production, was found by Americans entering Tokyo. In some areas, almost every house had a machine for producing war materials. These "backyard factories" are believed to have been spread out over large sections of Japan when superfortresses started pounding the country's large war plants.

How much these home workshops contributed to the Nipponese war effort is difficult to judge. However, there is no evidence that a subcontracting system anywhere near as efficient as that organized in this country was attained in Japan.

Photo at upper left shows a lathe which survived the fury of Allied fire bombs which wrecked the house sheltering it.

At upper right, a drill press is the only recognizable object amid the debris of this workers' shack which formerly served as a home workshop.

Lower photo shows a milling machine amid the rubble of another wrecked house, found by advance parties of Americans entering Tokyo. NEA photos.



WING TIPS

Tail warning radar device that served as "rear vision mirror" for fighter pilots said to have great postwar value. Airborne radar devices for Army Air Forces use streamed steadily from two laboratories of Air Technical Service Command

FUNCTIONING as "eyes in the back of a pilot's head," a tail warning radar device protected Army Air Force fighter pilots from surprise enemy attacks from the rear, it has been announced by Headquarters, Air Technical Service Command, Wright Field, O.

This tail warning device, developed by the Aircraft Radio Laboratories, Wright Field, and the Radio Corp. of America, New York, through modifications of the radar altimeter, was installed in AAF aircraft as early as May, 1944, less than one year after development was undertaken, according to Col. George F. Metcalf, chief of the Radar Laboratory, who conceived the idea that the altimeter could be used for such a purpose. Under his direction, equipment was installed on the roof of the laboratory building. Its ability to "pick up" airplanes flying overhead was proof of the feasibility of the project.

Serving as a "rear vision mirror" to the pilot, the tail warning set transmits a cone of radar pulses from the rear of the aircraft in which it is installed. When another aircraft enters this cone, the reflected radar pulse causes a warning bell to ring and a light to flash on in the cockpit, he explained.

With the installation of both forward and rear scanning antennas and other minor switching modifications, the equipment has now been adapted for forwarding ranging and obstacle detection, an application which will have great postwar value, Colonel Metcalf said.

Key activity in the engineering of radar equipment for use in the AAF's world-wide operations is the Radio and Radar Subdivision of the ATSC at Wright Field.

Under technical supervision of the Radio and Radar Subdivision, of which Col. Hobart R. Yeager, command pilot and veteran in the field of radio and radar, is chief are the Aircraft Radio Laboratories at Wright Field and the Watson Laboratories, Eatontown, N. J.

Playing a unique role in research, development, engineering, testing, contracting and installation activities, these two groups of laboratories have been responsible for guiding the direction of radar research in government, university and commercial laboratories, adapting theoretical research results to the solution of engineering problems, engineering the quantity production of millions of dollars of radar equipment and fitting the complicated devices into AAF aircraft and various vehicles as workable systems.

Out of the Aircraft Radio Laboratories, of which Col. Wayne G. Eaton, former longtime civilian employee there, is now acting chief, have come a steady stream of airborne radar devices for every conceivable AAF use. Chiefly concerned in the development was the Radar Laboratory, of which Colonel Metcalf is chief.

In addition to the tail warning device airborne radar equipment of major significance made available to the AAF through the efforts of ATSC included:

Search equipment which contributed largely to the defeat of the German submarine.

Bombing devices permitting bombardment raids over enemy territory regardless of weather or visibility conditions.

Light-weight, portable beacons used as navigating systems to guide paratroopers and gliders in the invasions of Sicily and Normandy.

Precision navigation equipment used for exact location of drop zones, strategic targets and long range navigation over water and poorly marked land areas.

Altimeters providing accurate readings indicating altitude above the terrain over which the aircraft is flying.

Airborne interception devices used by night fighters to locate and intercept enemy night raiders.

Devices to facilitate rescue of air crews downed at sea or in dense jungles.

Airborne gun sighting and gun laying devices providing automatic control and firing of airborne machine guns and cannon.

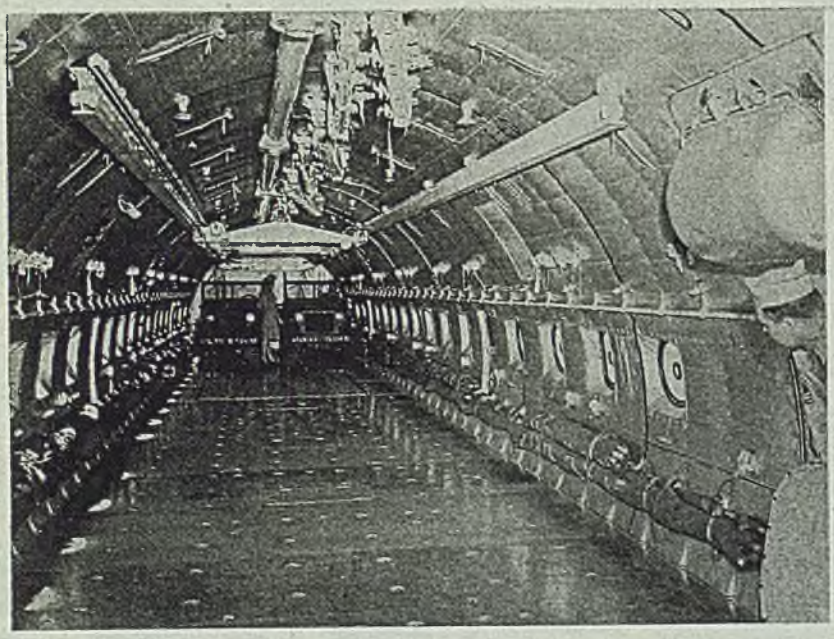
Devices used for the low altitude bombing of shipping in the Pacific theater.

System tie-ins with optical bombsights, permitting synchronous operation of radar bombing sets and optical bombsights.

Although a Signal Corps installation until the transfer to the AAF in October, 1944, the Aircraft Radio Laboratories have always been located at Wright Field, with the primary mission of developing radio and radar equipment for the AAF. The Watson Laboratories, on the other hand, were established in February, 1945, as a result of a transfer of responsibilities for certain ground based radio and radar equipment from the Signal Corps to the AAF.

Col. Oscar C. Maier, commanding officer of the Watson Laboratories, and many of his key military and civilian engineers have been associated with the engineering of ground radio and radar equipment for use by the AAF for a number of years. These laboratories, and their predecessor, the Signal Corps Laboratories near Ft. Monmouth, N. J., from which the responsibilities were transferred, have made available to the AAF the following types of radar equipment:

Long range, early warning equipment



CARRIES HUGE LOAD: The DC-7 Douglas Globemaster plane carries two Army jeeps side by side with ease. The big plane is designed to transport 108 passengers in deluxe comfort, in addition to a crew of 13 with adequate quarters. The Globemaster will be equipped also with a galley for passenger meal services, dressing rooms, and cargo compartments. NEA photo

for the detection, from the ground, of enemy aircraft, indicating range, height, and azimuth.

Ground control interception devices plotting the course of enemy aircraft and the directing of defensive operations, either ground based or friendly aircraft already in flight.

Ground control approach installations enabling ground crews to inform pilots of their location with respect to overcast runways and to guide them to safe landings.

Equipment to clearly mark front lines and enemy targets enabling the AAF to concentrate its striking force in the support of ground troops.

"Magic Glue" Helps Make Helicopter Rotor Blades

Cement produced by the Cycle-Weld Division of Chrysler Corp., Detroit, is being used in manufacturing rotor blades for helicopters used by the Army Air Forces.

The new method of fabrication was adopted when extensive research and tests showed that the blades were stronger when Cycle-Welded than they had been when spot-welded. Company engineers foresee further use of the "magic glue" in the peacetime manufacture of the aircraft which ascends and descends vertically and operates without the usual motor, wing and fuselage construction found in conventional airplanes.

The four blades, which whirl horizontally above the body of the helicopter, are made of metal, wood and canvas. Inside each of the blades is an alloy steel spar—a tube-like brace running from the hub of the rotor, located on the top side of the body, to the tips of the four blades. To the steel spars, assemblers fit wooden ribs of various sizes and lengths, over which is placed plywood and canvas to form a tapering, finished blade.

The ribs are anchored into place on metal collars which fit snugly around the spar at designated points. Until Cycle-Weld cement was adopted to further resist heavy loads placed on the blades in flight, the collars had been spot-welded to the spars.

A specially designed locating fixture is used to spot the steel collars around the spars. The cement is applied to the spar and to flanges at the base of the collars. Round metal clips, tightened by screws, hold the collars to the spars under pressure while heat is applied. The combination of heat and pressure bonds the glue on the mating surface, it is pointed out.

ATSC Seeks To Reduce Airplane Fire Hazards

Consolidation of the Procurement and Readjustment Divisions, Air Technical Service Command, under the single name of Procurement Division with Brig. Gen. Edwin W. Rawlings as chief, was announced by Maj. Gen. Hugh J. Knerr, commanding general, ATSC, Wright Field, O.

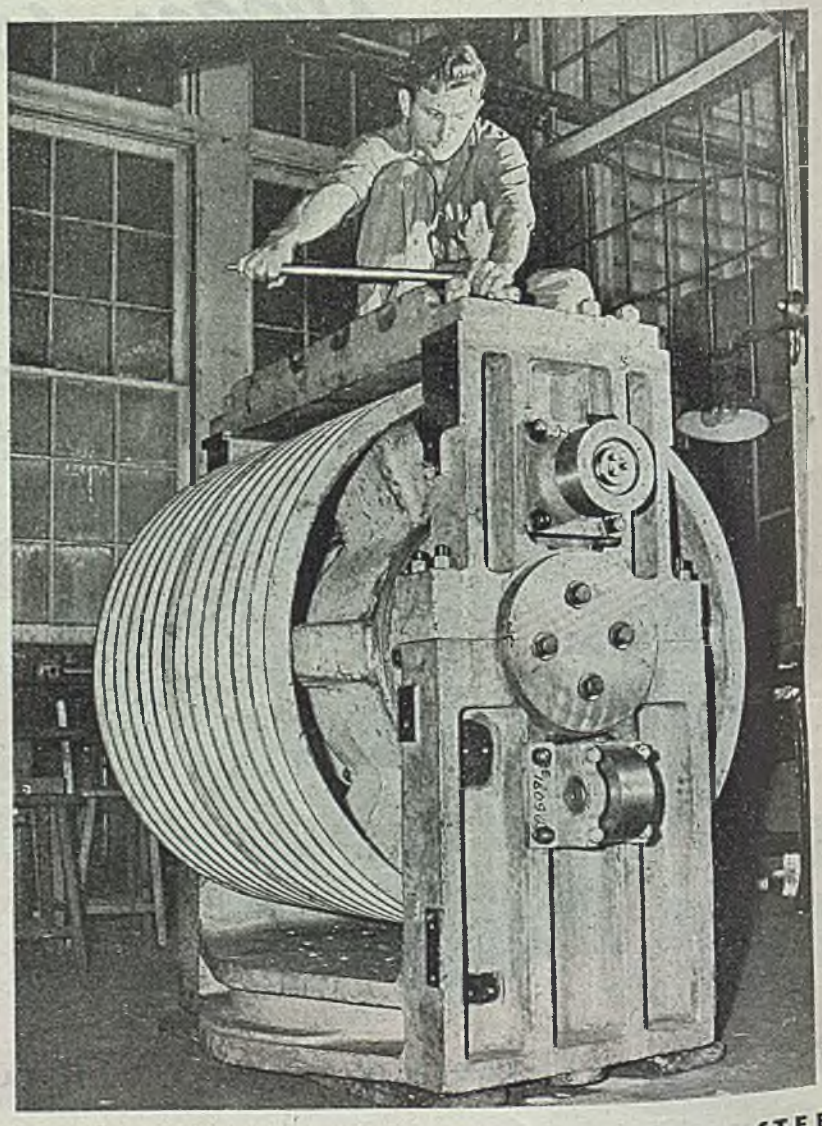
"Deck-Edge" Elevators Being Installed on Navy's Aircraft Carriers

A UNIQUE "deck-edge" elevator that whisks airplanes up the outside of an aircraft carrier to the flight deck helped the U. S. Navy hurl carrier-based bombers and fighters against Japan.

Because of its success, the elevator is being installed on the Navy's new fleet of Midway class supercarriers, according to Ellis L. Spray, vice president in charge of the elevator and air-conditioning divisions of the Westinghouse Electric Corp., Pittsburgh, who pointed out that the elevators have secretly been in battle service for two and one-half years on the 27,000-ton Essex class fleet in every major task force operation in the Pacific.

Thirty-four feet wide and 60 feet long, the 50-ton platform is hung "outboard" at the edge of the flight deck, opposite the carrier's superstructure. The platform is lifted and lowered by steel cables, 1⅛ in. in diameter, which pass over a series of direction-changing and leverage-multiplying sheaves, one of which is shown in the accompanying photograph. This sheave is one of a series which translate horizontal engine thrust into high-speed vertical lift. The sheave's roller bearing alone weighs nearly a ton.

The deck-edge elevator speeds battle action aboard the carriers because it enables plane-handling crews to keep the central flight deck cleared of incoming planes as fast as they land. During take-offs it permits faster delivery of planes from the hangar deck and prevents planes awaiting take-off from "bunching up" around the elevator openings, as they did when only the bow and stern deck elevators were available.



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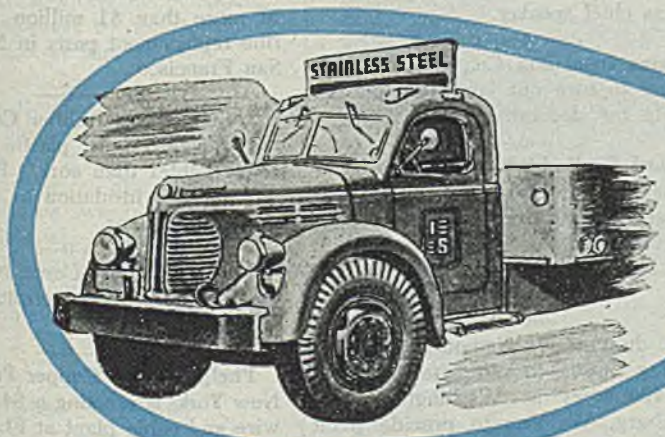

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INDUSTRIAL STEELS INC.

Everything in *Stainless*

Olin Industries Organize Brass Mill Division

New division designated as Western Brass Mills. Headquarters will be located at East Alton, Ill.

OLIN Industries Inc., has consolidated all of its brass mill business into an integrated division designated as Western Brass Mills, it was announced last week at the corporation's headquarters at East Alton, Ill.

Production facilities serving the division are the brass mills at East Alton and New Haven, Conn., operated in connection with two other divisions of Olin Industries. These are the Western Cartridge Co. Division at East Alton and the Winchester Repeating Arms Co. Division at New Haven.

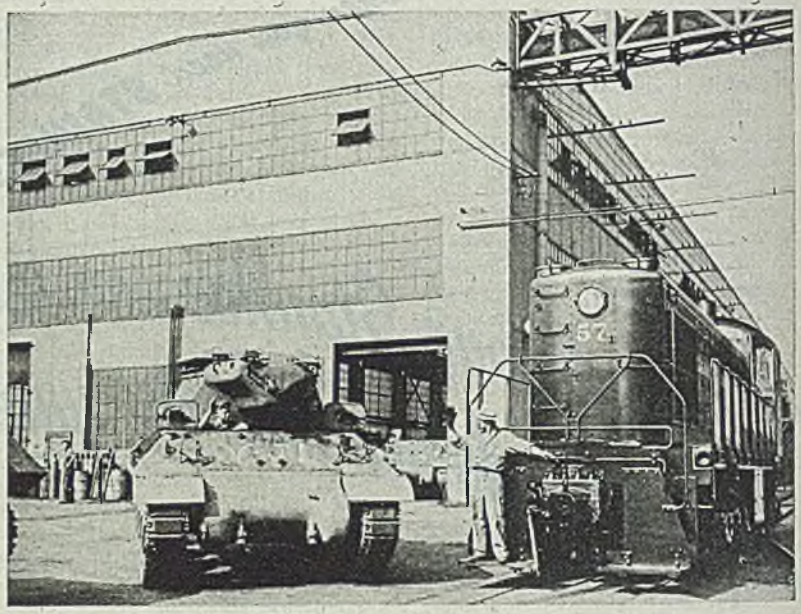
Marshall W. Acker, former general manager of East Alton brass mill operations, has been appointed director of the new division. He will be assisted by a complete technical and sales organization with headquarters at East Alton, resident technical and sales staffs at New Haven and a network of branch offices in the principal manufacturing centers of the country.

Western Cartridge Co. became a brass producer during the first world war to supply its needs for the manufacture of small arms ammunition and entered the commercial brass business on Nov. 18, 1918.

The Western Cartridge group acquired its second brass mill in 1931 with purchase of the Winchester Repeating Arms Co. of New Haven. The New Haven mill, in operation since 1883, had confined its production largely to cartridge metal for Winchester's own requirements. Following acquisition by Western, facilities were expanded. With the outbreak of World War II, facilities at the New Haven mill were increased again, this time to include improved processes and equipment developed by Western at East Alton.

Detroit Engineers and Ceramic Society to Meet

Story of the development of porcelain enamel from a medium of artistic expression to a modern engineering material will be related to Dr. Robert A. Weaver, president of Ferro Enamel Corp., Cleveland, at a joint meeting of the Engineering Society of Detroit and the American Ceramic Society. The meeting will be held Sept. 25 at 8 p.m., at the Horace H. Rackham Educational Memorial, Detroit.



WAR WORK ENDS: Production right-of-way is given now to locomotives at the Schenectady, N. Y., plant of American Locomotive Co. since war requirements for tanks and tank destroyers have been curtailed. Pictured is the last of the M-36 tank destroyers, and a new 1000-horsepower diesel-electric unit

BRIEFS . . . .

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

Philco Corp., Philadelphia, has started construction of a modern plant costing over $1 million, featuring long continuous radio production lines. The new facility will adjoin the company's present Philadelphia plants.

—o—

Eastern Enamelers Club will meet for for the first time since travel restrictions went into effect, Sept. 22 at the Ritz Carlton in Philadelphia, with H. B. Brown, promotion manager of Philco Corp., as chief speaker.

—o—

Formica Insulation Co., Cincinnati, is preparing to turn out laminated plastics materials for decorative uses.

—o—

Edward G. Budd Mfg. Co., Philadelphia, has already under way a two-year reconversion and expansion program costing $16 million. The program will affect the Detroit and Philadelphia plants.

—o—

E. I. du Pont de Nemours & Co., is exercising option to purchase a site of about 400 acres at Washington, near Parkersburg, W. Va., to provide plant space for projected expansion in the plastics field.

—o—

Pullman-Standard Car Mfg. Co., Chicago, has purchased from the Bureau of Ships, Navy Department, for $927,472 the ship assembly building which was erected at Pullman's south side car works plant.

—o—

Ace Mfg. Co., Philadelphia, has purchased Delloy Metals, Philadelphia, manufacturer of cutting tools. The latter firm will be operated as Delloy Metal Corp.

—o—

General Electric Co., Schenectady, N. Y., has established warehouse stocks of more than $1 million worth of marine replacement parts in New York and San Francisco.

—o—

United States Rubber Co., New York, has developed a plastic foam seven times lighter than cork. Peacetime uses will include insulation as well as buoyancy applications.

—o—

Vascoloy-Ramet Corp., North Chicago, Ill., has installed a Detroit branch office at 512 Hook Bldg.

—o—

Phelps Dodge Copper Products Corp., New York, is erecting a $4.5 million rod, wire and cable plant at Ft. Wayne, Ind., to serve as a separate division.

—o—

Cooper Alloy Foundry Co., Hillside, N. J., has established a subdivision in Newark, N. J., devoted exclusively to

precision casting of small intricate parts, to be known as Precise Castings Corp.

—o—

Burdett Oxygen Co., Cleveland, has opened a Cincinnati warehouse at 316 West Seventh Street.

—o—

Heppenstall Co., Pittsburgh, is investing $170,000 in a new research laboratory to be located at Hatfield and 58th Streets, near the company's general offices and opposite its plant.

—o—

Latrobe Electric Steel Co., Latrobe, Pa., has opened a new sales office in the Rice Bldg., 10 High Street, Boston. Robert S. Rose is new district sales manager of the territory, comprising eastern Massachusetts, Rhode Island, New Hampshire and Maine.

—o—

Pipe & Tube Products Inc., Jersey City, N. J., and Reading, Pa., moved its executive and sales offices from Jersey City to the Empire State Bldg., New York, on Sept. 15.

—o—

Edward Valve & Mfg. Co. Inc., East Chicago, Ind., has appointed Leatherman & Mertz, Detroit, as its representative for all of Michigan, excluding the Upper peninsula.

—o—

Monroe Auto Equipment Co., Monroe, Mich., Railway Division, opened its new Chicago office, 3001 Willoughby Tower Bldg., Sept. 15, with an open house for railway officials and engineers.

—o—

Square D Co., Detroit, is taking steps to double the size of its Milwaukee plant, devoted to manufacture of industrial electric motor controls and other electrical equipment used by industry.

—o—

Whiting Corp., Harvey, Ill., has completed arrangements with the British Cast Iron Research Association for the exclusive rights to manufacture and market balanced blast tuyeres for cupolas as previously supplied by the McWane Cast Iron Pipe Co. of Birmingham.

—o—

Refrigeration Equipment Manufacturers Association has called a special meeting Oct. 15, 16 and 17 at Hot Springs, Va., for the purpose of discussing with government officials ways and means of obtaining materials quickly. REMA will resume its annual all-industry refrigeration and air conditioning show in Cleveland's Municipal Auditorium Oct. 28-Nov. 1.

Scrap Institute To Meet In St. Louis in January

Institute of Scrap Iron & Steel Inc., Washington, is planning to hold its 18th annual convention next Jan. 8, 9 and 10, in St. Louis, assuming ODT by that time will have further modified or abandoned its restriction on conventions.

Plans so far name the Jefferson Hotel as convention headquarters. The program will emphasize the preparation of scrap, particularly those problems arising from the enforced absorption of government surpluses and alloy scrap

Termination of Army-Navy "E" Award is Announced

Termination of the Army-Navy "E" award program, by which the Army and Navy Departments recognized outstanding contributions to the war effort by industrial plants, was announced last week by Under Secretary of War Robert P. Patterson and Assistant Secretary of Navy H. Struve Hensel. Awards decided upon for August will be presented, but no further additions to the "E" list will be made.

The Army-Navy "E" award came into existence in July of 1942 when the Navy "E," the Army "A," and the Army-Navy Munitions Board Star were merged. Since that time, it is estimated, the award has been granted to approximately five per cent of the nation's war plants.

Most recent awards include:

Chain Belt Co., Milwaukee.
Handy & Harman, New York.
Albert Wright, Oakland, Calif.
Greenlee Bros. & Co., Rockford, Ill.
Ellwood Co., Ellwood City, Pa.
United States Steel Corp., American Bridge Co., Gary, Ind., plant.
Glidden Co., Hammond, Ind.
Square D Co., Milwaukee plant.

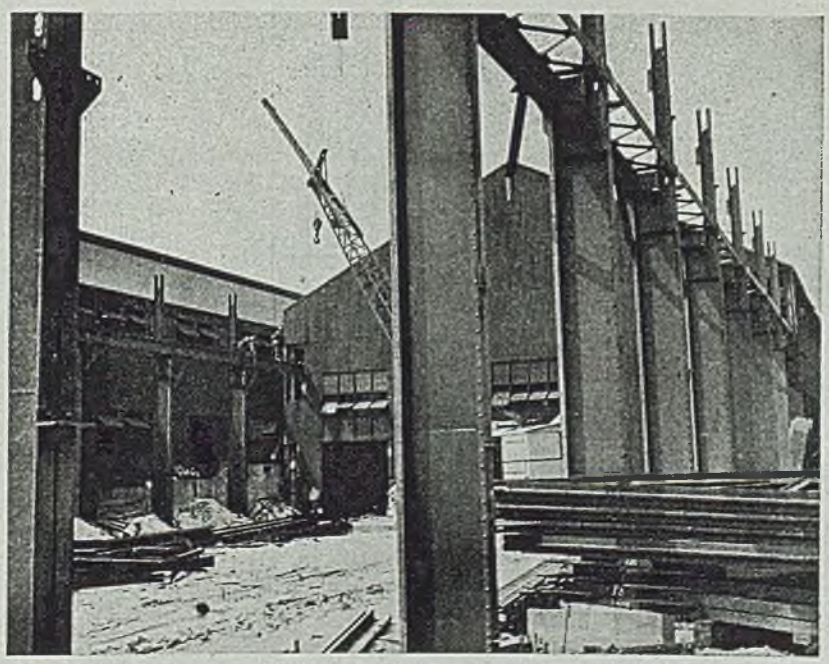
McLouth Corp. Now Produces Stainless Steel

Output is limited but installation of new facilities will enable Detroit firm to expand production

STAINLESS steel sheet and strip is now in production at McLouth Steel Corp., Detroit. Although tonnage is limited with present facilities, an entirely new and separate division for the manufacture of stainless is now under construction.

A new building 75 x 412 ft is being erected on property purchased adjoining the present plant site. It will house two new cold rolling mills with auxiliary electrical motors and controls and finishing and production equipment. In another new building additional facilities and equipment provide a continuous annealing and pickling line for processing stainless steel.

Purchase orders were placed for the new mills and equipment early this year and their delivery and installation will be completed before the end of the year. Full production will be attained for a wide range of gages and types of stainless steel to meet rapidly increasing demands.



EXPANSION PROGRAM: Largest unit in the $2,440,000 expansion program of Rustless Iron & Steel Corp., Baltimore, is this new $1,370,000 rod mill in the opening stages of construction. It will be a 28-bay building, 560 feet long

FLASH BUTT HEAVY SECTIONS

By IRWIN H. SUCH
Engineering Editor, STEEL

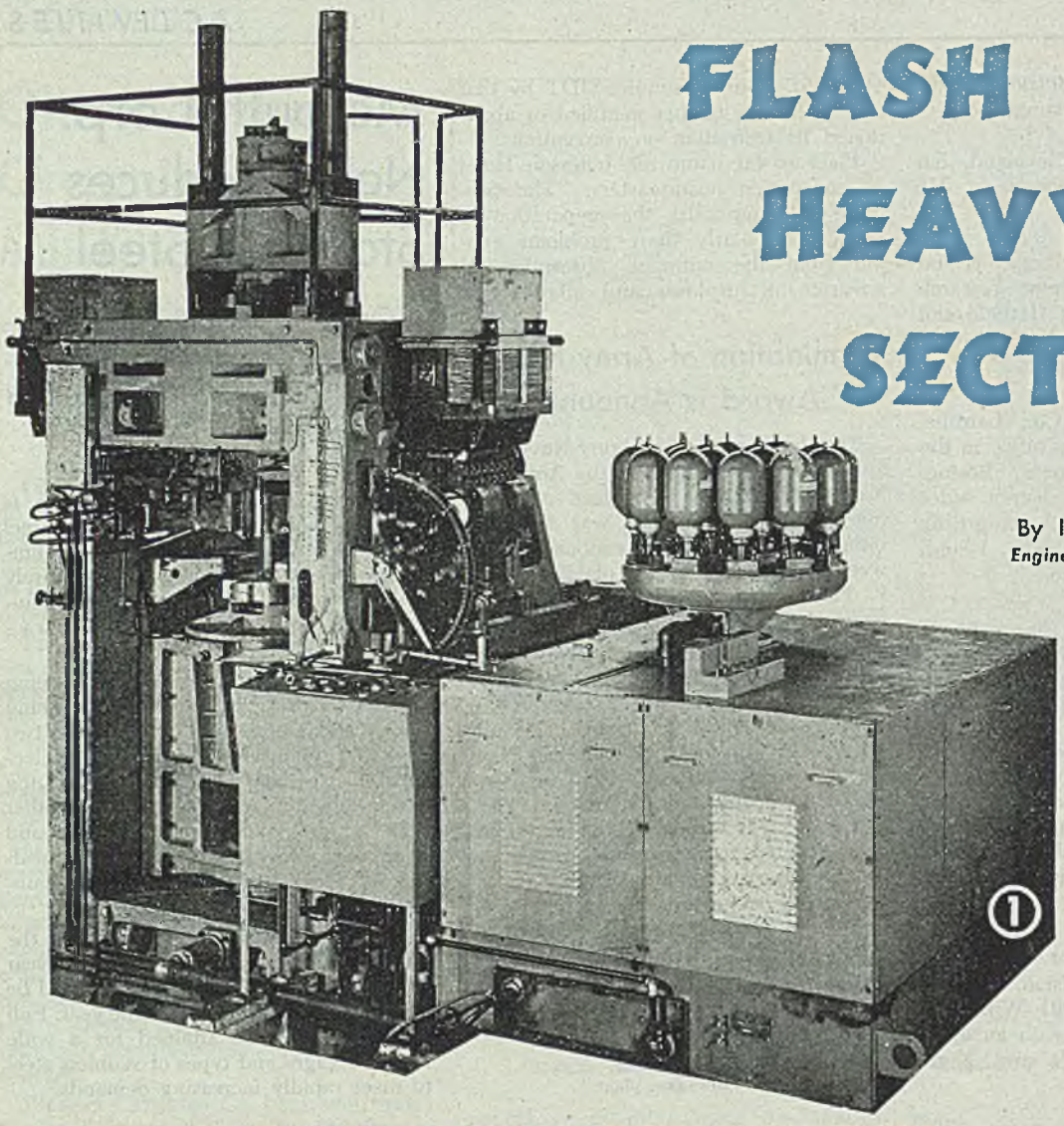


Fig. 1 — Reported to be the world's largest vertical type flash welder. This machine built by Taylor-Winfield Corp. can readily join 6-in. diameter solid steel sections. It is rated at 1200 kva and designed to join jet engine steel shafts and bucket wheels

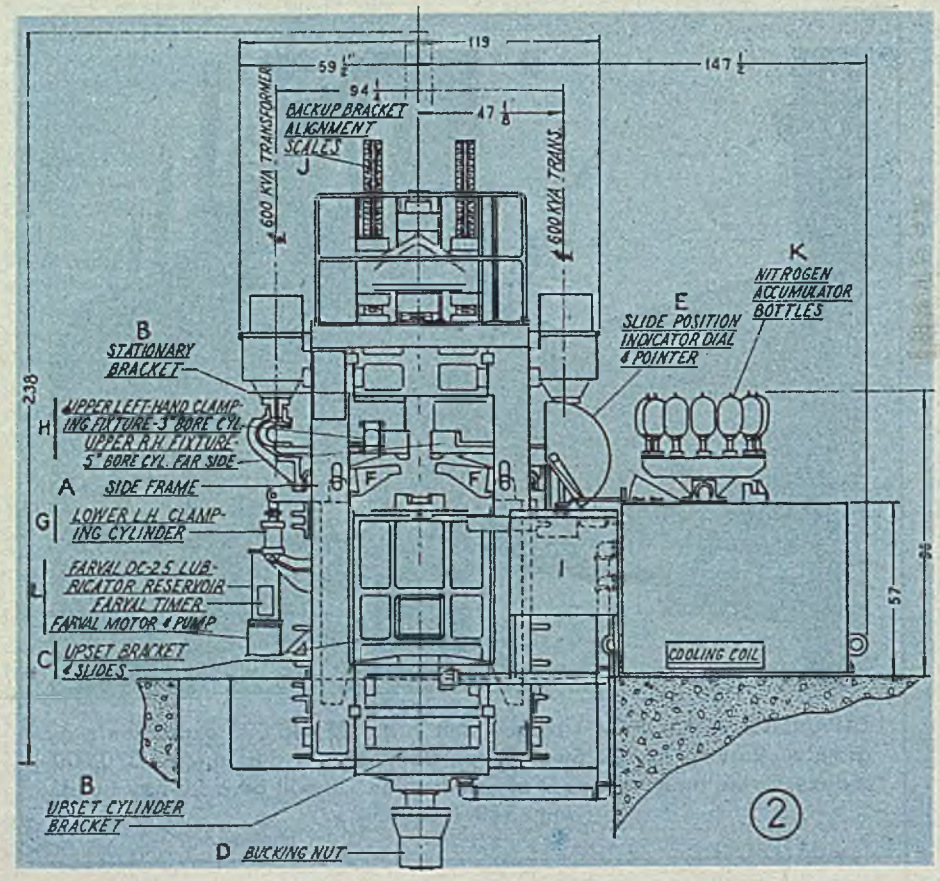


Fig. 2—Principal features of the 1200 kva flash welder are shown in this schematic diagram

WELDING

Huge 1200 kva machine designed to join shafts to jet engine turbine wheels in 135 seconds can handle shafts ranging from 1 to 6 in. in diameter, 12 to 72 in. in length and wheels from 5 to 40 in. in diameter

WHAT is probably the largest and most spectacular flash welder ever built has just been completed for the General Electric Co. and a duplicate machine now under construction for the Westinghouse Electric Corp. A third machine is on order for the Pratt & Whitney Aircraft Co.

The machine is a hydraulically operated vertical flash-butt welder designed by the Taylor-Winfield Corp. for joining solid steel shafts to the turbine bucket wheels of jet propulsion engines. Its size is indicated by the fact that it is rated at 1200 kva at 50 per cent duty cycle, 2300 v primary, 60 cycles and has a maximum upsetting capacity of 850,000 lb at 1000 psi hydraulic pressure. It is equipped to take shafts ranging from 1 in. to 6 in. in diameter in length from 12 to 72 in. and bucket wheels from 5 to 40 in. in diameter.

The developmental work on flash welding wheel assemblies for jet engines was done by the General Electric Co. using a Taylor-Winfield 800 kva welder and many of the design features of this vertical machine are the result of such work.

While designed for the jet engine job, it is believed that the machines can be readily adapted for joining similar pieces for other purposes. The development also serves to dissipate further any conception that flash-butt welding is confined to fabrication of relatively small and thin sections.

In considering a flash welder for the jet engine job, it was decided to design a vertical machine of the hydraulic press type since it would make possible very close work alignment and allow a minimum of die deflection at the time of upset. While horizontal machines of the conventional type are well adapted for many types of work, it usually is difficult to keep stresses in a straight line. Of course, with the vertical welder, the problem of handling heavy work pieces into and out of the machine immediately arose but, upon carefully analyzing the problem, the designers came to the conclusion that loading the bucket wheel into the welder by means of a loading carriage was many times more efficient than loading it into a horizontal welder. Designers of the machine also found it necessary to cope with the problem of joining two steels of widely differing analysis, the shaft and bucket wheel. In addition, hardness value of the shaft must be retained at a high level. In actual practice, rockwell C hardness at the weld drops only about 10 points.

Fig. 1 shows the first welder as assembled in the Taylor-Winfield plant at Warren, O., prior to shipment to the General Electric Co. at Syracuse, N. Y. The simple schematic diagram, Fig. 2, shows that the machine mainly comprises two vertical side frames (A) of cast steel, at each end bolted to and separated by cast steel brackets (B). A hydraulic cylinder with a bore of 35 in. drives the upset slide (C) with a pressure of 850,000 lb at 1000 psi line pressure. Cylinder and piston are machined to a close fit so that piston rings are unnecessary. A slight leakage offsets friction.

Both brackets are positioned by keys, the upper one being insulated electrically from the side frames. The upset slide, on which is mounted the platen bearing the bucket wheel to be welded, is guided by two attached slide brackets (C) which move vertically in hardened and ground

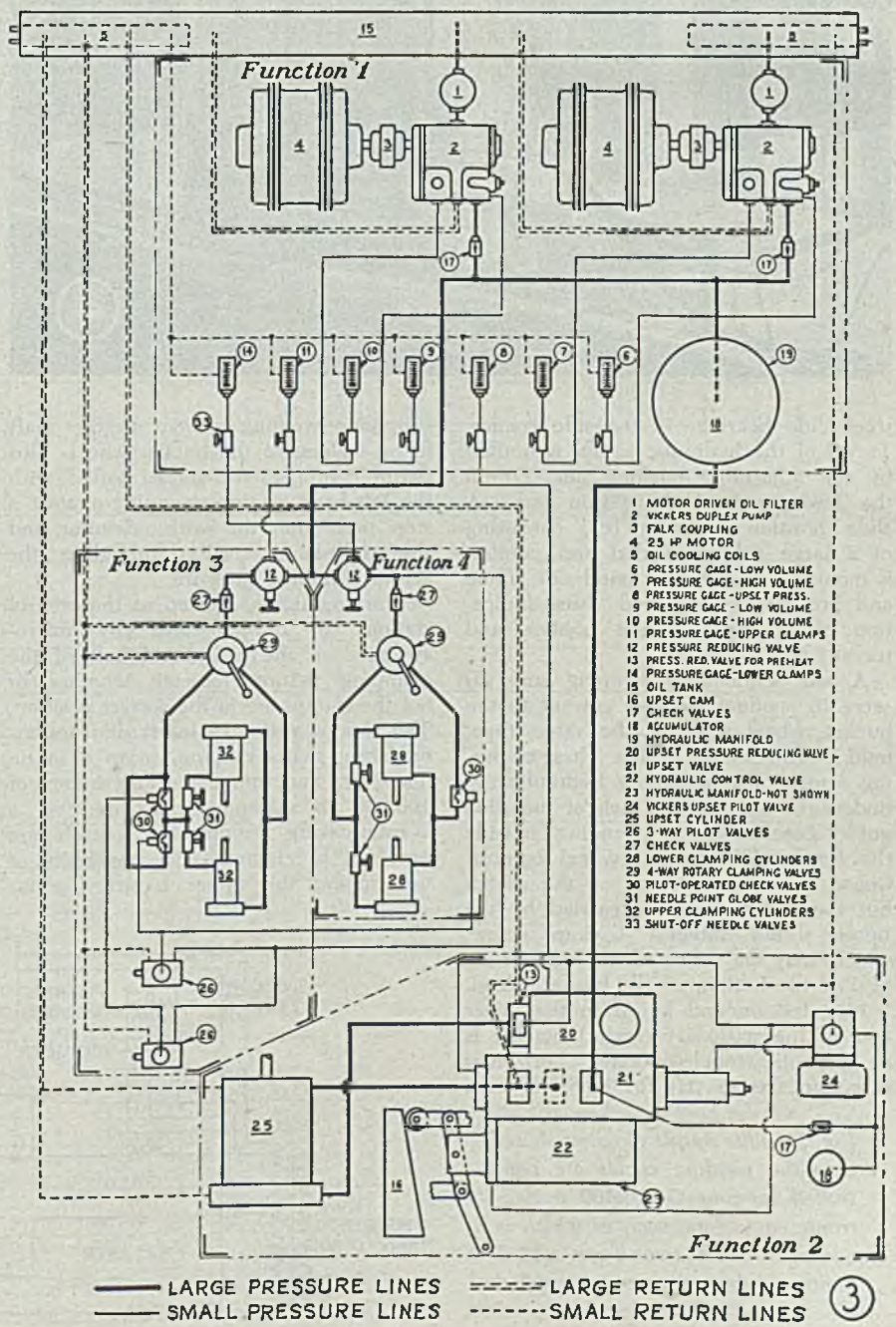


Fig. 3 — Schematic diagram of the hydraulic system shows (1) the pair of duplex pumps, (2) upset cylinder mechanism, (3) upper clamping cylinders and (4) lower clamping cylinders

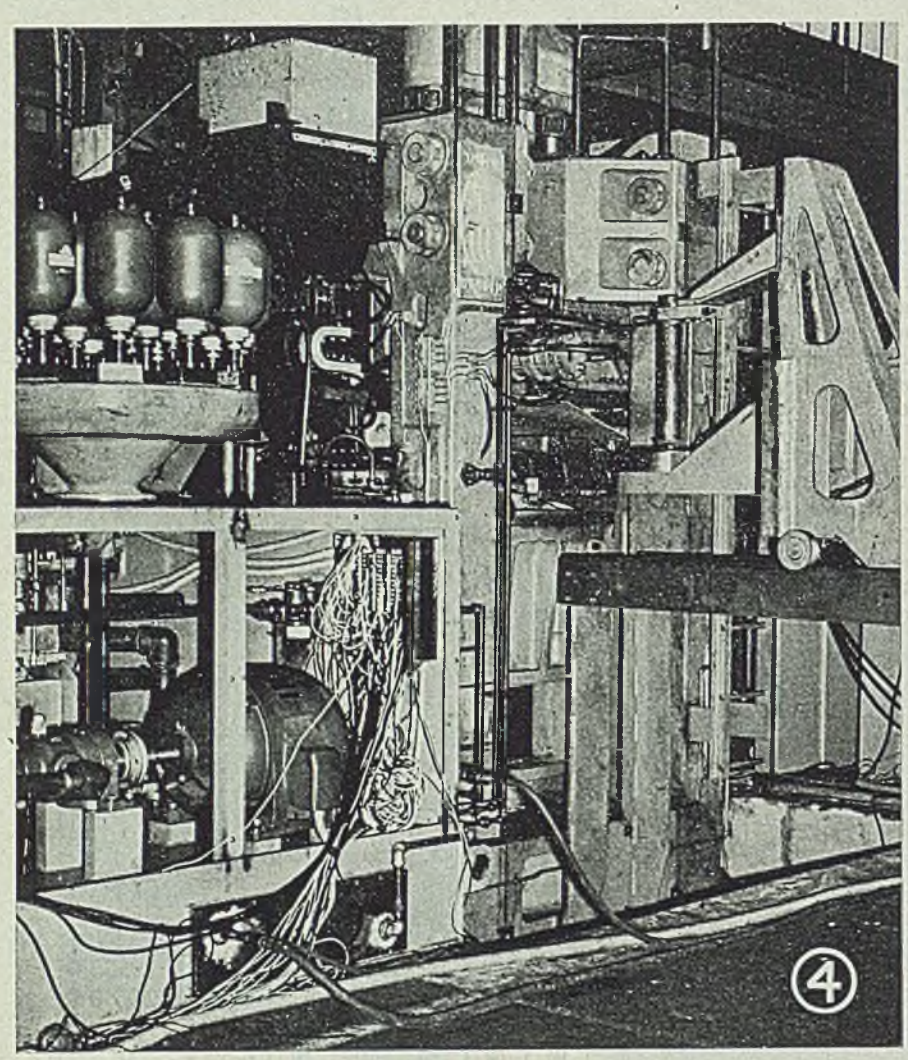


Fig. 4 — This rear view of the welder taken on Taylor-Winfield's assembly floor shows the hydraulic system at the left and the loading fixture at the right

steel slide bearings in the side frames. Travel of the hydraulic piston is limited by the adjustable bucking nut (D) on the lower end of the piston rod. A slide position indicator (E), consisting of a large calibrated dial and pointer, is mounted on the right hand side frame and provides a magnified visual indication of the upset slide's position and travel.

A pair of identical clamping arms (F) serve to conduct welding current to the bucket wheel and, at the same time, hold it firmly on the platen. These clamping arms are actuated by hydraulic cylinders (G) attached to each of the slide guide brackets and extending outside the frame. The bucket wheel is positioned by a locator ring on the platen but the welding load is carried by the upset slide's integral backup screw, which may be adjusted to butt firmly against the bottom of the bucket wheel.

Mounted on and keyed to the lower face of the stationary (upper) bracket is a hydraulic toggle-operated horizontal clamping fixture (H) for clamping and supplying welding current to the shaft to be welded to the bucket wheel. This fixture comprises two similar halves, with the left-hand section operating against a stop, positioning the work on center, and the right-hand section providing the actual clamping pressure.

Warning lights, located at the control station (I) and operated by microswitches on the right-hand half of the clamping fixture, indicate whether or not the clamps are in the correct position. The clamps will take insert dies accommodating shafts ranging up to 6 in. in diameter, and provide a maximum of 100,000 lb clamping presssure.

Interlocking hydraulic controls are provided to eliminate the possibility of unclamping the upper fixture too far at the completion of the weld, when the lower fixture and slide are in the upset position. The upper dies first open approximately 1 in., then after the lower fixture and slide have been lowered a sufficient amount, they automatically open the full 3½ in., each side to provide a total loading clearance of 7 in. The upper clamps are adjustable laterally, and the lower platen longitudinally, to insure accurate alignment of the work.

The upsetting force transmitted to the shaft being welded is absorbed by the upper backup screw, which butts against the upper end of the shaft. This backup screw projects through the cut-out stationary bracket and is carried by the backup bracket, which in turn is mounted on the two threaded backup bars projecting from the top of the welder. The backup bars are provided with the scales (J) for alignment of the backup bracket, and are surrounded by a railing for safety of operators in making adjustments. Top of the machine may be reached by means of a ladder mounted on the rear of the left hand side frame.

Controlled hydraulic pressure is supplied by the pumping and control unit mounted on the hydraulic reservoir to the right of the welder. This may be seen by referring to Fig. 4, and various functions are shown schematically in Fig. 3. Two Vickers Duplex pumps driven by two 440 v, 3 phase, 60 cycle, 25 hp GE motors provide a combined output of 96 gallons per minute at 1000 psi to the clamping cylinders as well as the large upsetting cylinder. Cuno motor-driven rotary oil filters are located in the suction lines of each pump. Two cooling coils mounted in the reservoir keep the oil at proper operating temperature.

A novel and highly successful departure from established welder design is the pneumatic accumulator mounted on top of the pumping unit ("K", Fig. 2 and Fig. 4.) This accumulator, comprising 18 drawn steel bottles of nitrogen precharged to a pressure of 750 psi, provides a very large flow of oil at high

(*Please turn to Page* 150)

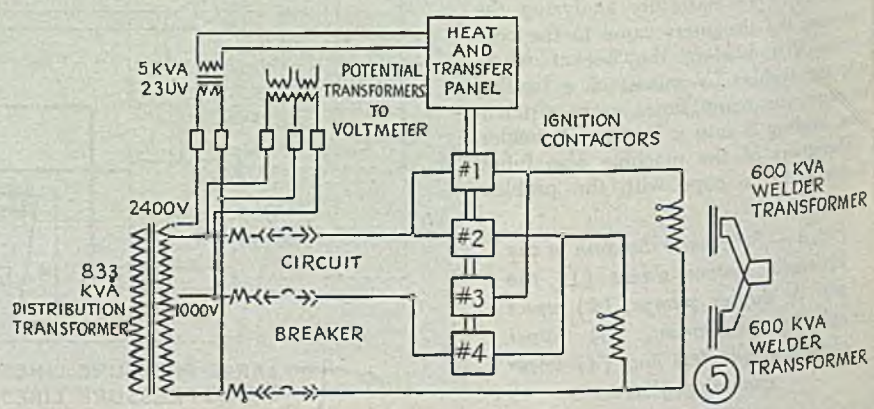


Fig. 5—This simple diagram shows how the welding cycles are controlled by four G-E 2400 v electronic contactors, each of which is equipped with two Type 238-B ignitron tubes. Power is supplied by an 833 kva transformer

Machine Feed Conversion Chart

This chart was originated by E. J. Klika, industrial engineer, Bedford, O., for quickly converting "inches of feed per minute" into "amount of feed per tooth" and vice versa. Read feed per minute at left—follow to spindle rpm at right—down to number of teeth in lower half of table—and read feed per tooth in left column.

Feed per Minute	SPINDLE RPM																									
0.100"	10	11	12	13	15	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	67	76	83	91	100
0.110"	11	12	13	15	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	67	76	83	91	100	110
0.120"	12	13	15	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	67	76	83	91	100	110	120
0.130"	13	15	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130
0.150"	15	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150
0.160"	16	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160
0.170"	17	19	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170
0.190"	19	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190
0.210"	21	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210
0.230"	23	25	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230
0.250"	25	27	30	33	36	40	44	48	53	58	63	68	76	83	91	100	110	120	130	150	160	170	190	210	230	250
0.270"	27	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270
0.300"	30	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300
0.330"	33	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330
0.360"	36	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360
0.400"	40	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400
0.440"	44	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440
0.480"	48	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480
0.530"	53	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530
0.580"	58	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580
0.630"	63	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630
0.690"	69	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630	690
0.760"	76	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630	690	760
0.830"	83	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630	690	760	830
0.910"	91	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630	690	760	830	910
1.000"	100	110	120	130	150	160	170	190	210	230	250	270	300	330	360	400	440	480	530	580	630	690	760	830	910	1000

Feed per Tooth	NUMBER OF TEETH IN CUTTER																									
0.00010"	100	91	83	76	69	63	58	53	48	44	40	36	33	30	27	25	23	21	19	17	16	15	13	12	11	10
0.00011"	91	83	75	69	63	57	53	48	44	40	36	33	30	27	25	23	21	19	17	15	15	14	12	11	10	9
0.00012"	83	76	69	63	58	53	48	44	40	37	33	30	28	25	23	21	19	18	16	14	13	12	11	10	9	8
0.00013"	77	70	64	59	53	48	45	41	37	34	31	28	25	23	21	19	18	16	15	13	12	12	10	9	8	8
0.00015"	67	61	55	51	46	42	39	35	32	29	27	24	22	20	18	17	15	14	13	12	11	10	9	8	8	7
0.00016"	63	57	52	48	43	39	36	33	30	28	25	23	21	19	17	16	14	13	12	11	10	9	8	8	7	6
0.00017"	59	54	49	45	41	37	34	31	28	26	24	21	19	18	16	15	13	12	11	10	9	8	8	7	6	6
0.00019"	53	48	44	40	36	33	31	28	25	23	21	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5
0.00021"	48	43	40	36	33	30	28	25	23	21	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5
0.00023"	43	40	36	33	30	27	25	23	21	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4
0.00025"	40	36	33	30	28	25	23	21	19	18	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4
0.00027"	37	34	31	28	25	23	22	20	18	16	15	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4
0.00030"	33	30	28	25	23	21	19	18	16	15	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3
0.00033"	30	28	25	23	21	19	18	16	15	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3
0.00036"	28	25	23	21	19	18	16	15	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3
0.00040"	25	23	21	19	17	16	15	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3
0.00044"	23	21	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2
0.00048"	21	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2
0.00053"	19	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2
0.00058"	17	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2
0.00063"	16	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2
0.00069"	14	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2
0.00076"	13	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2	1
0.00083"	12	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2	1	1
0.00091"	11	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2	1	1	1
0.00100"	10	9	8	8	7	6	6	5	5	4	4	4	3	3	3	3	2	2	2	2	2	2	1	1	1	1

RECOMMENDED FEED PER TOOTH

Material	Face Mill	Spiral Mill	Slotting Mill	Form Mill	End Mill	Saws
Aluminum - Soft Bronze	0.022	0.017	0.013	0.006	0.011	0.005
Medium Bronze-Cast Iron (Soft)	0.018	0.014	0.011	0.005	0.009	0.004
Malleable Iron-Cast Iron (Med.)	0.015	0.012	0.009	0.005	0.008	0.004
SAE X1112-Cast Iron (Hard)	0.013	0.010	0.008	0.004	0.006	0.003
SAE 1020-SAE X 1335	0.011	0.009	0.007	0.004	0.005	0.003
SAE 1045 - Cast Steel	0.009	0.007	0.006	0.003	0.005	0.003
Alloy Steel (Medium)	0.008	0.007	0.006	0.003	0.004	0.003
Alloy Steel (Tough)	0.007	0.005	0.004	0.002	0.004	0.002
Alloy Tool Steel-To 300 Brin.	0.006	0.005	0.004	0.002	0.003	0.0015
Alloy Tool Steel-To 360 Brin.	0.005	0.004	0.003	0.002	0.003	0.0015

Spindle Decimal ← Feed → Feed Per M. ← Per Tooth

No. Teeth Decimal ← Feed → Feed Per M. ← Per Tooth

Machine

Expectations

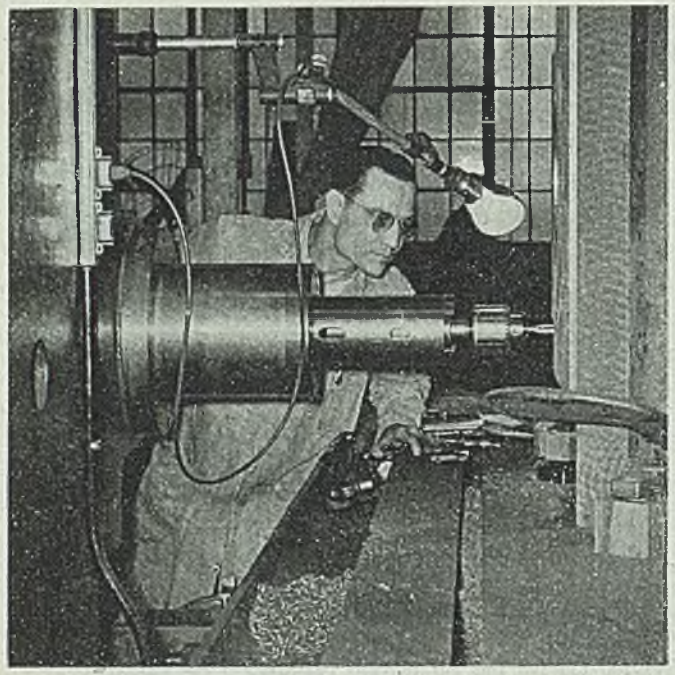
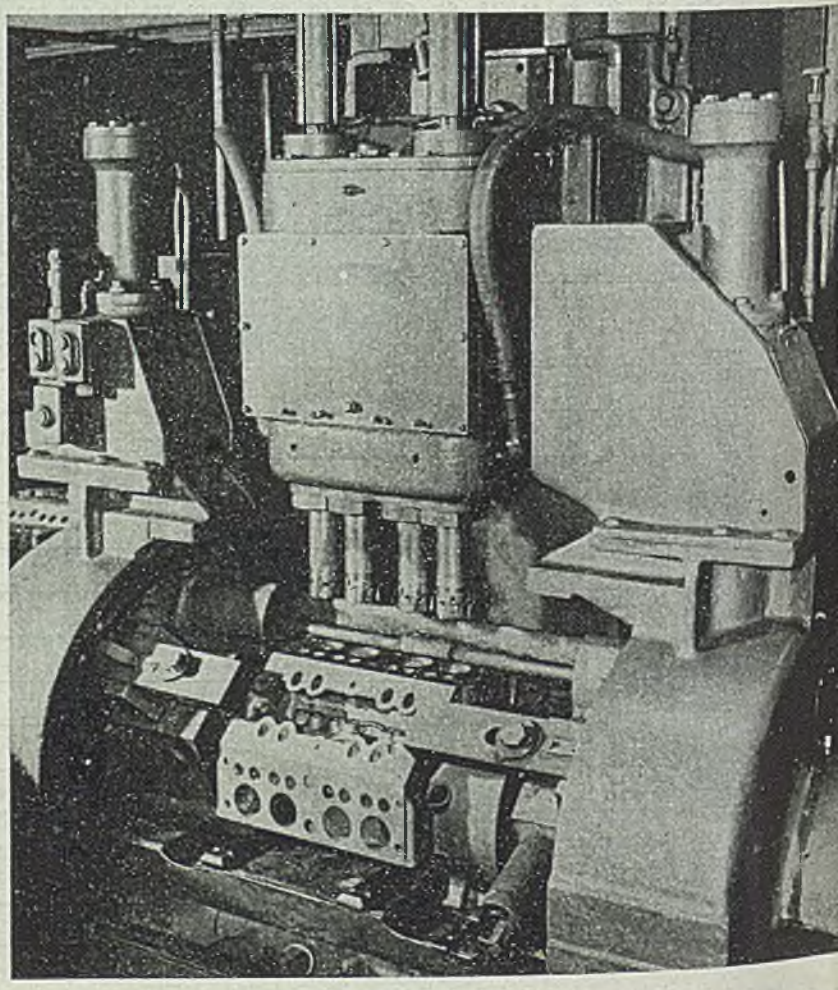


Fig. 1 (above)—What might be called minor refinements will in many cases exert major influence from now on in swaying purchases of new machine tools. "Built-in lighting" is a good example. STEEL's report on customers' preferences brings out the fact that 66.8 per cent of them favor it. Practical example shown is boring mill in the shop of Frederick Colman & Sons Inc. Photo by Palmer



WHEN I gave up attending country fairs and began to attend machine tool shows 30 years ago, I sensed something in common between horse racing as practiced in Vermont and the competition which exists in the American machine tool industry. Note that my reference is to horse racing, not to horse trading.

As those old and experienced owner-drivers maneuvered down the track to the post, they were doing two things at once. One was to bring their sulkies to the post wheel-to-wheel so that the starter would shout the word, "Col" The other was to size up their competition. Quick conclusions were drawn in those few seconds of the running start. Much of the strategy after the start was based on these conclusions.

The period immediately preceding the start of a machine tool show invariably has been a period of equally lively curiosity on the part of the participants as to the "entries" made by rival participants. Speaking at the dinner following the preview of the most recent National Machine Tool Exhibition—that in the fall of 1935—Ralph E. Flanders (now on leave from the industry to serve as president of the Federal Reserve Bank of Boston) sized the situation up in this manner: "Our exhibitors seemed to be spending quite a lot of time today in the booths of other exhibitors—shall we say, selling machine tools to each other?"

This fall numerous unscheduled events have been touched off unexpectedly and in many cases prematurely—shall we say, by the explosion of the atomic bomb? One of these is what bids fair to be about the liveliest and most interesting competitive race in the entire history of the machine tool industry. The grand prizes in this big race consist of generous shares in what, up until the middle of August, was that purely speculative thing of the future which was called "postwar business." Many people were thinking about it, some were talking about it, but, under the rules of war, no one was allowed to do much of anything about it.

Now, all of a sudden, this prize is before us as a tangible thing called "peacetime business." Now, almost overnight, the machine tool builders—along with industry in general—find themselves swept into the grand Peacetime Conversion Race, in which literally they al-

(*Please turn to Page 156*)

Tool Builders study of Their Customers...

By GUY HUBBARD
Machine Tool Editor, STEEL

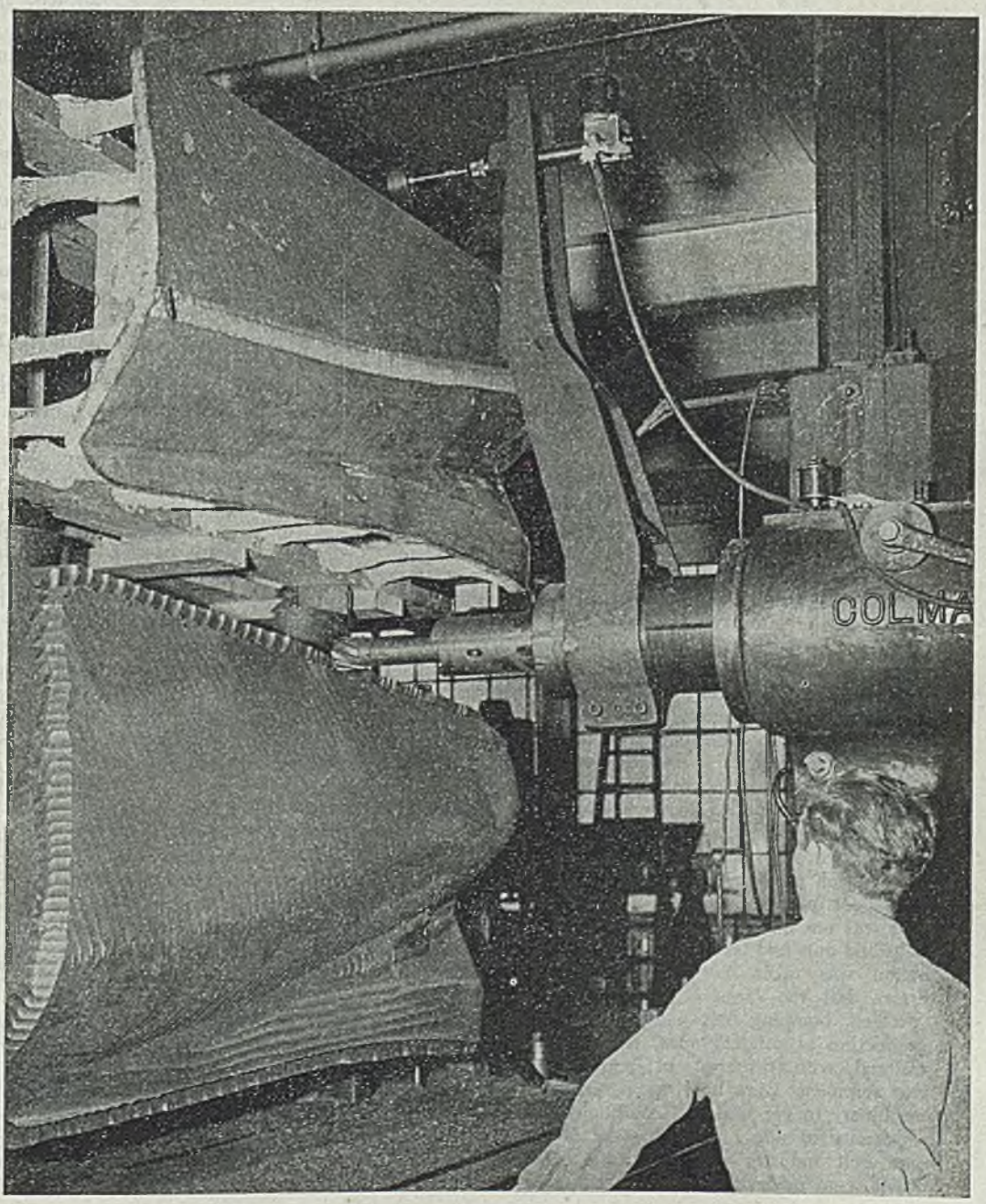


Fig. 2 (*left*)—*Of the 2358 production metalworking plants reporting to* STEEL, *45.8 per cent plan to install more "specially built machines." Projected over 11,000 companies, this means busy days ahead for sales engineers, machine tool designers and tool engineers, whose efforts must be coordinated as never before. Special machines will range all the way from slightly modified bench drills to huge transfer machines of amazing complexity. A typical example is this 4-spindle vertical with roll-over fixture for efficient Stellite boring of V-type cylinder blocks. Photo courtesy Haynes Stellite Co.*

Fig. 3 (*right*)—*Trend toward machines which relieve operators of mental as well as physical effort is reflected in* STEEL's *survey. For example, returns show that, while 6.9 per cent of plants now have die sinking machines, 7.9 per cent of all the plants intend to buy them. By the same token, 4.2 per cent have tracer controlled milling machines, while 4.9 per cent intend to buy them. Only through greater use of machines having "built-in skill and intelligence," as typified by this tracer-controlled die milling setup at the Frederick Colburn & Son shop, can the situation be met. Government photo by Palmer*

GERMAN FASTENER INDUSTRY

Thirty Years Behind Times

Report of American investigators, C. F. Newpher of National Screw & Mfg. Co. and R. H. Smith of Lamson & Sessions Co., indicates Nazi policy detrimental to progress in machines and techniques. Plentiful supply of cheap labor encouraged laissez-faire attitude. A few plants very progressive

GERMAN fasteners industry, generally speaking, is many years behind that of either England or the United States. Behind this is the fact labor had been plentiful and cheap, making it unnecessary to devise automatic or mechanical means to rapidly or accurately produce its products.

Also it appears that, during the period of preparation for war and during the war years, the whole of the German government's policy was to regard bolts, nuts, screws, and rivets as unimportant articles. Upon the word of people in the industry, the High Command in Germany obviously failed to appreciate the necessity for fasteners, as they continued to draft skilled labor, technicians, and engineering talent, either for army service or to supply other manufacturing plants. Inefficiency resulted both because remaining employes were compelled to work as long as 84 hours per week and because skilled labor drawn off was replaced by "slave" labor which produced material defective or of poor quality.

It was not until 1944 that scarcity of bolts and nuts had become so serious that action was taken to rectify previous errors, but too late.

Allied bombing not only disrupted production at original sites, but so interfered with dispersal of equipment that shipments were held up, permitting machinery to get into bad condition.

Scarcity of alloys early hit the German bolt industry and substitute materials were made mandatory, finally resulting in steels of high manganese as the sole alloy employed.

Standard of steels for use in the German bolt and nut industry was established, using manganese as the principal alloying element. Complete range of authorized steels is shown in accompanying table, together with heat treating and physical specifications.

Steel of Poor Quality

Almost universal complaint was heard from Germans in this industry about quality of the steel supplied. Full of seams, it was not suited to cold-heading, making it difficult to produce an acceptable product. The presence of seams was so pronounced that one factory heated connecting rod bolts to a cherry red in order to roll threads properly, resulting in a decarburized thread of poor structure.

Corrosion protection also had been neglected, probably with the thought that an airplane's life was limited anyway and, therefore, there was no need to protect fasteners by cadmium or zinc plating in the case of aircraft bolts. Parkerizing or bonderizing were found in a few instances, but they were in the minority.

All in all, the industry presents a sorry picture, with no vestige of high production methods in vogue in the United States and few places comparable with those of England. Methods that passed out 30 or more years ago are still in use, particularly on some hot-forged bolts.

Most significant was the fact the numerous questions asked by members of the delegation concerning developments already attained in United States or being worked on over here were met with blank stares. German plants showed no evidence of any developments along lines of deep freezing tools, double extruding, and controlled bolt tension. Summarized, this somewhat negative record goes as follows:

—No methods were found in use to determine machineability.

—No evidence was found that spheroidizing had been used.

—Age hardening of cold-heading wire had not been recognized.

—Cold drawing lubricants were commonly lime, but some copper-coated wire was found where attempt had been made to improve heading quality on difficult jobs. A phosphatic acid treatment given work which started to rust after a bombing episode, by accident, placed bonderizing advantages within grasp of one firm which used the treated wire in cold heading with excellent results.

—Maximum diameter cold headed was normally ⅝-in. (in only one case, ¾-in.) and normal coil weighed about 80 lb.

—Seams were prevalent in wire received by the industry.

—Induction heating had not been used in heating bolt blanks.

—Cold heading tools were largely of 0.90-carbon steel; no tungsten carbide was in use.

—No recessed head screws such as Phillips, Frearson or Clutch, were in use.

—Elastic stop nuts were used freely in airplane design, but a similar nut—involving a tapered split nut—although very popular, was a very expensive, difficult design.

For this survey, the delegation visited a score of plants whose overall organization, facilities, and production procedures were studied in detail, the remainder being so small in size or else so widely dispersed that they could be disregarded. The industry was concentrated largely at Dusseldorf and Hagen, with a few plants near Hamburg.

The following firms are among the most important:

Bauer & Schaurte: Company's total peak production of aircraft bolts was in June, 1944, when they produced 6.7 million units. Considerable tonnage was in production due to the lowering in quality of wire. In its entire plant are 63 cold heading machines. Nearly 12,000 tons of raw material was used in 1944 to produce 220 million threaded parts. Total employment was 3050.

Bauer & Schaurte's thread grinding machinery plant produced a large number of thread grinding machines, but, between July and October, 1944, production of new machinery was suspended to concentrate on maintenance of existing machines in use elsewhere. Machines built were delivered in large numbers, over 500 being used in various

bolt plants. Dr. Brendel, who was in charge while Dr. Schaurte was interned, allowed various customers to persuade him to change the machine in such a way that it became a bastard.

Bauer & Schaurte's dispersal plant at Munchen-Gladbach is exclusively composed of 8 headers, 8 trimmers, and 7 thread rollers. Working on two shifts, it produced 8 million bolts per month in diameters from ¼ to ⅝-in. No bolts were pointed, but all were heat treated there.

Gage plant of Bauer & Schaurte, the largest producers of thread gages in Germany, was dispersed so widely after severe bombing of Hamburg that none of it is in operation or ready to work. Product was known as Aggra, and production reached as high as 5000 per month, equal to 60-70 per cent of national output.

Wupperman Co.: Wupperman Co. at Hagen operated a spoke and nipple-making plant very out of date and badly kept. Total employment was about 1200 persons, most of whom were engaged in production of chains of the type usually associated with conveyors. Obstructive attitude of Mr. Wupperman prevented the gathering of more information.

Dusseldorfer - Eisenhuttengeselschaft: Although possessing nothing unusual in its plant, this organization has one of the best layouts seen in Germany. Furnaces operated for the hot forging presses are housed in a building separated from the latter by a brick wall; each furnace has a hole through the wall, and hot blanks are thrown down a tube to the forging machines, thus keeping the forger as cool as possible. Forger throws bolts onto conveyor which takes them to trimming machine and, in case of long spikes, they then are reheated and cut thread rolled. Owing to shortage of gas, furnaces were converted to coke.

Norm & Gewinde Teile, A. G.: This firm originally was named Hobus by the two Bauer & Schaurte men who established it. Plant was dispersed from Metz to an intermediate location, from which part of it went to Marburg, where it still remains and has not been seen by this delegation, the remainder going to Schwartzenbek. Plant consists mainly of 40 automatics, mostly of Index und Skoda manufacture; 14 Gildemeisters or turret lathes; 36 high speed lathes, mostly made by Ludwig Loewe of Berlin, and the balance made by Magdeburger Machinfabrik; 18 centerless grinders; 20 Pee-Wee roll threaders; 11 thread milling machines and 40 to 45 small second operation lathes; 20 drilling machines; 2 double-chain feed and slotting machines; and 2 heading machines. Most studs were produced by turning. Monthly production of studs was approximately 2 million, of nuts one-half million, special parts in all metals (turned) 300,000 per month, and special long studs 20,000 per month. Quality of products was very high and mostly for aircraft engine manufacture.

(Please turn to Page 176)

German Wartime Standard Steels For Bolt Industry

Running No.	Quality	Subst. for	Aircr. Std.	COMPOSITION C %	Si %	Mn %	P/S Max. %	Cr %	V %	HOT WORKING TEMPERATURES — °Centigrade Forging	Annealing	Normalize	Water Harden	Oil	Tempering	Brinell Hardness Annealed	NORMALIZED CONDITION S min. kg/mm²	Tensile Strength kg/mm²	Elongation	HEAT TREATED CONDITION Diameters	S min. kg/mm²	Tensile Strength kg/mm²	Elongation
1	C 22	StC25.61	—	0.19 0.25	0.15 0.40	0.20 0.40	0.05	—	—	850 1100	650 700	870 900	860 890	870 900	530 670	155 max.	24.0	42.0 50.0	27.0	up to 16.0 16.0– 40.0	36.0 30.0	55.0– 65.0 50.0– 60.0	18.0 20.0
2	C 35	StC35.61	1120	0.32 0.40	0.30 0.50	0.40 0.60	0.05	—	—	850 1100	700	850 880	840 870	850 880	— —	172	28.0	50.0 60.0	22.0	up to 16.0 16.0– 40.0 40.0–100.0	42.0 37.0 33.0	65.0– 80.0 60.0– 72.0 55.0– 65.0	16.0 18.0 20.0
3	C 45	StC45.61	1130	0.42 0.50	0.30 0.50	0.45 0.65	0.05	—	—	850 1100	700	830 860	820 850	830 860	— —	206	34.0	60.0 75.0	17.0	up to 16.0 16.0– 40.0 40.0–100.0	48.0 40.0 36.0	75.0– 90.0 65.0– 80.0 60.0– 72.0	13.0 14.0 15.0
4	C 60	StC60.61	1150	0.57 0.65	0.30 0.50	0.50 0.70	0.05	—	—	850 1050	700	810 840	800 830	810 840	— —	243	39.0	70.0 85.0	14.0	up to 16.0 16.0– 40.0 40.0–100.0	57.0 49.0 44.0	85.0–105.0 75.0– 90.0 70.0– 85.0	9.0 11.0 10.0
5	40M3	—	1261	0.36 0.44	0.30 0.50	0.70 1.00	0.04	—	—	850 1100	700	830 860	820 850	830 860	— —	217	—	—	—	up to 16.0 16.0– 40.0 40.0–100.0	65.0 55.0 45.0	90.0–105.0 80.0– 95.0 70.0– 85.0	11.0 12.0 13.0
6	32M5	VM125	—	0.28 0.36	max. 0.40	1.20 1.40	0.04	—	—	850 1100	650 700	830 860	820 840	830 850	— —	217	—	—	—	up to 16.0 16.0– 40.0 40.0–100.0	80.0 65.0 55.0	100.0–120.0 90.0–105.0 80.0– 95.0	9.0 10.0 11.0
7	37MS5	VMS135	—	0.33 0.41	1.10 1.40	1.10 1.40	0.04	—	—	850 1050	680 720	850 880	820 840	830 850	— —	217	—	—	—	up to 16.0 16.0– 40.0 40.0–100.0	90.0 80.0 72.0	110.0–130.0 100.0–120.0 90.0–110.0	7.0 10.0 10.0
8	42MV7	—	1310	0.38 0.45	max. 0.40	1.60 1.90	— 0.04	— —	0.10 0.18	850 1050	640 680	840 870	840 860	850 870	—	217	—	—	—	up to 40.0 40.0–100.0	90.0 80.0	110.0–130.0 100.0–120.0	8.0 10.0
9	50CV4	VCV150	1610	0.47 0.55	max. 0.40	0.70 1.00	— 0.04	0.90 1.20	0.10 0.18	850 1100	680 720	850 880	810 830	830 850	—	235	—	—	—	40.0–100.0	90.0	110.0–130.0	9.0
10	34CV7	—	—	0.30 0.38	max. 0.40	0.70 1.00	— 0.04	1.70 2.00	0.10 0.18	850 1100	700 730	850 880	830 850	850 870	—	235	—	—	—	—	—	—	—

A NEW METHOD

Tangent Bending

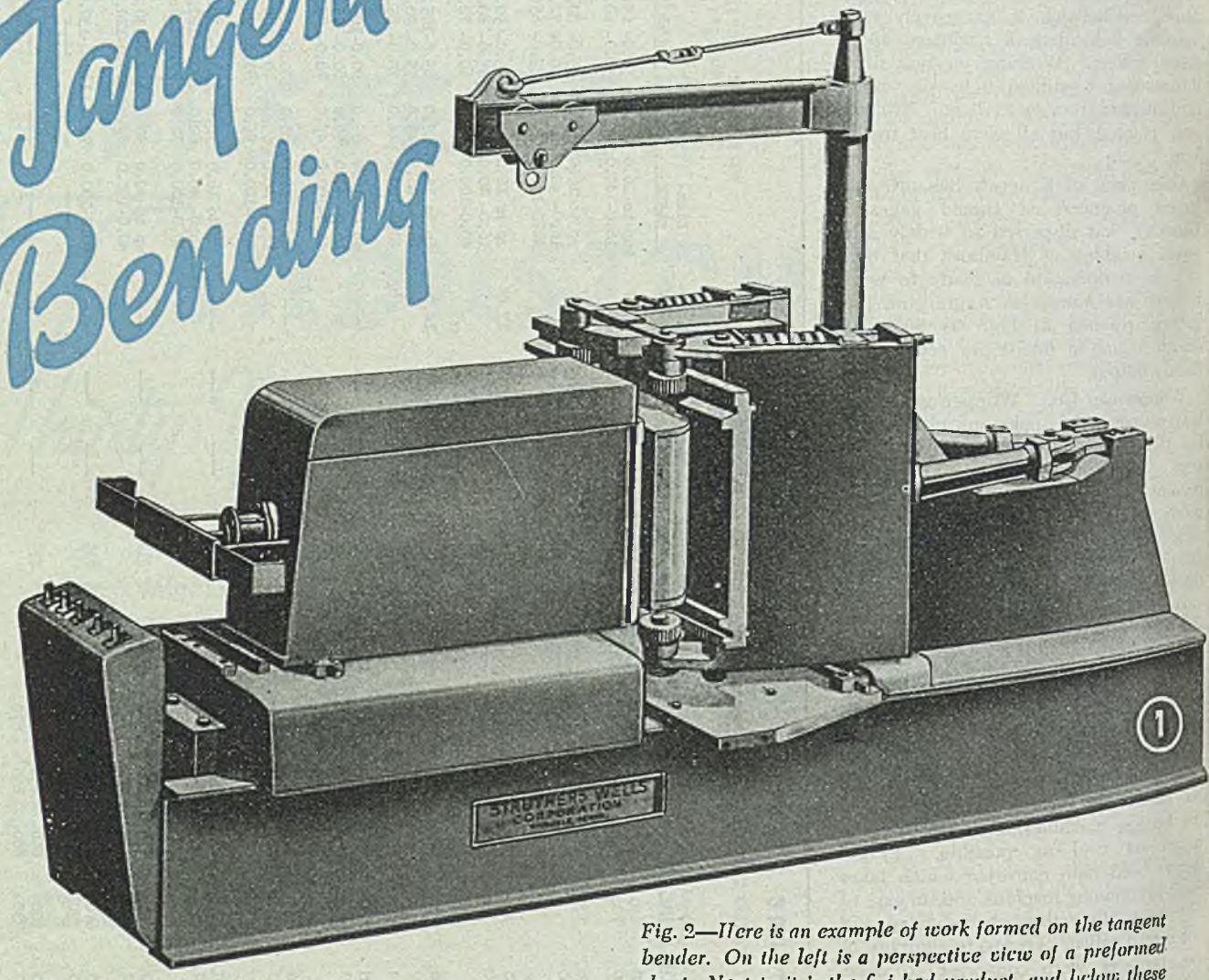
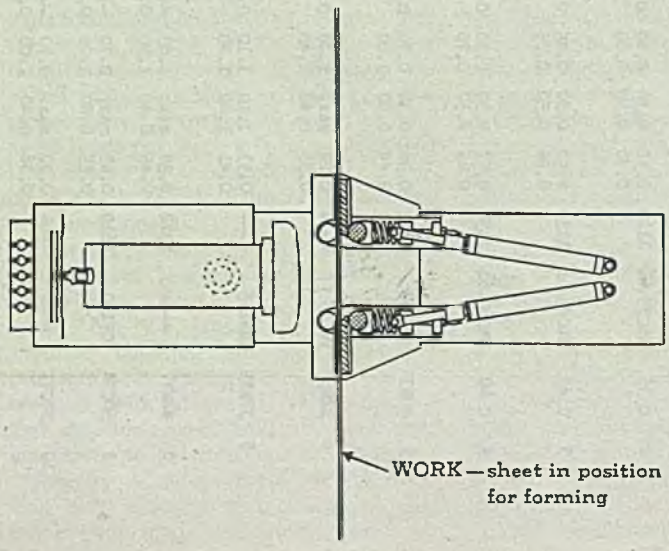
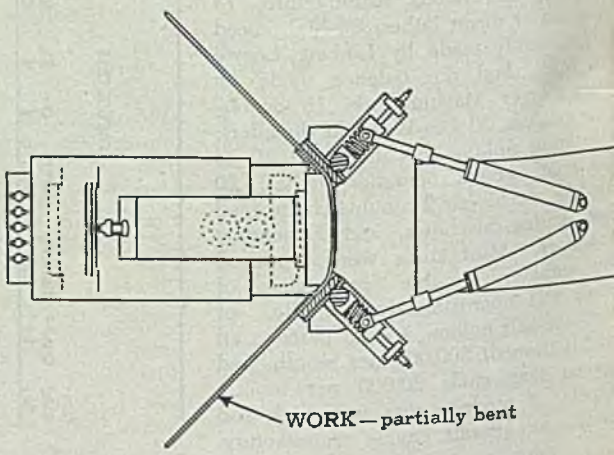


Fig. 1—This double wing tangent bender was designed to perform the difficult metal forming operations shown in other illustrations

Fig. 2—Here is an example of work formed on the tangent bender. On the left is a perspective view of a preformed sheet. Next to it is the finished product, and below these two views is an edge view of the preformed sheet before bending operation

Fig. 3—Schematic diagram of the tangent bending operation. In these diagrams a plain sheet is shown being formed into a refrigerator shell. Dies can be cut to fit any preformed sheet outline in this operation





)F METAL FABRICATION . . .

TANGENT bending is a new method f metal fabrication. It's a hybrid meth-d, a cross between press forming and traight bending in which the metal aws during the bending operation and s shape is controlled by a die. As in e case of many hybrids, the resulting peration is not like either of the parent perations, and can be used for many urposes unsuited to either.

Tangent bending, and the tangent ben-er, started before the war and a few achines were used production-wise on heet metal fabrication before limitation ders stopped production of civilian oods. This production, however, proved e economy of the bender and its ture possibilities over a wide range f bending, as first conceived by its ventor, Lee Green, now of Designers r Industry, Cleveland.

Development work on the unit has en undertaken and carried out by uthers-Wells Corp., Titusville, Pa., nd from the early experience the com-ny has evolved a series of new benders hich will not only bend sheet metal, ut will also form almost any metal oduct from thin strip through fairly eavy plate, bars, tubes and structural apes as well.

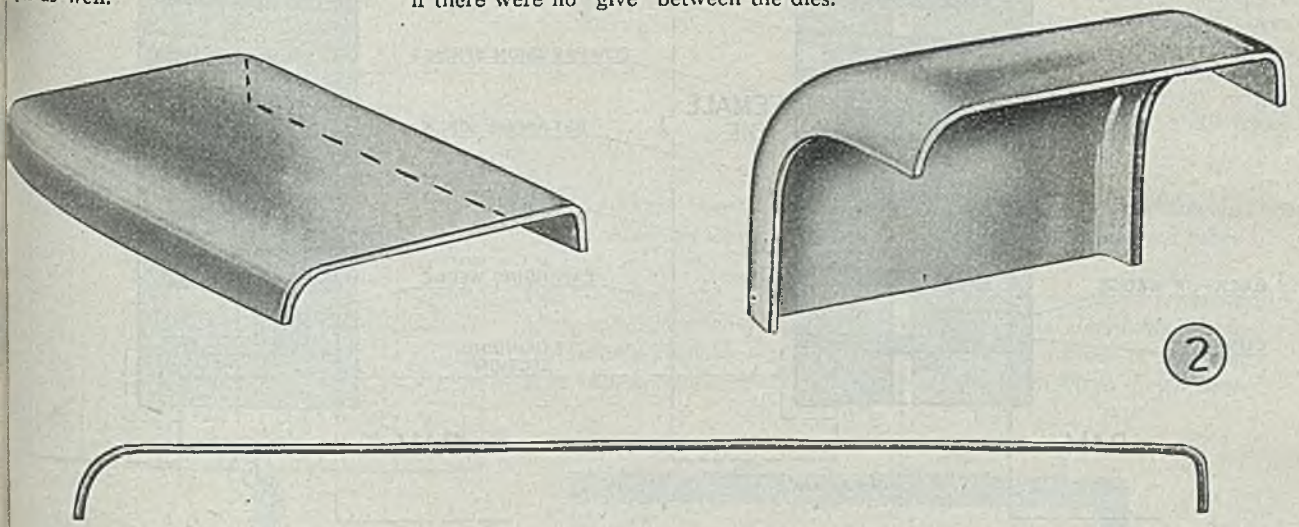
The principle of operation is simple, but not easily described. Heavy pressure is exerted on the metal during the bending operation, while the shape of the metal is controlled through the use of dies. This encourages the flow of metal, and provides for close dimensional tolerance on the finished bend. This means, for example, that sheets may be edge bent without wrinkling or tearing. Tubes can be bent without flattening or wrinkling on the inside radius. A T-section can be bent internally without buckling or deformation of the vertical member, and bent externally without cracking or tearing the vertical member.

There are three basic parts in the bender. The male die, the female die, which is mounted on a rocker plate; and the bending wing, which moves the rocker plate and applies the power. In operation the bending wing performs an arc around the male die, carrying with it the rocker plate and female die. The rocker plate is free to move across that portion of the work piece being bent, which produces an "ironing" action. This slippage, or ironing action, aids in the flow of metal and prevents tearing during the operation which would result if there were no "give" between the dies.

The term "tangent bending" arises from the fact that during this operation, the female die is constantly tangential to the male die and the sliding pressure is applied in this same tangential direction. This provides a constant and even pressure on the work piece at all times during the operation.

The most obvious and immediate use for this forming method is in the manufacture of metal cabinets for such items as refrigerators and ranges. It makes possible the rounded corners and edges demanded by today's designers without the need for hand finishing operations on these rounded surfaces. Fig. 8 shows, for example, the steps in bending a refrigerator shell from preformed sheet sections.

The bending operation is by no means limited to sheet fabrication. Successful bends have been made in bars, tubes and structural sections, as shown in Fig. 4. Size range is almost unlimited. Small sheet metal specialties, such as camera and instrument cases, can be handled just as easily as could a railroad car section. The only difference would be in the size and design of the bender,



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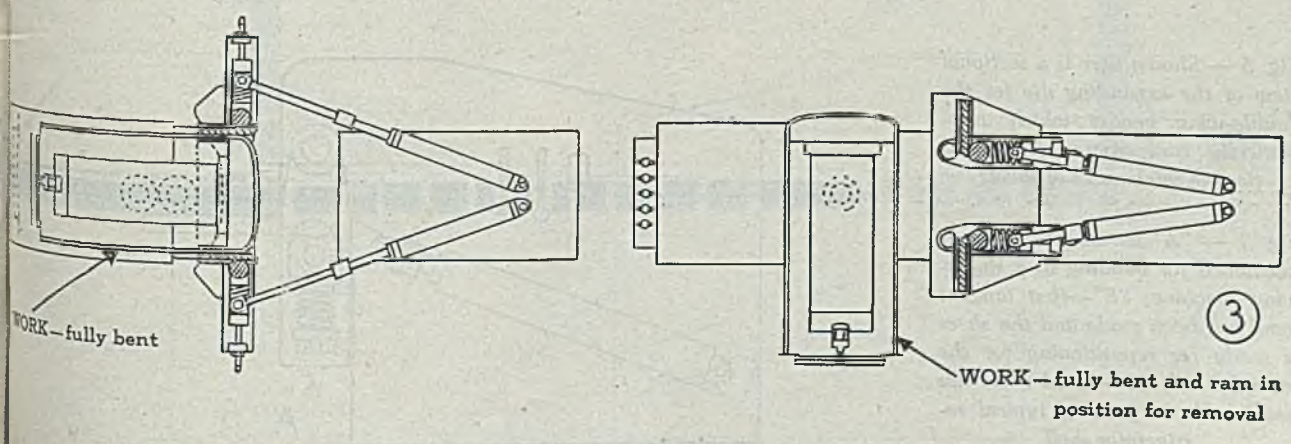

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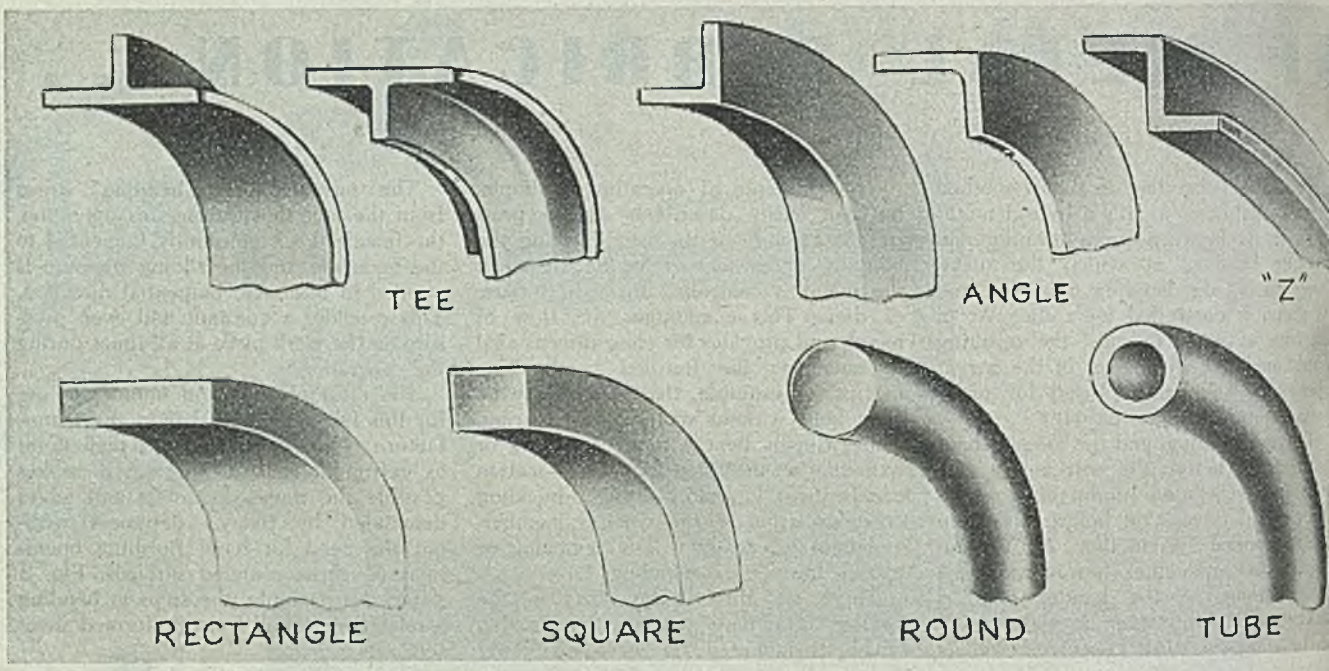


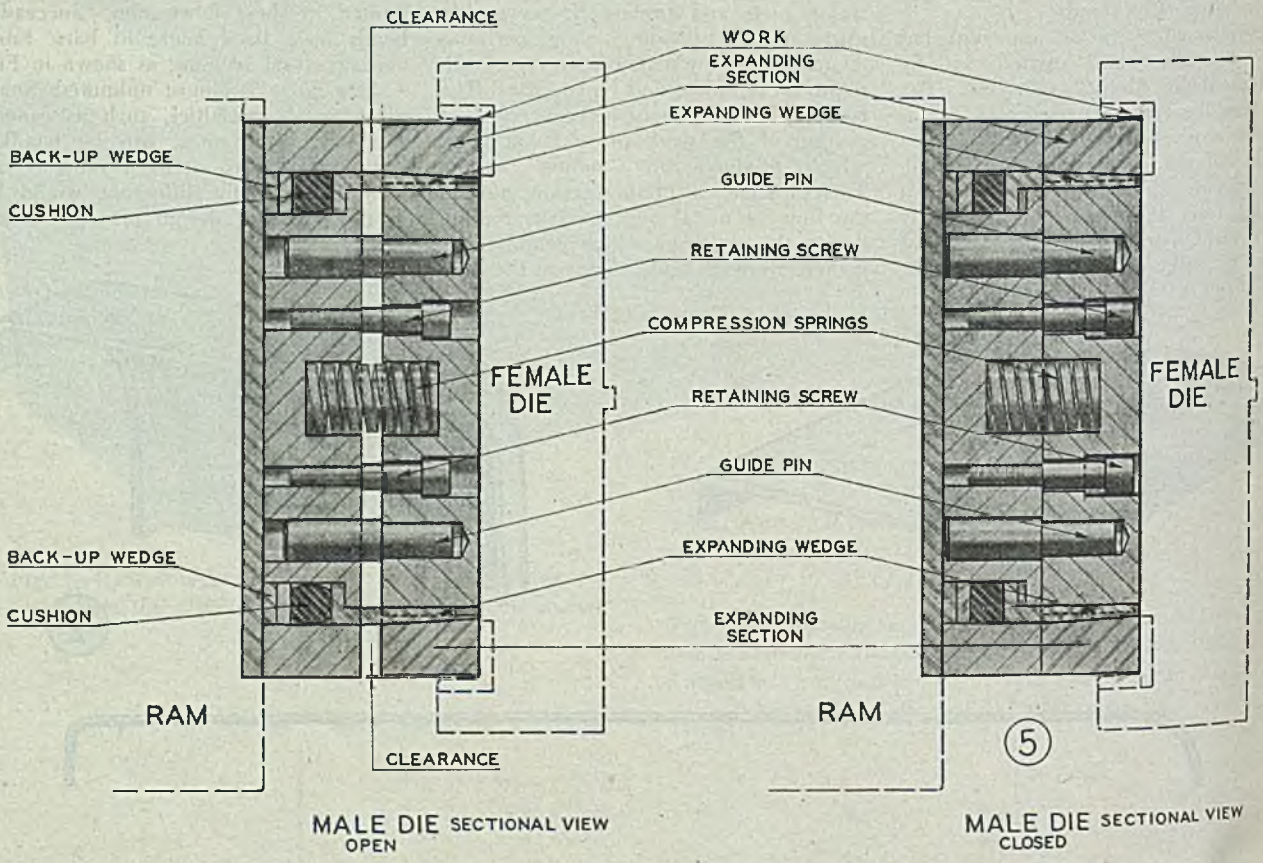


Fig. 5 — Shown here is a sectional view of the expanding die for the double-wing bender which automatically compensates for variations in thicknesses of sheets

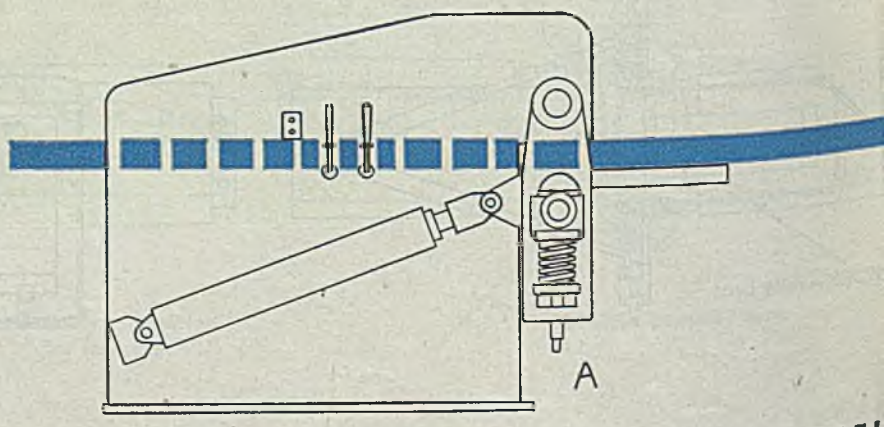
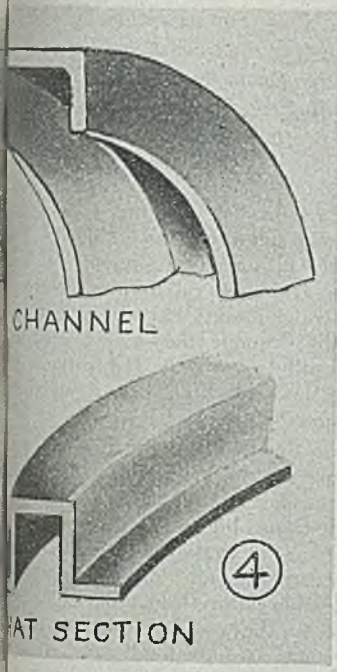


Fig. 7 — "A" shows formed sheet positioned for bending in a single-wing machine; "B"—first tangent bend has been made and the sheet is ready for repositioning for the second bend; "C"—final bend has been made in forming typical refrigerator shell



and the amount of power required. The initial models, built before the war, were air operated, but the compressibility of the air caused a "bucking" action in some cases where heavy bending was necessary. Present models have been switched to hydraulic power in order to provide an even flow of pressure throughout the bending cycle.

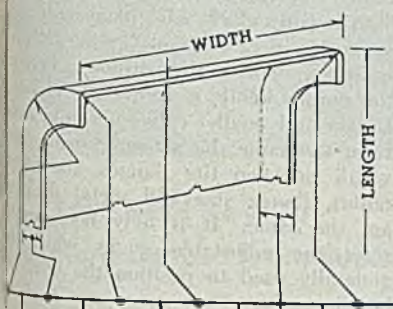
There are several standard models of tangent benders in four general classes—single wing, double wing, stretch wing and duplex benders—but in many instances a machine may be engineered for the particular job required of it. Variations are almost infinite, particularly for the dies. Duplex types permit forming of rectangular sections—boxes with only one seam—which are removed through the side of the machine. Size range is virtually unlimited, and any type of ductile metal in any gage thickness, width or length up to the limits of the particular bender involved can be processed as desired.

The machines are of welded steel construction. They are electric hydraulic drive throughout with fingertip electric controls to actuate pilot operated solenoid valves on the larger models. Operating speed ranges from 1200 complete cycles per hour on the smaller and faster units down to as few cycles as production requirements dictate. The top speeds are established at rates that are faster than it is possible to feed the machine. The bending wings have a maximum swing of 109 degrees, which controls the maximum degree of bend obtainable in one stroke. Maximum radius of bends obtainable is 6 in. on the double wing machine. When making two bends simultaneously, the distance between centers of the bends can vary from a minimum of 17 in. to a maximum of 31¾ in.

The pressure rolls, rocker plate and the bending die, although moving independent of each other, are geared together in order to maintain perfect alignment. The gearing does not act as a driving mechanism, since all motion is applied tangentially by the bending wing. Constant alignment of all moving parts, however prevents dies from slipping in relationship to each other while the bending action takes place.

The high die supports, a heavy bed and rugged design throughout make practical the use of automatic expanding dies. The female, or moving die is solid, while the male die is composed of sections kept separated by rubber cushion wedges and steel springs. As pressure is applied to the die by the bending operation, the springs and cushions compress. This floating die principle takes care of commercial variations in gage thickness of sheet metal being bent thereby eliminating the expensive gaging of the sheets as received, separating them according to exact thickness and shimming the dies to suit each different lot.

Because the use of tangent bending is new, and as a matter of fact has not been in use for production work over a great variety of applications, the designing of metal articles to take advantage of tangent bending is a new art and one which

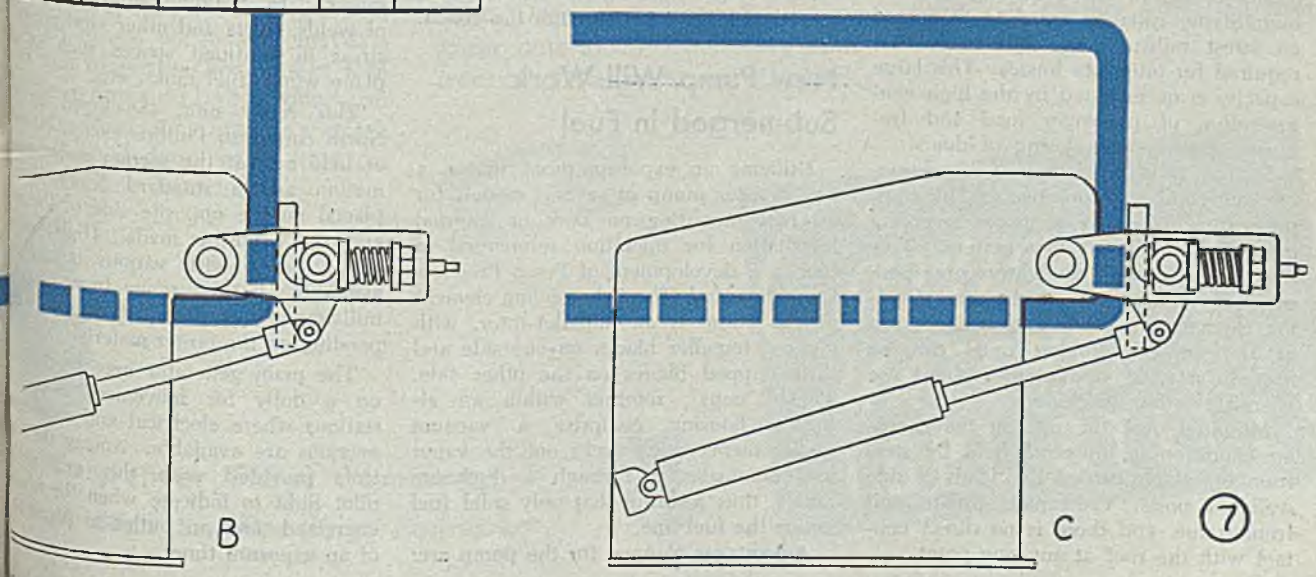


Flange Front FF	Corner Radius Front CRF	Gauge G	Flange Back FB	Corner Radius Back CRB	Width W
0.469	0.251	0.036	0.469	0.251	
0.500	0.275	0.060	0.500	0.275	
0.625	0.161	0.036	0.625	0.161	As
0.875	0.185	0.060	0.875	0.185	Required
1.000	0.125	0.125	2.000	0.125	and
0.750	0.161	0.036	0.750	0.161	Limited
1.000	0.185	0.060	1.000	0.185	only by
1.250	0.125	0.125	1.250	0.125	Capacity
0.875	0.223	0.036	0.875	0.223	of
1.125	0.247	0.060	1.125	0.247	Tangent
1.000	0.161	0.036	1.000	0.161	Bender
1.250	0.185	0.060	1.250	0.185	

6

Fig. 4—These shapes have been successfully bent on the tangent bender, both as formed sheet and as structural shapes, bars and tubes

Fig. 6—Relationship between dimensions has been developed for some of the more common bends. This typical upset bend data table shows the latitude available on straight bending. With the use of notches, radii may be made smaller and flanges wider than those shown here



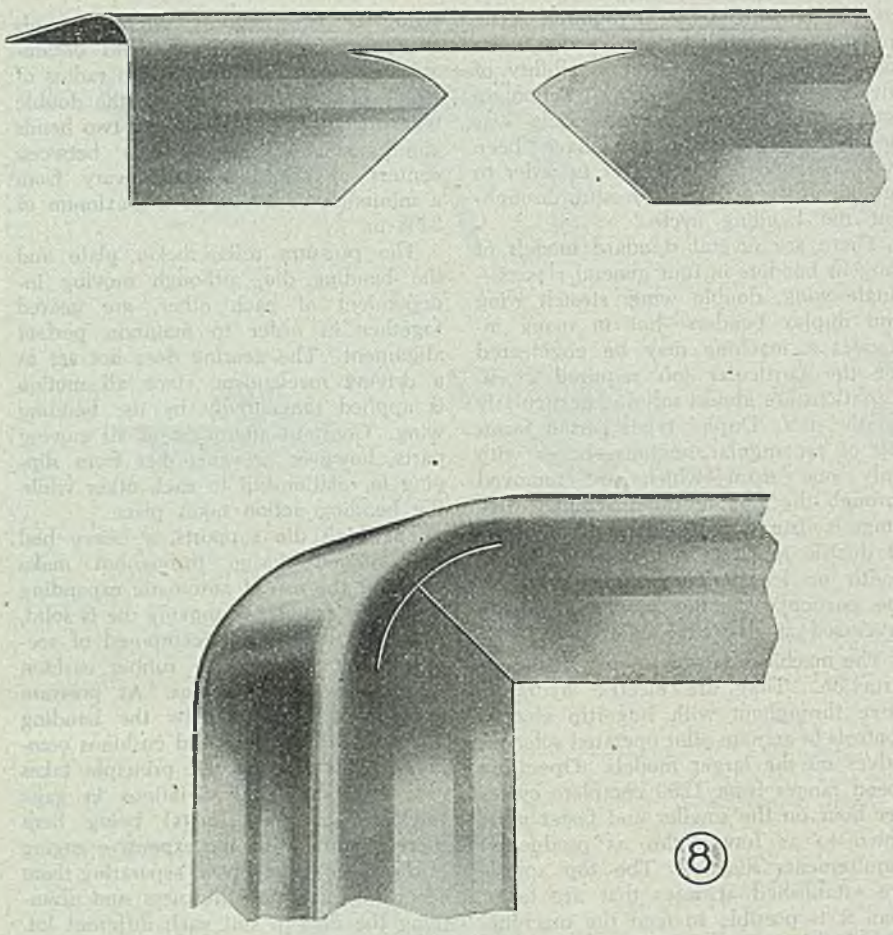


Fig. 8 — For exceptionally wide flanges of the type shown here, the notch may be located so that any welding or finishing required is confined to the flat surfaces

is still very much in the experimental stage. Certain dimensional relationships have been discovered which make for the easiest processing of the metal. Shown in the accompanying table is design data for the most common type of internal or upset tangent bend. The relationship of radii, metal thickness and flange widths, for example, is important if a good job is to be obtained. This does not necessarily represent the limit of the bender's capabilities, however. Much wider flanges have been bent successfully through the use of notches, which still leaves only flat surfaces for joining and no finishing required on the curved surfaces.

While the double wing benders operate more rapidly making two bends at a time, the singles still have their advantages. It is possible to use the single wing bender as a brake and make either sharp corner bends or bends with a considerable radius, the corner being controlled by the die. The length of the work piece is immaterial, and distance between bends or number of bends per given length of piece can be varied more easily than in the double wing bender. This is particularly advantageous in making a line of cabinets of varying sizes, for example, where the distance between the corner bends is frequently changed. Larger and smaller cabinets can be made from the same die set-up providing the width between the flanges, the corner radius, flange size and metal thickness are the same. It is only necessary to reset the adjustable gages which are generally used to position the work for bending.

Air-Conditioned Busses For City Transportation

A significant development in intracity transportation is a fully air-conditioned trolley coach, now under construction and soon to be delivered to the Georgia Power Co. for experimental use in Atlanta.

The air-conditioning equipment, designed and installed by Carrier Corp., Syracuse, N. Y., has a cooling and dehumidifying capacity equal to that used on latest railway cars, and twice that required for inter-city busses. This large capacity is necessitated by the high concentration of passenger load and frequent opening and closing of doors.

System consists of two air-conditioning units and one compressor. The compressor is driven by a motor receiving current from the trolley system. Two separate air-cooled condensers are used, each provided with fan and motor. Cooling capacity control is automatic. Fans of the air conditioning units can be used to provide ventilation without use of refrigeration machinery.

Mounted over the roof of the coach, air conditioning units are held by steel framing which carries the load to side walls or posts. Cork pads isolate unit from frame, and there is no direct contact with the roof at any one point.

Compressor-motor assembly is mounted on a rigid structural steel frame, welded, and attached to the coach under framing members through vibration eliminators. Air enters a louvered opening at the motor end and escapes along the sides and at the compressor end. This air flow is set up by forward motion of the coach.

Ducts passing down both sides of the coach at the ceiling distribute the air through perforations at the rate of 800 cu ft per min, while fans circulate a total of 2200 cu ft through the coach.

New Pump Will Work Submerged in Fuel

Utilizing an explosion-proof motor, a fuel booster pump in several models for external mounting on tank or internal installation for operation submerged in fuel, is a development of Pesco Products Co., Cleveland. The only moving element of the pump is an impeller-rotor, with tapered impeller blades on one side and little cupped blades on the other side. These "cups", rotating within an elliptical housing, comprise a vacuum arrangement which sucks out the vapor and eliminates it through a discharge outlet, thus insuring that only solid fuel enters the fuel line.

Advantages claimed for the pump are: Positive vapor-control in rapid climb to high altitudes, stabilized delivery of bubble-free fuel, self-priming under extreme conditions, ability to pump the fuel tank dry, and variety of installation adaptations.

Portable X-Ray Reaches Inaccesible Areas

A portable X-ray has been introduced recently to examine internal structure of welds, rivets and other vital points of stress in confined spaces such as airplane wings, fuel tanks, etc.

This X-ray unit, developed by the North American Phillips Co., is clamped or held against the section under examination and a standard X-ray film is placed on the opposite side of the area and the exposure made. High loading anode tubes, with various targets, are available. Ratings range from 10 to 20 milliamperes at potentials up to 50 depending on the target material.

The main generator may be mounted on a dolly for movement to certain stations where electrical and water connections are available. Among the controls provided with this unit are a pilot light to indicate when the tube is energized, and an outlet to permit use of an exposure timer.

How Much EXTRA Production Can Your TOOLS & DIES Give You Each Month?

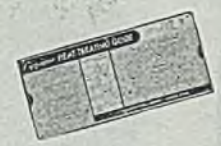
Extra output from your tools will cut unit costs. With this 3-step *job analysis* program you can actually predetermine tool performance on each job. For more output per month and lower production costs, put this 3-step plan to work now.

1. Your Real Key To More Output From Tools

By knowing *in advance* what performance to expect from your tools you can reduce idle machine and press time. And the Carpenter Matched Set Method gives you a way to do just that. It's a sure-fire way to get tools that need fewer regrindings and replacements. This 167-page Manual points the way to the tool steel properties you need—greater wear resistance, more toughness, etc. With its 80-page Tool Index and Steel Selector you can quickly find the best starting place when you have a new tool to make. For easier tool steel selection and better results on the job, send for this Carpenter Manual. Just drop us a note on your company letterhead.

2. Lick Hardening Trouble At The Start

Proper heat treatment is the second step to better tools that cut costs. To get the heat treating results you want, use the "Matched Tool Steel Manual". It contains the most complete heat treating information available in printed form. And as a special help to your heat treaters, we have prepared a handy slide chart that condenses the basic heat treating information and puts it in easy-to-use form. Drop us a line and let us know how many Carpenter heat treating slide charts you will need.



3. Keep Records Of Tool Output Per Grind

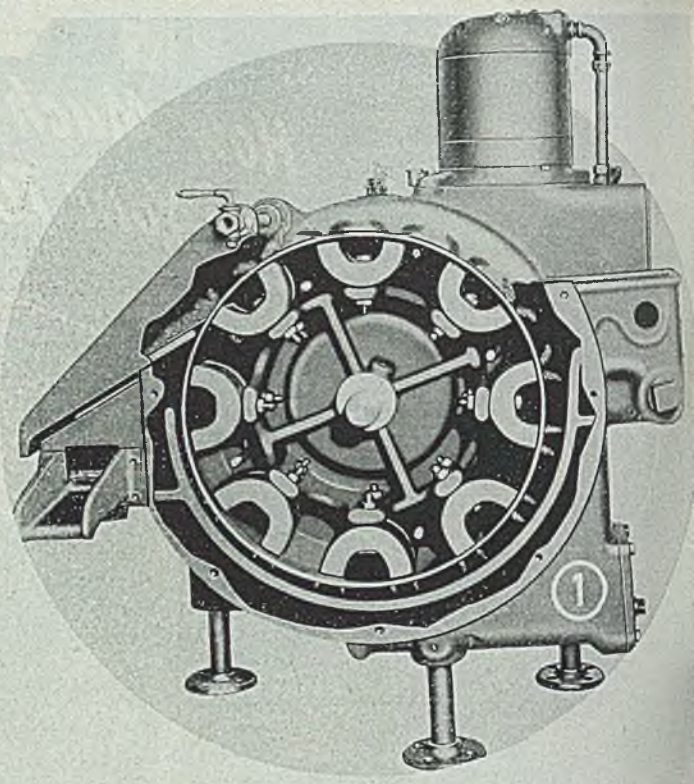
Follow each tool set-up on the job. Check the reasons for any premature failure or too frequent regrinding. You'll soon spot new ways to make your tools save production time—and money. And when you want personal help with a tooling problem call on your nearby Carpenter representative. He really knows tool steel and can help you reduce costs all along the line.

The Carpenter Steel Company
139 W. Bern St., Reading, Penna.

Carpenter MATCHED TOOL STEELS

Magnetic COOLANT SEPARATORS

Metal and abrasive particles carried by coolants are quickly removed by this automatic continuous-flow unit, eliminating danger of damage to precision-finished surfaces



REMOVAL of metal and abrasive particles, or swarf and sludge as they are called, from coolant used on honing machines, cylindrical, internal, surface, crankshaft, thread and other wet grinders is essential to the production of precision finished surfaces, especially in final or finish honing and grinding operations. Various types of filters and cleaners for this work have been devised, one of the most recent being the magnetic-automatic coolant separator developed by Barnes Drill Co., Rockford, Ill.

This separator employs a drum carrying a series of permanent magnets which are faced with a nonmagnetic sheet, as shown in Fig. 1. The drum rotates and the spent coolant from the machine flows over it in a direction counter to that of rotation. The magnets attract and hold all magnetized swarf, including most of the suspended abrasive which the swarf strains out. This sludge is continuously and automatically scraped off on the opposite side of the drum and discharged into a receptacle ready to be carried away, while cleaned coolant is returned to the reservoir of the machine for recirculation.

Built in three sizes, handling 10, 20 and 40 gal of coolant per minute, respe tively, the separators are compact unit powered by ¼-hp flange-mounted moto and floor mounted at the rear of the m chines they are serving. Other mountin systems may be used in special install tions. They may function intermittent or continuously and cause no temperatu rise in the coolant. An intermediate-si separator mounted on honing machine shown in Fig. 2. The upper pan at rig is simply to handle drainage from lateral

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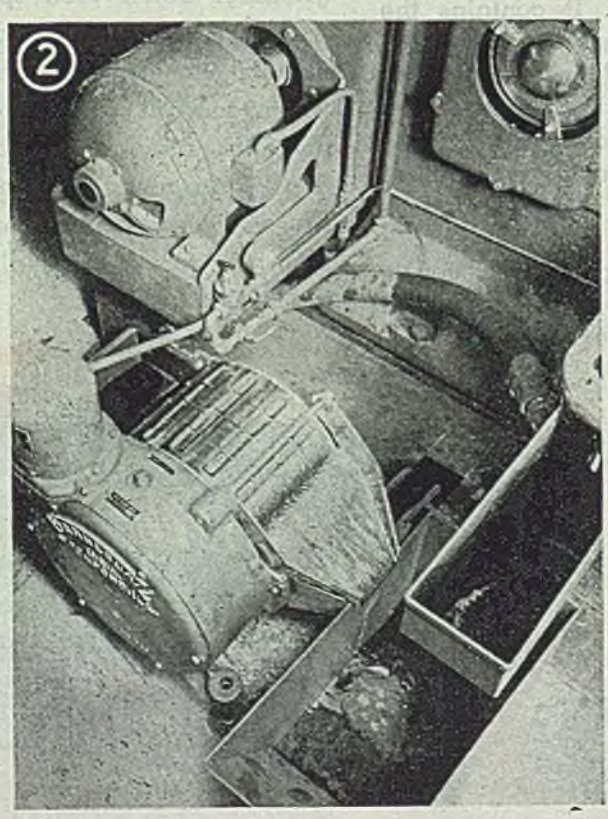
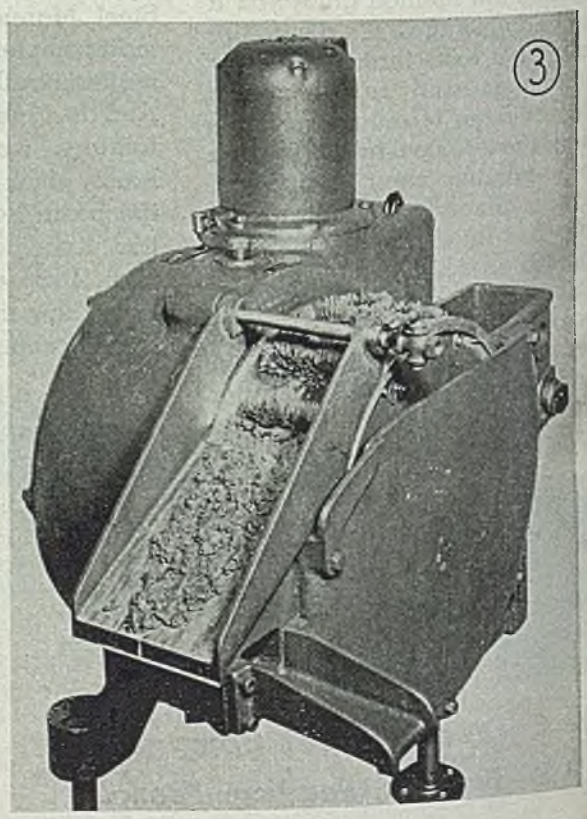




MESTA ROLLS

TURNING A MESTA SPECIAL ALLOY STEEL STRUCTURAL MILL ROLL USED IN PRODUCTION OF 4 INCH CHANNELS.

ARMY E NAVY

MESTA MACHINE COMPANY
PITTSBURGH, PA.

Modern HEAT TREATING Practice

Effectiveness of three systems of interrupted quenching in obtaining higher physicals with minimum dimensional changes, distortion, warpage and residual strains as well as scale-free surfaces is shown in the third article in this heat treating series. Cycle annealing is an additional topic of great interest

By ARNOLD P. SEASHOLTZ
Metallurgical Engineer
E. F. Houghton & Co
Philadelphia

FEW steels can offer full value t engineers today unless given suitab thermal treatment. These treatmen include softening for deep drawing good machinability, producing hi tensile properties with good fatigue impact values, or high hardness so th the steel thus treated may be used working other steels.

Specifically, the objectives are as fo lows: (1) Higher desired physicals; minimum of dimensional changes, d tortion or warpage; (3) minimum of r sidual strains to increase fatigue li and impact value; (4) a heat treati technique that produces parts free scale, surface decarburization or ca burization; and (5) parts that can finish-machined and then heat treat for high physicals, meanwhile holdi the parts to close dimensional toleranc

Steel is not the big bull in the woo which shows no signs of abuse. Inste it is temperamental. If not treat correctly, it may reflect this lack care in the form of cracks which w cause it to break down under seve service. But if it is properly treate it can be an able servant of industry.

Before we are able to determine t proper heat treating procedure to obta the most desirable properties for a particular steel, the heating cycle, co ing cycle, and the element of time one or more temperatures must be tak into consideration.

"Heating cycle" includes not only t raising of the temperature but the st at high temperature. This first step martempering and austempering, deed in any true quench, is to he the material to some temperature eith in or above the critical or transform tion range in order to transform alp into gamma iron and put the steel the austenitic condition. Carbon a other alloying elements will thus dissolved in a solid solution of t gamma iron, to form homogeneo austenite, given time and temperatu enough. This solution of elements m be either complete or partial, depen ing on the time-temperature cycle. Co plete diffusion into a truly homogeneo austenite is a time consuming proce

During this heating cycle there a

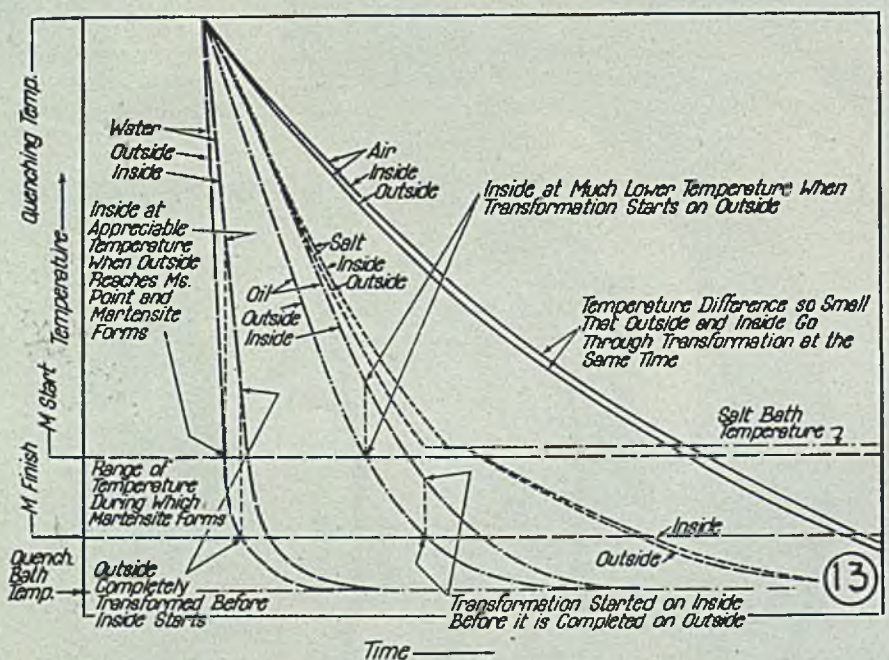


Fig. 13 — Cooling curves at surface and center of a steel cylinder quenched in water, oil, hot salt and air

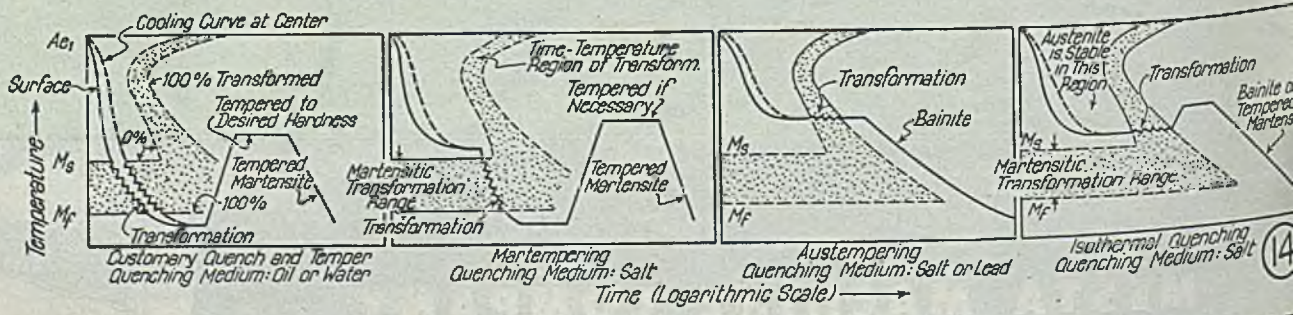
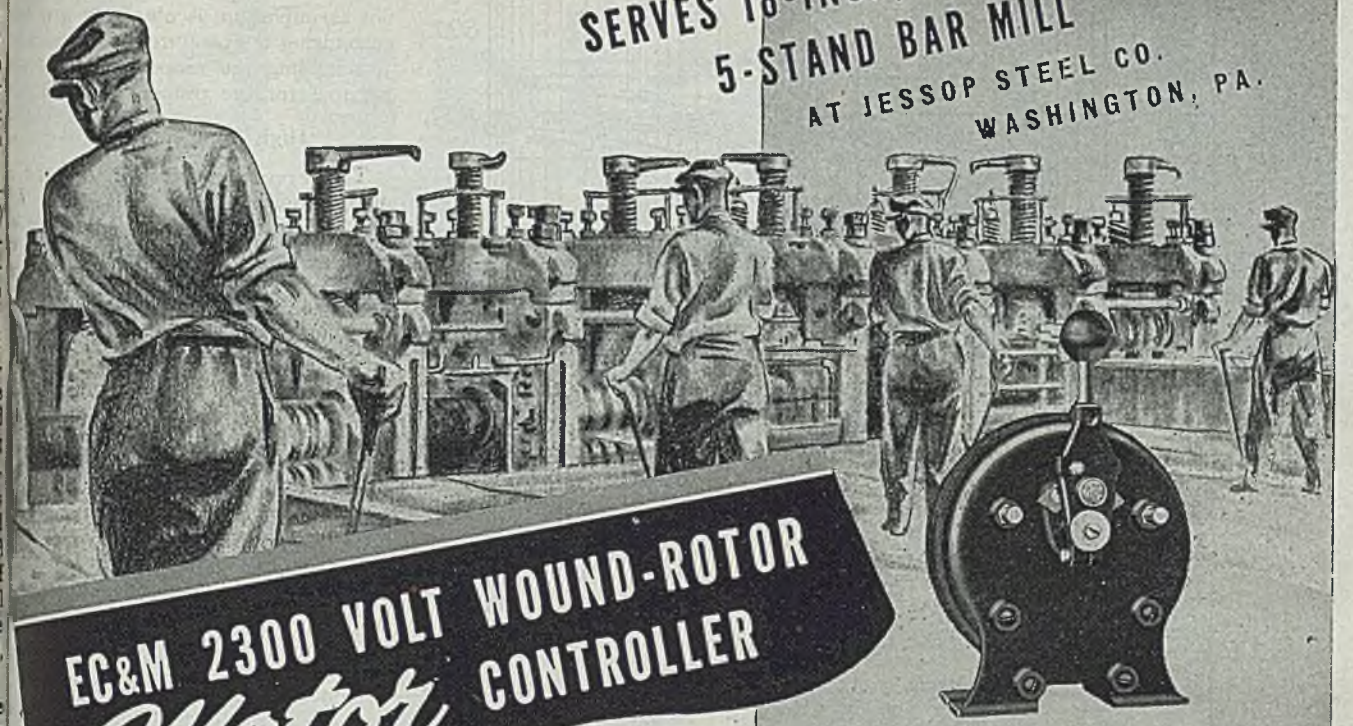
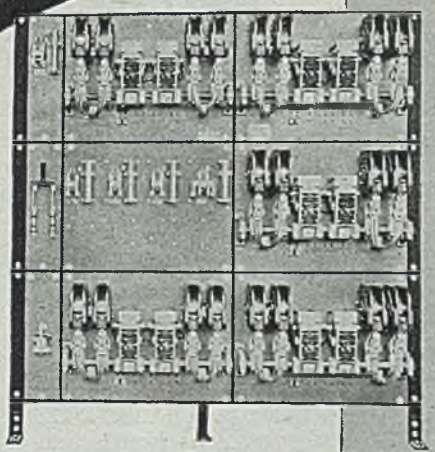


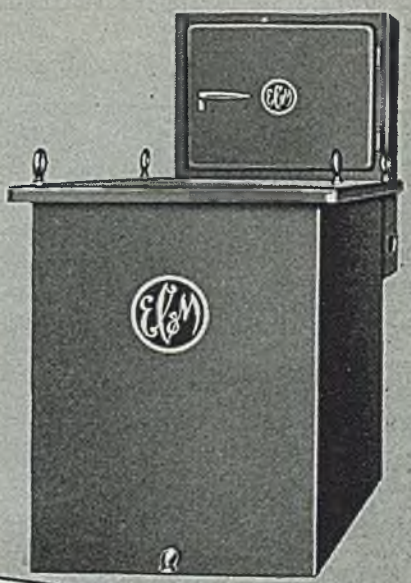
Fig. 14 — Diagram of four important quenching methods

SERVES 18-INCH, 5-STAND BAR MILL AT JESSOP STEEL CO. WASHINGTON, PA.



EC&M 2300 VOLT WOUND-ROTOR *Motor* CONTROLLER





For 2300 volt, wound-rotor motors, EC&M Non-reversing or Reversing Control is without equal. And for the primary, high voltage switching requirements, Type ZHS Magnetic Contactors are used.

These contactors are of compact design and oil-immersed, with the control circuit potential transformer, in a single shock-proof enclosure. For reversing applications, as used on this 18-inch mill, two contactors are mounted back-to-back with heavy, mechanical interlocking between them and enclosed under oil in one tank.

Panels for controlling the secondary, or rotor, circuit consist of *LINE-ARC* Contactors and Frequency Acceleration Relays. Type NX Master Switch gives speed control.

Specifications of these EC&M Wound-rotor Motor Controllers are given in Bulletins 1062-C, 1140-B, and 1182-2. Write for your copies.

OUTSTANDING FEATURES of EC&M 2300 Volt Magnetic CONTACTOR CONTROL

1 *Heavy-duty, mill type, 2300 volt contactors—mounted under oil in one enclosure with positive interlocks for separating the circuits.*

2 *LINE-ARC magnetic contactors for control of secondary circuits have low upkeep cost, high arc-rupturing ability.*

3 *FREQUENCY RELAYS govern rate of acceleration automatically—respond accurately to motor speed, increasing motor torque as required.*

4 *Potential transformer, self-contained in contactor enclosure, supplies 220 volts for control circuit.*

THE ELECTRIC CONTROLLER & MFG. CO.

2698 EAST 79th STREET • CLEVELAND 4, OHIO

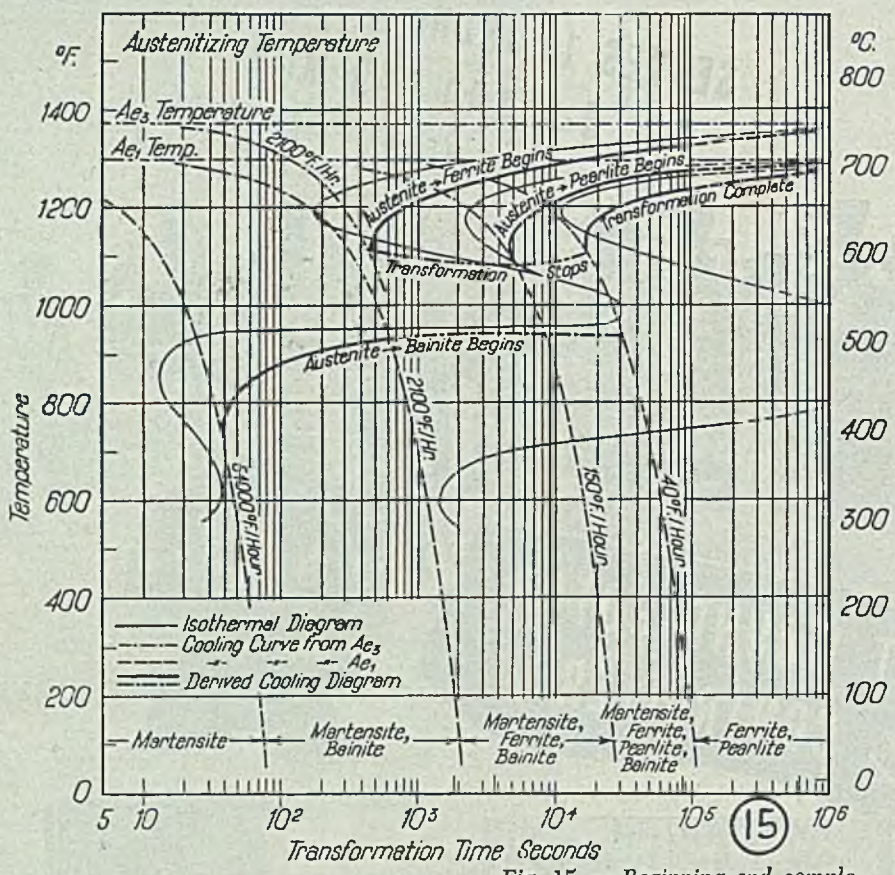


Fig. 15 — Beginning and completion of transformation for SAE 4340. S-curves (in light lines for 4340) are on basis of instantaneous cooling to a certain temperature and holding constant

Fig. 16—Micrograph 1000X showing cracks in part carburized and water quenched

TABLE II
COOLING SPEEDS AT 1000 DEG. FAHR.

	Per Second
Mineral oil at 70° F.	100 to 145° F.
Molten salt at 400° F.	115° F.
Molten salt at 500° F.	95° F.

definite dimensional and micro-structural changes taking place at the so-called critical temperature. As steel is heated, a steady thermal expansion takes place as the temperature increases until the critical is reached, whereupon a contraction in volume accompanies the heat-absorbing transformation as the metal passes through the critical range. Differences in the speed at which temperature rises or austenizing temperature is reached — as between thick and thin sections of parts of variable cross-section — cause distortion, warpage and differences in austenitic grain size. However, the rate of heating is not as important as obtaining a uniform austenizing temperature, and determining and holding the proper maximum temperature for the proper period of time.

High Temperature Soak

Time requirements for diffusion to obtain homogeneous austenite vary somewhat, depending upon the chemical composition. Elements diffuse at different rates. Many alloy steels are "sluggish" and require a longer soaking time at the austenizing temperature; often the temperature may be raised to accelerate diffusion without undue coarsening of the grain.

Actual heating temperature should be somewhat above $A_{3,2}$ the upper critical temperature, to assure homogeneous austenite. When heated too long after complete solution occurs, an increase in the austenitic grain may result. Some steels coarsen much more rapidly than others. A higher temperature than necessary has the same coarsening effect, although with fine-grain steel (which are really steels that start to coarsen at relatively high temperatures) this is less dangerous than too low a temperature. Complete austenizing may not be desirable in hyper-eutectoid steels but the pearlite should always be transformed into austenite as homogeneous as possible. Uniform austenite places the steel in proper condition to respond to cooling. It is now ready to quench.

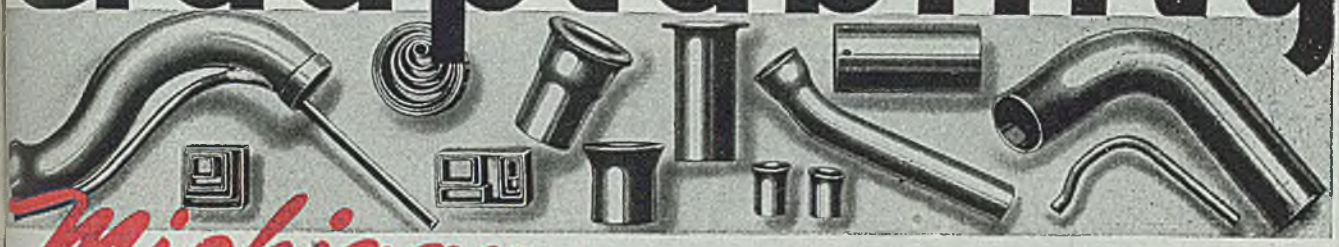
To understand what occurs when steel is cooled and the effect of different cooling rates, it is necessary to know the time required for decomposition of austenite at various temperatures, and what the resulting microconstituents will be. This was summarized by discussion of construction and use of the S—curve in the first article of this series. (See STEEL, Sept. 3, 1945, p. 120).

Carpenter and Robertson's work in England, contained in their two volumes entitled "Metals", has shown that austenite undoubtedly transforms to martensite as the temperature drops through a range which is characteristic for most of the commercial carbon and alloy heat-treated structural steels. When the steel is quenched by exceeding the critical cooling rate — that is to say, at such a

TABLE III
HARDNESS LIMITS AND COMMERCIAL MAXIMA IN SIZE FOR AUSTEMPERED PARTS

Type of Steel	Analysis of Steel C	Mn	Cr	Ni	Mo	Hardness Ceiling, Rockwell C Scale	Largest Round (or Equivalent in Area)
Carbon	0.95 to 1.05	0.30 to 0.50	.....	.....	.....	57 to 60	0.148 in.
Carbon (high Mn)	0.95 to 1.05	0.60 to 0.90	.....	.....	.....	57 to 60	0.187
Carbon	0.80 to 0.90	0.30 to 0.50	.....	.....	.....	55 to 58	0.156
Carbon (high Mn)	0.80 to 0.90	0.60 to 0 90	.....	.....	.....	55 to 58	0.218
Carbon	0.60 to 0.70	0.60 to 0.90	.....	.....	.....	52 to 55	0 187
Carbon (high Mn)	0.60 to 0.70	0.90 to 1.20	.....	.....	.....	53 to 56	0.281
Carbon (very high Mn)	0.60 to 0.70	1.60 to 2.00	.....	.....	.....	53 to 56	0 625
Alloy (C-Co)	0.65 to 0.75	0.75 to 0 95	.....	.....	.....	53 to 56	0 623
Alloy (C-Cr)	1.00	0.40 to 0.60	0.40 to 0.60	.....	0.25	57 to 60	0.312
Alloy (S.A.E. 4150)	0.45 to 0.55	0.60 to 0.90	0.80 to 1.10	.....	0.15 to 0 25	52	0.500
Alloy (S.A.E. 5365)	0.60 to 0.70	0.50 to 0.80	0.50 to 0.80	1.50 to 2.00	0.30 to 0.40	54	1.0 or larger

Adaptability



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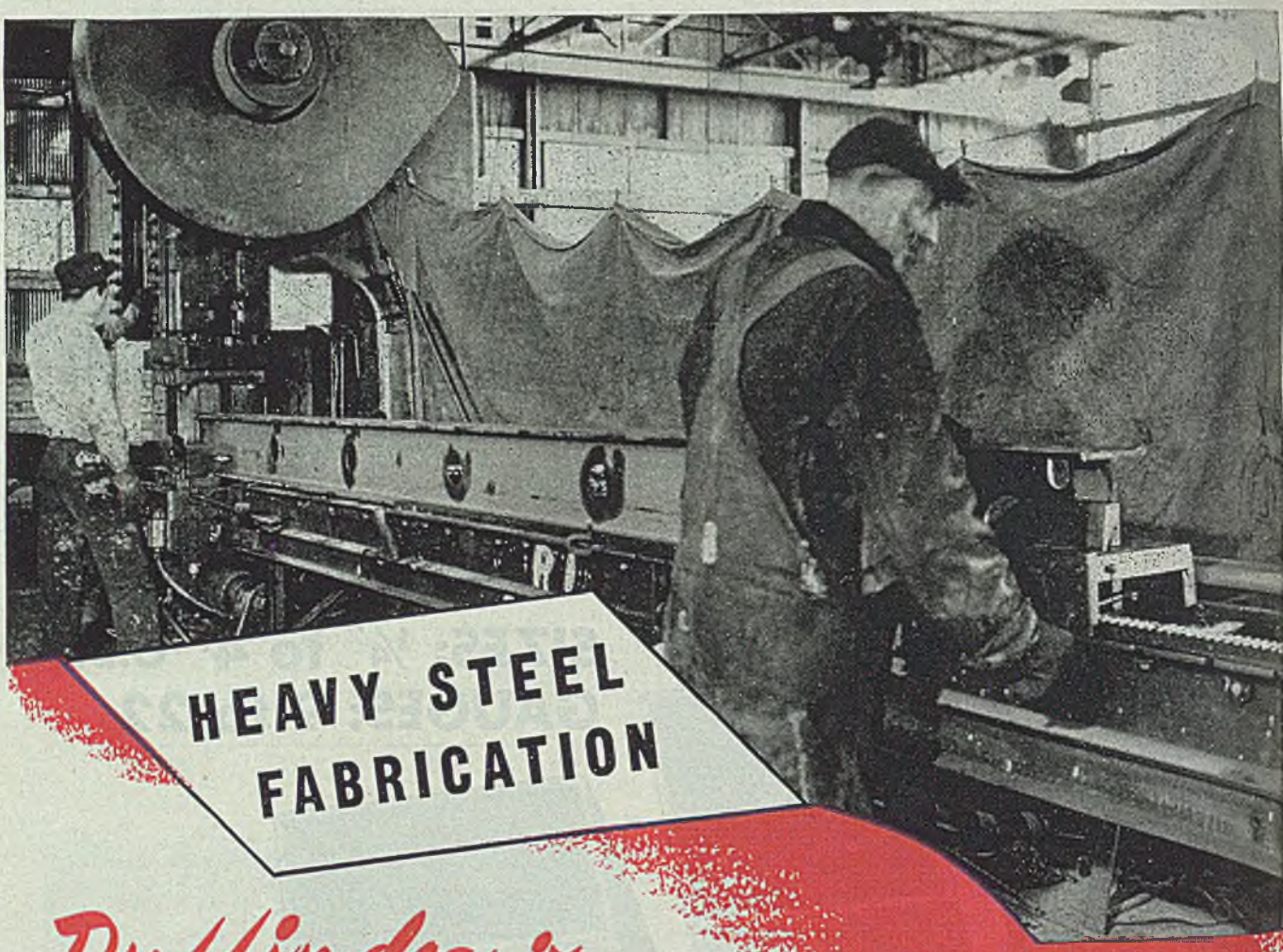

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peed that no austenite has time to ansform between 1150 and 850° F, he region of the nose of the S curve) ansformation of austenite is suppressed ntil the M. point is reached; formation f martensite then starts and continues s cooling progresses. When the M. point is reached, the austenite is practically completely transformed to martensite. In some tool steels and in high alloy steels a certain amount of austenite is retained untransformed after the quench.

If, in the process of quenching, the cooling is interrupted at some temperature within the martensitic transformation range, then transformation stops. If a constant temperature is held, isothermal transformation will start after some little time and progress slowly, but the time required for complete transformation would take too long for this scheme to be of any practical use in commercial heat treating. If, after interrupting such a quench, cooling is then continued, austenite will again continue to transform to martensite until substantially completed.

Steels cooled by the usual quench in oil or water are transformed during the cooling. They do not transform at the same rate and time, surface to center, as occurs when holding at a constant temperature, thus permitting isothermal transformation. It has been found by Grange and Kiefer that transformation during continuous cooling and isothermal transformation have a definite relation which can be evaluated. If transformation curves for continuous cooling and constant temperature be superimposed, the curves representing beginning and end of transformation during continuous cooling in commercial quenches will be somewhat below and to the right of the constant temperature or isothermal curve.

Since it has been determined that there is a definite relationship between the two types of cooling, the isothermal diagrams can be used with a reasonable degree of accuracy to predict the time-temperature and the resulting product. Liedholm has presented a method whereby a continuous cooling transformation diagram can be constructed from a series of Jominy end-quench test bars.

Fig. 15 is Grange and Kiefer's diagram showing the beginning and completion of transformation for SAE 4340, which reveals the above mentioned relationship between transformation during constant cooling, and isothermally. The slow critical cooling rate of alloy steels has many advantages, since maximum hardness can be obtained with a less drastic quench, larger pieces may be quenched to full hardness, higher fatigue and tensile strength and greater toughness. Influence of the cross-section of the part being quenched must continually be borne in mind while considering any heat treating process. The microstructure produced is in a large measure related to the rate of cooling and it is evident that under any given set of conditions large sections will cool at a slower rate than thin sections. Equivalent final structures can only be had by using a faster quenching medium to neutralize the effect of larger sections, or by changing to a steel with a slower critical cooling rate.

The size of section and the severity of the quench have an influence in the occurrence of the common quench crack and the less familiar microscopic cracks. See Fig. 16.

Effects of Quenching Media

Cooling curves of the outside and center of similar pieces quenched in water, oil, air and salt and the process of transformation by these various quenching methods are illustrated in Fig. 13. In each case, the quenching speed exceeds the critical cooling rate of the steel being quenched, making it compulsory for martensite to form. The quenching rates are seriously affected by a natural law relating to mass of the part, which causes the interior portions to lag behind and cool slower than the outside. The faster the quenching speed, the greater the temperature differential between the surface exposed to the coolant and the center.

With a very rapid quench, such as shown by the curve for water quenching, there is a notable temperature difference between the outside and center, measured by the distance between curves at any time ordinate. When the surface of the part reaches the M. point, transformation of austenite begins, and progresses to completion at the M. point. It is readily seen that in water quenching of the part in question, the outside is completely transformed while there is a large portion of the center still austenitic and above the M. temperature; in other words, there is a large volume of unstable austenite entrapped in a case of hard, brittle martensite. Later, as the center cools through the martensite transformation range, the entrapped austenite transforms. This would not be serious but for the fact that in the transformation of austenite to martensite there is an increase in volume. It is this internal expansion within a shrunk hard case that causes excessive residual strains and quench cracks, distortion and low ductility.

The curves for oil quenching show a slower rate of cooling and a smaller temperature difference betwen the outside and center of the piece, resulting in greater amount of transformation and accompanying expansion of the center before the surface reaches the M. point and forms a case of brittle martensite. Oil quenching therefore results in a smaller volume increase as there would be less transformation to take place within the part after the transformation is completed on the surface.

Steels that harden on such slow cooling as in still air are used for complicated dies and sections because they transform (as shown by the curves in Fig. 13) at the same time in all parts, and thus have a minimum of residual strains and possibility of quench cracks. When air quenched, the temperature difference between the outside and center is quite small and the formation of martensite will occur as the temperature drops through the transformation range at a fairly uniform rate throughout the matrix of austenite. Furthermore there is usually a sizable amount of retained austenite at the end of the quench and this relatively soft constituent will cushion or adjust the stresses so that a minimum of residual internal strains result.

Martempering

Martempering (its name indicates that the formation of martensite is the primary objective) consists of quenching the hot steel in a liquid salt bath at an elevated temperature above the M. point, holding in the bath long enough for the part to become uniform in temperature throughout, then cooling in air, then following with a conventional tempering

(*Please turn to Page* 164)

SNOW CRUISERS: Aluminum and steel construction of these tractors built by Iron Fireman Mfg. Co. of Portland, Oreg. allow them to be driven into large planes and carried to search areas for rescue, supply and scouting work of the Army Air Forces. The snow cruisers can be dismantled into four parts. Top speed is 18 miles per hour and maximum load over 2 tons. They will climb grades as steep as 35 degrees in deep snow, extra wide tracks and deep grousers aiding traction

SPIEGELEISEN *Its History, Uses and Purpose*

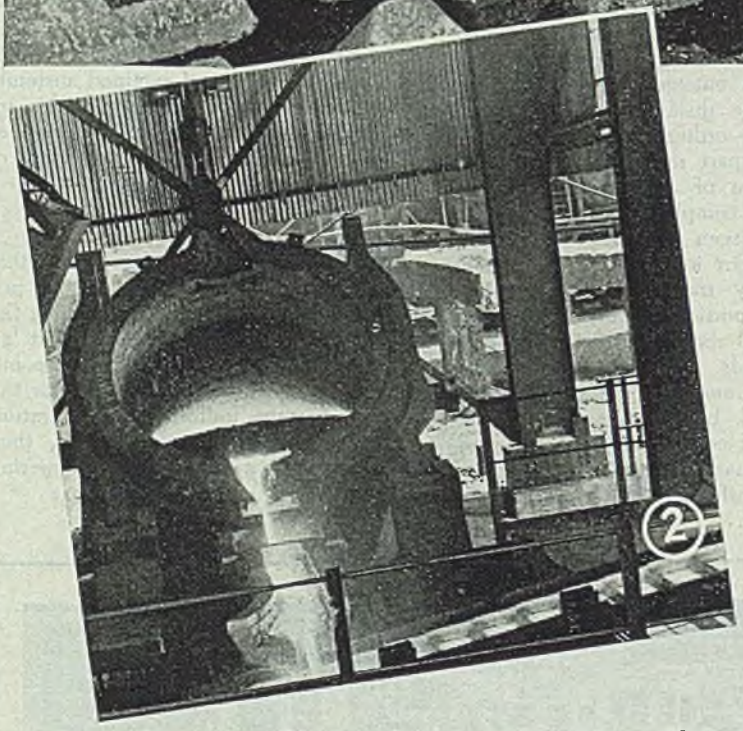

Fig. 1—Pigs of spiegeleisen weigh about 80 lb and are molded with breaking notch in middle

Fig. 2—Molten spiegel being poured into single-strand pig machine molds

Iron-manganese alloy produced in this country for past 90 years is available in three grades, all low in phosphorus and varying in manganese and silicon contents. Product finds wide application in acid and basic open-hearth shops for recarburizing and reboiling and for blocking carbon content of heat; also helpful in gray iron and malleable practice

By S. E. MAXON
Technical Service
New Jersey Zinc Co.
New York

SPIEGELEISEN is probably the most versatile alloy employed in the manufacture of iron and steel. It is used in the production of basic and acid open-hearth steel, electric furnace steel, duplex bessemer and open-hearth steel, duplex bessemer and electric furnace steel, and bessemer steel as well as in the production of gray iron and malleable iron in the cupola or air furnace, and the duplex processes which are used in their manufacture. It is added in the charge, or during the refining or finishing periods or for alloy purposes. It probably has more applications than any other ferroalloy.

Someone might advance the fact, in partial explanation, that this iron-manganese alloy has been produced in this country since 1855. Actually, however, although more concentrated manganese alloys have become available during these 90 years, spiegeleisen has not only been standard for certain practices during all of this time, but has greatly expanded its fields of application.

During the present war, as during most of this period of 90 years, the New Jersey Zinc Co. has been the largest producer of spiegeleisen consumed in this country. Various needs of the steel industry now justify three grades of this iron-manganese alloy, all characterized by low phosphorus, but varying in their content of both manganese and silica. Carbon varies only slightly with the silicon content, and is usually of no importance. The grades produced have the typical composition shown in the accompanying table.

Probably there is no individual com-

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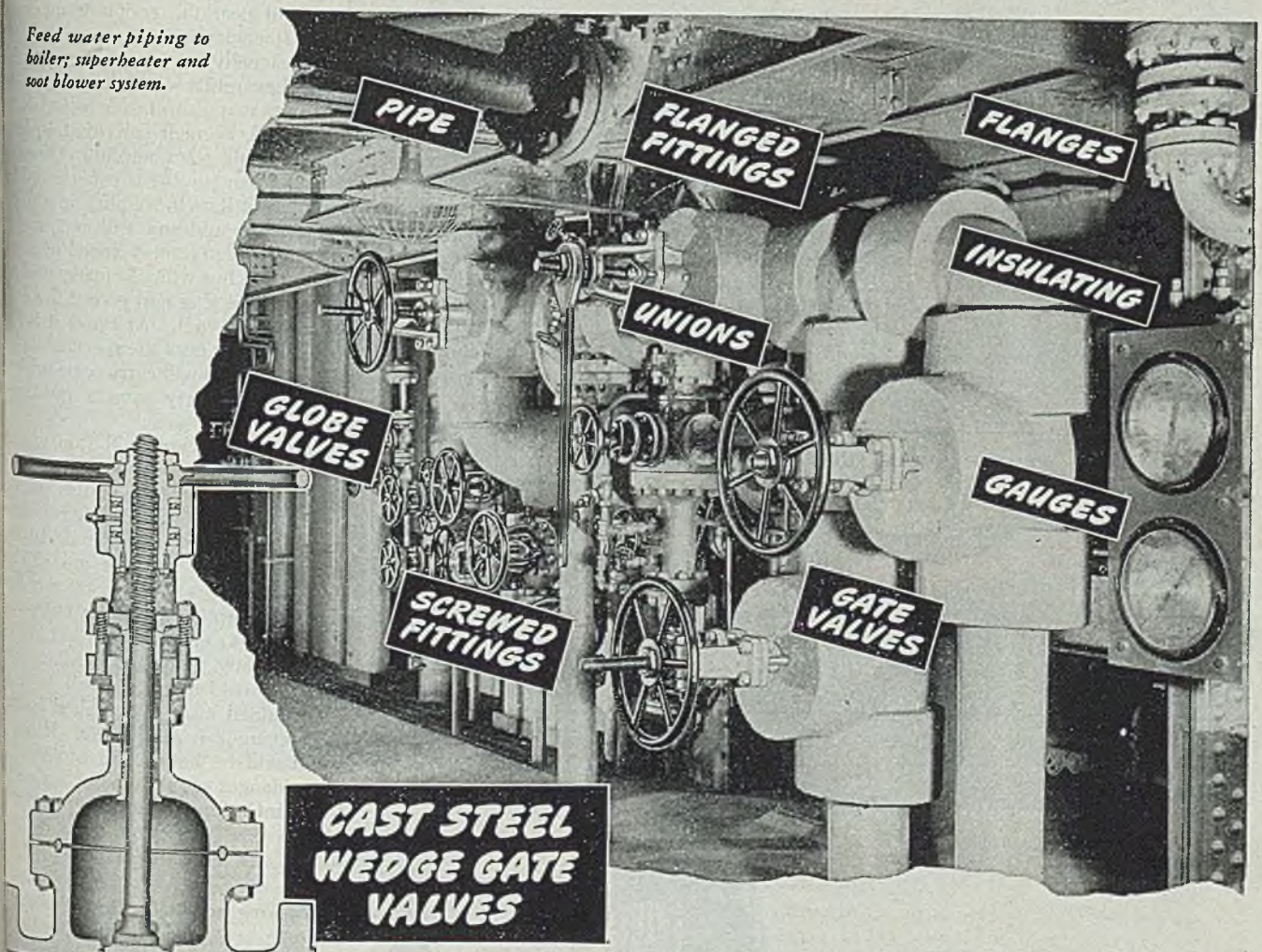

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nected with the steel and iron industry who is not in a more or less general way familiar with the colorful name spiegeleisen and the fact that the literal translation, "mirror iron", is remarkably descriptive of the large mirror-like crystals which are revealed when the pigs are broken. It is probably the oldest ferroalloy used in the industry and was intimately associated with development of the bessemer process of steelmaking. Spiegeleisen was first made in Prussia about 1850, and has been made in this country from the Franklin ore since 1855. While a blast furnace was built and attempts were made to smelt these ores as early as 1779, nothing of commercial importance was accomplished until a furnace was built in Newark, N. J., in 1855.

The early output was used for safe linings under the name of Franklin Iron. The product was soon found to be of value in the manufacture of car wheels, and is still used by nearly all foundries producing chilled iron wheels. Naturally is was also used extensively in the bessemer converters which were built in this country at about the same time, and for many years all of the steel made by this process was recarburized with spiegeleisen which was melted in a cupola and added to the blown metal in the molten state.

Today, if the subject of spiegeleisen is discussed with a steelmaker or foundryman he naturally thinks of his own application of the alloy, but is not always familiar with the many other ways in which it can be advantageously used. It is hoped that the following general description of the varied uses of this alloy will be helpful to those in the industry who are responsible for the excellent quality and large quantity of steel and iron which is produced today.

Use in the Charge: Spiegeleisen is frequently used in the charge of both basic and acid-open-hearth furnaces. It is not always possible to secure the required amount of manganese from the available scrap and pig iron, but by the addition of the proper amount of spiegeleisen it is possible to do this and insure the necessary manganese for best slag properties and the most desirable residual manganese.

A condition is frequently encountered in plants making both ingot iron and steel using hot metal. A high-manganese charge is desired for the steel heats and low manganese for the ingot iron. It is not practical to change the blast furnace product, but by running the furnace on low-manganese iron it is possible to add spiegel to the open-hearth furnace when steel heats are being made.

In plants using a cold metal charge it is often economically advantageous to increase the amount of scrap charged when the price ratio with pig iron is favorable. Sometimes this results in a lower total carbon and manganese than is desired, and spiegeleisen is helpful in supplying both of the required elements. In acid open-hearth furnaces the low phosphorus and sulphur content of spiegeleisen is of great assistance when this practice is followed.

Recarburizing and Reboiling: One o the most valuable and widespread uses o spiegeleisen is for recarburizing and re boiling open-hearth heats. Its purpose i to prolong the boil without taking th heat down too low in carbon, and at th same time gain temperature.

Open-hearth furnace operations depen on a boil in the bath to provide the neces sary agitation and circulation so that th metal may absorb heat from the flame Ore or pig iron may be used for thi purpose during the early stages of th heat, but near the end it is much safe to use spiegeleisen.

Occasionally it is necessary to hol a heat beyond its scheduled tapping time or a heat may drop faster in carbon tha anticipated, or melt soft (that is, low i carbon.) Spiegel is helpful in these case as it is when trouble is experienced fro undissolved lime in shaping up a slag. spiegeleisen addition will not only giv the needed agitation to speed up solutio of the lime, but will add manganese oxid (MnO) to the slag and give it the desire properties as well. At times it is foun that sulphur is near the specification limi A spiegel reboil will carry some sulphur t the slag and may save a questionabl heat.

Sometimes a boil will stop when th carbon is still a few points too high. O is not considered safe at this point an cold steel rods, while effective momen tarily, are temporary and laborious Green poles or saplings are also use but are cumbersome, and there is dange of gas absorption from the water vapo Spiegeleisen, entirely safe and effectiv will not only produce a quick local bo from the cold metal reaction, but it wi be sustained after it is melted inasmuc as manganese is exothermic. Hence, th metal will be hotter. In addition, ther is no danger of phosphorus reversion s the MnO formed in the reaction in creases the basicity of the slag. Som oxides will be carried out as the Mn rises.

Blocking and Reboiling: Probably th largest use of spiegeleisen is for blockin and reboiling open-hearth heats. Whe the carbon in a heat has been reduced t the desired point, a further drop is elim inated by adding spiegeleisen. Th manganese reduces the iron oxide (FeO of the steel, thus stopping the FeO+ reaction while the analysis is bein checked. At the end of this time, Fe diffuses from the slag to the metal an the boil is resumed. While silicon allo have been used for this purpose, spiege

(*Please turn to Page 172*)

COMPOSITION OF THREE GRADES OF SPIEGELEISEN

Element, %	GRADE A	GRADE B	GRADE C
Manganese	16.00-19.00	19.00-21.00	19.00-21.00
Iron	73.50-78.00	71.00-75.50	71.00-75.50
Carbon, combined	4.25- 5.00	4.25- 5.00	3.00- 3.20
Carbon, graphitic	0.15- 0.35	0.15- 0.35	0.90- 1.10
Silicon*	1.00- 3.00	1.00- 3.00	3.50- 4.50
Phosphorus	0.05- 0.08	0.05- 0.08	0.05- 0.08
Sulphur	0.01- 0.03	0.01- 0.03	0.01- 0.03

*Grades A and B also available with 1 to 2, or 2 to 3 per cent silicon.

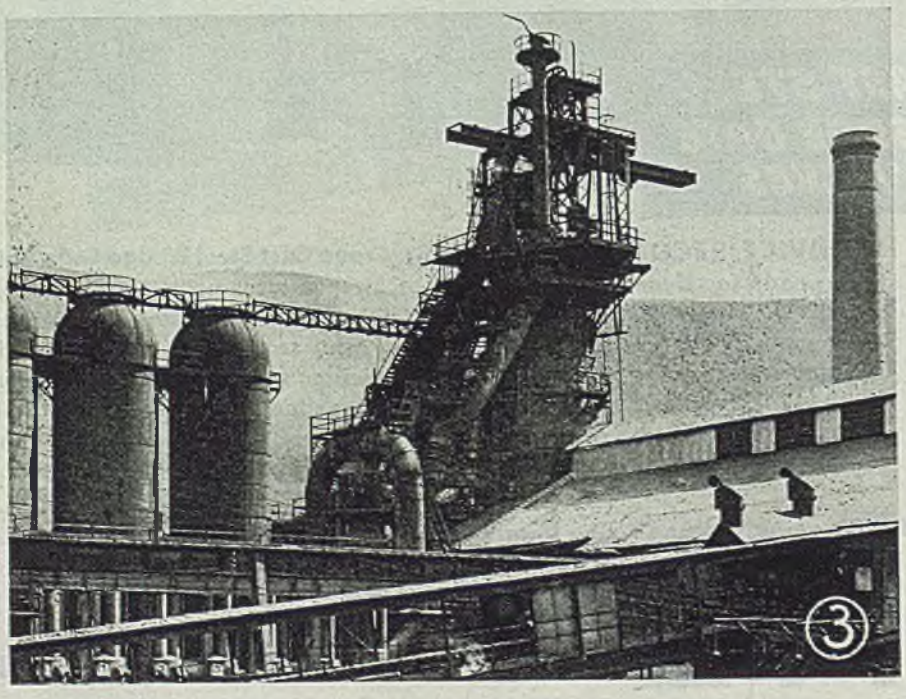

Fig. 3—One of the blast furnaces at Palmerton, Pa. plant of New Jersey Zinc Co. burdened for spiegeleisen production

This huge marine cargo drive is typical of the unusual machining and assembly jobs that are handled every day at Warren City. One of the best-equipped heavy steel fabricating plants in the world, Warren City's facilities include more than 600 separate pieces of large-capacity equipment. These include planers, shapers, milling machines, lathes, boring mills, drills, cranes, automatic welders, grinders, flame cutting machines, stress-relieving furnaces, and extensive facilities for X-ray and other types of testing. Send for our illustrated brochure, "Men, Machines and Management for Heavy-Industry Jobs," with complete listing of the facilities and equipment in our huge plant at Warren, Ohio. Located in the heart of the Cleveland-Pittsburgh industrial area, Warren is on main or connecting lines of four major railroads.

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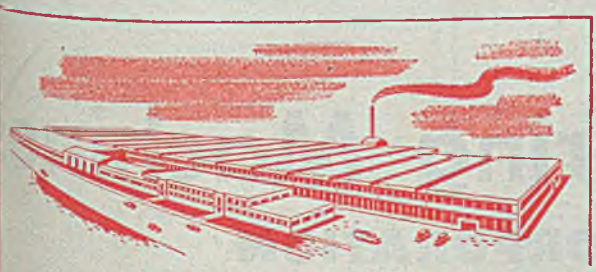

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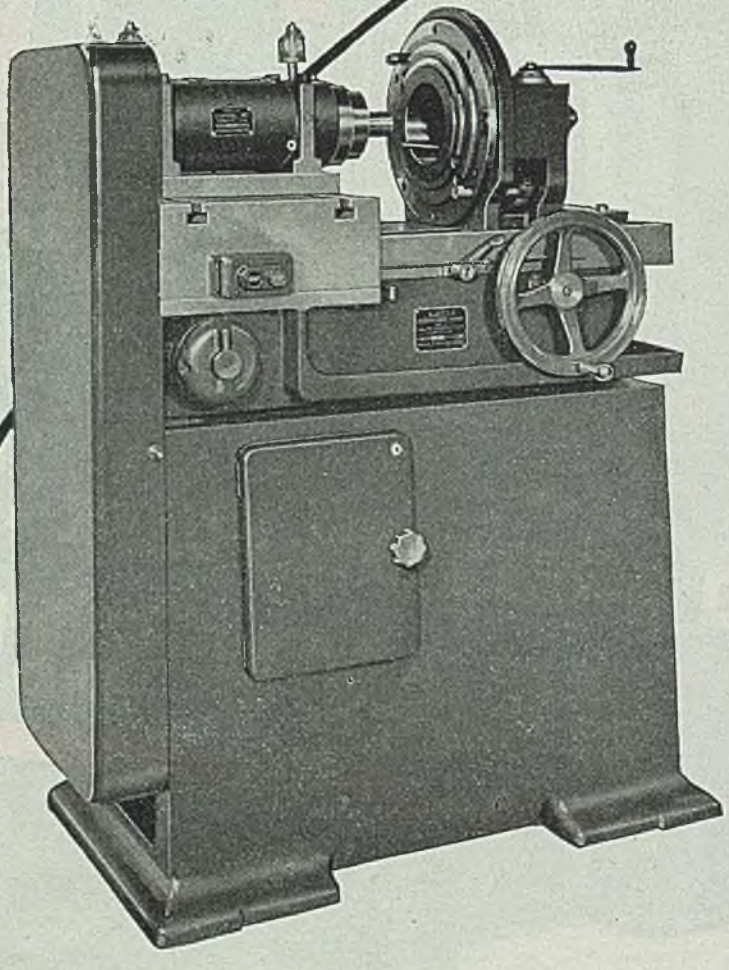

The SIMPLEX No. 2B Precision Boring Machine shown is equipped with No. 3 spindle and a multiple step locator type of fixture for mounting three sizes of motor end shields for precision boring bearing holes in accurate concentricity with the rabbet. A quick-acting clamp operates two hook bars which both seat and eject the piece mechanically so that loading and clamping is very fast and positive and ejection equally fast and positive. Micrometer eccentric adjustment of the tool makes for extreme accuracy in addition to concentricity and squareness desired.

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EFFECT of Polishing STEEL

On Protective Value of Electroplated Coatings

Results of studies to determine whether surface finish of a steel affects protective value of plated coating are timely and of interest to all fabricators of steel products requiring a protective or "bright" plate

RECENT report on studies carried out the National Bureau of Standards in operation with the American Electroaters' Society[1] shows that wide differnces in the surface finish of a steel have o significant effect on the protective alue of the plated coating. However, the report on this work, it was brought t that this may apply only to a very e quality of cold-rolled steel. Results ported several years ago by other inestigators[2] indicate that proper polishg improves the life of coatings on ordiny commercial cold and hot rolled steel t not on the high quality cold rolled eel.

The question of whether the finish of el prior to electroplating affects the tective value of the plated coating is widespread interest to engineers, deners and finishing experts dealing with e fabrication and production of a vaety of iron and steel products. Now t reconversion to civilian goods has rted, finishing for appearance as well corrosion protection again is of inrest.

Studies carried out at the National Buau of Standards by G. A. Lux and Wilm Blum[1] and reported in the April e of the Journal of Research of the ational Bureau of Standards concerned ntrolled thickness plating, with copperckel-chromium and nickel-chromium, steel specimens on which the degree polish varied from that produced with very coarse abrasive (90-grain) to the called "superfinish." These test specins then were exposed to the atmosere at New York; Sandy Hook, N. J.; d Washington. The extent of rusting served at periodic intervals of inspecn was expressed on a numerical scale d average results over a period such 1 year finally were expressed as "perntage-scores."

For most decorative plating it is cus-

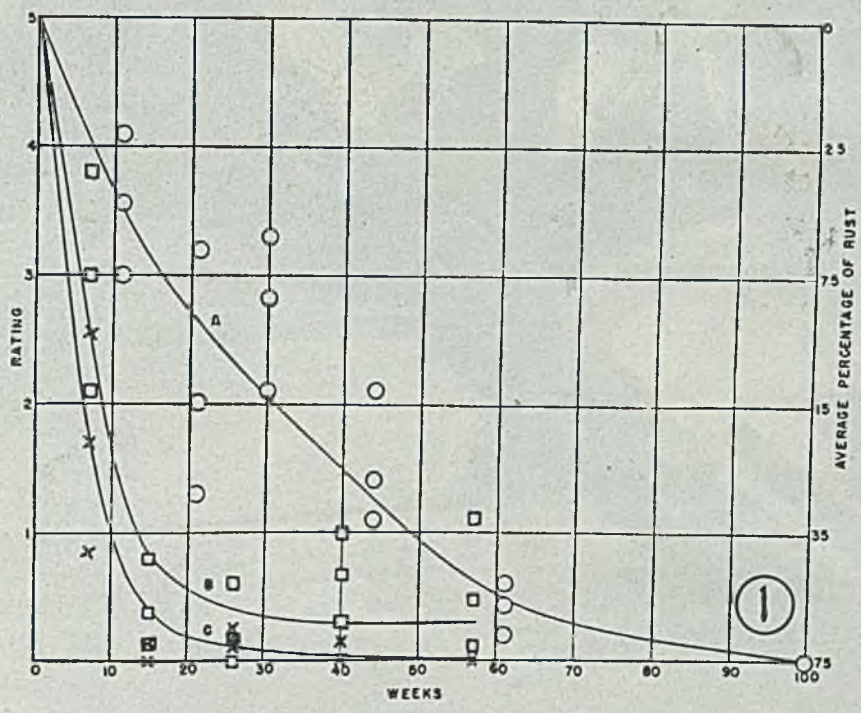


Fig. 1—*Rate of failure of bright nickel on steel. Curve "A," Washington, D.C.; curve "B," New York City; curve "C" Sandy Hook, N. J.*

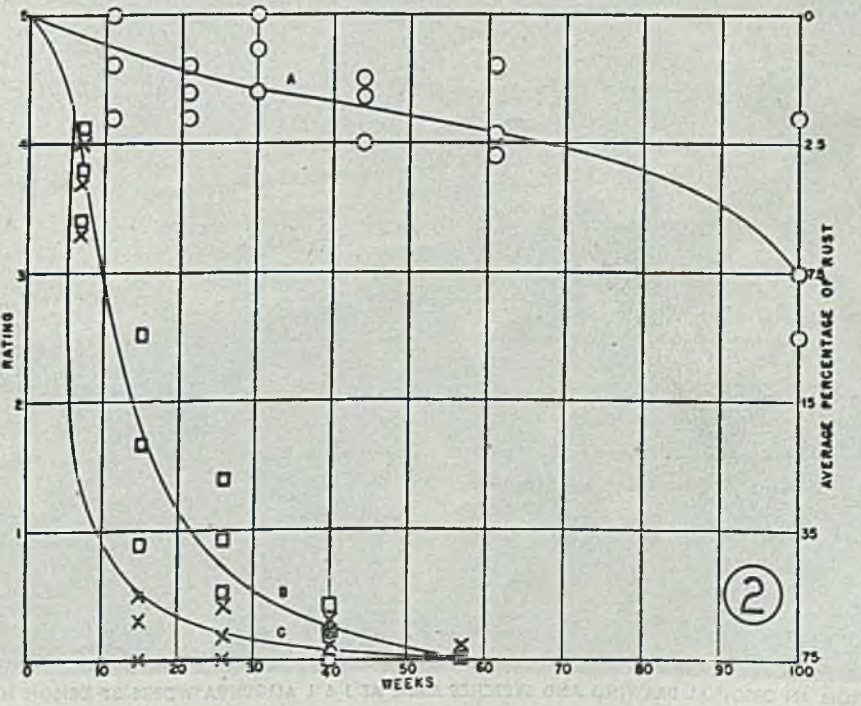
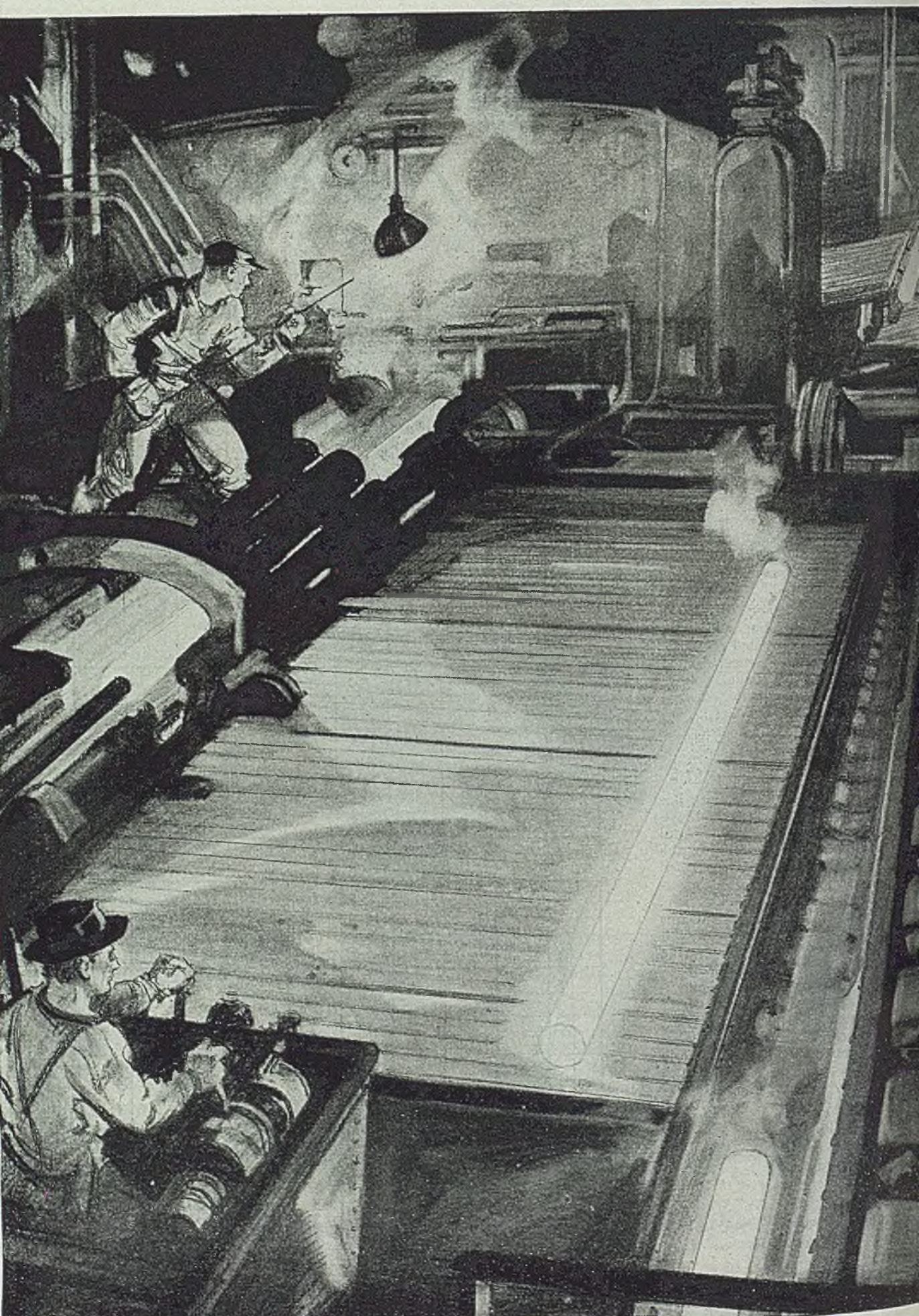


Fig. 2—*Rate of failure of buffed dull nickel on steel. Tests were based on same locations as Fig. 1*



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OIL & STEEL

Steel pipe line mileages in U.S. total 389,000, divided into trunk lines as follows: crude oil, 128,000 miles; natural gas, 245,000 miles; gasoline, 16,000 miles. To this can be added an estimated equal mileage of gathering lines from the wells.

5 million bbls. daily of crude are produced, gathered, and transported in pipe lines.

Steel tank cars saved the day for the Allies at start of World War II by hauling eastward millions of bbls. of petroleum products while the "Big Inch" and "Little Inch" transcontinental pipe lines were being rushed to completion.

Pilot retired for "advanced years" by Army Air Corps, made first 100-octane tryout in 1934 as test pilot for airplane company. He filled the tanks of his Seversky with this new fuel and took off. Engine performance exceeded anything previously dreamed of. Pilot's name? Jimmie Doolittle!

First oil tank car, devised by Amos Densmore, 1865, a flat car on which he built two 45 bbl. wooden tanks, arrived in New York without leaking.

Col. Drake originated casing for world's first oil well to stop earth from caving in the hole before the drill got down to solid rock. By driving a length of iron pipe through the soil down 39 feet to bedrock, he drilled the well inside the pipe, thus establishing the flourishing business of manufacturing steel casing for oil and gas wells, in which the J&L pipe mills participate extensively.

William A. (Uncle Billy) Smith, and his two sons, experienced salt and water well drillers, were hired by Col. Drake to drill the first oil well on the site of an oil seepage long known around Titusville. The well came in Aug. 30, 1859 at 69½ feet. Uncle Billy leaped on a mule and set out to spread the news. That oil brought $20 a barrel.

Post-war motoring will benefit from products perfected by petroleum industry for war and enjoy cheaper, quicker, smoother driving, longer life for engine parts, G. H. Freyermuth, Standard Oil of New Jersey engineer, told *New York Times.*

Electric welded tube plant at Oil City, Pa., has been purchased by Jones & Laughlin Steel Corporation. Its production of electric welded mechanical and pressure tubing in sizes ⅝-inch to 4-inch outside diameter, inclusive, will supplement J&L's present line of seamless, lapwelded and butt-welded tubular products.

Steel has no substitute in the national economy, indicates the following extract from report submitted (June 14, 1945) by Senator J. C. O'Mahoney for Committee on Military Affairs: "In 1944, steel was the most important of all processed metallic and non-metallic basic materials used by manufacturing industries in the United States, accounting on a tonnage basis for about 85% of the total, while light metals accounted for only about 1.8%."

tomary to produce a bright finish. Results of studies are of particular interest in view of the fact the copper-nickel-chromium combination is among the most widely accepted of common decorative plating procedures. Also of interest to the finishing engineer was the finding that exposure panels with buffed copper under bright nickel were distinctly better (21 per cent) than those with bright nickel of the same total thickness applied directly to the steel, and were equal to those with buffed dull nickel of the same total thickness.

Defining Surface Finish: The term "polishing," as generally used in the plating and metal finishing industry, implies removal of metal from a surface by means of abrasive particles attached by an adhesive to surface of wheels or belts. While this method normally is used commercially for the purpose of making the surface smoother, Lux and Blum applied it in their investigation to yield any desired finish, which in some cases gave a surface rougher than the original, as, for example, when cold-rolled steel was polished with a 90-grain abrasive.

In order to insure that specimens polished according to a given procedure were sufficiently like each other and sufficiently different from those of another set to give reproducible and significant results, it was necessary for the investigators to employ some objective method for defining the surface finish produced. Various methods have been proposed for measuring surface roughness, including (1) microscopic examination of cross section, (2) visual or photographic examination, usually with aid of a microscope, (3) measurements of reflectivity and (4) tracer methods. Lux and Blum found that the tracer methods could best be applied to their particular problem, as it was necessary to use a method that fully defined the surface because all comparable specimens were polished by about the same procedure except for the grain size of the abrasive.

In the tracer methods the mechanism involves the drawing of a fine-pointed stylus across the surface whereupon its movements are measured or recorded. In the Brush surface analyzer[3] this is accomplished by means of a tracing pen, the vertical fluctuations of which are usually magnified much more than the horizontal. Typical results are shown in Fig. 3. The steel specimen was polished by a wheel headed with 120-grain abrasive. Vertical magnification was X 3200, and horizontal magnification X 80.

The profilometer[4] converts movements of the stylus electrically into scale readings the magnitude of which expresses in microinches the root mean square of the deviations of the contours from a plane. Lux and Blum found that each of these tracer methods for recording the condition of the surface had definite advantages and limitations. The Brush method gave a permanent record that was especially valuable in comparing the exact contours of surfaces. Because of the large magnification involved, this type of record usually covers only a short distance, about 0.06-in., and many observations would be required to explore and properly record the surface. The profilometer permits measurements over distances of several inches and directly yields numbers that serve to identify surfaces of a given type. To facilitate an accurate comparison of the finish produced at different stages in the life of a polishing wheel, systematic profilometer measurements were made throughout the entire investigation.

Procedure Followed: Lux and Blum used for their study an SAE 1010 steel of No. 22 U. S. gage having a cold-rolled No. 3 finish and a No. 3 temper. Polishing grains consisted of artificial aluminum oxide with specified grain sizes from 90 to 320. Care was taken to secure uniform surface finish in the polishing operation. Strips of cold-rolled steel were polished with wheels to which abrasives of different grain sizes were glued. Resultant finishes were measured with a profilometer and were expressed as root mean square, in microinches, of the departure of the contours from a plane surface. The finishes varied from a "superfinish" with a root mean, square of less than 1 microinch to 65 microinches, produced with a 90-grain abrasive.

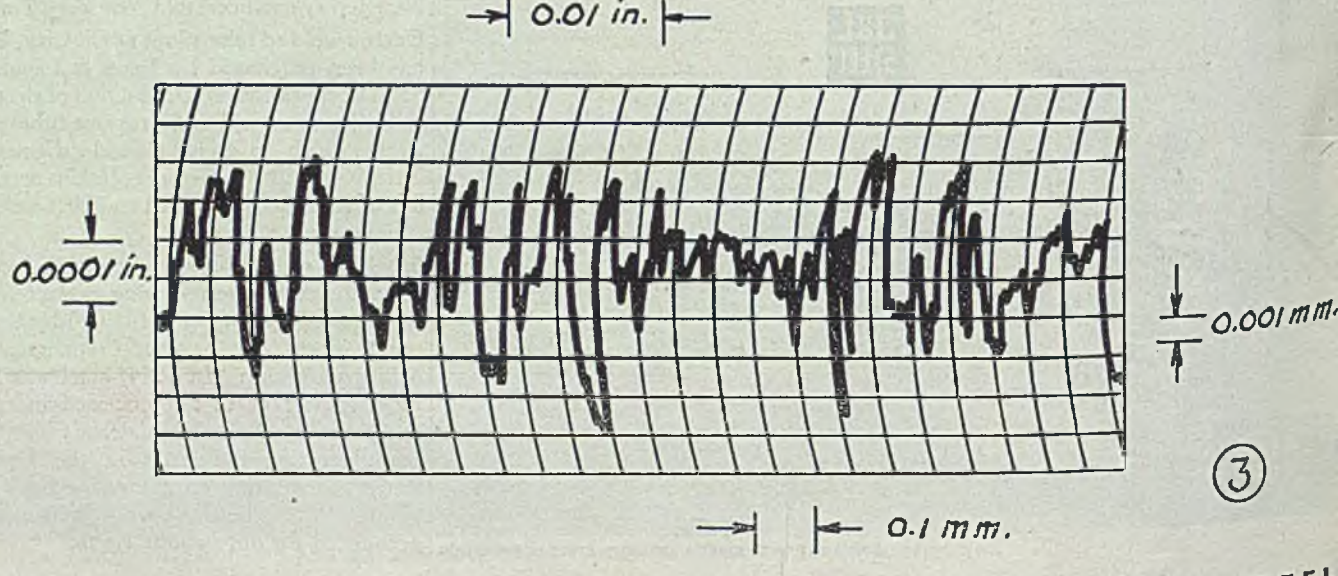
In general, the racked specimens were subjected to the following cycle of operations prior to plating: (1) Degreasing with trichlorethylene in a vapor degreaser, (2) electrolytic alkaline cleaning, (3) rinsing in water, (4) dipping in acid, and (5) rinsing in water. A Rochelle salt copper, a dull nickel, a proprietary bright nickel, and a chromium plating solution were used in plating operations.

Atmospheric Exposure Tests: Inspections of exposed test specimens were made at regular intervals by members of the American Electroplaters' Society Research Committee and other interested persons. Each inspector assigned to every specimen a numerical rating from 0 to 5. This was based on the percentage of the surface that had failed, the failed area being determined by the amount of rusting. Fig. 1 and Fig. 2 show the course of corrosion as a function of the elapsed time for the buffed dull nickel and bright nickel coatings on steel, respectively, in the three locations[5]. Specimens in both Fig. 1 and Fig. 2 were coated with 0.00075-in. of nickel and 0.00002-in. of chromium. Eight sets of each type of coating were exposed in each of the three locations. Finish varied from 90 grain to superfinish. The three points in each location for each period represent maximum, average and minimum ratings of each set of eight.

Results: Tests carried out by Lux and

(*Please turn to Page* 186)

Fig. 3—Brush surface analyzer chart. Vertical magnification X3200. Horizontal magnification X80. Steel specimen polished with wheel headed with 120 grain



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The new Shell Tellus Oils are not designed to *remove* rust. They will not eliminate all existing rusting conditions that may be present in your machines. But, where moisture is a factor, the new Shell Tellus Oils, because of the special rust inhibiting qualities built into them, afford unequalled protection against the formation of rust. At the same time, moving parts are lubricated and protected against wear.

In addition to helping prevent rust, Shell Tellus Oils have other valuable assets. For example, they have high oxidation stability. This prevents sludge, keeps viscosity uniform, and enables the oil to shed moisture throughout long periods of service.

Still another advantage of this oil is its high viscosity index, which prevents wide fluctuation in oil viscosity with varying temperatures.

* * *

Why not try this new-type oil? It is available in a number of grades, providing necessary viscosity ranges for all normal applications. For details, get in touch with Shell Oil Company, Incorporated, 50 West 50th Street, New York 20, New York; or 100 Bush Street, San Francisco 6, California.

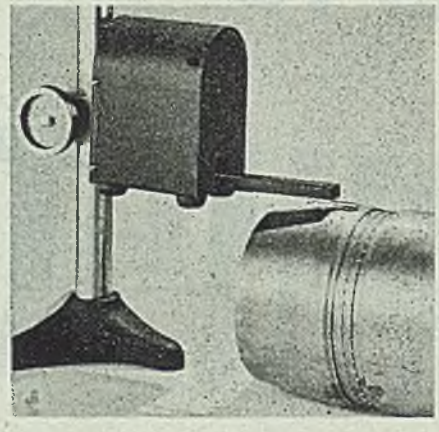
SHELL

SHELL TELLUS OILS

INDUSTRIAL EQUIPMENT

Measuring Head

Brush Development Co., 3311 Perkins avenue, Cleveland, announces a new rough-finishing measuring head for checking rough surface finishes and waviness in metals, glass, plastics, plated and painted material. With trend towards more rigid specifications and tolerances,



particularly on turned surfaces, the rough surface analyzer makes a complement for the company's surface analyzer. The pickup and drive head accurately measures irregularities from 100 to 3000 microinches, peak to valley. It thus extends use and range of surface analyzer from 1 to 3000 microinches.

Control Relay

A new relay for both ac and dc service is offered by Electric Controller & Mfg. Co., 2700 East 79th street, Cleveland 4, for use in relaying the output of electronic apparatus such as pyrometers, and for general control functions.

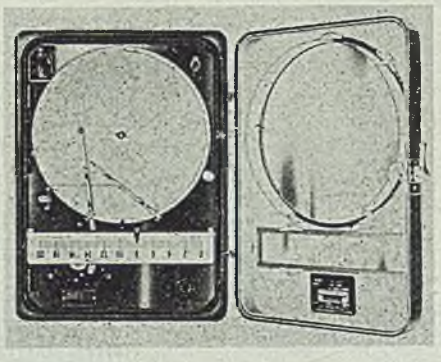
The relay is a double pole design with the poles electrically insulated on the moving arm. On alternating current, relays are available with single pole auxiliary contacts of normally-open, double-break design.

Main contacts are rated at 10 amp, 300 v and may also be used on circuits up to 600 v under certain conditions. Contacts are silver to silver, including the auxiliary contacts on ac relays.

The relay is mounted on a thick molded base for direct mounting on metal bases. Front connected relays are standard; rear connected relays are optional.

Potentiometer Controllers

Bristol Co., Waterbury 91, Conn., announces a new series of electric-type potentiometer controllers. Five basic control unit types are available. Three are electric contact types to be known as Microact controllers and the other two are electric proportioning and current input types. The control units are mounted on internal panel of the company's potentiometer recorder and any type may

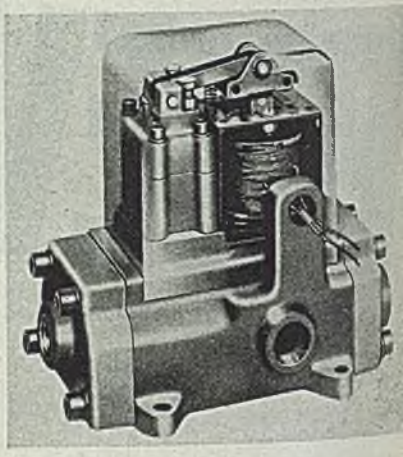


be converted to any other type by following wiring and mounting instructions.

The three Microact units are provided with one, two and three precision-type toggle switches respectively and six different terminal board connection arrangements to meet an assortment of control circuit requirements. Proportioning controllers may be used with any type of electric proportioning valve and may be had with resetting contacts if required. Proportional current input controller is primarily designed to provide close temperature control of electric furnaces and ovens.

Valve

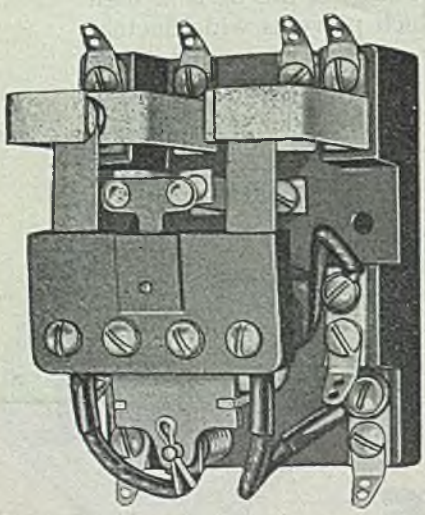
Numatics, Milford, Mich., announces a new valve with a fluid lever. The design of this valve is a combination of compressed air and electricity to effect efficient, high speed control of

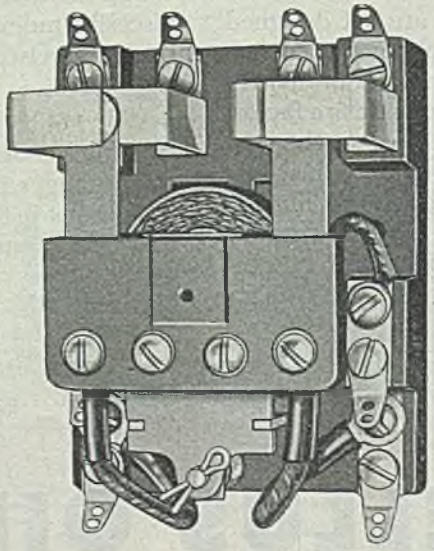


any single or double acting air cylinder up to ¾-in. pipe capacity.

Requiring fewer operating parts, the fluid lever principle achieves a design that is compact. It makes possible the use of a very small solenoid, drawing only 3.6 amp at 110 v in all models regardless of valve size. Diverting to operating advantage a portion of the air that passes through the valve controls the ratio of air balance to such an extent that the remaining effort can be handled by a small solenoid.

Valve is also suitable for two pressure control. The four-way model can be converted for three way use by plugging one port. The straight line air flow minimizes pressure drop, simplifies installation and requires fewer fittings.





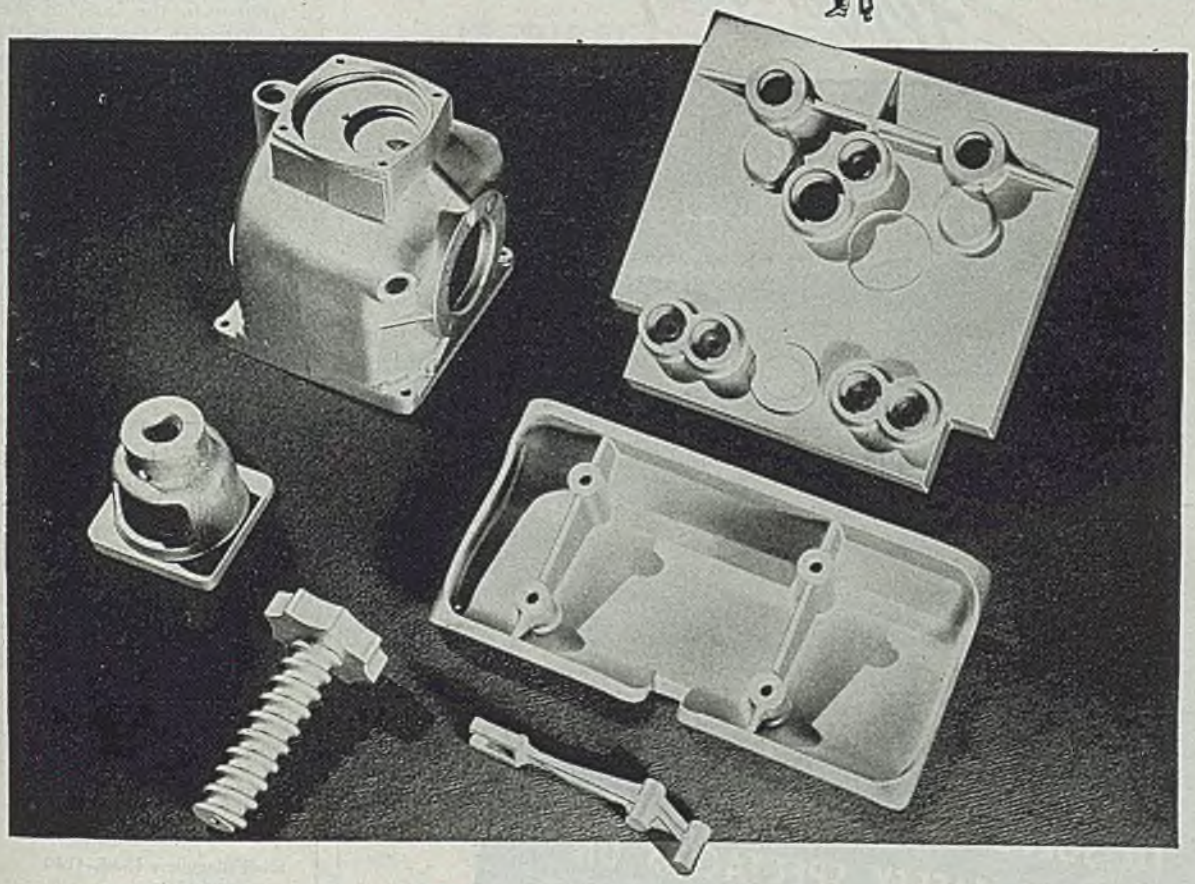
Circuit Tester

A new circuit tester, designated as Lo-Volt Test Glo, intended for testing circuits from 5 to 50 v, is announced by Ideal Commutator Dresser Co., 1921 Park avenue, Sycamore, Ill. It simplifies testing of open circuits, burned out fuses and can be used for indicating relative value of line voltage.

Incandescent glow lamp is protected by a transparent plastic housing. Over all length is 7 in. Fully insulated test leads are 4 in. long.

All claims are those of the manufacturer of the equipment being described.

If you want them light...strong... shock resistant



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How would magnesium alloys work in your own product? For a sound, dependable answer, we invite you to call upon the accumulated experience of many years' work in Dow's own shops. Get in touch with the nearest Dow office; a technically trained magnesium consultant will be assigned to work with you.

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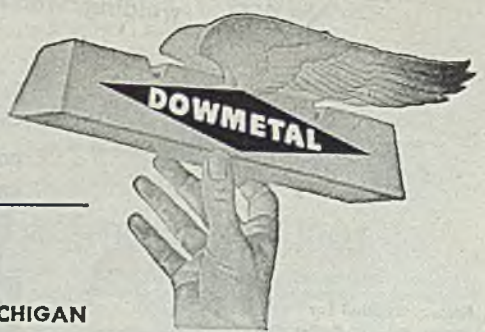

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Flash Butt-Welding

(*Continued from Page 118*)

pressure at the moment of actual upsetting of the weld. A rubber diaphragm in each bottle is the pressure transmitting medium between the nitrogen and the oil reserve in the base of the accumulator. Nitrogen is used instead of oxygen to preclude possibility of formation of an explosive mixture. This type of accumulator is used to cut to a minimum losses due to friction.

Hydraulic oil is delivered through the pneumatic accumulator and patented Taylor-Winfield control valves directly to the upsetting cylinder. The control valve unit consists of a highly sensitive follow valve to control the travel of the upset slide during flashing, a dumping valve for rapid upset and a G-E Thymatrol (adjustable voltage

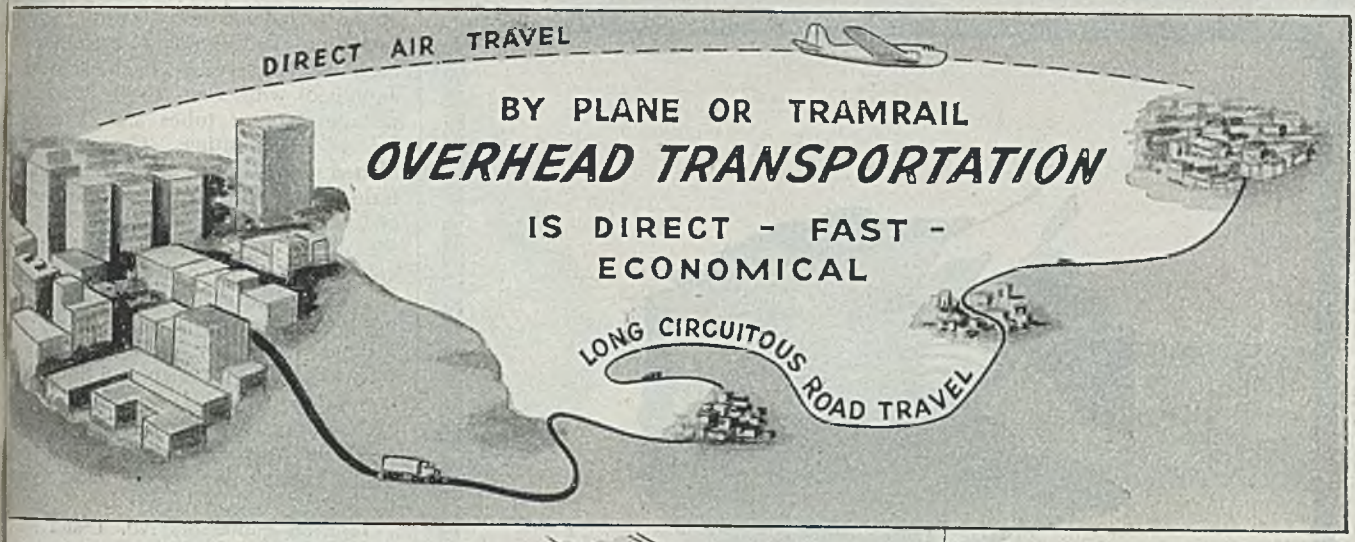
DATA ON 1200 KVA VERTICAL FLASH WELDER

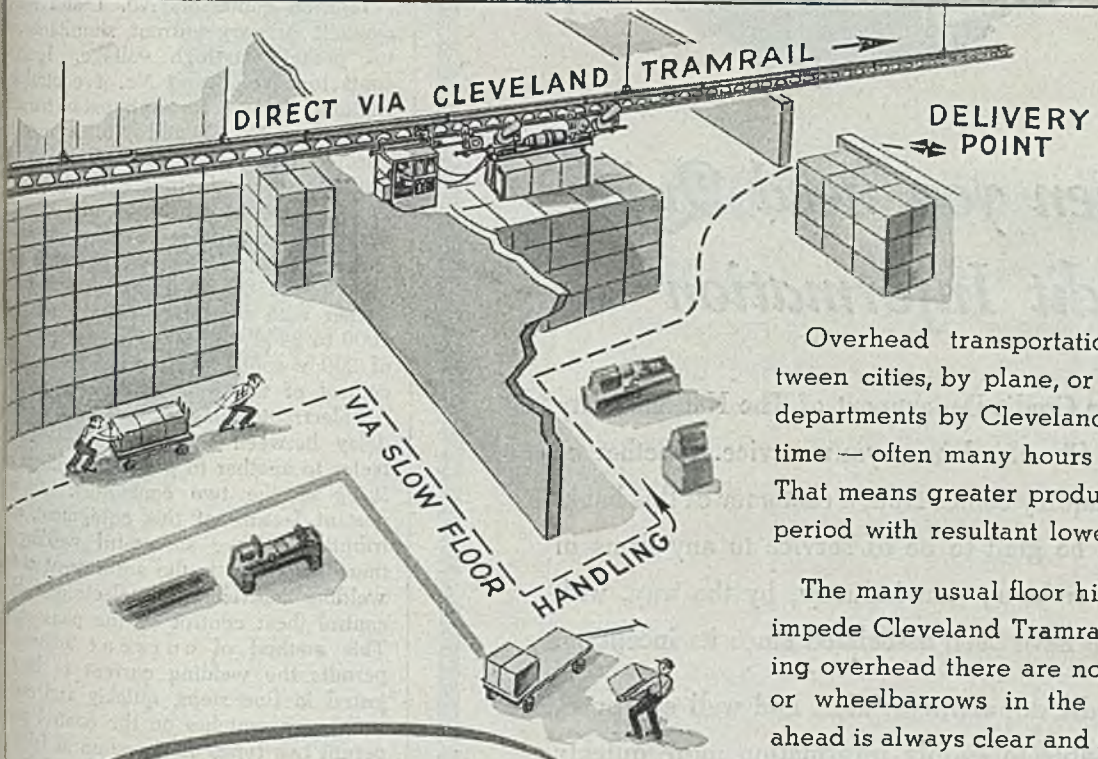
Overall height	22 ft 9 in.
Height above floor level	17 ft 7 in.
Actual weight of equip. approx.	95,000 lb.
Mechanical Characteristics	
Max. upset pressure	850,000 lb.
Max. lower clamp pressure	40,000 lb.
Max. upper clamp pressure	100,000 lb.
Max. slide travel	6 in.
Max. amount of flashing	4 in.
Max. flashing time	7 min.
Max. amount of upset	1¼ in.
Oil capacity	325 gal.
Large vol. pump delivery	41 gpm ea.
Small vol. pump delivery	7.1 gpm ea.
Capacity	
Shaft diameters (SAE-4140 or equiv.)	1–6 in.
Shaft lengths	12-72 in.
Wheel diameters	5-40 in.

variable speed motor driven cam which controls the follow valve during automatic flashing. Operation may be entirely manual, semiautomatic, or completely automatic. In manual operation the amount of flashing and upset is controlled by movement of a hand lever. In semiautomatic operation, flashing is started manually and the motor-driven cam takes over control of the follow valve at a predetermined point in the flashing operation. In fully automatic operation, speed of flashing is controlled by a preset rheostat governing the cam motor and amount of flashing is controlled by cam rise during the complete welding process.

Welding current is provided by two 600 kva transformers connected in parallel and mounted on the side frames. Through the clamping devices, one side of each transformer is connected to the bucket wheel and the other to the shaft. The 600 kva rating is based upon a 50 per cent duty cycle, in accordance with standards set up by the Resistance Welder Manufacturers' Association. The transformers operate on 2300 v at 60 cycles.

The equipment is controlled by four G-E 2400 v electronic contactors (Fig





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5), each having heat control, separate excitation and holding excitation for flash welder service. Each contactor is equipped with two Type 238-B high voltage ignitron tubes and is arranged for floor mounting. Contactors have hinged doors, front and rear, with interlocks to provide automatic dropout of the main circuit breaker whenever the doors are opened. The contactors are arranged for connection to incoming power lines from the floor and cooling water may be piped in in the same manner. The four units, measuring 3[illegible] in. wide by 32 in. deep and 86 in. high may be mounted side by side. They also are equipped with indicating lights on the front panels to show "control power on", "cooling water on" and "power on".

Ignitron contactors No. 1 and No. [illegible] conduct primary current simultaneously for preheat at high voltage. Ignitron contactors No. 3 and No. 4 control the flashing current for automatic burnoff. Contactors No. 1 and No. 2 may be selected for upset or No. 3 and No. [illegible] can remain conducting current for this function, depending upon the current desired for the proper welding schedule.

As the diagram shows, power is supplied by an 833 kva single phase transformer with secondary voltage range of 1000 to 2400 v in 200 v steps. Five kva of 230 v control power is necessary for control of the four ignitron contactors. An electronic relay provides a one cycle delay between transfer from one contactor to another to prevent simultaneous firing of the two contactors. An important feature of this equipment, contributing to the successful welding of these materials, is the adjustment of the welding current by electronic heat control (heat control by the phase-shift). This method of current adjustment permits the welding current to be adjusted in fine steps, quickly and easily.

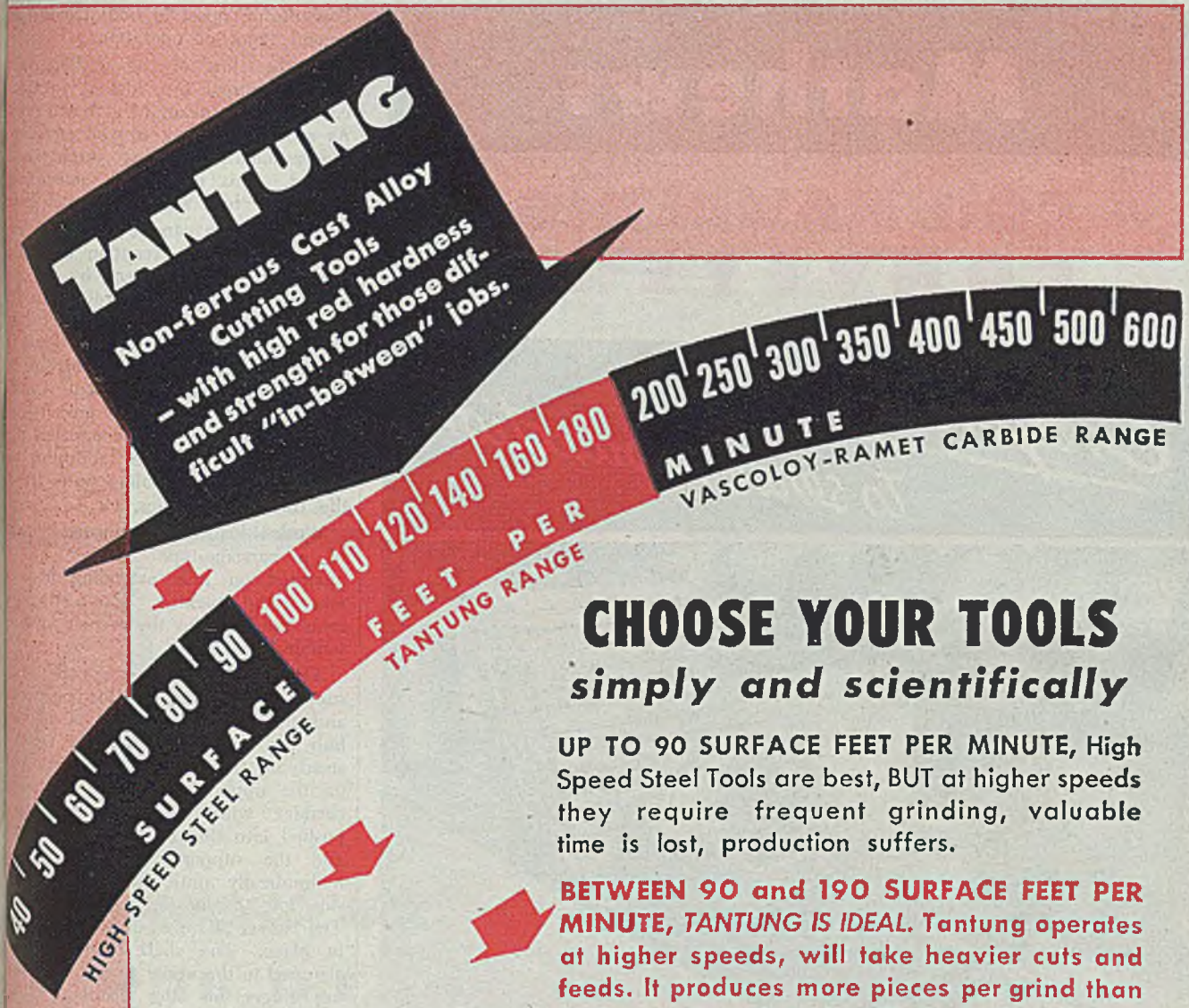
Selector switches on the control panel permit two types of operation as follows:

First Type of Operation

Flash	Heat by Phase Control
Condition No. 1	Full
Condition No. 2	Reduced heat initiated by limit switch on welder
Condition No. 3	Further reduction of heat initiated by another limit switch on welder
Upset	
Condition No. 4	Increased heat above that used during flashing
Condition No. 5	Full heat

Second Type of Operation

Two of the electronic contactors, one for each transformer, connected to the highest voltage tap on the distribution transformer are first energized for starting the flashing operation. After the flashing is well started, these two contactors are de-energized and the two others connected to the lower voltage tap on the supply transformer are energized to continue the flashing at this reduced voltage. It then is possible to continue through the upsetting operation at this reduced voltage or perform it at the original high voltage. A time delay relay regulates the time of current



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The Vascoloy-Ramet standard of quality is reflected in lower overall machining costs when you use Tantung or Tantalum/Tungsten Carbide Tools.

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flow during upset in both the first an second types of operation.

At the start of the flashing actio or preheating, the higher voltage controlled by means of a thumb switc As soon as flashing is well establishe the automatic flashing mechanism started. This mechanism automatical selects the heat sequences noted abov

The machine can be completely co trolled, with the exception of loadin unloading and adjustment, by one ope ator standing at the control station ("I Fig. 2). This panel provides controls f the preselection of welding time, f hydraulic elements, for motors and t like. Additional equipment includ photo-electric current, pressure, a platen-travel recorders; completely aut matic Farval pressure lubricating u ("L", Fig. 2) and cooling water lines the transformers, dies, etc.

Work is loaded and removed by mea of a carriage-type fixture, Fig. mounted on rails extending from t rear of the machine. This carriage pr sents the work to the welder in an a sembled position.

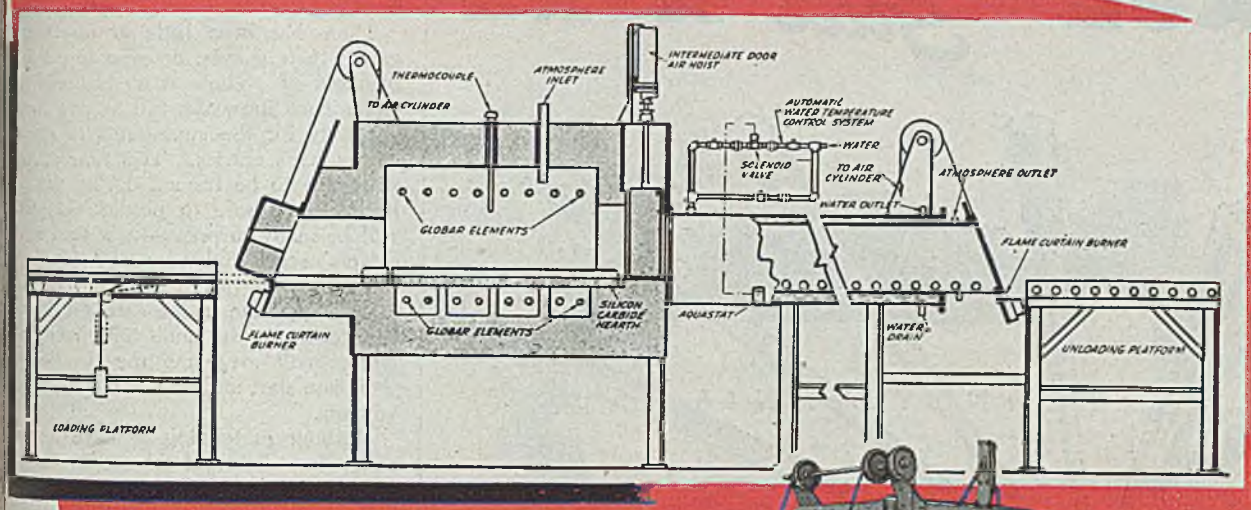
The bucket wheel is nested into t support bracket on the loading carria and the shaft is positioned on the whe hub by a split collar, after which steadying finger is tightened into plac on the upper part of the shaft. Th carriage with the work in place pushed into the machine against a sto and the support bracket is lowere hydraulically until the bucket whe slips into the locator ring on the plate The lower fixture clamps the whe in place. The shaft then is partiall clamped in the upper fixture, the steady ing finger on the loading carria loosened and the carriage removed.

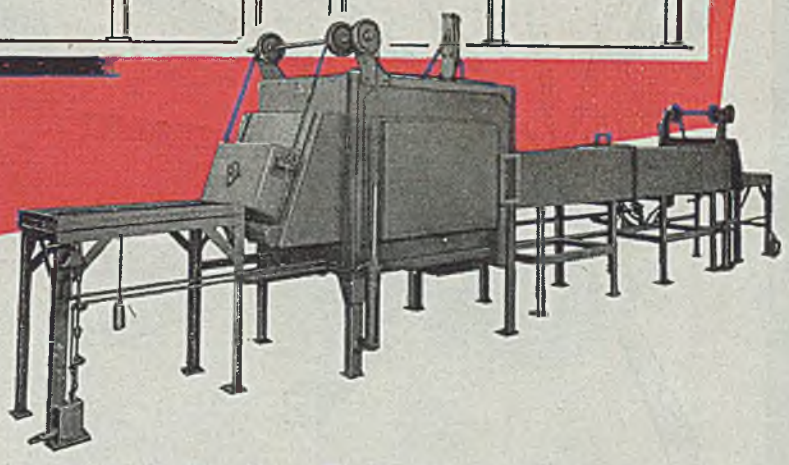
The lower backup screw then turned until it butts firmly against th bottom of the bucket wheel. Next, th upset slide is brought up until the shaf end pushes firmly against the uppe backup screw. Then the shaft is clampe rigidly in the upper fixture, the spli collar is removed from around the lowe end of the shaft and the welding cyc is started. The welded assembly is re moved from the machine by means of th same carriage.

In joining the 3¼-in. diameter shafts to the bucket wheels, total welding time is about 135 sec. Total loss of length of stock is 2 1/8-in., figuring 5/8-in. for upset and 1 1/8-in. for automatic flashing. Eight to ten welds can be made per hour using the present carriage for loading. Total upset current is approximately 58,500 amp. Flashing time is figured at about 30 sec per inch of shaft diameter. Both the end of the shaft and the 2-in. stub end of the bucket wheel are machined with a 5° cone to facilitate flashing when the current is turned on

—o—

A nomograph for determining correct rotameter size for steam measurement is available from Fischer & Porter Co. 9103-S County Line Road, Hatboro, Pa.





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Sintering of powder metals
Bright annealing
General tool hardening
High speed tool hardening

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Machine Tool Builders

(*Continued from Page* 120)

ready have been pushed right out in front.

There has been little or no time to groom their entries, or even to get their blankets off. There is no National Machine Tool Show this fall to give an opportunity for the contestants to size up each other's entries. This time strategy will have to be framed during the race itself. It is safe to predict that there will be many surprises—new men in the drivers' seats and new and previously unheard-of entries forging ahead. Undoubtedly, some of the early entries will drop out. At the same time, many new entries will overcome the handicap of their late start and will come in with the winners.

Without pretending to have any advance knowledge of when the war was going to end, but with a belief that its end would be sudden and unexpected, the editors of STEEL began—shortly after the first of this year—to compile a "tip sheet" on the competitive race which was inevitable sooner or later in the machine tool industry. As things turned out, the timing of this project was almost perfect.

In compiling our tip sheet we did not follow traditional methods of gathering information — methods comparable to hanging around the track watching for tryouts, watching the stables in the hope of seeing an entry getting a rubdown, or in the hope of getting someone carelessly to disclose something. Instead, we went direct to those who are putting up the prizes—in other words, the machine tool users—to get their ideas as to what characteristics the successful entries in the competitive race should possess.

We had splendid co-operation. Of the approximately 11,000 companies in this country directly interested, 2358 went to considerable trouble to tell us in detail what they desire and expect in the machine tools which they intend to purchase for peacetime production operations.

We also had splendid co-operation from a number of the leading machine tool builders during the interpretation and compilation of our findings—in return for which we hope and believe that we have given the builders something of definite value to them in connection with the strategy of the big race in which they now find themselves involved.

We know that many of them already have done some excellent advance planning—the nature of which we are not at the moment in a position to reveal. We have, however, released our "tip sheet" under the title, "A Special Report to Industry on Machine Tools" (June 25, 1945, issue of STEEL) of which several thousand reprints have been distributed. Incidentally, a limited number still are available and will be sent to those interested upon request.

In the September 3, 1945, issue of STEEL (pages 124, 125, 126 and 184)

CHICAGO CUT-OFF WHEELS

From the swift era of war production comes another modern miracle, the cut-off wheel—man power and man hour saver—for the fastest, smoothest method of cutting tubing, wire, steel and brass sheets, glass, porcelain, Stellite, tungsten, plastics, laminates and other hard-to-slice materials.

When RT, the special formula bond was developed, it put the cool-running CHICAGOS 'way out in front in real performance records.

Available in rubber or resinoid—a full range of styles and sizes. 3 bond types—for every operation.

WANT TO TRY ONE? Tell us what you have to cut, grinder you use and size wheel you'd like. We'll send a test wheel promptly. *Write for Circular.*

CHICAGO WHEEL & MFG. CO.

Originators of the famous Chicago Soft Rubber Polishing Wheels

1101 W. Monroe St., Dept ST, Chicago 7, Illinois

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THE NEW BOND THAT HOLDS ITS OWN . . . GIVES ONLY WHEN IT MUST!

Send CIRCULAR___ SEND TEST WHEEL___ SIZE___ TO CUT___

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I expanded to some degree on a few of the findings in the "Report." In more or less the same vein, I will do likewise here with a few more of them. Please bear in mind that these findings do not represent what we assume industry wants in new machine tools, or what the machine tool builders assume the users want. They represent what the users themselves want.

Of the numerous engineering matters explored through our survey, those dealt with here apparently are of average interest. Take the matter of what we called in our questionnaire "built-in lighting." When 66.8 per cent of machine tools users favor it—as has been disclosed by the returns—that certainly cannot be taken lightly.

The example illustrated by Fig. 1 purposely is a simple one because, when we talked to many of the users, they said "What we want in many cases need be no more complicated than a gooseneck lamp fastened to the machine." That is exactly what Frederick Colman & Son are employing in this instance on a horizontal boring mill, operating on precision tool work. The convenience of the thing is self-evident, as the toolmaker concentrates the light on the point where the work is being done.

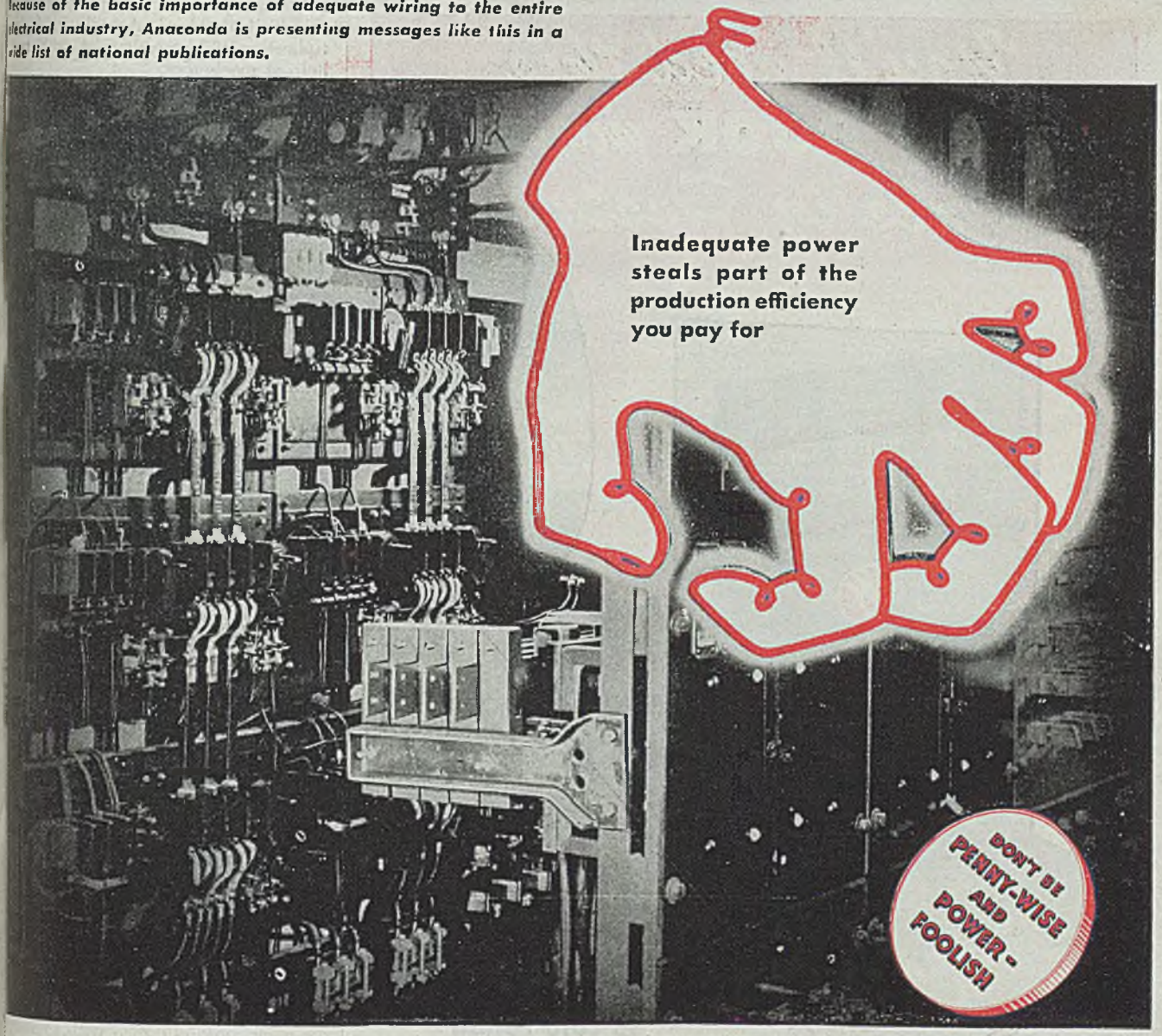
Machine tool builders in many cases have this matter of built-in lighting well in hand. Several of them have shown me ingenious installations involving bulbs and tubes recessed in at strategic points with oiltight translucent covers to diffuse the light and to keep out chips and coolant. Others have shown me ingenious illuminated control panels, dials, etc. This kind of thing goes hand-in-hand with "colors contributing to safety and lighting of work areas," in which 67.2 per cent of the prospective buyers likewise are interested.

Another thing which is reflected strongly through STEEL's study is the trend toward machine tools where in "built-in skill and intelligence" will relieve operators of a lot of the physical and mental responsibility formerly involved in the carrying out of the work. Passing by at this time consideration of that important group commonly called "automatics," I will deal here with die sinking machines and tracer-controlled milling machines. Of the former, 6.9 per cent of our informants have them while 7.9 intend to buy. Of the latter 4.2 have them, and 4.9 intend to buy.

In Fig. 3 I find it possible to present a combined example—a tracer-controlled milling operation on a big forming die job in the Frederick Colman shop in Detroit. The man in this case is a skilled toolmaker, and the fact that the machine embodies skill and intelligence is no reflection on him. The point here is: "How far would he be getting with this job if he were trying to cut this die by old-fashioned methods—and how far would the reconversion program be getting if skilled men like him did not have the help of techniques such as this?"

With increasing use of plastics, metal stampings, large and small, die castings, formed powdered metal, etc., we prob-

Because of the basic importance of adequate wiring to the entire electrical industry, Anaconda is presenting messages like this in a wide list of national publications.



Backward wiring handicaps advanced equipment

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HELP BRING VICTORY SOONER ...BUY MORE WAR BONDS

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ably have only seen the beginning of this kind of thing. Actually, it is "multiplication and spreading of skill" by the help of machinery.

My final example in this article deals with what we called in our questionnaire "specially built machines." Interest in these runs to 45.8 per cent in all industry, this figure jumping to 65.9 per cent in plants employing over 1000 people. This should be no surprise, because prominent industrialists have been emphasizing that only through a higher degree of mechanization can costs be held within reason.

A "special machine" can be anything from a slightly modified bench drill to a huge transfer machine which receives the raw material at one end and ejects completely machined parts at the other. Aircraft engine makers have sparked this kind of thing during the war. Its possibilities in peacetime work are forecast by those achievements.

In Fig. 2, I present a relatively simple example involving a multiple boring head and a rollover fixture for rough boring V-type cylinder blocks. This job is tooled up with Stellite-2400, each boring tool having six blades.

In passing, I would like to point out that the rollover fixture has great possibilities in connection with machines such as radial drills, making such familiar machines into the equivalent of special machines in the best sense of the term.

In closing this article, I want to say something about the engineering and selling organization problems with which I have found machine tool builders dealing in recent weeks. In many cases, sales and engineering departments are being rebuilt literally from the ground up with an entirely new conception of the close interrelation of engineering and selling now that the war is over. It looks to me as though there are going to be a lot more salesmen with engineering background—and a lot more salesminded engineers. The two groups are going to harmonize far better than before.

Old territories are in the process of being re-arranged and new industrial areas are leading to the creation of many entirely new territories. There is a growing realization of what air travel and air delivery of tools and repair parts will mean. Several companies plan thus to spread the activities of "star" salesmen and service men from their home offices over very large areas. They plan to fly vital repair parts out of the home plant rather than try to carry them in stock here and there all over the country.

From what I have seen thus far of the reorganized engineering departments, I would say that machine designers, tool engineers and electrical engineers (familiar with electronics) will all be recognized as indispensable and will all be on about an equal basis. I believe that patternmakers, foundrymen, welding experts, and metallurgists are going to be very much more "in on this engineering picture." The day of the old-fashioned rivalries and even of bitter jealousies between these and other contributing groups is gone forever.

HELPFUL LITERATURE

1. Copper Base Alloys

Ampco Metal Inc.—28-page illustrated bulletin No. 71 covers products, facilities and abilities of company and points out applications of Ampco metal and Ampcoloy bronzes. Methods of fabricating are discussed. Engineering literature is described.

2. Curved Tooth Files

American Swiss File & Tool Co.—8-page illustrated catalog of milled curved-tooth files shows complete range of types, sizes and cuts authorized by WPB. These files are recommended for use on ferrous and nonferrous metals, especially softer metals including aluminum, brass, solder and babbitt.

3. Blast Cleaning

American Foundry Equipment Co.—12-page illustrated catalog No. 204 "The Wheelabrator Pan-Table" describes unit recommended for blast cleaning wide variety of flat fragile work with few pockets and high vertical edges. Specifications, method of operation, electrical specifications, floor layouts and performance results are covered.

4. Melamine

American Cyanamid Co.—24-page illustrated booklet "Melamine" describes applications of chemical melamine in plastics, textile, paper, leather, chemical, paint and allied industries. Written for popular appeal, booklet supplements technical publications on subject.

5. Ethyl Silicate

Carbide & Carbon Chemicals Corp.—12-page illustrated booklet No. F-5989 discusses hydrolysis of ethyl silicate and its use as a source of silica. Principles of the hydrolysis and typical formulas are included. Applications as bonding agent and as preservative and waterproofing agent are covered.

6. Fire Extinguishing System

Cardox Corp.—Two illustrated bulletins "Out In 33 Seconds Flat" and "How Cardox Fire Extinguishing Systems Tame Tough Transformer Fires" describe fire fighting installations for industrial use. Case studies are discussed.

7. V-Belt Drive

Allis-Chalmers Mfg. Co.—12-page illustrated catalog No. B6051E is engineering summary which covers Texrope drive and Magic-Grip sheave, designed for fast, easy mounting and dismounting. Handy charts, tables and drawings aid in selection of correct drive.

8. Tool Steel

Crucible Steel Co. of America—4-page illustrated data sheet No. DS115 is descriptive of Ketos oil hardening tool steel which can be used in manufacture of blanking, coining, drawing, forming, plastic mold, thread rolling and trimming dies as well as gages, broaches, paper knives and taps.

9. Buffer Tablets

Harrell Technical Suppy Co.—4-page illustrated catalog section B-205 describes Colepalmer certified buffer tablets. Methods and advantages of use, composition and prices are given. List of tablets for 2.00 pH to 12.00 pH inclusive is included and sample for 5.00 pH solution is enclosed.

10. Small Precision Drills

Chicago-Latrobe Twist Drill Works—4-page illustrated folder No. 50M contains complete data, prices and dimensions of high speed micro precision and watchmaker drills which can be used at speeds of 2500 to 10,000 revolutions per minute or higher depending upon machinability of materials being drilled.

11. Hydraulic Press

Denison Engineering Co.—Illustrated leaflet describes briefly features of Basic Multipress, Multi-Speed Multipress and Vibra-Press Multipress units. Exact control of ram actions is feature.

12. Plating Equipment

Udylite Corp.—10-page illustrated "Price Guide for Plating & Polishing Supplies" lists prices of various types of anodes, plating chemicals, plating accessories, and priority requirements for supplies procurement.

13. Magnesium Domes

Worcester Pressed Steel Co.—8-page illustrated methods article by J. Walter Gulliksen, Mechanical Engineer, contains design, material and processing data on deep drawing magnesium domes.

14. Electric & Automotive Units

Wagner Electric Corp.—16-page bulletin No. GU-86 briefly describes company's line of such electrical and automotive products as motors, transformers, brakes, controls, tachographs, brake linings and service tools.

15. Snow Removal

A. M. Byers Co.—6-page illustrated case study No. 4 presents information on use of underground hot water and steam wrought iron pipe lines for snow removal for sidewalks, driveways and industrial locations.

16. Self-Sealing Couplings

Aeroquip Corp.—4-page illustrated bulletin No. 107 describes in detail use of this coupling in solving problem of disconnecting liquid-carrying lines without customary need for draining system and priming after reconnection.

17. Billet Shears

Buffalo Forge Co.—28-page illustrated bulletin No. 3295-A describes four types of shears, including billet shears, bar cutters, special bar cutters and diagonal bar cutters. Specifications and capacities are given.

18. Excavating Equipment

Bucyrus-Erie Co. —36-page illustrated brochure "In War and Peace Progress Starts With Excavation" shows typical uses of ⅜ to 2½-yard shovels, cranes and draglines.

19. Peelable Plastic Coating

Better Finishes & Coatings—16-page illustrated booklet describes Liquid Envelope peelable plastic film used as protective coating for aircraft assemblies and with peacetime finished metal and wood or plastic surfaces during manufacturing operations.

20. Process Control Terms

Askania Regulator Co.—20-page illustrated technical paper No. 100 contains proposed A.S.M.E. definitions of process control terms with pictoral interpretations.

21. Hydraulic Presses

Baldwin Locomotive Works, Baldwin Southwark Div.—36-page illustrated bulletin No. 160 describes Southwark self-contained hydraulic presses. Advantages of design are set forth and many typical presses are shown.

22. Relieved Form Cutters

Colonial Tool Co., Ltd.—20-page illustrated bulletin No. D-45 contains complete data on company's line of relieved form cutters for gears, threads, worms and splines, as well as special form tools. Also included is aid for proper procedure in ordering cutters.

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23. Steel Sheets & Wire

Continental Steel Corp.—16-page illustrated booklet entitled "Continental Steel Sheets and Wire" covers sizes, tempers, shapes, finishes and coatings of steel sheets, and gives data on roofing, siding, fencing and standard and special wires.

24. Flat Top Conveyor Chain

Chain Belt Co.—4-page illustrated folder No. 461 describes Rex S815 Table Top chain belt for application in food handling and bottling or capping processes. Advantages of this chain belt include simplicity of design, detachability and easy cleaning.

25. Rivets

Cherry Rivet Co.—20-page illustrated pocket manual No. D-45 describes self-plugging and hollow rivets in various styles, sizes and alloys. Typical applications in such materials as sheet metal, fabric, plywood, plastic, rubber, leather and enamels are listed.

26. Tubing & Fittings

Youngstown Welding & Engineering Co.—8-page illustrated booklet No. T145 describes Weldco tubing and fittings of cupro nickel, monel, nickel, inconel and alloy and stainless steels as well as fabricated piping of all types, sizes and thicknesses.

27. Fastening Devices

Camloc Fastener Corp.—8-page illustrated service manual No. 44-C describes various service operations of Camloc Fastener 4002 series. Presented in pictorial form, procedure for replacement of fasteners is shown. Maintenance parts list is included.

28. Dynamometers

W. C. Dillon & Co.—20-page illustrated booklet entitled "Dillon Dynamometer — A Precision Instrument for Precision Testing" is descriptive of traction type dynamometers in capacities from 500 to 20,000 pounds for use in steel, rubber, aircraft and marine industries.

29. Hydraulic Oils

Warren Refining & Chemical Co.—72-page illustrated catalog entitled "Warren Specialized Lubricants" explains development and application of hydraulic power, selection and functions of hydraulic oils, and characteristics and properties of various hydraulic fluids.

30. Welding Electrodes

Air Reduction Sales Co.—56-page illustrated catalog No. 120 deals with selection of proper electrode for various applications, mechanical properties and testing of electrodes, welding symbols and instructions for their use, hardness conversion and welding terms.

31. Screw Thread System

Aircraft Screw Products Co.—4-page illustrated bulletin No. 242 gives complete data on adaptability, advantages, dimensions, specifications, design and installation of Aero-Thread system. Sequence of operations and installation tools are also shown.

32. Electrical Parts

Cutler-Hammer, Inc.—48-page illustrated catalog No. CS-182A, second edition of renewal parts guide, gives descriptions, dimensions and ratings of contacts, relays, arc shields, fingers, shoes, brushes, resistors, timers and coils.

33. Centrifugal Pumps & Impellers

Deming Co.—20-page illustrated manual entitled "Facts You Should Know About Centrifugal Pumps and Impellers" discusses fundamental hydraulic law; various types of pumps; hydraulics; mechanical, static and dynamic balance; and various impellers.

34. Refrigeration Equipment

Weatherhead Co.—38-page illustrated catalog J-104-F gives complete data on valves, dehydrators, strainers, manifold assemblies, accessories and fittings used in refrigeration industry. List prices, dimensions, part numbers and other technical information are included.

35. Hydraulic Presses

Colonial Broach Co.—4-page illustrated bulletin No. VJI-44 gives specifications and shipping data of Junior bench and base type hydraulic presses which are made in 1, 2 and 4-ton capacities and are intended for light and medium duty assembly and broaching work. Special accessories for this press are also described.

36. Protective Tissue

Charles Bruning Co.—6-page illustrated folder No. A. 1009 describes Dulseal tissue-thin, transparent film that protects, preserves and repairs tracings, drawings, black and white prints, blue prints, maps, records, charts, sketches and other papers.

37. Oxygen Generators

Air Products, Inc.—Illustrated technical booklet "Making Your Own Oxygen" explains how savings of up to 60 per cent can be obtained on oxygen production costs through use of Air Products generators. Various models and sizes of generators are described. Units are available with capacity to suit most industrial needs.

38. Plaster Mold Castings

Briggs Mfg. Co.—8-page illustrated booklet entitled "Plaster Mold Castings by Briggs" describes company's facilities for producing nonferrous castings through use of baked plaster molds. Chemical and physical characteristics of four standard alloys used in plaster mold casting production are listed.

39. Wirebound Boxes & Crates

Rathborne, Hair & Ridgway Co.—24-page illustrated booklet No. 45-A describes advantages of using wirebound boxes and crates in automotive, marine, aircraft and food processing industries. Thickness of face sections, size of cleats, size and position of battens, gage numbers and location of binding wires and staples are discussed.

40. Floor Sweeping Compound

A. J. Stull & Co—6-page illustrated folder shows applications and explains properties of Re-Mov-Oil grease-absorbent floor sweeping and cleaning compound which can be used on wood, linoleum, metal, concrete or composition floors. It is claimed to be nonskid, fireproof and non-abrasive cleaner and deodorant.

41. Self-Tapping Screws

Parker-Kalon Corp. — 20-page illustrated bulletin No. 475A is entitled "Parker-Kalon Quality-Controlled Self-Tapping Screws." In addition to explaining applications, manufacturing technique and advantages of these fastening devices, details and specifications are given on various sizes and types for assembly of metal and plastic parts or equipment.

42. Hydraulic Presses

Watson-Stillman Co.—8-page illustrated bulletin No. 550-A describes four types of hydraulic presses used for spring stripping, banding, forming and testing operations. Complete specifications of these self-contained, oil-operated machines which can be controlled with single lever are included.

43. Industrial Equipment

A. O. Smith Corp.—16-page illustrated bulletin "We of A. O. Smith" traces organization of company and describes principal products. Latter include welding electrodes, pressure vessels, automotive frames, line pipe, oil well casing, glass-lined tanks, home appliances, centrifugal pumps, electric motors, petroleum meters and allied equipment.

44. Microscope Aligning Instrument

Cincinnati Grinders, Inc.—2-page illustrated specification sheet No. G-419-1 presents details of microscope aligning instrument designed specifically for checking alignment of lo... Cincinnati grinding machine beds. This u... is recommended for shops having machin... with rated table travels exceeding 96 inch...

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Coolant Separators

(*Concluded from Page* 130)

ndexing table, while the lower pan receives removed swarf.

While no claims are made that the magetic separator equals the efficiency of a ilter in removing sludge, experience in many installations has shown on surface, ylindrical, internal and thread grinders most detrimental abrasive, as well as magetic material, is removed, due partly to he magnetic grid under the drum causng magnetized particles to stand on end en masse, thus serving as a brush to creen out nonmagnetic material.

The magnet drum has four rows (two n the small size and eight on the large) f eight U-shaped permanent magnets olted circumferentially to a cast iron pider which is keyed to the rotating haft. The lower half of the drum passes hrough a semicircular trough, coolant lowing in one side, under the drum and palling out the other side from a spout which is slightly lower than the intake side. The scraper is positioned just above he discharge lip and, as the drum, rotating at a speed of 4-1/6 min per revolution, passes the scraper edge, the particles clinging to the exposed magnet ends are removed and fall down a chute to the collection receptacle.

Flux path of magnetic resistance for he permanent magnets is formed by the hannel between the underside of the ide-faced drum and the magnetic inner urface of the cast iron frame surrounding the under portion of the drum, serving as a magnetic shunt plate (see cutaway view of drum). This induction magetized apron grid causes magnetized warf to extend on end from the magnet oles. A drum with its top cover removed, shown in Fig. 3, illustrates this ffect.

Where gravity feed of coolant from achine to separator is not practical, a otor driven pump can be used to transer used coolant into the separator trough, rom which the cleaned coolant flows by ravity into the reservoir of the machine.

Often Re-Set Industrial Diamond Still in Use

A diamond dresser, considered the argest in the world, is still in use by he Northwest Engineering Co., Green ay, Wis., after 4½ years of service and ven re-settings. This tool, originally t with a common quality, 62.5 carat iamond, is used on a 24 in. diam. by 3 n. face, Norton crank-shaft grinder.

The diamond dresser is owned by heldon M. Booth, president, Diamond ool Co., Chicago., and is set in comany's patented Loc-Key-Set-Re-Set-Able etting. It is said that this setting permits many quick re-settings without amage and results in the longest and ost complete utilization of the diamond nd the lowest priced service on its riginal cost. Present weight of the iamond is 19.2 carats.

Heat Treating Practice

(*Continued from Page* 137)

operation, if needed. This method of interrupted quenching produces martensite with very low residual strains.

Martempering thus includes the quenching from an austenizing temperature into a salt bath at a temperature near the M_s point of the steel and holding in that bath, then further cooling in the atmosphere at a moderate rate so as to set up no great temperature differential between the outside and center as the piece goes through the martensite transformation range. Formation of martensite then occurs at a fairly uniform rate at innumerable locations throughout the matrix of softer austenite. An excess of residual strain is avoided by this equalizing process.

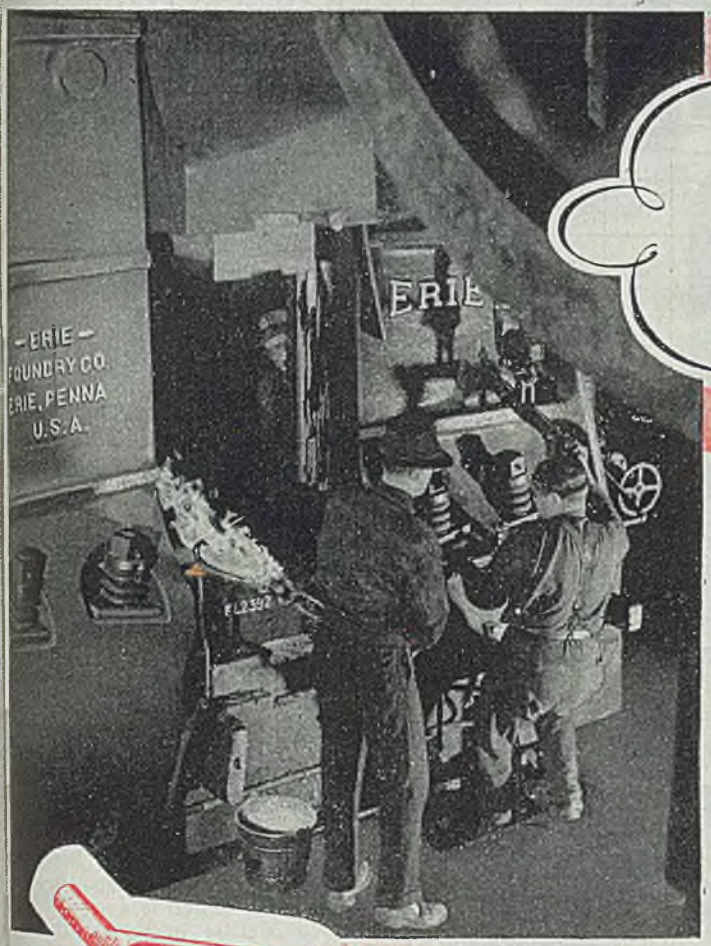
As noted, the temperature of the quench bath should be near the M_s point; if much below this temperature, an appreciable quantity of martensite will form and may defeat the purpose of the process. This M_s point varies with different steels, and can be computed by the Carapella formula, given in first article of this series, but 400° F usually has been found satisfactory for martempering the more tender of the SAE alloy steels and the high carbon, low alloy tool steels.

The operation is quite practical commercially, as the pieces may be held in the salt for considerable periods after equalizing in temperature with no effect upon the results. The S curves show that austenite does not begin to transform for a sizable fraction of an hour when held steady at a temperature of 400° F.

Cooling power of salt at elevated temperatures previously had been underestimated, but agitated salt at 400° F, is now established as having a quenching speed approximately as fast as the customary oil quench. This conclusion could be drawn from some figures published by the Germans, Lueg and Pomp, in "Stahl und Eisen" in 1941, p. 266, who measured cooling rates of ½-in. steel balls quenched from 1475° F into oil at room temperature and salt baths at various temperatures. Cooling speeds at 1000°F the approximate nose of the S—curve are shown in Table II.

Agitating the molten salt will bring the cooling power up to equal that of still mineral oil at room temperature, and quite high enough to quench many alloy steels to a 100 per cent martensitic structure. Stated in another way, the quenching speed of agitated salt at 400° F has an H-value of 0.25 to 0.30 (equivalent to still oil) on parts that have a machined surface. With materials having a light scale, the quenching speed is somewhat lower, approximately H equals 0.20, equivalent to warm oil.

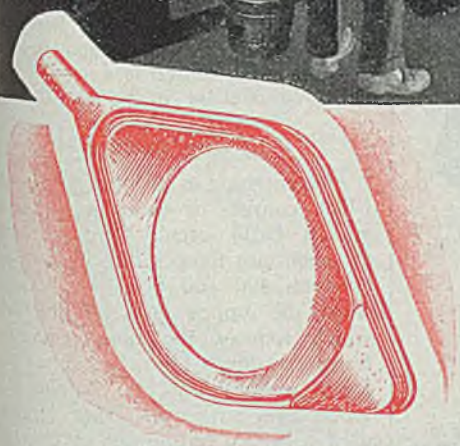
Heavier sections can be hardened by the martempering process that can be handled by austempering, and with a minimum of residual strains. Quenching



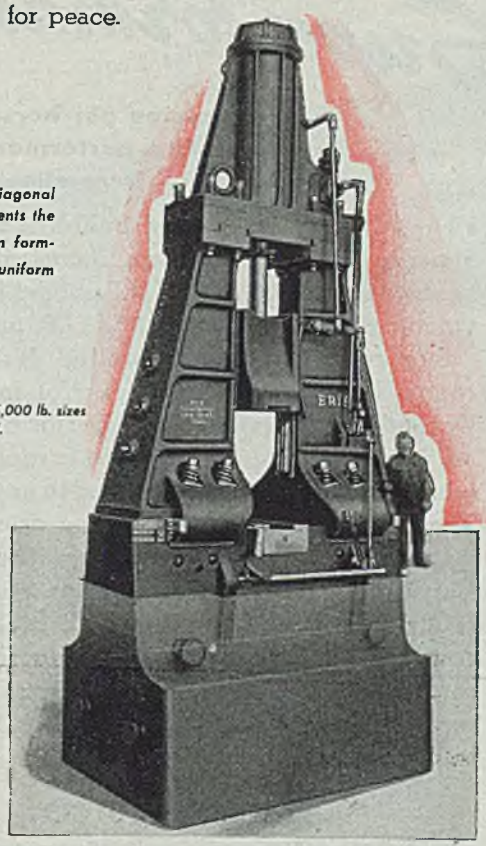
FORGINGS

HIGH STRENGTH-TO-WEIGHT RATIO

FORMED to close tolerances with little machine finishing required, forging this rear engine mount permits use of lighter sectional thickness . . . kneads metal into a dense mass of flawless strength, and makes it more resilient and wear resistant. Close temperature control with several quick blows in the forging hammer assure uniformity in the thin section and avoid cold working the metal which cools rapidly while in the forging dies. Erie Steam Hammers have been forging thousands of these diagonal rear engine mount forgings for war and will continue to do so for peace.



The unusual design of this diagonal rear engine mount forging presents the necessity of speed and skill in forming the thin section to assure uniform structure.



* *This Erie Hammer is typical of the 8,000 lb. to 15,000 lb. sizes regularly made with one piece anvil.*

ARMY E NAVY

ERIE

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA

ERIE BUILDS *Dependable* HAMMERS

speed of the bath should not be overlooked; obviously, the lower the temperature of the salt bath, the faster is its quenching speed.

The martempering method has been used commercially to improve the quality and production of a large number of products. A few examples are:

1. Small tools such as shear blades, chisels, punches made of carbon steel, as well as tools of the same type made of alloy steel, eliminating possible quench cracks and permitting hardness without spalling of edges.
2. Alloy gears, bearing races, ball bearings—to obtain high hardness with minimum distortion or dimensional changes, greater fatigue life and impact properties.
3. Spring steels are being hardened with a minimum of distortion and with very high resilience. Springs and knife blades have been martempered to high hardness and then tempered to the same hardness as the conventional quench and draw, with better resilience, resistance to shock and fatigue life.
4. Miscellaneous parts which must be finish-machined and then heat treated to high hardness with a minimum of distortion and the finished surface clear and free from oxidation.
5. Grinding balls have been thus treated, rendering them free from cracking, either as a result of heat treatment or in service thereafter.

Austempering

Austempering is an interrupted quench which consists of quenching steel in a molten bath, usually salt, maintained at a constant temperature of some point between 400 and 800° F, usually toward the upper level of this range which reduces the time required for transformation. The austenite transforms isothermally into bainite or intermediate structure. This process is used to attain hardnesses of C48 to 55 along with added desirable characteristics of toughness and ductility. Commercially it is applied to heat treat wire chisels, small springs, steel safety shoe toes, among many other applications which might be mentioned as suitable for this process.

Table III shows the austempered hardness ceilings and suggested maximum austemperable size for various carbon and alloy steels; as recommended by the American Steel and Wire Co., a subsidiary of United States Steel Corp. which owns the patent.

A development in the interrupted quench is a modification of austempering quench. This method is a three step process: (a) Heating to austenize, (b) immediately quenching in an agitated heated salt bath at 450° F or above and holding at this temperature to permit isothermal transformation; (c) immersing in a third bath maintained at a higher temperature to serve as a draw. This method allows isothermal transformation at a low temperature to produce high hardness, and then draws back

GREAT Things are Happening

IN THE ELIMINATION AND CONTROL OF VIBRATION BY THE USE OF

TORFLEX *flexible* BEARINGS

Up until a few years ago, vibration was largely an uncontrolled, deadly force that shook, jarred, and deteriorated equipment in a relatively short time.

Harris Products Company pioneering in the field of engineered vibration control created, designed and introduced the new, widely used Torflex Flexible Bearings, the most scientific, effective method known for the control and elimination of vibration, noise, and excessive wear.

Torflex Flexible Bearings consist of a tube or ring of rubber stretched longitudinally between two concentric metal sleeves which prevent the rubber from returning to its original state. The pressure thus exerted by the rubber on the metal sleeves insures a high capacity mechanical bond between the rubber and metal under all operating conditions.

Torflex Flexible Bearings come in a wide range of sizes and have invaded many fields where vibration had caused havoc to equipment, They have controlled and eliminated vibration up to 90 per cent, thereby not only increasing the efficiency and performance of such equipment, but also greatly prolonging its useful life.

Torflex Bearings have done a remarkable job on military equipment such as tanks, tractors, and mobile units of all kinds. They are also used on many types of industrial equipment.

Our engineers know how, when and where to put Torflex Flexible Bearings to work advantageously. We would be glad to work on your problem, if you will just drop us a line.

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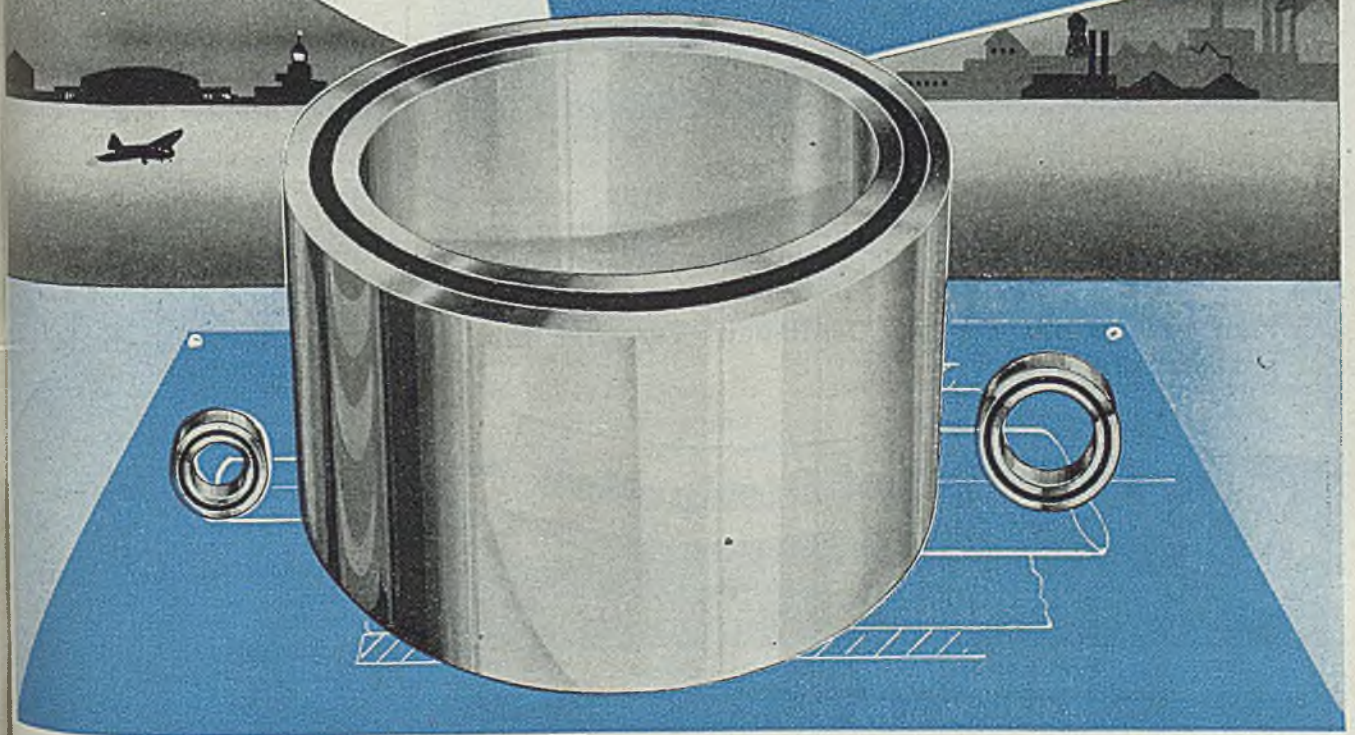

to the required physical properties. In this manner, parts of heavier section can be heat treated than can be handled in the conventional austempering method.

In summary, the various modern types of interrupted quenches designed to eliminate or materially reduce quench cracks, distortion and dimensional changes, include martempering, austempering, and their modifications. The mechanics of each are diagrammed in Fig. 14. In all of them, duplication of results is possible by workmen who are comparatively new to the science of heat treating.

Cycle Annealing

Thus far, discussion has been confined to the hardening of steel, but there are many requirements when softer structures are desired. High carbon, alloy and tool steels often have to be softened for machining or cold forming. The definition of full annealing, as given in the 1942 preprint of the American Society for Testing Materials, report of Committee E-8, is "A softening process in which an iron-base alloy is heated to a temperature above the transformation range and after being held for a proper time at this temperature is cooled slowly to a temperature below the transformation range. The objects are ordinarily allowed to cool slowly in the furnace, although they may be removed from the furnace and cooled in some medium which reduces rate of cooling.

"Spheroidizing — any process of heating and cooling steel that produces a rounded or globular form of carbide. Spheroidizing methods frequently used are as follows:

1. Prolonged heating at a temperature just below the lower limit of the transformation temperature range with subsequent slow cooling.
2. The object is subjected to a temperature which rises and falls alternately between a point within and a point just below the transformation range. This method gives good results with small high carbon steel objects.
3. Tool steel may be spheroidized by heating to a temperature above the transformation range and then, after holding a suitable time, cooling very slowly in the furnace.
4. Tool steel containing a carbide network may be spheroidized by quenching in oil from the minimum temperature at which all the carbon is dissolved, followed by reheating to a temperature slightly below the transformation range."

In general, the types of annealing may be described best by defining the resulting microstructure. (a) Lamellar structure is preferred for most machining operations on medium carbon and carbon alloy structural steels. (b) Spheroidized structure is generally required for cold working operation.

Principles of cycle annealing of steel as developed by Peter Payson, chief research metallurgist, Crucible Steel Co. of America, are covered by patent issued to the author and assigned to that company. Yet, in belief that they might

be of use, the information was made available by Crucible Steel to anyone wishing to utilize it during the war years.

Basic principle of cycle annealing is taken from construction of the S or TTT-curve. In the hardening of steel we are mainly interested in that portion of the S-curve showing the time and temperature for the beginning of transformation in order to avoid the softer structures forming at the higher temperatures. In cycle annealing the chief concern is the temperature and time required for completion of transformation of the softer structures in the temperature range between the nose of the S-curve (1050° F) and the lower critical temperature, A_{r_1}. If the transformation takes place within this range, the higher the temperature at time of transformation, the coarser and softer the structure.

Curve representing the ending of transformation tells us relatively how slowly we must cool to avoid formation of the harder structures and at what temperature the retarded cooling may be discontinued safely. This temperature may vary with the type of steel, in accordance with the difference in the form of the isothermal transformation curve. In the vicinity of 1200°F, usually most carbon and alloy steels require the minimum time to end transformation; to continue slow cooling below this temperature is a waste of time.

According to Payson, the shortest annealing cycle would be to cool as quickly as possible to some predetermined temperature below the lower critical temperature for the time indicated by the S-curve for completion of transformation, and then complete the cooling in the most convenient manner. Precautions should be taken when considering an S-curve of a particular steel as that S-curve represents one heat of steel, as different heats of similar analysis vary somewhat in hardenability, which in turn will change the location of the curve.

It is possible to construct an S-curve for any steel for determining the time and temperature required for cycle annealing, but for the steels in common use, such curves have already been developed and are available.

Cycle annealing is a practical application for annealing of high carbon and alloy steels when time is an important factor. The preferred method for cycle annealing is to cool rapidly from the austenizing temperature to the annealing temperature and hold there long enough to permit isothermal transformation. However, the slow continuous cooling will produce approximately the same results.

(*Continued next week*)

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Spiegeleisen

(*Continued from Page* 140)

eisen is preferred because the MnO, which is formed in the reaction, increases the basicity of the slag and does not tend to cause reversion of phosphorus to the metal. The MnO also acts as a flux for impurities and some sulphur is removed. This practice is almost essential on quality steels and is excellent insurance on steels of lower quality, particularly where a plant is having trouble in consistently meeting specification requirements.

This practice has been used primarily on low-carbon killed steels, but recently it has been found that it is excellent for killed steels of medium-carbon content. The reboil is eliminated, and spiegeleisen used only as a block. It has been found that it results in increased fluidity which improves the pouring qualities of the steel, with the result that better ingot surface is secured and chipping costs are reduced. With regular grades of spiegel of normal silicon content about 50 per cent of the manganese is retained in the steel with the result that less ferromanganese is required. With the high-silicon grade of spiegel manganese, efficiencies from 70 to 80 per cent are obtainable.

High-silicon spiegeleisen is helpful in duplex steel operations where the low slag volume imposes limitations with respect to the kind of deoxidizers used without danger of phosphorus reversion. The more concentrated alloys are not as well suited for blocking duplex heats as is high-silicon spiegel. It has been found that steel treated in the furnace with silico-spiegel is superior to that which is entirely deoxidized in the ladle with silicon and aluminum, and also gives higher yields of finished material. In plants using a cold charge it has sometimes been found that the more concentrated alloys of silicon and manganese caused a cutting effect on the basic bottoms, while no trouble was experienced with silico-spiegel. Other steelmakers have found they experienced less trouble in maintaining the correct finishing temperature when this alloy is used.

An interesting phase of the general use of spiegel has been developed by producers of acid open-hearth steel. It has been found possible to increase production by shortening the furnace time of heats. The general practice consists of continuing to add ore to the furnace to a much later period than was formerly considered safe, and by using spiegel to slow up the reactions during the final finishing stages of the heat. The spiegel not only reduces the carbon elimination but fluxes the residual oxides resulting from late oreing.

Finishing: Spiegeleisen is not used extensively for alloy purposes, in the steel plant, except as previously mentioned. This is primarily due to the high ratio of iron and carbon to manganese. Some plants, however, find it economical particularly where medium and high-carbon steels are made, and where a fairly high residual manganese is carried in the bath. If moderate recarburization is required

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spiegeleisen is desirable as it has a carbon content of about 5 percent, most of which is combined carbon. The low phosphorus and sulphur content of spiegel makes its use for this purpose possible for both acid and basic steel. High-silicon grades are particularly suited for this purpose when used as a combined block and for alloy additions. Ferromanganese may be used to supplement the spiegeleisen if the manganese specification is high.

In considering the economics of this application of spiegeleisen or, in fact, all applications in the steel plant or foundry, it must be borne in mind that about 75 per cent of the spiegel added is iron, which adds that amount to the yield, and is sold for same price as product.

Electric Furnaces: The volume of spiegeleisen used in electric furnaces is not large, but it has several applications nevertheless. Some plants use small quantities to produce a boil for obvious purposes, and it is also used as a recarburizer in those plants which prefer to take all heats down low in carbon and adjust the composition by additions of alloys. A considerable portion of the required manganese is incidentally obtained. In plants which use blown metal for the charge, spiegel adds carbon and manganese, both of which are desired.

Gray Iron: In cupola operations it is seldom possible to obtain the desired amount of manganese from the raw materials charged. Spiegeleisen is an efficient and economical alloy for this purpose, and may be added with the charge without undue loss of manganese. The melting point of spiegeleisen (about 1120° C or 2048° F) is about the same as the pig irons of low-melting point, consequently the possibility of retarded melting is eliminated. It is also helpful where high sulphur is encountered, as some manganese will combine with the sulphur and carry it to the slag. In addition the spiegel has the same deoxidizing properties in the cupola that it has in the steel furnace.

Malleable Iron: In the production of malleable iron, either by the direct process or duplex process, spiegeleisen is used for the same purposes that it is used in gray iron.

Use of spiegeleisen in the war effort did establish its familiarity to many in the steel industry who previously were not aware of its versatility. Indications are that the next few years will see much additional experimentation with this material and its consequent adoption in many steelmaking operations.

Die-Cast Line Expanded

Company line of die-castings for plumbing and heating and the appliance and hardware trades is being expanded by Titan Metal Mfg. Co., Bellefonte, P. It includes products cast on Polak hydro mechanical machines, originally imported from Czechoslovakia, and, although the company now has facilities for producing brass pressure die-castings weighing up to 11 lb, it has not yet applied pressure die-casting for producing parts weighing more than 4 lb.

German Fasteners

(*Continued from Page* 123)

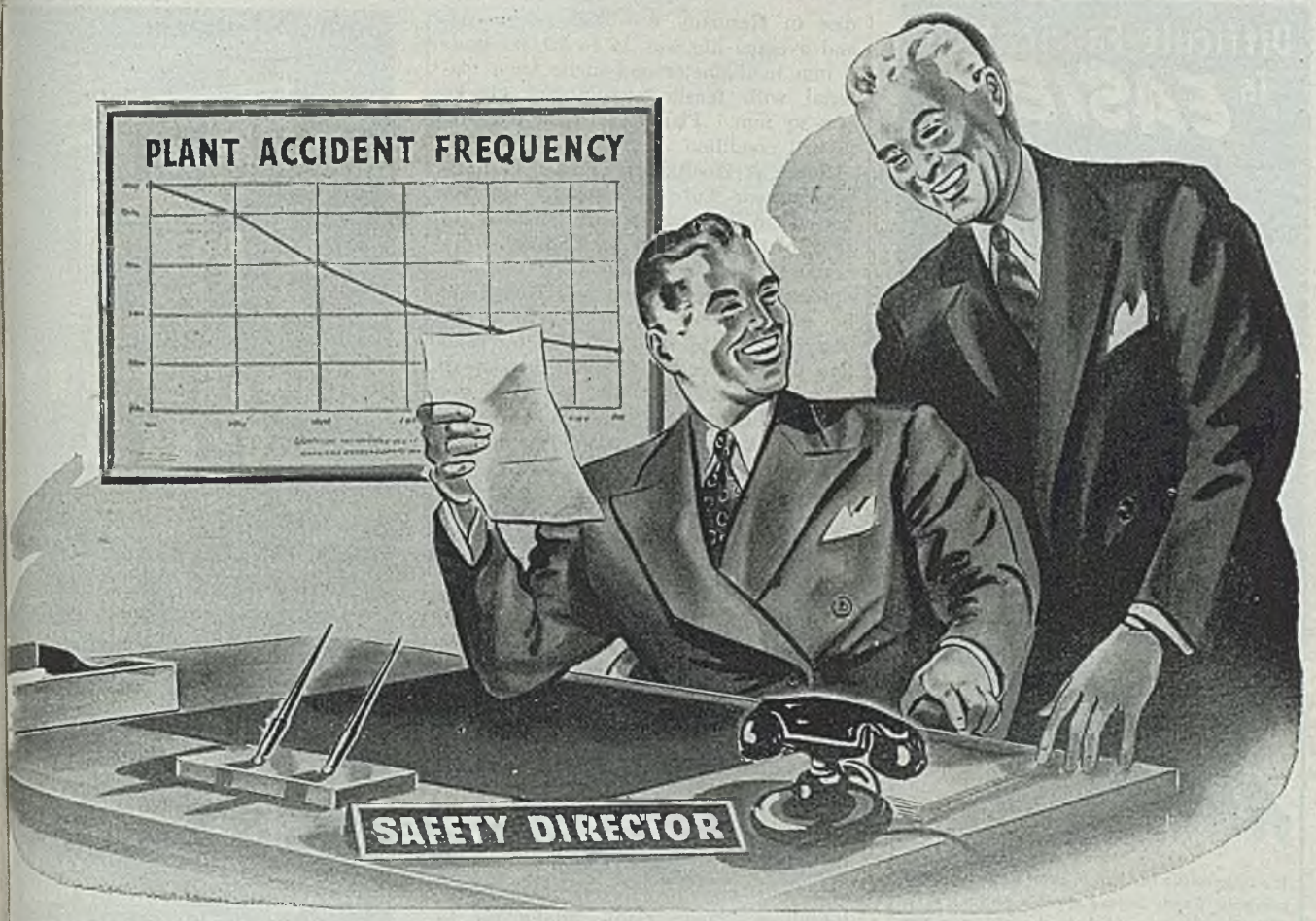
Between 900 and 1000 persons were employed. Of the total 65 per cent were aliens, mostly Danes and Belgians, the latter being best workers of all foreigners employed.

Lenerwerk G. M. B. H.: The firm of Lenerwerk formerly known as Geber Knipping, is a branch of Vereingte, Stahlwerke. They made bolts, nuts, screws, and rivets. The plant is fairly well maintained but not up to American or British standards; layout is not good and building badly lighted and ventilated. Employment during the war was about 1000, of whom 440 were foreigners.

Schraubenwerke, Neuss (Fisene & Co.): This company has the most up-to-date factory in Germany for manufacture of wooden screws. It employed 350 people to make 800,000 gross of screws per month, using 130 foreigners and, of the total, 60 per cent women. It has dispersal plant at Velbert in running order, and with 55 employes can produce 200,000 gross of screws monthly in a short time. Equipment consists of 80 heading machines, 470 slotters, and 851 threaders. Smallest size screw made is 1.3 mm diameter x 5 mm long, and largest is 10 mm diameter x 100 mm long.

Funcke & Hueck, A G: The factory of Funcke & Hueck has built many machines for its own use War employment totaled 1200, of which 500 were women, many of them Russian. Commercial bolt and nut production was 400 to 500 tons per month; high tensile bolt production, 160 tons per month, and drop forgings, 300 tons per month. No new development was seen. Smallest diameter made is ¼-in. cold, largest is ⅝-in. cold, and up to 2-in. diameter made by hot forgings on either Vincent presses or 4-hammer headers. Nuts are cold pressed on horizontal machines up to ½-in. diameter and hot forged up to 2-in.

Altenloh Brinck & Co.: Bolt plant is at Gevelsburg, near Hagen. Commercial bolt production was concentrated in 6, 8, and 12 mm diameter, with a few 16 mm, all of these being cold headed. Factory made a small quantity of 19 mm, hot forged. It employed between 500 and 600 workers during the war. Monthly production average over 6 years was about 250 tons, with a peak of 290 in 1941. Material used was exclusively commercial quality. In 1944 company also made a small number of aircraft studs, about 50,000 pieces per month. These were turned and rolled on Pee-Wee thread rollers of the circular-die type similar to Great Britain's and marketed by Leo Steinle & Co. Ltd. and by Watson-Flagg in the U. S. Machine does not compare favorably with either British or American counterpart, being less robust in construction. Rolling dies, however, are more economical to produce and average cost per pair o



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dies in Germany was 225 reichmarks, and average life was 15 to 20,000 studs 8 mm in diameter and made from material with tensile strength of 80 kg per sq mm. Plant was very old and in bad condition.

Speck & Hoeltgen: Located at Ratsbourg, near Lubeck, company was reported to have a special method of zinc plating. From Mr. Speck's own account, it soon became apparent the process was well-known and would not be considered of much interest to the delegation. He used an alkaline solution with current of 600-700 amp at 10 v and treated 50-60 kilos per hour per barrel, obtaining thickness of 0.0003-in. Factory was well laid out and modern in construction. At its previous location, Remsheid, the firm also did hard chromium and nickel plating.

Ehrenreich, Obercassel, Dusseldorf: This is a firm specializing in ball and socket connections used by automotive industry mainly for steering gear and track rods. Plant was found to be very old and in very dirty condition, and product was inferior to that recognized as standard in England and America.

Altenloh Brinck & Co.: Located at Milspe, near Hagen, this company proved to be one of the largest producers of wood screws in Germany. Plant has not been added to during war and no new developments were found. Average daily production of wood screws over 7 years from 1938 through 1944 was slightly under 26,000 gross, a peak of 29,000 being reached in 1942.

Wood screw plant consists of 70 heading machines, 400 slotters, and 700 threaders. Plant was undamaged by bombs.

Carl Bauer, K. G., Kronenburg, Wuppertal: Produced mainly screws for metal thread work and special parts, but plant and production were crude. Employment totaled 600 persons, one-third foreign. No heat treating was done at this plant, and, although it had an automatic department and facilities for drawing bars, these were not up to date.

Hugo Betzer, Ludenscheid, near Hagen: Small factory but completely equipped with Hilgeland machines. Of these there were 14 double-blow headers, the largest being ⅜-in. and remainder varying between 6 mm diameter and 2.6 mm diameter. Also seen were 18 slotters, 11 thread rollers and 7 automatic pointing machines. Shop was modern and clean. Maximum of 35 employes can attain top production of 10 to 12 million screws per 48 hr shift. Product was of highest quality.

Berninghaus & Co., Velbert, near Essen: Firm is primarily machine tool builder, specializing on presses and forging equipment. Large number of machines were found in semi-finished condition, among them a hinge-making machine suitable for making hinges 3-in. long and ⅛-in. thick. Unit is similar to those used by Stanley Works in same

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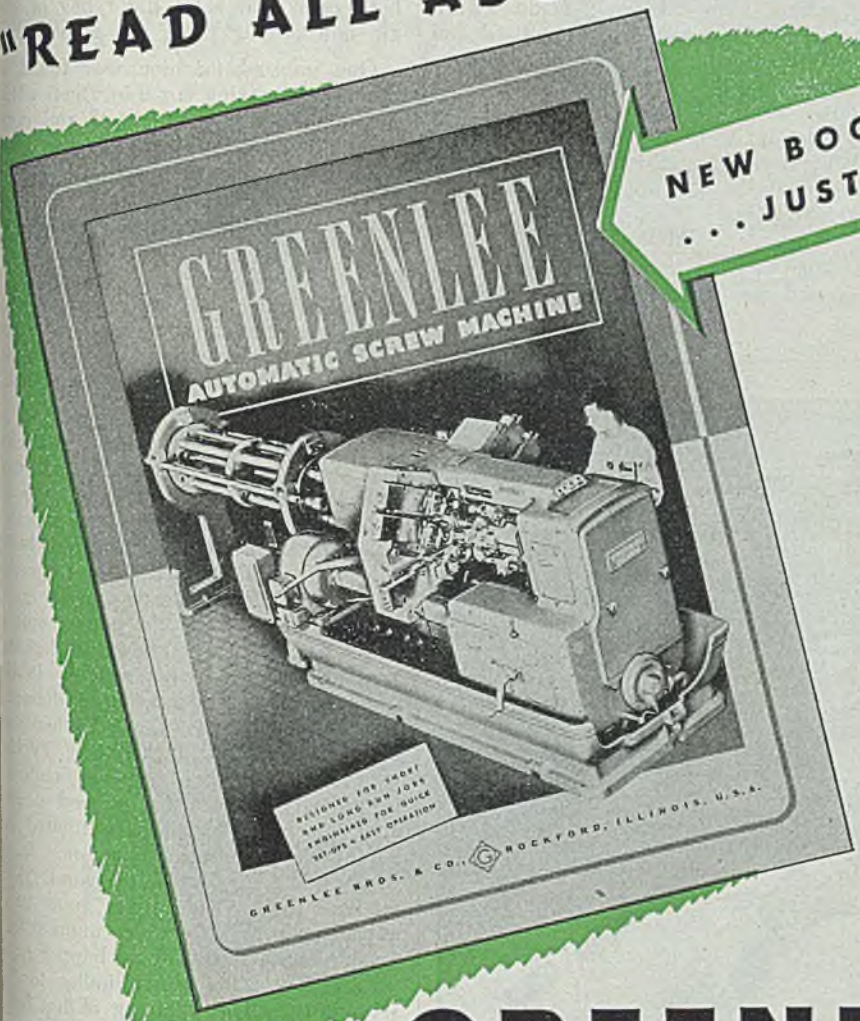

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town. In addition, there were two Ajax-type horizontal forging machines with capacity of 1½ to 2 in. ready for delivery. It is believed machines of this type are urgently needed in this country.

Scissenschmidt & Co., Plettenberg, near Hagen: Company produced large commercial bolts for railroad use by extremely crude methods. Here, again, the answer was cheap labor.

Graeve & Kayser, Plettenberg: A rather large plant, entirely undamaged, employing 1200 to 1400 persons in normal times, making a complete line of commercial products and some high tensile bolts. One very economical hollow hex cap screw was being produced. Nothing else of interest was found.

Gebruder Hilgeland, Wuppertahl, Ronsdorf: Unquestionably the best makers in Germany of machine tools for the bolt, screw and rivet trade. Firm's modern factory was well organized and well equipped. Quality of work was highest possible. Too much hand work done, resulting in machines being individually built and parts not always being interchangeable. Firm's modified automatic pointer just entered the market in 1939.

Methods

Cold-heading of fasteners has progressed much further than hot methods. On the whole machines are excellent, and recent installations show trend toward a heavier more rigid machine than is employed here or in England. They are slightly slower in production, and both open and solid die types in single and double blow are employed.

One unusual machine was found at Lenerwerk, making ¾ x 3-in. rivets which had solid die type of cutoff and carry over into an open die with the usual mechanism. Recent machines of Hilgeland (See description of this firm) were comparable with those of Waterbury-Farrel Foundry & Machine Co. and E. J. Manville.

Cold-heading coils are no larger than ⅝-in. diameter and limited to about 80 ft of wire, except in one case where heavier coils up to 250 lb were found, permitting top diameter of ¾-in.

Hot Forging: Investigation of hot forging methods for bolts afforded very little information of interest. The 3 slide type hammer header was common being used on short as well as long bolts. Another typical method is to forge the bolts from a cold-made upset on a Vincent press, with its power unit a large vertical screw acting as heading ram, driven by a friction wheel. It will produce unusual heads, large diameter odd shapes but as a production machine is slow and inefficient. Typical of heat treating are furnaces made of cylindrical tiles radially pierced which after receiving blanks, are rotated by hand. Neither continuous nor hand wrought hot headers were found. Most modern plants had quite good trimming machines but with no unusual features. Feeds were largely hopper type with a few chain feeds similar to the Waterbury. Bolt trimming of hot bolt and pointing methods were very crude the one exception being a 2-station automatic feed pointer of rather expensive and rigid design, resembling the American-made Economy and produced by Hilgeland. Pointing operation was very positive.

Thread Rolling: Threading of bolts and screws was distinguished only by roll threading machines and methods which were more in line with our practices. Cut threading was done mainly on single and double spindle hand threaders. Insert was done manually. The best roll threading machines were of Hilgeland make, but no advance or new art was observed. Typical roll thread die was threaded both sides and with square ends, omitting the familiar American dovetail.

An unusually large machine at Baum & Schaurte was fitted with very deep composite dies (possibly 10 in.) with individual adjusting wedges backing each die to obviate shimming.

A novel roll threader, known as Pee Wee, was very popular in the better plants. It employs a round roller die and resembles the Watson-Flagg (American) and Steinle (British). The product looked satisfactory. It was criticized for not being rigid enough and also

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brief die life—15 to 20 M bolts—and for cost of dies (250 reichmarks).

Another novel installation, built in 1910 by the company using it (Funcke & Hueck) had a long stroke roller, perhaps 20-in. die length, and a skiving tool following the work and cutting off thread as it rolled up until, finally finished bolt had full diameter thread with full diameter shank. Tool also pointed bolt. Thus excess metal is cut off as dispersed. Roll thread dies, 20 in. long, 3 in. deep, and ¾-in. thick, were produced for 35 years.

A method of blank rolling produced a finish superior to centerless grinding It was used on "waisted" bolts or studs for engines and consisted of rolling product between polished and lapped dies latter contacting full width of waisted portion and up into radii at each end.

Special Operations: Good-quality, economical hollow hex cap screw was produced (Graeve & Kayser) by simple upsetting on a cold header. Blank was heated and fed while hot into Vincent press which punched hexagon recess to produce a fillister head without further finish machining. Screw looked crude but was highly efficient.

Wood Screws: No features of major importance in machine design improvement were found. Slotting, shaving, and threading machines resemble those in vogue here and in England. The product was good. Aluminum substituted for brass in wood screws, due to brass shortage. One plant (Altenloh Brinck) had machines so equipped that finished screws dropped on a shaker chute which distributed screws on a forked receptacle, the chips and shavings dropped through, leaving screws hanging in the fork with heads arranged for inspection by feeler. One type threader used a toothed cutting tool something like a Fellows gear generating tool. It rotated as it was fed against screw, and by proper caming generated thread and point. Some lag screws were made this way.

Machine Screws and Stove Bolts: These are produced in the typical way by heading, slotting and roll threading on Waterbury-type machines. Fillister binding head design seemed popular. Many machines had no burr removers.

Aircraft Studs and Bolts: An ultra high speed lathe running from 1500 to 5000 rpm, depending on work diameter, makes aircraft fasteners in several plants. Shank of the bolt or stud is turned undersize to root diameter of thread or below in order to distribute load. Live center of machine is a matrix formed to receive bolt head, or is a chuck in the case of studs. Dead center receives pointed end and is mounted on ball bearings, thus free to revolve with work. Positioning is done hydraulically or with air. Machine's design is such that full cutting speeds of tungsten carbide tipped tool are used. Tool slide is held to work, but follows a cam which determines length of full diameter and length of waisted reduced area to be cut away. Directly op-

posite is a steady rest, movable in an out, so that if reduced section is long, se arate profile or cam will determine pos tion of this rest and steady work.

In operation, worker takes c through to the end, shuts off feed, a faces underside of head, with a va efficient job of filleting at junction head and shank. On a bolt about ⅝-i diameter, with feed of 0.01-centimet per revolution, 0.2 mm in depth, a c was taken in 68 sec on a 12-in. lengt reducing diameter 0.4 mm. In oper tion feed and rpm are balanced again tool's capacity.

Forging Hot Nuts: A machine for ma ing hot hexagonal nuts with very litt scrap is widely employed, the proce —indenting hot bar, squeezing rough to form, cutting off, carrying back matrix die where piercer partly swag stock from hole outwardly to fill co ners as corresponding punch advanc to punch and size hole—never attain much success in the United States e cept at the old Neely plant in Pit burgh. Steel for these nuts is repu ed to be low in carbon and high in pho phorus and possibly of different h working characteristics than ours. is made by the Thomas process.

Bar Nut Making: A single spind screw machine, the Index, was usual used. Employed stationary drill a two cutoffs, with a countersinking too Made good nut of high accuracy and sa isfactory finish.

Nut Tapping: In contrast to th common hand-tapping machines was very good automatic tapper used nuts from 3/16-in. to 1-in. bolt siz Called the Nutap, it is a twin-stati machine with two chutes loading out hoppers and feeding two taps of Be design, the latter being enclosed.

Centerless Grinding: This meth was used generally on aircraft bol Grinder design was light and frail com pared to our machines, their light co struction making it difficult to hold to erances with any degree of accuracy.

One notable and very new develo ment (at Bauer & Schaurte) was an aut matic feed for bolts. This embrace the idea of cutting away the feed whe at two points and mounting cams on bo sides of the wheel to time the fee with relation to the cut-out portion Blade-type hopper, mounted on the cen terless grinder, then fed ¼ x 1½-in bolts at the rate of 35 per min into a inclined magazine, an escape motio permitting one bolt to slide down th chute. Striking end of chute, it fell horizontal slide below. Pusher the advanced bolt, point first, between feed ing wheel and grinding wheel.

Heat Treating Furnaces: Furnac almost universally used for heat trea ing were similar to the Victor Penins lar furnaces of America, using a lig sheet metal belt made of 25 per cen chromium, 20 per cent nickel materi known as Anti-Corro Steel—Poldi—K. C. These furnaces seem to have give very little trouble.

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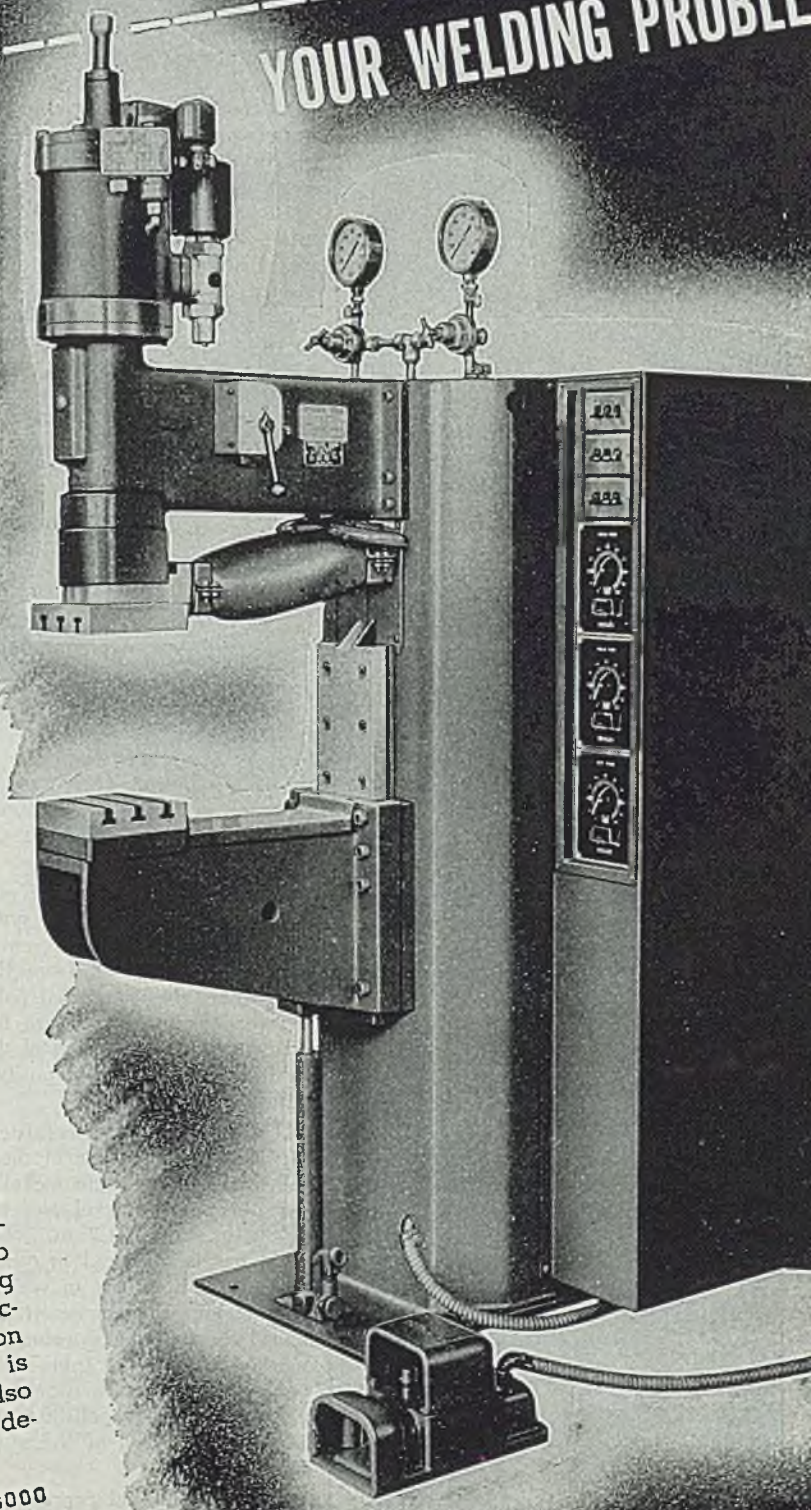

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CLEARANCE BETWEEN ARMS: Lower arm adjustable over a range of 11½". Maximum working space between arms 21".

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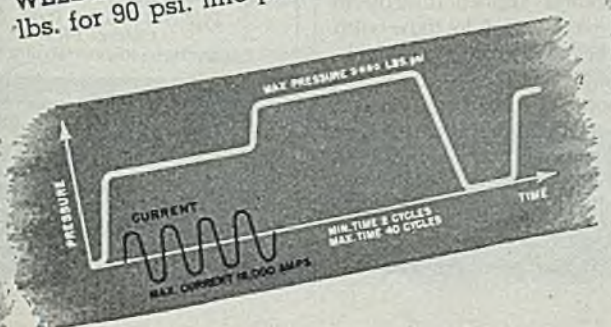
WELDING PRESSURE: Maximum 3000 lbs. for 90 psi. line pressure.



PMC01-9
projection welder

Polishing Steel

(*Continued from Page* 146)

Blum are of interest when using steel base construction that later is to be given a bright plate of the copper-nickel-chromium type or nickel-chromium type. However, in order to draw conclusions from their data, the experimenters found it necessary to first evaluate the reproducibility of the results. To be significant, any effects of a particular variable must be greater than the accidental variations. A study of the results of their investigations and of the much larger number of inspection data from previous similar exposure tests has indicated that in any single location a given score must vary by about 10 per cent from the average of comparable sets to be significant and for the mean of three or more locations, by at least 5 per cent from the average. Application of this criterion to the tests afforded definite conclusions.

No conclusive evidence was obtained of a consistent effect of the polishing or surface finish on the protective value of the plated coatings on cold-rolled steel. For example, it was pointed out that with 0.00075-in. of buffed dull nickel followed by 0.00001-in. of chromium, eight sets ranging from a 90-grain finish to a superfinish showed no variations as high as 5 per cent from the average of the three locations. No significant effects of polishing were observed with seven similar sets plated with bright nickel and chromium.

No significant effects of polishing on corrosion resistance were noted in test samples from which different depths of metal were removed from the surface, but having the same final polish. Varying the cleaning procedure had no significant effect on the life of the coatings so long as adherent deposits were obtained.

The results show a consistent increase in the protective value of the coating as the thickness of bright nickel or of copper plus bright nickel was varied from 0.0004-in. to 0.00125-in. This confirms what has been found in other exposure tests. On those sets in which unbuffed dull nickel was compared with buffed nickel the unbuffed specimens showed a marked superiority (plus 21 per cent) only on the unpolished cold-rolled steel. On exposure sets polished with 150 or 220 grain, buffing of the nickel had no large effect.

Sets with buffed copper under bright nickel were distinctly better (plus 21 per cent) than those with bright nickel of the same total thickness applied directly to the steel, and were equal to those with buffed dull nickel of the same total thickness. This result is different from the previously reported detrimental effect of copper under buffed dull nickel. These results were confirmed in supplemental exposure tests with additional sets plated with copper followed by buffed or bright nickel.

Discussion: It has been generally be-

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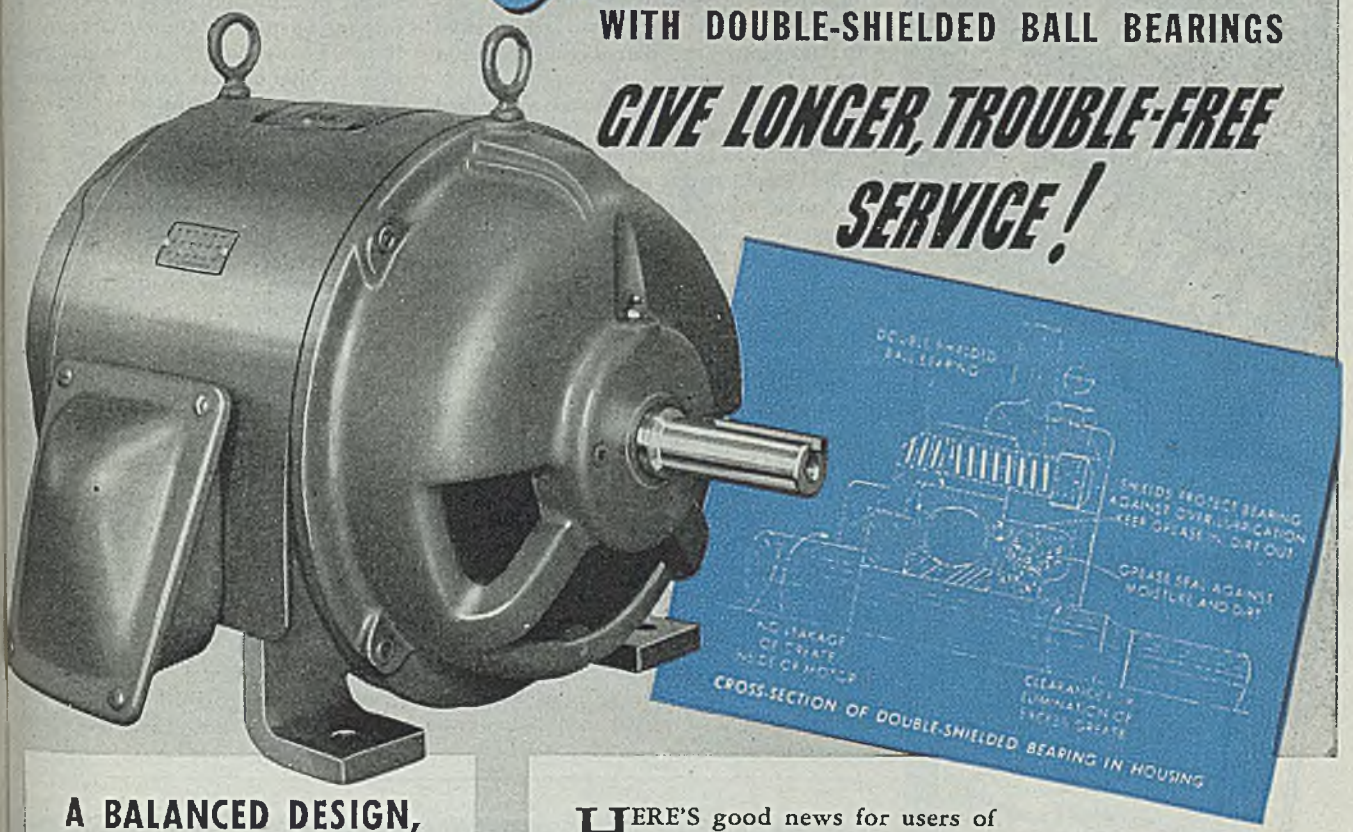

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8. **Flange and face type brackets** offer alternative methods of machine application.

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If under-lubricated after installation, bearings with this design will last longer than non-shielded bearings given the same treatment. This is because of grease retained within the shields plus grease remaining in the housing from its initial filling.

If over-greased after installation, they will operate satisfactorily without overheating, whereas non-shielded bearings under the same treatment may fail.

It is not necessary to disassemble motors at the end of fixed periods to grease bearings. Bearing shields do not require renewal.

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RELIANCE A-C D-C MOTORS

lieved that plated coatings of a given thickness are more porous and hence less protective when applied to rough surfaces than to smooth or highly polished surfaces. This belief was not borne out by the recent work of Lux and Blum, and these experimenters point out several causes that may have contributed to this apparent contradiction between wo sets of results.

Steel used in the study was cold-rolled and the surface was free from oxide or scale such as is normally present on hot-rolled steel. It was reasoned that a given polishing scheme might not leave as continuous a metal surface on hot-rolled steel as on the cold-rolled used in this study. It also was pointed out that the steel plated in this study was of a type that possibly might contain less foreign inclusions than other grades of steel, especially hot-rolled.

A study similar to this one is described by Pinner[2], who polished panels of hot-rolled SAE 1085, commercial cold-rolled SAE 1010, and "perfect" cold-rolled SAE 1010, with various abrasive grains, plated them with nickel, and subsequently exposed them to salt spray tests. With the hot-rolled steel and the commercial cold-rolled steel Pinner found that a decrease in grain size of the abrasive, in general, improved the protective value of the nickel coatings. The grain size of the abrasive studied varied from 90 to 220 grain. With the perfect cold-rolled steel no effect of grain size was observed by Pinner except with the coarse 90-grain which yielded a poor protective coating. The results obtained by Pinner on the perfect steel are consistent with those found by Lux and Blum, except for the low rating on the 90-grain abrasive, and it was pointed out that this discrepancy may involve the use of the salt spray in Pinner's test as contrasted with the present atmospheric corrosion tests.

Thus the conclusion reached in the study by Lux and Blum, that wide variations in polishing operations and in contours of the steel surface prior to plating have no significant effect on the protective value of plated coatings, may therefore apply only to steel that is initially free from scale and inclusions and has not been polished to produce a smooth surface after plating.

Correlation of Accelerated Corrosion Tests with Exposure Tests: It is the general purpose of accelerated corrosion tests on coated metals to determine in short time the relative protective value of two or more coatings. Due to the fact it is necessary to change some conditions of the test in order to expedite corrosion results obtained often do not check those in actual service. Lux and Blum in the study carried out a comparison of accelerated tests with atmospheric exposure tests. In view of the fact failure

coatings of relatively noble metals, such as copper and nickel on steel, is generally believed due to porosity of the coating, the accelerated corrosion tests used were based on four types of porosity tests, namely (a) salt-spray test, (b) ferroxyl test[6], (c) hot water test[6], and (d) moisture-condensation test[7].

According to Lux and Blum, results obtained from the salt-spray test cast doubt upon the value of this method for detecting pores in nickel coatings. Pending a more exhaustive study it was suggested that as a tentative measure of porosity, the results of a relatively short period, such as 100 hr, in the salt-spray be taken.

There is the possibility that long exposure in the salt-spray may slowly attack the coatings, producing pores where none existed previously. When this salt-spray test criterion was applied to the results with the polished and plated specimens, no correlation was found with the exposure tests. An example cited to illustrate this lack of correlation was that of two sets of dull nickel panels which showed large numbers (40 and 20) of spots in the salt spray and the one of bright nickel (30 spots), all were from sets that showed no marked failure in the exposure tests. Similarly the number of porosity spots brought out by the ferroxyl test[6] and the hot water test[6] showed no correlation with the results of the exposure tests. Results with the moisture condensation test[7], which has been used at the National Bureau of Standards for testing painted coatings on steel, indicated in general that this test is impractical for testing plated metals.

REFERENCES

[1] Research Paper RP 1645, National Bureau of Standards.

[2] Pinner; proceedings, American Electroplating Society (1940).

[3] Made by Brush Development Co., Cleveland.

[4] Made by Physicists Research Co., Ann Arbor, Mich.

[5] Figures taken from Research Paper RP1645, National Bureau of Standards.

[6] P. W. C. Strausser; proceedings, American Electroplaters' Society (1939).

[7] Pollard and Porter; National Bureau of Standards Report BMS 44 (1940).

Metal Welded to Glass by Special Alloy

An alloy of iron, nickel, and cobalt whose expansion with temperature closely parallels that of hard glass up to about 465 degrees Cent., where glass begins to soften, provides an intermediary by which metal can be permanently welded to glass of an electronic tube, according to Westinghouse Electric Corp., Pittsburgh, Pa. This process does not require extensive operator training. Thoroughly cleaned glass and Kovar alloy are heated in a gas flame, the oxidized alloy worked into the softened glass and the joint allowed to cool. The compound surface then provides a base for conventional soldering or brazing processes.

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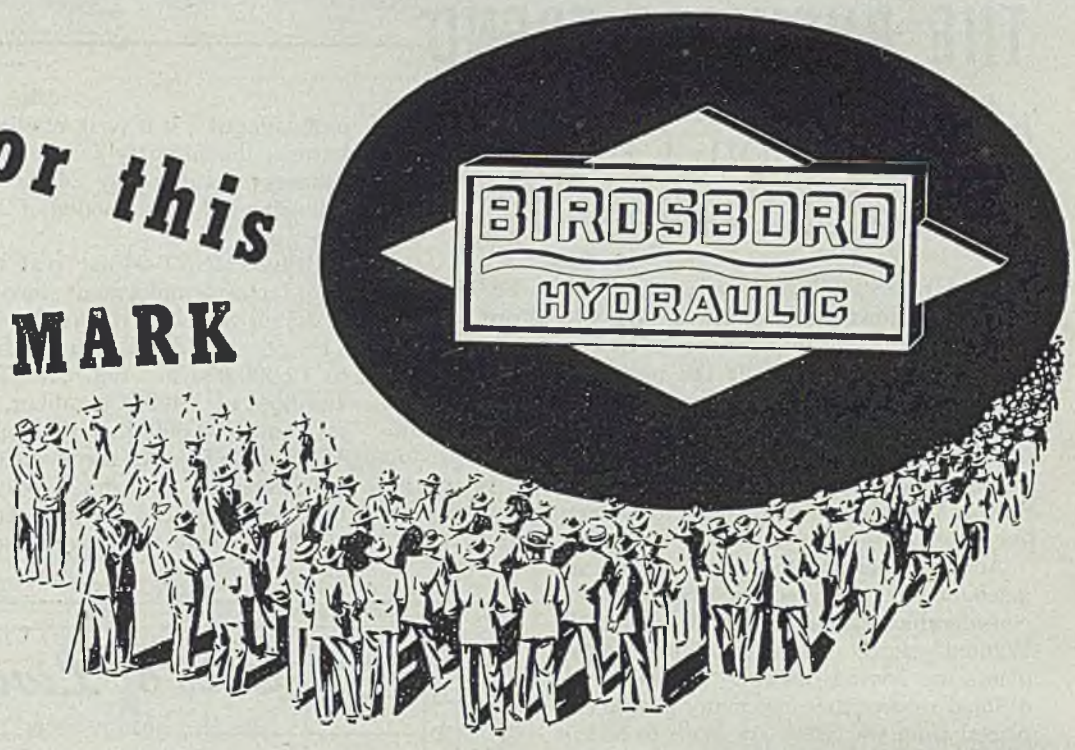

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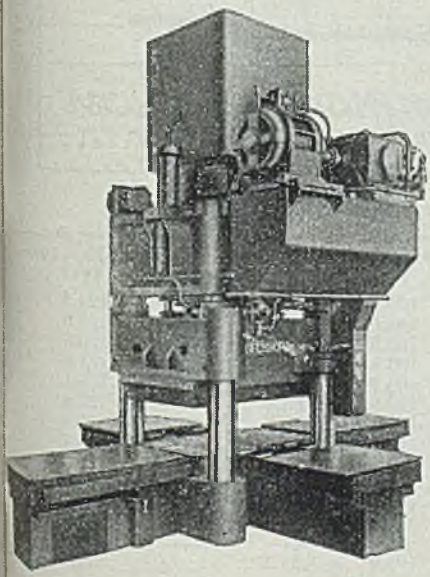

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Reconversion Checking Industrial Decline

PROGRESS of reconversion appears to be checking the strong downward influence that was thrust into industrial production by cessation of the war.

One evidence of this is the performance of the steel ingot production rate over the Labor Day holiday. Although this holiday came only three weeks after the ending of hostilities jolted industry out of its war production pace, the ingot output rate which was recovering from a V-J week low was affected adversely by only 1.5 points.

Another evidence that many plants are mechanically prepared to operate on a considerable scale is the display of "Help Wanted" signs. Numerous labor-seeking plants are having difficulty obtaining additional workers because many people displaced from war work are loath to accept jobs paying less money or offering less desirable working conditions than some war work, but the fact that there are jobs available indicates some industries are ready for all-out peacetime production.

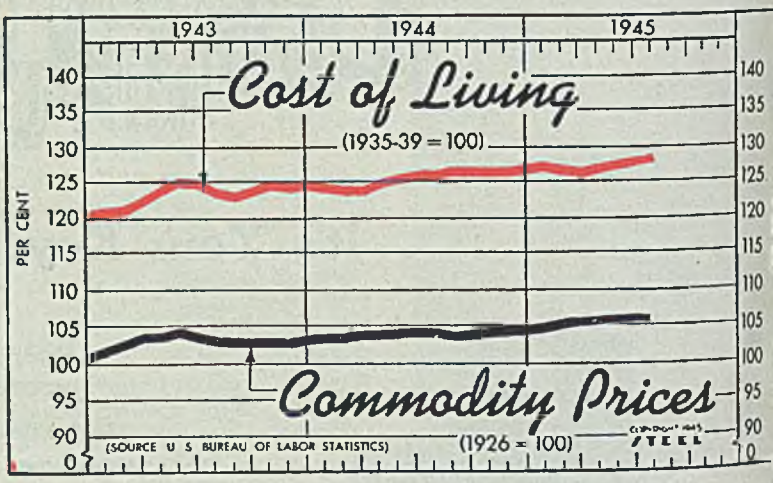
All indicators, however, will not show an upward trend in adjusting to peacetime production.

ELECTRIC POWER—Until the Labor Day holiday week, electric power output recovered moderately from the V-J week low but predictions have been made that a heavy decline in electricity consumption will occur about a month hence. It is reported that since the end of the Japanese war the decline in power consumption has been restricted almost solely to large industrial users but that the cutback is beginning to filter down to subcontractors in the small industrial and large commercial consumer classifications.

OIL—The oil industry is one that already has made a good start in adjusting for peacetime. Expecting a demand of 4,200,000 barrels of petroleum products daily against a war peak of slightly more than five millio barrels, the industry in the week ended Sept. 1 cut its refinery operations by 246,000 barrels of crude oil dail following a daily reduction of 269,000 barrels in the previous week.

EMPLOYMENT—First real measure of the change i total factory employment since the end of war is a Burea of Labor Statistics report that such employment droppe 11½ per cent during August from 13,900,000 on July 3 to 12,300,000 on Aug. 31. The reduction of 1,600,00 consisted of 1,400,000 rubber, metal, and chemical wor ers, and 200,000 factory employees in other fields.

WAR COSTS—As reconversion got underway, war e penditures in August not only were 13 per cent belo those of July and 15 per cent below those of Augus 1944, but were the lowest since February, 1943.



Wholesale Commodity Price—Cost of Living Index

	Commodities (1926 = 100)			Living Cost (1935-39 = 100)		
	1945	1944	1943	1945	1944	19
January	104.9	103.8	101.9	127.1	124.2	12
February	105.2	103.6	102.5	126.9	123.8	12
March	105.3	103.8	103.4	126.8	123.8	12
April	105.7	103.9	103.7	127.1	124.6	12
May	106.0	104.0	104.1	128.1	125.1	12
June	106.1	104.3	103.8	129.0	125.4	12
July	105.9	104.1	103.2	129.4	126.1	12
August	....	103.9	103.1	....	126.4	12
September	....	104.0	103.1	....	126.5	12
October	....	104.1	103.0	....	126.5	12
November	....	104.4	102.9	....	126.6	12
December	....	104.7	103.2	....	127.0	12
Average	....	104.0	103.2	....	125.5	12

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	73.5	75	88.5	96
Electric Power Distributed (million kilowatt hours)	3,909	4,137	4,395	4,928
Bituminous Coal Production (daily av.—1000 tons)	2,020	2,000	1,892	1,947
Petroleum Production (daily av.—1000 bbls.)	4,518	4,875	4,934	4,688
Construction Volume (ENR—Unit $1,000,000)	$30.8	$35.3	$30.2	$25.4
Automobile and Truck Output (Ward's—number units)	14,560	13,845	20,790	17,285

*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	737†	860	870	826
Business Failures (Dun & Bradstreet, number)	19	16	8	9
Money in Circulation (in millions of dollars)‡	$27,750	$27,600	$27,269	$23,43
Department Store Sales (change from like wk. a yr. ago)‡	−1%	+6%	+22%	+1

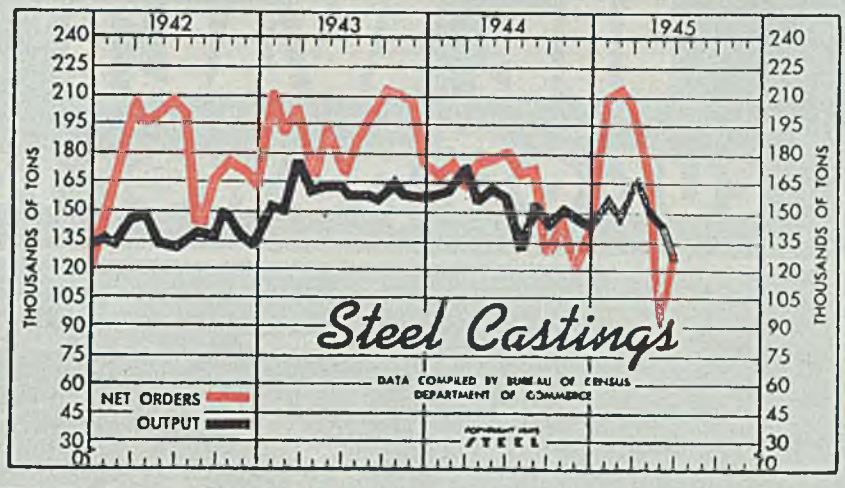
†Preliminary. ‡Federal Reserve Board.

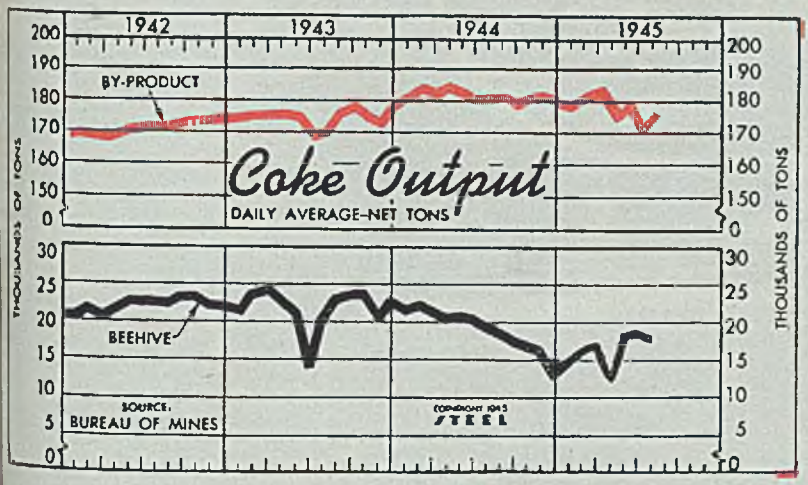
Commercial Steel Castings†

(Net tons in thousands)

	Orders		Production	
	1945	1944	1945	1944
Jan.	210.2	167.7	157.2	159.8
Feb.	214.4	173.6	146.2	161.4
Mar.	203.2	162.6	166.9	174.6
Apr.	177.7	175.1	150 3	155.8
May	89.8	177.0	145.1	161.8
June	130.2	181.8	125.1	157.4
July	....	169.9	....	131.9
Aug.	....	171.3	....	154.9
Sept.	....	129.8	....	144.5
Oct.	....	146.1	....	150.7
Nov.	....	120.7	....	146.4
Dec.	....	138.7	....	144.2
Ave.	....	159.5	....	153.6

† For sale.





Coke Output

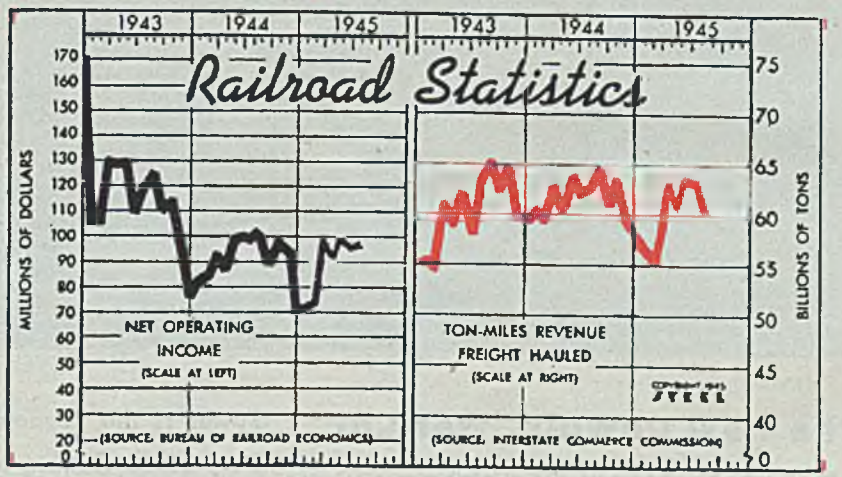
Bureau of Mines

(Daily Average—Net Tons)

	By-Product		Beehive	
	1945	1944	1945	1944
Jan.	179,879	182,226	14,745	21,933
Feb.	180,727	184,384	16,210	22,248
March	182,120	183,123	17,115	21,529
April	174,239	185,259	12,554	20,457
May	178,338	184,071	17,963	20,783
June	172,201	181,891	18,616	20 472
July	175,163	181,506	17,711	19,531
Aug.	.....	181,718	.....	18,572
Sept.	.....	179,234	.....	17,305
Oct.	.....	181,772	.....	16,994
Nov.	.....	182,383	.....	16 199
Dec.	.....	180,746	.....	13,507
Ave.	.....	182,359	.....	19,128

Statistics of Class I Railroads

	Net Operating Income			Ton-Miles Revenue Freight		
	1945	1944	1943	1945	1944	1943
	—(millions)—			—(billions)—		
Jan.	$73 0	$84.9	$105.3	56.8	60.5	55.1
Feb.	73.2	84.5	105.8	55.3	59 3	54.4
Mar.	99 9	92.5	129.7	62.9	62.7	61.2
Apr.	91.9	87.7	128.7	61.6	60.4	59.1
May	99 9	98 5	129 5	64 6	64 0	62 1
June	96.1	99.8	109.0	63.6	62.0	58.0
July	97.1	96 6	127 8	60.1	62.8	63.7
Aug.	....	101.4	132.3	....	64.5	65.1
Sept.	....	89.1	110.3	....	61.0	62.5
Oct.	....	97.3	113.1	....	63.5	65.0
Nov.	....	91.6	96.4	....	59.4	59.9
Dec.	....	69.8	76.9	....	57.3	60.6
Ave.	....	$91.3	$113.7	....	61.5	60.6



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$8,177	$9,944	$10,837	$8,034
Federal Gross Debt (billions)	$263.2	$263.4	$262.7	$211.2
Bond Volume, NYSE (millions)	$30.6	$22.2	$25.2	$34.2
Stocks Sales, NYSE (thousands)	5,141	5,767	5,335	4,725
Loans and Investments (billions)†	$62.5	$62.7	$63.7	$55.5
United States Gov't. Obligations Held (millions)†	$46,371	$46,455	$47,000	$41,446

*Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$58.7	$58.27	$58.27	$56.73
All Commodities†	105.2	105.5	105.7	103.6
Industrial Raw Materials†	115.8	116.9	118.1	112.7
Manufactured Products†	102.1	102.1	101.9	101.1

†Bureau of Labor Statistics Index, 1926=100.

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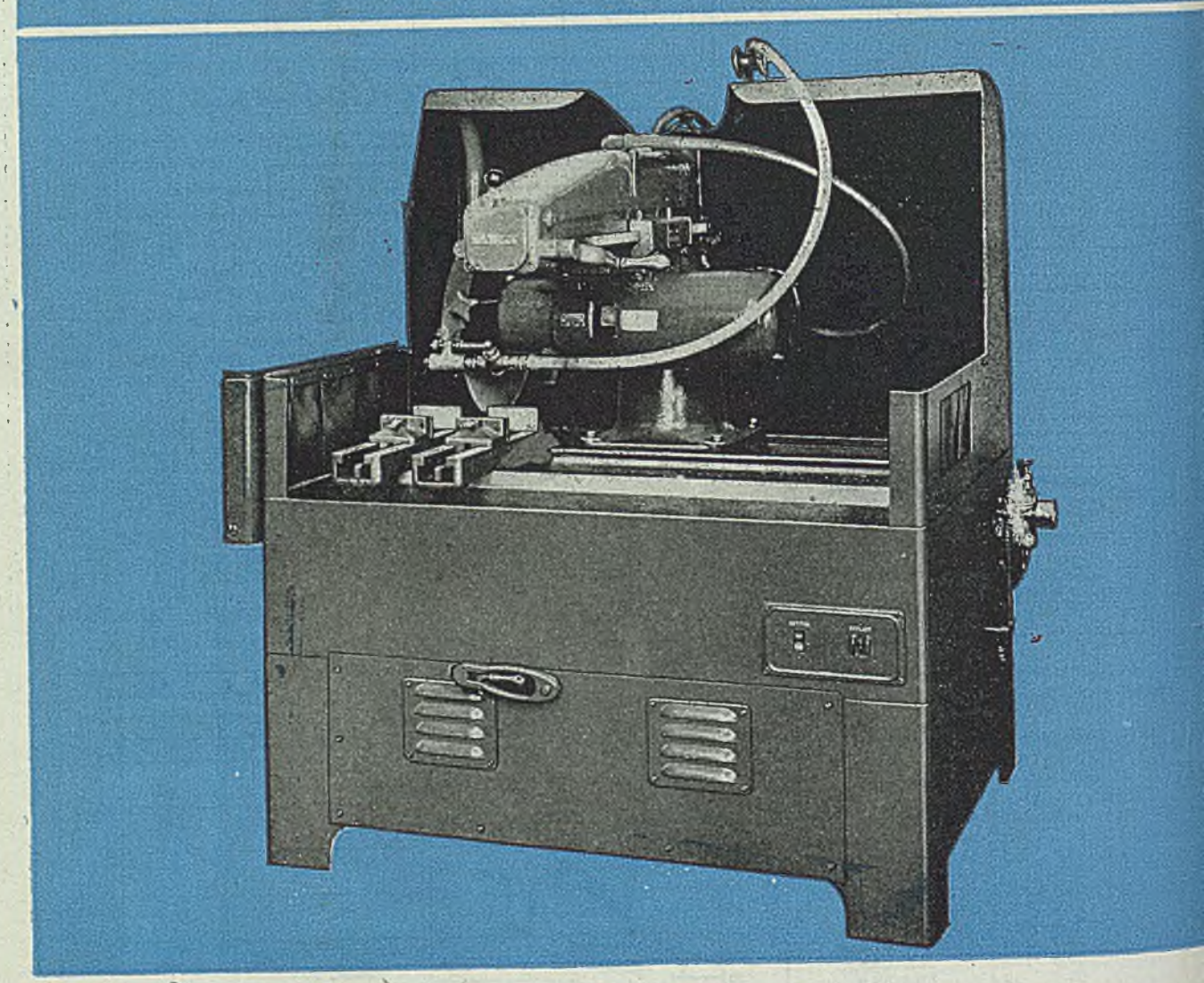

The new DeWalt "Wet-Cut" Metal Cutting Machine:

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Steel Orders, Output Fast Approaching Wartime Level

Deliveries in some lines in next year . . . Mills make gain in operations . . . New basing points established on stainless steels

STEEL backlogs are increasing rapidly, with schedules in some lines, especially light flat products, becoming almost as extended as they were before the end of the war.

Some early gaps are appearing in mill schedules, even in products most in demand, as cancellations and readjustments continue. But in general deliveries are increasingly tight, in some instances several months away, some sheet producers citing February and March. Some carbon bar sellers are out of the market for this year. Merchant pipe, shapes and some are specialties, among others, also reflect the strong upsurge in civilian buying.

Position of some mills is tighter because of MM tonnage. Most of this was booked originally under CMP ratings, especially for shipyards, and general opinion is that a relatively small tonnage of this character will come out. Few CC ratings, representing urgent civilian needs, have been issued and there is increasing confidence that these will be used sparingly. Concern in some quarters that possibly entire industries might get put on such a rating has been completely eliminated by assurances from Washington that such will not be the case and that CC rating will be used only in individual cases in breaking special bottlenecks, and only as a last resort.

While some sellers of carbon bars are practically sold for the year tonnage still may be obtained for late November and December, in cold-drawn as well as hot-rolled. In general bar producers have not regained as much ground since the end of the war as sheetmakers, particularly considering hot-top quality bars, which were quoted for second quarter before the Japanese surrender and now can be had on a parity with ordinary commercial steel bars, which is late this year.

Shape schedules are extending to the point where some producers have little to offer before December. Structural activity is increasing materially, with fabricators practically forced to choose tonnage for figuring because of shortage of estimators and draftsmen. Practical capacity of shape mills is estimated by some authorities at about 5,400,000 tons annually, compared with about 4,600,000 tons when civilian prewar demand was at its height. Present estimated capacity would be at 450,000 tons per month, well in excess of production in war years and also of the better peacetime years.

An important market development is establishment of new basing points on stainless steel products, now covering practically all producers and all plants. This will be in effect a reduction in price of stainless steel from all mills except those in the Pittsburgh district, which formerly was the only basing point.

Steel operations last week took a long step in postwar recovery, the estimated national rate advancing 7 points to 80½ per cent of capacity, with substantial increases in all the leading districts and only two minor decreases. Pittsburgh rose 8 points to 72½ per cent, Chicago 11½ points to 83½, Youngstown 13 points to 85, Cleveland 4 points to 83, eastern Pennsylvania 3 points to 75, Buffalo 9½ points to 81½ and St. Louis 3 points to 68. New England lost 2 points to 78 per cent and Cincinnati 6 points to 76. Rates were unchanged at Wheeling, 95; Birmingham 95 and Detroit 89.

Reaching the lowest figure since June, 1940, steel ingot production in August was 5,712,770 net tons, a result of the dip following end of the Japanese war. This compares with 6,987,008 tons in July and with 7,498,913 tons in August, 1944.

Scrap and pig iron are in sufficient supply but are tight, with some concern expressed over prospects for winter. Both suffer from lack of manpower in yards and at furnaces.

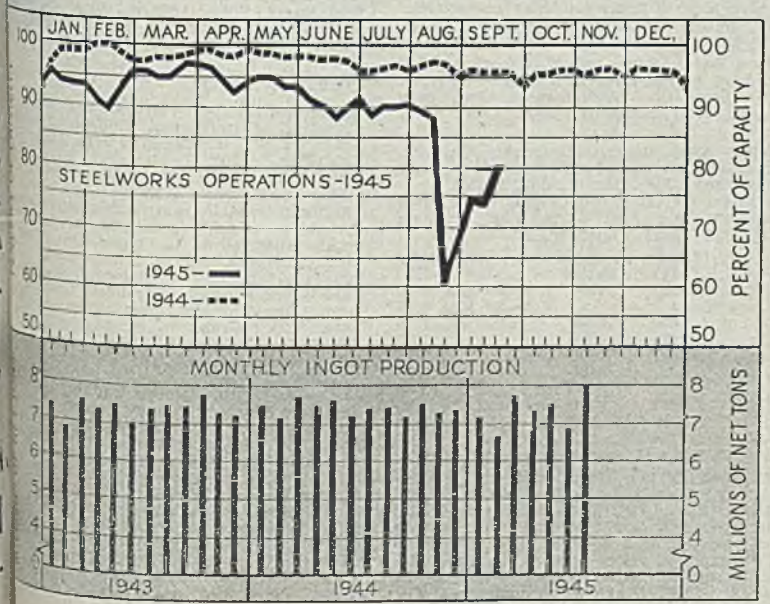
Average composite prices of steel and iron products show no change, remaining at ceilings. Finished steel composite is $58.27, semifinished steel at $37.80, steelmaking pig iron at $24.05 and steelmaking scrap at $19.17.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Sept. 15	Change	Same Week 1944	Same Week 1943
Pittsburgh	73.5	+8	88.5	100
Chicago	83.5	+11.5	100	99
Eastern Pa.	75	+3	95	96
Youngstown	85	+13	88	97
Wheeling	95	None	93	95
Cleveland	83	+4.5	93	95
Buffalo	81.5	+9.5	90.5	90.5
Birmingham	95	None	93	100
New England	78	—2	92	95
Cincinnati	76	—6	87	92
St. Louis	68	+3	87	93
Detroit	89	None	89	90
Estimated national rate	80.5	+7	96	99.5

* Based on steelmaking capacities as of these dates.



COMPOSITE MARKET AVERAGES

	Sept. 15	Sept. 8	Sept. 1	One Month Ago Aug., 1945	Three Months Ago June, 1945	One Year Ago Aug., 1944	Five Years A Aug., 19
Finished Steel	$58.27	$58.27	$58.27	$58.27	$58.27	$56.73	$56
Semifinished Steel	37.80	37.80	37.80	37.80	36.45	36.00	36
Steelmaking Pig Iron	24.05	24.05	24.05	24.05	24.05	23.05	22
Steelmaking Scrap	19.17	19.17	19.17	19.07	19.07	19.17	18

Se inished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelw Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania. Finished steel, net tons; ot

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for last Month, Three Months and One Year Ago

Finished Material	Sept. 15, 1945	Aug., 1945	June, 1945	Sept., 1944
Steel bars, Pittsburgh	2.25c	2.25c	2.25c	2.15c
Steel bars, Philadelphia	2.57	2.57	2.57	2.47
Steel bars, Chicago	2.25	2.25	2.17	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.25	2.25	2.25	2.10
Plates, Philadelphia	2.30	2.30	2.30	2.15
Plates, Chicago	2.25	2.25	2.25	2.10
Sheets, hot-rolled, Pittsburgh	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.70	3.70	3.70	3.50
Sheets, hot-rolled, Gary	2.20	2.20	2.20	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.70	3.70	3.70	3.50
Bright bess., basic wire, Pittsburgh	2.75	2.75	2.75	2.80
Tin plate, per base box, Pittsburgh	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.90	2.90	2.90	2.55

Semifinished Material				
Sheet bars, Pittsburgh, Chicago	$36.00	$36.00	$36.00	$34.00
Slabs, Pittsburgh, Chicago	36.00	36.00	36.00	34.00
Rerolling billets, Pittsburgh	36.00	36.00	36.00	34.00
Wire rods. No. 5 to ⅜-inch, Pitts.	2.15	2.15	2.15	2.00

Pig Iron	Sept. 15, 1945	Aug., 1945	June, 1945	Se 19
Bessemer, del. Pittsburgh	$26.19	$26.19	$26.19	$2
Basic, Valley	24.50	24.50	24.50	2
Basic, eastern del. Philadelphia	26.34	26.34	26.34	2
No. 2 fdry., del. Pitts., N.&S. Sides	25.69	25.69	25.69	2
No. 2 foundry, Chicago	25.00	25.00	25.00	2
Southern No. 2, Birmingham	21.38	21.38	21.38	2
Southern No. 2 del. Cincinnati	25.30	25.30	25.30	2
No. 2 fdry., del. Philadelphia	26.84	26.84	26.84	2
Malleable, Valley	25.00	25.00	25.00	2
Malleable, Chicago	25.00	25.00	25.00	2
Lake Sup., charcoal del. Chicago	37.34	37.34	37.34	3
Gray forge, del. Pittsburgh	25.19	25.19	25.19	2
Ferromanganese, del. Pittsburgh	140.33	140.33	140.33	14

Scrap				
Heavy melting steel, No. 1 Pittsburgh	$20.00	$20.00	$20.00	$1
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.45	1
Heavy melting steel, Chicago	18.75	18.75	18.75	1
Rails for rolling, Chicago	22.25	22.25	22.25	2
No. 1 cast, Chicago	20.00	20.00	20.00	2

Coke				
Connellsville, furnace, ovens	$7.50	$7.50	$7.50	$
Connellsville, foundry ovens	8.25	8.25	8.25	
Chicago, by-product fdry., del.	13.35	13.67	13.35	1

STEEL, IRON RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941, Feb. 4, 1942 and May 1945. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel pro and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding etc., although only principal e lished basing points for selected products are named specifically. Seconds and off-grade products are also covered. Exceptions applying to vidual companies are noted in the table. Finished steel quoted in cents per pound.

Semifinished Steel

Gross ton basis except wire rods, skelp.

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill Kaiser Co. Inc., $43, f.o.b. Pacific ports.)

Alloy Steel Ingots: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon; uncrop, $45.

Rerolling Billets, Blooms, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $36; Detroit, del. $38; Duluth (bil) $38; Pac. Ports, (bil) $48. (Andrews Steel Co., carbon slabs $41; Continental Steel Corp., billets $34, Kokomo, to Acme Steel Co.; Northwestern Steel & Wire Co., $41, Sterling, Ill; Laclede Steel Co., $34 Alton or Madison, Ill.; Wheeling Steel Corp. $36 base, billets for lend-lease, $34, Portsmouth, O., on slabs on WPB directives. Granite City Steel Co. $47.50 gross ton slabs from D.P.C. mill. Geneva Steel Co., Kaiser Co. Inc., $58.64, Pac. ports.)

Forging Quality Blooms, Slabs, Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $42. Detroit, del. $44; Duluth, billets, $44; forg. bil. f.o.b. Pac. ports, $54.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points; Follansbee Steel Corp., $49.50 f.o.b. Toronto, O. Geneva Steel Co., Kaiser Co. Inc., $64.64, Pacific ports.)

Open Hearth Shell Steel: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Youngstown, Birmingham, base 1000 tons one size and section; 3-12 in., $52; 12-18 in., excl., $54.00; 18 in. and over $56. Add $2.00 del. Detroit; $3.00 del. Eastern Mich. (Kaiser Co. Inc., $76.64, f.o.b. Los Angeles.)

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54, del. Detroit $56, Eastern Mich. $57.

Sheet Bars: Pittsburgh Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $36. (Wheeling Steel Corp. $37 on lend-lease sheet bars, $38 Portsmouth, O., on WPB directives; Empire Sheet & Tin Plate Co., Mansfield, O., carbon sheet bars, $39, f.ob. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Point, Youngstown, Coatesville, lb., 1.90c.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, 5—⅜ in. inclusive, per 100 lbs., $2.15 Do., over ⅜—$\frac{47}{64}$-in., incl., $2.30; Galveston, base, 2.25c and 2.40c, respectively. Worcester add $0.10; Pacific ports $0.50 (Pittsburgh Steel Co., $0.20 higher.)

Bars

Hot-Rolled Carbon Bars and Bar-Size Shapes under 3 : Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham base 20 tons one size, 2.25c; Duluth, base 2.35c; Mahoning Valley 2.32½c; Detroit, del. 2.35c; Eastern Mich. 2.40c; New York del. 2.59c; Phila. del. 2.57c; Gulf Ports, dock 2.62c; Pac. ports, dock 2.90c, (Calumet Steel Division. Borg-Warner Corp., and Joslyn Mfg. & Suply Co., may quote 2.35c, Chicago base; Sheffield Steel Corp., 2.75c, f.o.b. St Louis.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c; Detroit, del., 2.80c.
(Texas Steel Co. may use Chicago base price as maximum f.o.b. Fort Worth, Tex., price on sales outside Texas, Oklahoma.)

AISI Series	(*Basic O-H)	AISI Series	(*Basic O-H)
1300	$0.10	4100 (.15-.25 Mo)	0.70
		(.20-.30 Mo)	0.75
2300	1.70	4300	1.70
2500	2.55	4600	1.20
3000	0.50	4800	2.15
3100	0.85	5100	0.35
3200	1.35	5130 or 5152	0.45
3400	3.20	6120 or 6152	0.95
4000	0.45-0.55	6145 or 6150	1.20

*Add 0.25 for acid open-hearth; 0.50 electric.

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.75c; Detroit 2.80c; Toledo 2.90c. (Keystone Drawn Steel Co. may sell outside its usual market area on Proc. Div., Treasury Dept. contracts at 2.65c, Spring City, Pa., plus freight on hot-rolled bars from Pittsburgh to Spring City, New England Drawn Steel Co. may sell outside New England on WPB directives at 2.65c, Mansfield, Mass., plus fr on hot-rolled bars from Buffalo to Mansf

Cold-Finished Alloy Bars: Pittsburgh, Chi Gary, Cleveland, Buffalo, base 3.35c; De del. 3.45c; Eastern Mich. 3.50c.

Reinforcing Bars (New Billet): Pittsb Chicago, Gary, Cleveland, Birmingham, rows Point, Buffalo, Youngstown, base Detroit del. 2.25c; Eastern Mich. and T 2.30c; Gulf ports, dock 2.50c; Pacific dock 2.55c.

Reinforcing Bars (Rail Steel): Pittsburgh cago, Gary, Cleveland, Birmingham, Yo town, Buffalo base 2.15c; Detroit, del. Eastern Mich. and Toledo 2.30c; Gulf dock 2.50c.

Iron Bars: Single refined, Pitts. 4.40c; refined 5.40c; Pittsburgh, staybolt, 5.75c; Haute, single ref., 5.00, double ref., 6.25

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Birmingham, Buffalo, Youngs Sparrows Pt., Middletown, base 2.20c; Gr City, base 2.30c; Detroit del. 2.30c; Ea Mich. 2.35c; Phila. del. 2.37c; New York 2.44c; Pacific ports 2.75c.
(Andrews Steel Co. may quote hot-rolled s for shipment to Detroit and the Detroit on the Middletown, O., base; Alan Wood Co., Conshohocken, Pa., may quote 2.3 hot carbon sheets, nearest eastern basing p

Cold-Rolled Sheets: Pittsburgh, Chicago, land, Gary, Buffalo, Youngstown, Middle base, 3.05c; Granite City, base 3.15c; D del. 3.15c; Eastern Mich. 3.20c; New Yor 3.39c; Phila. del. 3.37c; Pacific ports

Galvanized Sheets, No. 24: Pittsburgh, cago, Gary, Birmingham, Buffalo, Youngs Sparrows Point, Middletown, base 3.70c; ite City, base 3.80c; New York del. Phila. del. 3.87c; Pacific ports 4.25c.
(Andrews Steel Co. may quote galv sheets 3.75c at established basing poin

Corrugated Galv. Sheets: Pittsburgh, Ch Gary, Birmingham, 29 gage, per square

Culvert Sheets: Pittsburgh, Chicago, Birmingham, 16 gage not corrugated, alloy 3.60c; Granite City 3.70c; Pacific 4.25c; copper iron, 3.90c; pure iron 3.95c coated, hot-dipped, heat-treated, No. 24, burgh, 4.25c.

STE

Enameling Sheets: 10-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base, 2.85c; Granite City, base 2.95c; Detroit, del. 2.95c; eastern, Mich. 3.00c; Pacific ports 3.50c; 20-gage; Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, base 3.45c; Detroit del. 3.55c; eastern Mich. 3.60c; Pacific ports 4.10c.

Electrical Sheets No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.30c	4.05c	3.30c
Armature	3.65c	4.40c	3.75c
Electrical	4.15c	4.90c	4.25c
Motor	5.05c	5.80c	5.15c
Dynamo	5.75c	6.50c	5.85c
Transformer			
72	6.25c	7.00c	.....
65	7.25c	8.00c	.....
58	7.75c	8.50c	.....
52	8.55c	9.30c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Eastern Mich. 2.25c; Pacific ports 2.75c (Joslyn Mfg. Co. may quote 2.30c, Chicago base.)

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Eastern Mich. 2.95c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland Youngstown, base 3 tons and over, 2.95c; Chicago 3.05c; Detroit del. 3.05c; Eastern Mich. 3.10c; Worcester base 3.35c.

Cold Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Electrolytic Tin Plate: Pittsburgh, Gary, 100-lb. base box, 0.25 lb. tin, $4.35; 0.50 lb. tin, $4.50; 0.75 lb. tin $4.65; Granite City, $4.45, $4.60, $4.75, respectively.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c; Pacific ports 4.55c.

Manufacturing Ternes: (Special Coated) Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets; 20 x 28 in., coating I.C. 8-lb. $12.90; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.25c; New York, del. 2.44c; Phila., del. 2.30c; St. Louis, 2.49c; Boston, del. 2.57-82c; Pacific ports, 2.80c; Gulf ports, 2.60c.

Granite City Steel Co. may quote carbon plates 2.35c f.o.b. mill; 2.65c f.o.b. D.P.C. Kaiser Co. Inc., 3.20c, f.o.b. Los Angeles. Central Iron & Steel Co. 2.50c f.o.b. basing points; Geneva Steel Co., Provo, Utah, 3.20c, f.o.b. Pac. ports.)

Floor Plates: Pittsburgh, Chicago, 3.50c; Pacific ports, 4.15c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c; Gulf ports 3.95c; Pacific ports 4.15c.

Wrought Iron Plates: Pittsburgh, 4.30c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del. 2.27c; Phila., del. 2.215c; Pacific ports, 2.75c.

Phoenix Iron Co., Phoenixville, Pa., may quote carbon steel shapes at 2.35c at established basing points and 2.50c, Phoenixville, for export; Sheffield Steel Corp., 2.55c f.o.b. St. Louis. Geneva Steel Co., 3.25c, Pac. ports; Bethlehem Co. Inc., 3.20c f.o.b. Los Angeles).

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester, $1 Duluth).

Bright basic, bessemer wire 2.75c
Spring wire 3.35c
(Pittsburgh Steel Co., 0.20c higher.)

Wire Products to the Trade:

Standard and Cement-coated wire nails, 100-lb. keg, Pittsburgh, Chicago, Birmingham, Cleveland, Duluth $2.90; galvanized, $2.55; Pac. ports .....$3.40 and $3.05

Galvanized fence wire, 100-lb., Pittsburgh, Chicago, Cleveland 3.20c

Galvanized fence wire, 100 lb., Pittsburgh, Chicago, Cleveland 3.55c

Woven fence, 15½ gage and heavier, per rod 67c

Base column .....

Annealed wire, 80-rod spool, Pittsburgh, Chicago, Cleveland, Birmingham, column 70; twisted barbless wire, column 70.

Tubular Goods

Standard Pipe: Base price in carloads, threaded and coupled to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

	Steel		Iron	
In.	Blk.	Galv.	Blk.	Galv.
⅛	56	33	24	3½
¼ & ⅜	59	40½	30	10
½	63½	51	34	16
¾	66½	55	38	18½
1-3	68½	57½	37½	18

Lap Weld

	Steel		Iron	
In.	Blk.	Galv.	Blk.	Galv.
2	61	49½	23	3½
2½-3	64	54½	28½	10
3½-6	66	54½	30½	12
7-8	65	52½	31½	14½
9-10	64½	52	33½	18
11-12	63½	51	32½	17

Boiler Tubes: Net base prices per 100 feet f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O.D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $43.00. Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $45.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $31-$33.

Supplies: Track bolts, 4.75c; heat treated, 5.00c. Tie plates $46 net ton, base, Standard spikes, 3.25c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.; Reg. carbon 14.00c, extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

Tung.	Chr.	Van.	Moly.	Pitts. base per lb
18.00	4	1	...	67.00c
1.5	4	1	8.5	54.00c
....	4	2	8	54.00c
6.40	4.15	1.90	5	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb., f.o.b. mill base.

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
CHROMIUM NICKEL STEEL					
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
‡321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50
STRAIGHT CHROMIUM STEEL					
403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
410A	24.00	28.50	33.50	23.75	36.50
442	22.50	25.50	32.50	24.00	32.00
443	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00
STAINLESS CLAD STEEL (20%)					
304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extra mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price.

Seconds, maximum prices: flat-rolled rejects 75% of prime prices, wasters 75%, waste-wasters 65% except plates, which take waster prices; tin plate $2.80 per 100 lbs.; terne plate $2.25; semifinished 85% of primes; other grades limited to new material ceilings.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅝ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off
Step bolts	56 off
Plow bolts	65 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 80 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Nuts

Semifinished hex	U.S.S.	S.A.E.
⅞-inch and less	62	64
⅛-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	

Hexagon Cap Screws

Upset 1-in., smaller	64 off
Milled 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	71 off
Headless, ¼-in., larger	60 off
No. 10, smaller	70 off

Piling

Pittsburgh, Chicago, Buffalo 2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought, Washers, Pittsburgh, Chicago, Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	*7.50
Connellsville, foundry	8.00- 8.50
New River, foundry	9.00- 9.25
Wise county, foundry	7.75- 8.25
Wise county, furnace	7.25- 7.75

By-Product Foundry

Kearney, N. J., ovens	13.05
Chicago, outside delivered	13.00
Chicago, delivered	13.75
Terre Haute, delivered	13.50
Milwaukee, ovens	13.75
New England, delivered	14.65
St. Louis, delivered	†13.75
Birmingham, delivered	10.90
Indianapolis, delivered	13.50
Cincinnati, delivered	13.25
Cleveland, delivered	13.20
Buffalo, delivered	13.40
Detroit, delivered	13.75
Philadelphia, delivered	13.28

*Operators of hand-drawn ovens using trucked coal may charge $8.00; effective May 28, 1945 †14.25 from other than Ala., Mo., Tenn.

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do., less than car lots	13.25c
Do., tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls., to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.20

WAREHOUSE STEEL PRICES

Base delivered price, cents per pound, for delivery within switching limits, subject to established extras.

	Hot rolled bars	Structural shapes	Plates	Floor plates	Hot rolled sheets (10 gage base)	Hot rolled bands (12 gage and heavier)	Hot rolled hoops (14 gage and lighter)	Galvanized flat sheets (24 gage base)	Cold-rolled sheets (17 gage base)	Cold finished bars	Cold-rolled strip	NE hot bars 8600 series	NE hot bars 9400 series
Boston	4.044[1]	3.912[1]	3.912[1]	5.727[1]	3.774[1]	4.106[1]	5.106[1]	5.224[14]	4.744[16]	4.244[11]	4.715	6.012[23]	6.012[23]
New York	3.853[1]	3.758[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Jersey City	3.853[1]	3.747[1]	3.768[1]	5.574[1]	3.590[1]	3.974[1]	3.974[1]	5.010[12]	4.613[14]	4.203[21]	4.774	.....	.....
Philadelphia	3.822[1]	3.666[1]	3.605[1]	5.272[1]	3.518[1]	3.922[1]	4.272[1]	5.018[15]	4.872[25]	4.172[21]	4.772	5.816[23]	5.860[23]
Baltimore	3.802[1]	3.759[1]	3.594[1]	5.252[1]	3.394[1]	3.902[1]	4.252[1]	4.894[1]	4.852[25]	4.152[21]	.....	.....	.....
Washington	3.941[1]	3.930[1]	3.796[1]	5.341[1]	3.596[1]	4.041[1]	4.391[1]	5.196[17]	4.841[20]	4.141[21]	.....	.....	.....
Norfolk, Va.	4.065[1]	4.002[1]	3.971[1]	5.465[1]	3.771[1]	4.165[1]	4.515[1]	5.371[17]	4.965[24]	4.265[21]	.....	.....	.....
Bethlehem, Pa.*	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Claymont, Del.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Coatesville, Pa.*	.....	.....	3.45[1]	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Buffalo (city)	3.35[1]	3.40[1]	3.63[1]	5.26[1]	3.35[1]	3.819[1]	3.819[1]	4.75[15]	4.40[10]	3.85[21]	4.669	5.60[23]	5.75[23]
Buffalo (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.81[1]	3.50[1]	4.65[15]	4.30[10]	3.75[21]	4.35	5.60[23]	5.75[23]
Pittsburgh (city)	3.35[1]	3.40[1]	3.40[1]	5.00[1]	3.35[1]	3.60[1]	3.60[1]	4.75[12]	4.40[24]	3.85[21]	.....	.....	.....
Pittsburgh (country)	3.25[1]	3.30[1]	3.30[1]	4.90[1]	3.25[1]	3.50[1]	3.50[1]	4.65[12]	4.30[24]	3.75[21]	.....	.....	.....
Cleveland (city)	3.35[1]	3.588[1]	3.40[1]	5.188[1]	3.35[1]	3.60[1]	3.60[1]	4.877[12]	4.40[24]	3.85[21]	4.45[21]	5.60[23]	5.65[23]
Cleveland (country)	3.25[1]	.....	3.30[1]	.....	3.25[1]	3.50[1]	3.50[1]	.....	4.30[24]	3.75[21]	4.35[21]	.....	.....
Detroit	3.450[1]	3.661[1]	3.609[1]	5.281[1]	3.450[1]	3.700[1]	3.700[1]	5.000[12]	4.500[24]	3.900[21]	4.659	5.93[23]	5.93[23]
Omaha (city, delivered)	4.115[1]	4.165[1]	4.165[1]	5.765[1]	3.865[1]	4.215[1]	4.215[1]	5.608[19]	5.443[24]	4.543[12]	.....	.....	.....
Omaha (country, base)	4.015[1]	4.065[1]	4.065[1]	5.665[1]	3.765[1]	4.115[1]	4.115[1]	5.508[19]	.....	.....	.....	.....	.....
Cincinnati	3.611[1]	3.691[1]	3.661[1]	5.291[1]	3.425[1]	3.675[1]	3.675[1]	4.825[12]	4.475[24]	4.111[21]	4.711	6.10	6.20
Youngstown, O.*	.....	.....	.....	.....	.....	.....	.....	4.40[13]	.....	.....	.....	.....	.....
Middletown, O.*	.....	.....	.....	.....	3.25[1]	3.50[1]	3.50[1]	4.65[10]	.....	.....	.....	.....	.....
Chicago (city)	3.50[1]	3.55[1]	3.55[1]	5.15[1]	3.25[1]	3.60[1]	3.60[1]	5.231[15]	4.20[24]	3.85[21]	4.65	5.75[23]	5.85[23]
Milwaukee	3.637[1]	3.687[1]	3.687[1]	5.287[1]	3.387[1]	3.737[1]	3.737[1]	5.272[15]	4.337[24]	3.987[21]	4.787	5.987[23]	6.087[23]
Indianapolis	3.58[1]	3.63[1]	3.63[1]	5.23[1]	3.518[1]	3.768[1]	3.768[1]	4.918[15]	4.568[24]	4.08[21]	4.78	6.08[23]	6.18[23]
St. Paul	3.76[2]	3.81[2]	3.81[2]	5.41[2]	3.51[2]	3.86[2]	3.86[2]	5.257[15]	4.46[24]	4.461[21]	5.102	6.09[23]	6.19[23]
St. Louis	3.647[1]	3.697[1]	3.697[1]	5.297[1]	3.397[1]	3.747[1]	3.747[1]	5.172[15]	4.347[24]	4.131[21]	4.931	6.131[23]	6.281[23]
Memphis, Tenn.	4.015[5]	4.065[5]	4.065[5]	5.78[5]	3.965[5]	4.215[5]	4.215[5]	5.265[15]	4.78[24]	4.43[21]	.....	.....	.....
Birmingham	3.50[1]	3.55[1]	3.55[1]	5.903[1]	3.45[1]	3.70[1]	3.70[1]	4.75[15]	4.852[24]	4.64	5.215	.....	.....
New Orleans (city)	4.10[4]	3.90[4]	3.90[4]	5.85[4]	4.058[4]	4.20[4]	4.20[4]	5.25[26]	5.079[10]	4.70[21]	5.429	.....	.....
Houston, Tex.	3.75[3]	4.25[3]	4.25[3]	5.50[9]	3.763[3]	4.313[6]	4.313[3]	5.313[20]	4.10[10]	3.75[22]	.....	.....	.....
Los Angeles	4.40[4]	4.65[4]	4.95[4]	7.20[4]	5.00[4]	4.95[4]	6.75[4]	6.00[12]	7.20[6]	5.683[22]	5.613	5.85[23]	5.95[23]
San Francisco	4.15[7]	4.35[7]	4.65[7]	6.35[7]	4.55[7]	4.50[7]	5.75[7]	6.35[15]	7.30[15]	5.433[21]	7.333	8.304[23]	8.404[23]
Portland, Oreg.	4.45[27]	4.45[27]	4.75[27]	6.50[27]	4.65[27]	4.75[27]	6.30[27]	5.75[15]	6.60[15]	5.633[15]	.....	.....	8.00[23]
Tacoma	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.60[15]	5.883[21]	.....	.....	8.00[23]
Seattle	4.35[8]	4.45[8]	4.75[8]	6.50[8]	4.65[8]	4.25[8]	5.45[8]	5.95[15]	7.05[15]	5.883[21]	.....	.....	.....

*Basing point cities with quotations representing mill prices, plus ware house spread.
NOTE—All prices fixed by Office of Price Administration in Amendments Nos. 10 to 33 to Revised Price Schedule No. 49. Deliveries outside above cities computed in accordance with regulations.

BASE QUANTITIES

[1]400 to 1999 pounds; [2]—400 to 14,999 pounds; [3]—any quantity; [4]—300 to 1999 pounds; [5]—400 to 8999 pounds; [6]—300 to 9999 pounds; [7]—400 to 39,999 pounds; [8]—under 2000 pounds; [9]—under 4000 pounds; [10]—500 to 1499 pounds; [11]—one bundle to 39,999 pounds; [12]—150 to 2249 pounds; [13]—150 to 1499 pounds; [14]—three to 24 bundles; [15]—450 to 1499 pounds; [16]—one bundle to 1499 pounds; [17]—one to nine bundles; [18]—one to six bundles; [19]—100 to 749 pounds; [20]—300 to 1999 pounds; [21]—1500 to 39,999 pounds; [22]—1500 to 1999 pounds; [23]—1000 to 39,999 pounds; [24]—400 to 1499 pounds; [25]—1000 to 1999 pounds; [26]—under 25 bundles. Cold-rolled strip, 2000 to 39,999 pounds, base; [27]—300 to 4999 pounds.

Ores

Lake Superior Iron Ore

Gross ton. 51½% (Natural) Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, units, del. E. Pa.

Foundry and basic 56-63% contract	13.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Brazil iron ore, 68-69% f.o.b. Rio de Janeiro	7.50-8.00

Tungsten Ore

Chinese Wolframite, per short ton unit, duty paid	$24.00

Chrome Ore

(Equivalent OPA schedules):

Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., Portland, Ore., or Tacoma, Wash.
(S/S paying for discharge; dry basis, subject to penalties if guarantees are not met.)

Indian and African	
48% 2.8:1	$41.00
48% 3:1	43.50
48% no ratio	31.00
South African (Transval)	
44% no ratio	$27.40
45% no ratio	28.30
48% no ratio	31.00
50% no ratio	32.80
Brazilian—nominal	
44% 2.5:1 lump	33.65
48% 3:1 lump	43.50
Rhodesian	
45% no ratio	28.30
48% no ratio	31.00
48% 3:1 lump	43.50
Domestic (seller's nearest rail)	
48% 3:1 less $7 freight allowance	52.80

Manganese Ore

Sales prices of Metals Reserve Co., cents per gross ton unit, dry, 48%, at New York, Philadelphia, Baltimore, Norfolk, Mobile and New Orleans, 85.0c; Fontana, Calif., Provo, Utah, and Pueblo, Colo. 91.0c; prices include duty on imported ore and are subject to premiums, penalties and other provisions of amended M.P.R. No. 24, effective as of May 15. Price basing points which are also points of discharge of imported manganese ore is f.o.b. cars, shipside, dock most favorable to the buyer.

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.7

NATIONAL EMERGENCY STEELS (Hot Rolled)

(Extras for alloy content)

Basic open-hearth Electric furnace

Designation	Chemical Composition Limits, Per Cent — Carbon	Mn.	Si.	Cr.	Ni.	Mo.	Bars per 100 lb.	Billets per GT	Bars per 100 lb.	Billets per GT
NE 8612	.10-.15	.70-.90	.20-.35	.40-.60	.40-.70	.15-.25	$0.65	$13.00	$1.15	$23.00
NE 8720	.18-.23	.70-.90	.20-.35	.40-.60	.40-.70	.20-.30	.70	14.00	1.20	24.00
NE 9415	.13-.18	.80-1.10	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.25	25.00
NE 9425	.23-.28	.80-1.20	.20-.35	.30-.50	.30-.60	.08-.15	.75	15.00	1.30	26.00
NE 9442	.40-.45	1.00-1.30	.20-.35	.30-.50	.30-.60	.08-.15	.80	16.00	1.15	23.00
NE 9722	.20-.25	.50-.80	.20-.35	.10-.25	.40-.70	.15-.25	.65	13.00	1.80	36.00
NE 9830	.28-.33	.70-.90	.20-.35	.70-.90	.85-1.15	.20-.30	1.30	26.00	1.55	31.00
NE 9912	.10-.15	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00	1.55	31.00
NE 9920	.18-.23	.50-.70	.20-.35	.40-.60	1.00-1.30	.20-.30	1.20	24.00		

Extras are in addition to a base price of 2.70c, per pound on finished products and $54 per gross ton on semifinished steel major basing points and are in cents per pound and dollars per gross ton. No prices quoted on vanadium alloy.

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941, amended Feb. 14, 1945. Exceptions indicated in footnotes. Base prices bold face, delivered light face. Federal tax on freight charges, effective Dec. 1, 1942, not included in following prices.

	Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$26.00	$25.50	$27.00	$26.50
Newark, N. J., del.	27.53	27.03	28.53	28.03
Brooklyn, N. Y., del.	28.50	.....	.....	29.00
Birdsboro, Pa., base	26.00	25.50	27.00	26.50
Birmingham, base	‡21.38	‡20.00	26.00	.....
Baltimore, del.	26.61	.....	.....	.....
Boston, del.	26.12	.....	.....	.....
Chicago, del.	25.22	.....	.....	.....
Cincinnati, del.	25.06	23.68	.....	.....
Cleveland, del.	25.12	24.24	.....	.....
Newark, N. J.	27.15	.....	.....	.....
Philadelphia, del.	26.46	25.96	.....	.....
St. Louis, del.	25.12	24.24	.....	.....
Buffalo, base	25.00	24.00	26.00	25.50
Boston, del.	26.50	26.00	27.50	27.00
Rochester, del.	26.53	.....	27.53	27.03
Syracuse, del	27.08	.....	28.08	27.58
Chicago, base	25.00	24.50	25.50	25.00
Milwaukee, del.	26.10	25.60	26.60	26.10
Muskegon, Mich., del.	28.19	.....	.....	28.19
Cleveland, base	25.00	24.50	25.50	25.00
Akron, Canton, O., del.	26.39	25.89	26.89	26.39
Detroit, base	25.00	24.50	25.50	25.00
Saginaw, Mich., del.	27.31,	26.81	27.81	27.31
Duluth, base	25.50	25.00	26.00	25.50
St. Paul, del.	27.63	27.13	28.13	27.63
Erie, Pa., base	25.00	24.50	26.00	25.50
Everett, Mass., base	26.00	25.50	27.00	26.50
Boston, del.	26.50	26.00	27.50	27.00
Granite City, Ill., base	25.00	24.50	25.50	25.00
St. Louis, del.	25.50	25.00	.....	25.50
Hamilton, O., base	25.00	24.50	.....	25.00
Cincinnati, del.	25.44	25.61	.....	26.11
Neville Island, Pa., base	25.00	24.50	25.50	25.00
‡Pittsburgh, del.				
No. & So. sides	25.69	25.19	26.19	25.69
Provo, Utah, base	23.00	22.50	.....	.....
Sharpsville, Pa., base	25.00	24.50	25.50	25.00
Sparrows Point, base	26.00	25.50	.....	.....
Baltimore, del.	26.99	.....	.....	.....
Swedeland, Pa., base	.....	25.50	.....	26.50
Philadelphia, del.	26.00	25.50	27.00	26.50
Toledo, O., base	26.84	26.34	.....	27.34
Youngstown, O., base	25.00	24.50	25.50	25.00
Mansfield, O., del.	25.00	24.50	25.50	25.00
	26.94	26.44	27.44	26.94

Basic grade, silicon 1.75-2.25%; add 50 cents for each additional 0.25% silicon, or portion thereof; deduct 50 cents for silicon below 1.75% on foundry iron. ‡For phosphorus 0.70% or over deduct 38 cents. §For Kees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenbridge 1.24.

Note: Add 50 cents per ton for each 0.50% manganese or portion thereof over 1.00%.

Nickel differentials: Under 0.50%, no extra; 0.50% to 0.74% incl., $2 per ton: for each additional 0.25% nickel, $1 per ton.

High Silicon, Silvery

6.00-6.50 per cent (base)	$30.50		
6.51-7.00	$31.50	9.01- 9.50	36.50
7.01-7.50	32.50	9.51-10.00	37.50
7.51-8.00	33.50	10.01-10.50	38.50
8.01-8.50	34.50	10.51-11.00	39.50
8.51-9.00	35.50	11.01-11.50	40.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Electric Furnace Ferrosilicon: Sil. 14.01 to 14.50%, $45.50; each additional .50% silicon up to and including 18% add $1; low impurities not exceeding 0.05 Phos., 0.40 Sulphur, 1.0% Carbon, add $1.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling iron, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$34.00
Chicago, del.	37.34

Southern

Semi-cold blast, high phos. f.o.b. furnace, Lyles, Tenn	$28.50
Semi-cold blast, low phos., f.o.b. furnace, Lyles, Tenn	33.00

Gray Forge

Neville Island, Pa.	$24.50
Valley base	24.50

Low Phosphorus

Basing points: Birdsboro, Pa., $30.50; Steelton, Pa., and Buffalo, N. Y., 30.50 base; 31.74, del. Philadelphia. Intermediate phos., Central Furnace, Cleveland, $27.50

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differential: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorus Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorus content of 0.70% and over.

Ceiling Prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic Bessemer and Malleable. Mystic Iron Works, Everett, Mass., may exceed basing point prices by $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Duty	
Pa., Mo., Ky.	$68.50
First Quality	
Pa., Ill., Md., Mo., Ky	54.40
Alabama, Georgia	54.40
New Jersey	59.35
Ohio	47.70
Second Quality	
Pa., Ill., Md., Mo., Ky.	49.35
Alabama, Georgia	40.30
New Jersey	52.00
Ohio	38.15
Malleable Bung Brick	
All bases	63.45
Silica Brick	
Pennsylvania	54.40
Joliet, E. Chicago	62.45
Birmingham, Ala.	54.40
Ladle Brick	
(Pa., O., W. Va., Mo.)	
Dry Press	32.90
Wire Cut	30.80
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded Magnesite	65.00

Fluorspar

Metallurgical grade, f.o.b. Ill., Ky., net tons, carloads CaF_2 content, 70% or more, $33; 65 but less than 70%, $32; 60 but less than 65% $31; less than 60%, $30. After Aug. 29 base price any grade $30.00 war chemicals.

Ferroalloy Prices

Ferromanganese (standard) 78-82% gross ton, duty paid, $135; add for packed c.l., $10 for ton, 50 less-ton, f.o.b. cars, Baltimore, Philadelphia or New York, whichever is most favorable to buyer: Rockdale or Rockwood, Tenn.; Tennessee Products Co. is seller; Birmingham, Ala., where Sheffield Steel & Iron Co. is seller; $1.70 for each 1%, or fraction contained manganese over 78% or under 78%; delivered Pittsburgh, $140.33.

Ferromanganese (Low and Medium carbon); per lb. contained manganese: eastern zone, low carbon, 20c, c.l., 23c; 2000 lb. to c.l., 21c; medium, 14.50c and 15.20c; central, low carbon, bulk, c.l., 19c; 2000 lb to c.l., 24.40c; medium 14.80c and 16.20c; western, low carbon, bulk, c.l., 24.50c. 2000 lb. to c.l., 25.40c; medium, 14.75c and 17.20c; f.o.b. shipping point, freight allowed.

Ferrosilicon: 19-21% carlots per gross ton, Palmerton, Pa., $36; 16-18% $35.

Electrolytic Manganese: 99.9% plus, ton lots, per lb. 37.6 cents.

Chromium Metal: 97% min. chromium, 1% max. .50% carbon, eastern zone, per lb. contained chromium in 100 lb. c.l., 79.50c, 2000 lb. to c.l. lots, central 81c and 82.50c; western 82.25c and 84.75c; f.o.b. shipping point, freight allowed.

Ferrocolumbium: 50-60%, per lb. contained columbium in gross ton lots, contract basis, R. R. freight allowed, eastern zone, $2.25; less-ton lots $2.30. Spot prices 10 cents per lb. higher.

Ferrochrome: High carbon, eastern zone, bulk, c.l., 13c, 2000 lb. to c.l., 13.90c; central, add .40c and .65c; western, add 1c and 1.85c—high nitrogen, high carbon ferrochrome; Add 5c to all high carbon ferrochrome prices; all zones; low carbon eastern, bulk, c.l., max. 0.06% carbon, 23c, 0.10% 22.50c, 0.15% 22c, 0.20% 21.50c, 0.50% 21c, 1.00% 20.50c, 2.00% 19.50c; 2000 lb. to c.l., 0.06% 24c, 0.10% 23.50c, 0.15% 23c, 0.20% 22.50c, 0.50% 22c, 1.00% 21.50c, 2.00% 20.50c; central, add .4c for bulk, c.l. and .65 for 2000 lb. to c.l.; western, add 1c for bulk, c.l. and 1.85c for 2000 lb. c.l.; carload packed differential .45c; f.o.b. shipping point, freight allowed. Prices per lb. contained Cr high nitrogen, low carbon ferrochrome: Add 2c to low carbon ferrochrome prices; all zones. For higher nitrogen carbon add 2c for each .25% of nitrogen over 0.75%.

Special Foundry ferrochrome: (Chrom. 62-66%, car. approx. 5-7%) Contract, carload, bulk 13.50c, packed 13.95c, ton lots 14.40c, less, 14.90c, eastern, freight allowed, per pound contained chromium; 13.90c, 14.35c, 15.05c and 15.55c central; 14.50c, 14.95c, 16.25c and 16.75c, western; spot up .25c.

S.M. Ferrochrome, high carbon: (Chrom: 60-65%, sil. 4-6%, mang. 4-6% and carbon 4-6%.) Contract, carlot, bulk, 14.00c, packed 14.45c, ton lots 14.90c, less 15.40c, eastern, freight allowed; 14.40c, 14.85c, 15.55c and 16.05c, central; 15.00c, 15.45c, 16.75c and 17.25c, western; spot up .25c; per pound contained chromium.

S.M. Ferrochrome, low carbon: (Chrom. 62-66%, sil.4-6%, mang. 4-6% and carbon 1.25% max.) Contract, carlot, bulk, 20.00c, packed 20.45c, ton lots 21.00c, less ton lots 22.00c, eastern, freight allowed, per pound contained chromium, 20.40c, 20.85c, 21.65c and 22.65c, central; 21.00c, 21.45c, 22.85c and 23.85c, western; spot up .25c.

SMZ Alloy: (Silicon 60-65%, Mang. 5-7%, zir. 5-7% and iron approx. 20%) per lb. of alloy contract carlots 11.50c, ton lots 12.00c, less 12.50c, eastern zone, freight allowed: 12.00c, 12.85c and 13.35c central zone; 14.05c, 14.60c and 15.10c, western; spot up .25c.

Silcaz Alloy: (Sil. 35-40%, cal. 9-11%, alum. 6-8%, zir. 3-5%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy contract, carlots 25.00c, ton lots 26.00c, less ton lots 27.00c, eastern, freight allowed; 25.50c, 26.75c and 27.75c, central; 27.50c, 28.90c and 29.90c, western; spot up .25c.

Silvaz Alloy: (Sil. 35-40%, van. 9-11%, alum. 5-7%, zir. 5-7%, tit. 9-11% and boron 0.55-0.75%), per lb. of alloy. Contract, carlots 58.00c, ton lots 59.00c, less 60.00c, eastern, freight allowed; 58.50c, 59.75c and 60.75c, central; 60.50c, 61.90c and 62.90c, western; spot up ¼c.

OMSZ Alloy 4: (Chr. 45-49%, mang. 4-6%, sil. 18-21%, zir. 1.25-1.75%, and car. 3.00-4.50%). Contract, carlots, bulk, 11.00c and packed 11.50c; ton lots 12.00c; less 12.50c, eastern, freight allowed; 11.50c and 12.00c, 12.75c, 13.25c, central; 13.50c and 14.00c, 14.75c, 15.25c, western; spot up .25c.

OMSZ Alloy 5: (Chr. 50-56%, mang. 4-6%, sil. 13.50-16.00%, zir. .75-1.25%, car. 3.50-5.00%) per lb. of alloy. Contract, carlots, bulk, 10.75c, packed 11.25c, ton lots 11.75c, less 12.25c, eastern, freight allowed; 11.25c, 11.75c and 12.50c, central; 13.25c and 13.75c, 14.50c and 15.00c, western; spot up .25c.

Ferro-Boron: (Bor. 17.50% min., sil. 1.50% max., alum. 0.50% max. and car. 0.50% max.) per lb. of alloy contract ton lots, $1.20, less ton lots $1.30, eastern, freight allowed; $1.2075 and $1.3075 central; $1.229 and $1.329, western; spot add 5c.

Manganese-Boron: (Mang. 75% approx., boron 15-20%, iron 5% max. sil. 1.50% max. and carbon 3% max.), per lb. of alloy. Contract ton lots, $1.89, less, $2.01, eastern; freight allowed; $1.903 and $2.023, central, $1.935 and $2.055 western; spot up 5c.

Nickel-Boron: (Bor. 15-18%, alum, 1% max., sil. 1.50% max., car. 0.50% max., iron 3% max., nickel, balance), per lb. of alloy. Contract, 5 tons or more, $1.90, 1 ton to 5 tons, $2.00, less than ton $2.10, eastern, freight allowed; $1.9125, $2.0125 and $2.1125, central; $1.9445, $2.0445 and $2.1445, western; spot same as contract.

Chromium-Copper: (Chrom. 8-11%, cu. 88-90%, iron 1% max. sil. 0.50% max.) contract, any quantity, 45c, eastern, Niagara Falls, N. Y., basis, freight allowed to destination, except to points taking rate in excess of St. Louis rate to which equivalent of St. Louis rate will be allowed; spot up 2c.

Vanadium Oxide: (Fused: Vanadium oxide 85-88%, sodium oxide approx. 10% and calcium oxide approx 2%, or Red Cake; Vanadium oxide 85% approx., sodium oxide, approx. 9% and water approx.

2.5%) Contract, any quantity, $1.10 eastern, freight allowed per pound vanadium oxide contained; contract carlots, $1.105, less carlots, $1.108, central; $1.118 and $1.133, western; spot add 5c to contracts in all cases.

Calcium metal; east: Contract ton lots or more $1.80, less, $2.30, eastern zone, freight allowed, per pound of metal; $1.809 and $2.309 Central, $1.849 and $2.349, western; spot up 5c.

Calcium-Manganese-Silicon: (Cal. 16-20% mang. 14-18% and sil. 53-59%), per lb. of alloy. Contract, carlots, 15.50c, ton lots 16.50c and less 17.00c, eastern, freight allowed; 16.00c, 17.35c and 17.85c, central; 18.05c, 19.10c and 19.60c western; spot up .25c.

Calcium-Silicon: (Cal. 30-35%, sil. 60-65% and iron 3.00% max.), per lb. of alloy. Contract, carlot, lump 18.00c, ton lots 14.50c, less 15.50c, eastern, freight allowed; 13.50c, 15.25c and 16.25c central; 15.55c, 17.40c and 18.40c, western; spot up .25c.

Briquets, Ferromanganese: (Weight approx. 3 lbs. and containing exactly 2 lbs. mang.) per lb. of briquets. Contract, carlots, bulk .0605c, packed .063c, tons .0655c, less .068c eastern freight allowed; .063c, .0655c, .0755c and .078c, central; .066c, .0685c, .0855c and .088c, western; spot up .25c.

Briquets: Ferrochrome, containing exactly 2 lb. cr., eastern zone, bulk, c.l., 8.25c per lb. of briquets, 2000 lb. to c.l., 8.75c; central, add .3c for c.l. and .5c for 2000 lb. to c.l.; western, add .70c for c.l., and .2c for 2000 lb. to c.l.; **silicomanganese,** eastern, containing exactly 2 lb. manganese and approx. ½ lb. silicon, bulk, c.l., 5.80c, 2000 lbs. to c.l., 6.30c; central, add .25c for c.l. and 1c for 2000 lb. to c.l.; western, add .5c for c.l., and 2c for 2000 lb. to c.l.; **ferrosilicon,** eastern, approx. 5 lb., containing exactly 2 lb. silicon, or weighing approx. 2½ lb. and containing exactly 1 lb. of silicon, bulk, c.l., 3.35c, 2000 lb. to c.l., 3.80c; central, add 1.50c for c.l., and .40c for 2000 lb. to c.l.; western, add 3.0c for c.l. and .45c for 2000 to c.l.; f.o.b. shipping point, freight allowed.

Ferromolybdenum: 55-75% per lb. contained molybdenum f.o.b. Langeloth and Washington, Pa., furnace, any quantity 95.00c.

Ferrophosphorus: 17-19%, based on 18% phosphorus content, with unitage of $3 for each 1% of phosphorus above or below the base; gross tons per carload f.o.b. sellers' works, with freight equalized with Rockdale, Tenn.; contract price $58.50, spot $62.25.

Ferrosilicon: Eastern zone, 90-95%, bulk, c.l., 11.05c, 2000 lb. to c.l., 12.30c; 80-90%, bulk c.l., 8.90c, 2000 lb. to c.l., 9.95c; 75%, bulk, c.l., 8.05c, 2000 lb. to c.l., 9.05c; 50%, bulk c.l., 6.65c and 2000 lb. to c.l., 7.85c; central 90-95%, bulk, c.l., 11.20c, 2000 lb. to c.l., 12.80c; 80-90%, bulk, c.l., 9.05c, 2000 to c.l., 10.45c; 75%, bulk, c.l., 8.20c, 2000 lb. to c.l., 9.65c; 50% bulk, c.l., 7.10c, 2000 lb. to c.l., 9.70c; western, 90-95%, bulk, c.l., 11.65c, 2000 lb. to c.l., 15.60c; 80-90%, bulk, c.l., 9.55c, 2000 lb. to c.l., 13.50c; 75%, bulk, c.l., 8.75c, 2000 to c.l., 13.10c; 50%, bulk, c.l., 7.25c, 2000 to c.l., 8.75c; f.o.b. shipping point, freight allowed. Prices per lb. contained silicon.

Silicon Metal: Min. 97% silicon and max. 1% iron, eastern zone, bulk, c.l., 12.90c, 2000 lb. to c.l., 13.45c; central, 13.20c and 13.90c; western, 13.85c and 16.80c; min. 96% silicon and max. 2% iron, eastern, bulk, c.l., 12.50c, 2000 lb. to c.l., 13.10c; central, 12.80c and 13.55c; western, 13.45c and 16.50c f.o.b. shipping point, freight allowed. Price per lb. contained silicon.

Manganese Metal: (96 to 98% manganese, max. 2% iron), per lb. of metal, eastern zone, bulk, c.l., 36c 2000 lb. to c.l., 38c, central, 36.25c, and 39c; western 36.55c and 41.05c; 95 to 97% manganese, max. 2.50% iron, eastern, bulk, c.l., 34c; 2000 to c.l., 35c; central 34.25c and 36c; western, 34.55c and 36.05c; f.o.b. shipping point, freight allowed.

Ferrotungsten: Spot, carlots, per lb. contained tungsten, $1.90; freight allowed as far west as St. Louis.

Tungsten Metal Powder: spot, not less than 97 per cent, $2.50-$2.60; freight allowed as far west as St. Louis.

Ferrotitanium: 40-45%, R.R. freight allowed, per lb. contained titanium; ton lots $1.23; less-ton lots $1.25; eastern. Spot up 5 cents per lb.

Ferrotitanium: 20-25%, 0.10 maximum carbon; per lb. contained titanium; ton lots $1.35; less-ton lots $1.40 eastern. Spot 5 cents per lb. higher.

High-Carbon Ferrotitanium: 15-20% contract basis, per gross ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi River and North of Baltimore and St. Louis, 6-8% carbon $142.50; 3-5% carbon $157.50.

Carbortam: Boron 0.90 to 1.15% net ton to carload, 8c lb. f.o.b. Suspension Bridge, N. Y., frt. allowed same as high-carbon ferro titanium.

Bortam: Boron 1.5-1.9%, ton lots 45c lb., less ton lots 50c lb.

Ferrovanadium: 35-55%, contract basis, per lb. contained vanadium f.o.b. producers plant with usual freight allowances; open-hearth grade $2.70; special grade $2.80, highly-special grade $2.90.

Zirconium Alloys: 12-15%, per lb. of alloy, eastern contract, carlots bulk, 4.60c, packed 4.80c, ton lots 4.80c, less tons 5c, carloads, bulk per gross ton $102.50; packed $107.50; ton lots $108; less-ton lots $112.50. Spot ¼c per ton higher.

Zirconium Alloy: 35-40%, Eastern contract basis, carloads in bulk, package, per lb. of alloy 14.00c, gross ton lots 15.00c; less-ton lots 16.00c. Spot ¼ cent higher.

Alsifer: (Approx. 20% aluminum, 40% silicon, 40% iron) contract basis f.o.b. Niagara Falls, N. Y., per lb. 5.75c; ton lots 6.50c, Spot ½ cent higher.

Siminal: (Approx. 20% each Si, Mn., Al.) Contract, frt. all. not over St. Louis rate, per lb. alloy; carlots 8c; ton lots 8.75c; less ton lots 9.25c.

Borosil: 3 to 4% boron, 40 to 45% Si., $6.25 lb. cont. Bo., f.o.b. Philo., freight not exceeding St. Louis rate allowed.

OPEN MARKET PRICES, IRON AND STEEL SCRAP

Following prices are quotations developed by editors of STEEL in the various centers. For complete OPA ceiling price schedule refer to page ... of Sept. 4, 1944, issue of STEEL. Quotations are on gross tons.

PHILADELPHIA:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$18.75
No. 2 Heavy Melt. Steel	18.75
No. 2 Bundles	18.75
No. 3 Bundles	16.75
Mixed Borings, Turnings	13.75
Machine Shop Turnings	13.75
Billet, Forge Crops	23.75
Bar Crops, Plate Scrap	21.25
Cast Steel	21.25
Punchings	21.25
Elec. Furnace Bundles	19.75
Heavy Turnings	18.25

Cast Grades

(F.o.b. Shipping Point)

Heavy Breakable Cast	16.50
Charging Box Cast	19.00
Cupola Cast	20.00
Unstripped Motor Blocks	17.50
Malleable	22.00
Chemical Borings	16.51

NEW YORK:

(Dealers' buying prices.)

No. 1 Heavy Melt. Steel	$15.33
No. 2 Heavy Melt. Steel	15.33
No. 2 Hyd. Bundles	15.33
No. 3 Hyd. Bundles	13.33
Chemical Borings	14.33
Machine Turnings	10.33
Mixed Borings, Turnings	10.33
No. 1 Cupola	20.00
Charging Box	19.00
Heavy Breakable	16.50
Unstrip Motor Blocks	17.50
Stove Plate	19.00

CLEVELAND:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.50
No. 2 Heavy Melt. Steel	19.50
No. 1 Comp. Bundles	19.50
No. 2 Comp. Bundles	19.50
No. 1 Busheling	19.50
Mach. Shop Turnings	14.50
Short Shovel Turnings	16.50
Mixed Borings, Turnings	14.50
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	13.50-14.00
Billet, Bloom Crops	24.50
Sheet Bar Crops	22.00
Plate Scrap, Punchings	22.00
Elec. Furnace Bundles	20.50

BOSTON:

(F.o.b. shipping points)

No. 1 Heavy Melt. Steel	$14.06
No. 2 Heavy Melt. Steel	14.06
No. 1 Bundles	14.06
No. 2 Bundles	14.06
No. 1 Busheling	14.06
Machine Shop Turnings	8.00
Mixed Borings, Turnings	8.00
Short Shovel Turnings	11.06
Chemical Borings	13.81
Low Phos. Clippings	16.56
No. 1 Cast	20.00
Clean Auto Cast	20.00
Stove Plate	19.00
Heavy Breakable Cast	16.50

Boston Differential 99 cents higher, steel-making grades; Providence $1.09 higher.

PITTSBURGH:

(Delivered consumer's plant)

Railroad Heavy Melting	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 2 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
No. 2 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Mach Shop Turnings	15.00
Mixed Borings, Turnings	15.00
No. 1 Cupola Cast	20.00
Heavy Breakable Cast	16.50
Cast Iron Borings	16.00
Billet, Bloom Crops	25.00
Sheet Bar Crops	22.50
Plate Scrap, Punchings	22.50
Railroad Specialties	24.50
Scrap Rail	21.50
Axles	26.00
Rail 3 ft. and under	23.50
Railroad Malleable	22.00

VALLEY:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$21.00
No. 1 Heavy Melt. Steel	20.00
No. 1 Comp. Bundles	20.00
Short Shovel Turnings	17.00
Cast Iron Borings	16.00
Machine Shop Turnings	15.00
Low Phos. Plate	22.50

MANSFIELD, O.:

(Delivered consumer's plant)

Machine Shop Turnings	15.00

BIRMINGHAM:

(Delivered consumer's plant)

Billet Forge Crops	$22.00
Structural, Plate Scrap	19.00
Scrap Rails Random	18.50
Rerolling Rails	20.50
Angle Splice Bars	20.50
Solid Steel Axles	24.00
Cupola Cast	20.00
Stove Plate	19.00
Long Turnings	8.50- 9.00
Cast Iron Borings	8.50- 9.00
Iron Car Wheels	16.50-17.00

CHICAGO:

(Delivered consumer's plant)

No. 1 R.R. Hvy Melt.	$19.75
No. 1 Heavy Melt. Steel	18.75
No. 2 Heavy Melt. Steel	18.75
No. 1 Ind. Bundles	18.75
No. 2 Dlr. Bundles	18.75
Baled Mach. Shop Turn.	18.75
No. 3 Galv. Bundles	16.75
Machine Turnings	13.75
Mix. Borings, Sht. Turn	13.75
Short Shovel Turnings	15.75
Cast Iron Borings	14.75
Scrap Rails	20.25
Cut Rails, 3 feet	22.25
Cut Rails, 18-inch	23.50
Angles, Splice Bars	22.25
Plate Scrap, Punchings	21.25
Railroad Specialties	22.75
No. 1 Cast	20.00
R.R. Malleable	22.00

(Cast grades f.o.b. shipping point, railroad grades f.o.b. tracks)

BUFFALO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$19.25
No. 2 Heavy Melt. Steel	19.25
No. 1 Bundles	19.25
No. 2 Bundles	19.25
No. 1 Busheling	19.25
Machine Turnings	14.25
Short Shovel Turnings	16.25
Mixed Borings, Turn.	14.25
Cast Iron Borings	15.25
Low Phos.	21.75

DETROIT:

(Dealers' buying prices.)

Heavy Melting Steel	$17.32
No. 1 Busheling	17.32
Hydraulic Bundles	17.32
Flashings	17.32
Machine Turnings	11.00-11.50
Short Shovel, Turnings	12.50-13.00
Cast Iron Borings	11.50-12.00
Low Phos. Plate	19.82
No. 1 Cast	20.00
Heavy Breakable Cast	16.50

ST. LOUIS:

(Delivered consumer's plant)

Heavy Melting	17.50
No. 1 Locomotive Tires	20.00
Misc. Rails	19.00
Railroad Springs	22.00
Bundled Sheets	17.50
Axle Turnings	17.00
Machine Turnings	8.00- 8
Shoveling Turnings	10.00-10
Rerolling Rails	21
Steel Car Axles	21.50-22
Steel Rails, 3 ft.	21
Steel Angle Bars	21
Cast Iron Wheels	20
No. 1 Machinery Cast	20
Railroad Malleable	20
Breakable Cast	19
Stove Plate	19
Grate Bars	19
Brake Shoes	19
(Cast grades f.o.b. shipping po	
Stove Plate	19

CINCINNATI:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$1
No. 2 Heavy Melt. Steel	19
No. 1 Comp. Bundles	19
No. 2 Comp. Bundles	19
Machine Turnings	9.50-10
Shoveling Turnings	11.50-12
Cast Iron Borings	11.00-12
Mixed Borings, Turnings	10.50-11
No. 1 Cupola Cast	20
Breakable Cast	19
Low Phosphorus	21.00-22
Scrap Rails	20.50-21
Stove Plate	16.00-17

LOS ANGELES:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$1
No. 2 Heavy Melt. Steel	17
No. 1, 2, Deal. Bundles	17
Machine Turnings	14
Mixed Borings Turnings	20
No. 1 Cast	20

SAN FRANCISCO:

(Delivered consumer's plant)

No. 1 Heavy Melt. Steel	$1
No. 2 Heavy Melt. Steel	19
No. 1 Busheling	19
No. 1, No. 2 Bundles	19
No. 3 Bundles	19
Machine Turnings	19
Billet, Forge Crops	19
Bar Crops, Plate	19
Cast Steel	19
Cut, Structural, Plate, 1", under	19
Alloy-free Turnings	19
Tin Can Bundles	19
No. 2 Steel Wheels	20
Iron, Steel Axles	19
No. 2 Cast Steel	19
Uncut Frogs, Switches	19
Scrap Rails	19
Locomotive Tires	19

Copper: Electrolytic or Lake from producers in carlots 12.00c, Del. Conn., less carlots 12.12½c, refinery; dealers may add ⅛c for 5000 lbs. to carload; 1000-4999 lbs. 1c; 500-999 1½c; 0-499 lb. Casting, 11.75c, refinery for 20,000 lbs., or more, 12.00c less than 20,000 lbs.

Brass Ingot: Carlot prices, including 25 cents per hundred freight allowance; add ¼c for less than 20 tons; 85-5-5-5 (No. 115) 13.00c; 80-10-2 (No. 215) 16.50c; 80-10-10 (No. 305) 13.75c; Navy G (No. 225) 16.75c; Navy M (No. 245) 14.75c; No. 1 yellow (No. 405) 13.00c; manganese bronze (No. 420) 12.75c.

Zinc: Prime western 8.25c, select 8.35c, brass special 8.50c, intermediate 8.75c, E. St. Louis, carlots. For 20,000 lbs. to carlots add 25c; 10,000-20,000 0.25c; 2000-10,000 0.40c; under 2000 0.50c.

Lead: Common 6.35c, chemical, 6.40c, corroding, 6.45c, E. St. Louis for carloads; add 5 points for Chicago, Minneapolis-St. Paul, Milwaukee-Kenosha districts; add 15 points for Cleveland-Akron-Detroit area, New Jersey New York state, Texas, Pacific Coast, Richmond, Indianapolis-Kokomo; add 20 points for Birmingham, Connecticut, Boston-Worcester, Springfield, New Hampshire, Rhode Island.

Primary Aluminum: 99% plus, ingots 15.00c lb., pigs 14.00c del.; metallurgical 94% min. 13.0c del. Base 10,000 lbs. and over; add ¼c 5000-9999 lbs.; 1c less through 2000 lbs.

Secondary Aluminum: All grades 12.50c per lb. except as follows: Low grade piston alloy (No. 12 type) 10.50c; No. 12 foundry alloy (No. 12 grade) 10.50c; chemical warfare service grade (92½% plus) 10.00c; steel deoxidizers (notch bars, granulated or shot, Grade 1 (95-97½%) 11.00c, Grade 2 (92-95%) 9.50c to 10c, Grade 3 (90-92%) 8.50c to 8.75c, Grade (85-90%) 7.50c to 8.00c; any other ingot containing over 1% iron, except PM 754 and hardness, 12.00c. Above prices for 30,000 lb. or more; add ¼c 10,000-30,000 lb.; ½c 1000-10,000 lbs.; 1c less than 1000 lbs. Prices include freight at carload rate up to 75 cents per hundred.

Magnesium: Commercially pure (99.8%) standard ingots (4-notch, 17 lbs.), 20.50c lb., add 1c for special shapes and sizes. Alloy ingots, incendiary bomb alloy, 23.40c; 50-50 magnesium-aluminum, 23.75c; ASTM B93-41T, No. 2, 3, 4, 12, 13, 14, 17, 23.00c; Nos. 4X, 12X, 17X, 25.00c; ASTM B-107-41T, or AM-41T, No. 8X, 23.00c; No. 18, 23.50c; No. 1, 25.00c. Selected magnesium crystals, powders, and muffs, including all packing screening, barrelling, handling, and other preparation charges, 23.50c. Prices for 100 lbs. or more; for 25-100 lbs., add 10c; for less than 25 lbs., 20c. Incendiary bomb alloy, f.o.b. plant, any quantity; carload freight allowed all other alloys for 500 lbs. or more.

Nickel: Prices ex-dock, New York in 5-ton lots, add 1 cent for 2240-11,199 lbs., 1½c 1000-2239. Spot 500-999, 3c under 500. Grade A, 99.8% and higher (includes Straits), 52.00c; Grade B, 99% or higher, not meeting specifications for Grade A, with 0.05 per cent maximum arsenic, 51.87½c; Grade C, 99.65-99.79% incl. arsenic; Grade D, 99.50-99.64% incl., 51.50c; Grade E, 99-99.49% incl. 51.12½c; Grade F, below 99% (for tin content), 51.00c.

Antimony: American bulk carlots f.o.b. Laredo, Tex., 99.0% to 99.8% and 99.8% and over but not meeting specifications below, 99.8% and over (arsenic, 0.05%, max. other impurities, 0.1%, max.) 15.00c. On producers' sales add ¼c for less than carload 20,000 lb.; ½c for 9999-224 lb.; and 2c for 224 lb. and less; on sales by dealers, distributors and jobbers add ½c, 1c, and 3c, respectively.

Cadmium: Electrolytic cathodes, 99.5%, f.o.b. refinery 55.00c lb.; pig and shot produced from electrolytic cathodes 36.00c; "F" nickel shot and ingot for additions to cast iron, 34.00c; nickel shot 28.00c.

Mercury: Open market, spot, New York, nominal, $125 per 76-lb. flask.

Cobalt: Prime, white, 99%, carlots, 4.00c lb.

Beryllium-Copper: 3.75-4.25% Be., $17 lb. contained Be.

Platinum: Bars, ingots, pencils, pigs, plates, sheets, slabs, sticks, and all other "regular" straight or flat forms 90.00c lb., del.; anodes, balls, discs and all other special or patented shapes 95.00c lb. del.

Cobalt: 97-99%, $1.50 lb. for 550 lb. (bbl.); $1.52 lb. for 100 lb. (case); $1.57 lb. under 100 lb.

Indium: 99.9%, $7.50 per troy ounce.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, N. Y. 44.75c per ounce.

Platinum: $35 per ounce.

Iridium: $165 per troy ounce.

Palladium: $24 per troy ounce.

Rolled, Drawn, Extruded Products

(Copper and brass product prices based on 12.00c, Conn., for copper. Freight prepaid on 100 lbs. or more.)

Sheet: Copper 20.87c; yellow brass 19.48c; commercial bronze, 90% 21.07c, 95% 21.28c; red brass, 80% 20.15c, 85% 20.36c; phosphor bronze, Grades A and B 5% 36.25c; Everdur, Herculoy, Duronze or equiv. 26.00c; naval brass 24.50c; manganese bronze 28.00c; Muntz metal 22.75c; nickel silver 5% 26.50c.

Rods: Copper, hot-rolled 17.37c, cold-rolled 18.37c; yellow brass 15.01c; commercial bronze 90% 21.32c, 95% 21.53c; red brass 80% 20.48c, 85% 20.61c; phosphor bronze Grade A, B 5% 36.50c; Everdur, Herculoy, Duronze or equiv. 25.50c; Naval brass 19.12c; manganese bronze 22.50c; Muntz metal 18.87c; nickel silver 5% 26.50c.

Seamless Tubing: Copper 21.37c; yellow brass 22.23c; commercial bronze 90% 23.47c; red brass 80% 22.80c, 85% 23.01c.

Extruded Shapes: Copper 20.87c; architectural bronze 19.12c; manganese bronze 24.00c; Muntz metal 20.12c; Naval brass 20.37c.

Angles and Channels: Yellow brass 27.98c; commercial bronze 90% 29.57c, 95% 29.78c; red brass 80% 28.65c, 85% 28.86c.

Copper Wire: Soft, f.o.b. Eastern mills, carlots 15.37½c, less-carlots 15.87½c; weatherproof, f.o.b. Eastern mills, carlot 17.00c, less-carlots 17.50c; magnet, delivered, carlots 17.50c, 15,000 lbs. or more 17.75c, less carlots 18.25c.

Aluminum Sheets and Circles: 2s and 3s, flat mill finish, base 30,000 lbs. or more; del.; sheet widths as indicated; circle diameter 9" and larger:

Gage	Width	Sheets	Circles
.249"-7	12"-48"	22.70c	25.20c
8-10	12"-48"	23.20c	25.70c
11-12	26"-48"	24.20c	27.00c
13-14	26"-48"	25.20c	28.50c
15-16	26"-48"	26.40c	30.40c
17-18	26"-48"	27.90c	32.80c
19-20	24"-42"	29.80c	35.20c
21-22	24"-42"	31.70c	37.20c
23-24	3"-24"	25.60c	29.20c

Lead Products: Prices to jobbers; full sheets 9.50c; cut sheets 9.75c; pipe 8.15c, New York; 8.25c, Philadelphia, Baltimore, Rochester and Buffalo; 8.75c, Chicago, Cleveland, Worcester, Boston.

Zinc Products: Sheet f.o.b. mill, 13.15c; 36,000 lbs. and over deduct 7%. Ribbon and strip 12.25c. 3000-lb. lots deduct 1%, 6000 lbs. 2% 9000 lbs. 3%, 18,000 lbs. 4%, carloads and over 7%. Boiler plate (not over 12") 3 tons and over 11.00c; 1-3 tons 12.00c; 500-2000 lbs. 12.50c; 100-500 lbs. 13.00c; under 100 lbs. 14.00c. Hull plate (over 12") add 1c to boiler plate prices.

Plating Materials

Chromic Acid: 99.75%, flake, del., carloads 16.25c; 5 tons and over 16.75c; 1-5 tons 17.25c; 400 lbs. to 1 ton 17.75c; under 400 lbs. 18.25c.

Copper Anodes: Base 2000-5000 lbs., del.; oval 17.62c; untrimmed 18.12c; electro-deposited 17.37c.

Copper Carbonate: 52-54% metallic cu, 250 lb. barrels 20.50c.

Copper Cyanide: 70-71% cu, 100-lb. kegs or bbls. 34.00c f.o.b. Niagara Falls.

Sodium Cyanide: 96%, 200-lb. drums 15.00c; 10,000-ib. lots 13.00c f.o.b. Niagara Falls.

Nickel Anodes: 500-2999 lb. lots; cast and rolled carbonized 47.00c; rolled, depolarized 48.00c.

Nickel Chloride: 100-lb. kegs or 275-lb. bbls. 18.00c lb., del.

Tin Anodes: 1000 lbs. and over 58.50c, del.; 500-999 59.00c; 200-499 59.50c; 100-199 61.00c.

Tin Crystals: 400 lb. bbls. 39.00c f.o.b. Grasselli, N. J.; 100-lb. kegs 39.50c.

Sodium Stannate: 100 or 300-lb. drums 36.50c, del.; ton lots 33.50c.

Zinc Cyanide: 100-lb. kegs or bbls. 33.00c f.o.b. Niagara Falls.

Brass Mill Allowances: Prices for less than 15,000 lbs. f.o.b. shipping point. Add ⅝c for 15,000-40,000 lbs.; 1c for 40,000 lbs. or more.

Scrap Metals

	Clean Heavy	Rod Ends	Clean Turnings
Copper	10.250	10.250	9.500
Tinned Copper	9.625	9.625	9.375
Yellow Brass	8.625	8.375	7.875
Commercial bronze 90%	9.375	9.125	8.625
95%	9.500	9.250	8.750
Red Brass, 85%	9.125	8.875	8.375
Red Brass, 80%	9.125	8.875	8.375
Muntz metal	8.000	7.750	7.250
Nickel Sil, 5%	9.250	9.000	4.625
Phos. br., A, B, 5%	11.000	10.750	9.750
Herculoy, Everdur or equivalent	10.250	10.000	9.250
Naval brass	8.250	8.000	7.500
Mang. bronze	8.250	3.000	7.500

Other than Brass Mill Scrap: Prices apply on material not meeting brass mill specifications and are f.o.b. shipping point; add ⅝c for shipment of 60,000 lbs. of one group and ½c for 20,000 lbs. of second group shipped in same car. Typical prices follow:

(Group 1) No. 1 heavy copper and wire, No. 1 tinned copper, copper borings 9.75c; No. 2 copper wire and mixed heavy copper, copper tuyeres 8.75c.

(Group 2) soft red brass and borings, aluminum bronze 9.00c; copper-nickel and borings 9.25c; car boxes, cocks and faucets 7.75c; bell metal 15.50c; babbit-lined brass bushings 13.00c.

(Group 3) zincy bronze borings, Admiralty condenser tubes, brass pipe 7.50c; Muntz metal condenser tubes 7.00c; yellow brass 6.25c; manganese bronze (lead 0.00%-0.40%) 7.25c, (lead 0.41%-1.0%) 6.25c; manganese bronze borings (lead 0.00-0.40%) 6.50c, (lead 0.41-1.00%) 5.50c.

Aluminum Scrap: Prices f.o.b. point of shipment, truckloads of 5000 pounds or over; Segregated solids, 2S, 3S, 5c lb., 11, 14, etc., 3 to 3.50c lb. All other high-grade alloys 5c lb. Segregated borings and turnings, wrought alloys, 2, 2.50c lb. Other high-grade alloys 3.50, 4.00c lb. Mixed plant scrap, all solids, 2, 2.50c lb. borings and turnings one cent less than segregated.

Lead Scrap: Prices f.o.b. point of shipment. For soft and hard lead, including cable lead, deduct 0.55c from basing point prices for refined metal.

Zinc Scrap: New clippings 7.25c, old zinc 5.25c f.o.b. point of shipment; add ½-cent for 10,000 lbs. or more. New die-cast scrap, radiator grilles 4.95c, add ½c 20,000 or more. Unsweated zinc dross, die cast slab 5.80c any quantity.

Nickel, Monel Scrap: Prices f.o.b. point of shipment; add ½c for 2000 lbs. or more of nickel or cupro-nickel shipped at one time and 20,000 lbs. or more of Monel. Converters (dealers) allowed 2c premium.

Nickel: 98% or more nickel and not over ½% copper 26.00c; 90-98% nickel, 26.00c per lb. nickel contained.

Cupro-nickel: 90% or more combined nickel and copper 26.00c per lb. contained nickel, plus 8.00c per lb. contained copper; less than 90% combined nickel and copper 26.00c for contained nickel only.

Monel: No. 1 castings, turnings 15.00c; new clipping 20.00c; soldered sheet 18.00c.

Sheets, Strip . . .

Sheet & Strip Prices, Page 196

Sheet and strip bookings continue to extend and deliveries now are well into next year for some producers, March being quoted in some instances. New business now far exceeds losses from cancellations. Most producers are planning allocations after expiration of CMP Sept. 30, to assure their customers fair supply. Inventory limitations still hold and prevent undue accumulations at the expense of other consumers.

New York — Sheet backlogs are extending rapidly. Some producers now quote March on hot-rolled pickled sheets and only little better for plain hot-rolled sheets; also they are quoting well into first quarter on cold-rolled sheets. At the same time certain sellers have not yet arrived at a position where they are able to quote reasonably firm deliveries. Still another mill has closed schedules for fourth quarter, but on the major items such as hot and cold sheets and galvanized sheets has not opened books for first quarter. This should take place very shortly, however. On specialties, such as electrical sheets and stainless steel sheets, sellers generally are booked into next year and well into the year on electrical sheets. Pressure for galvanized sheets is strong, although some producers are none too keen for this business, because of the extra costs involved and with ceiling prices as they are.

Chicago — Virtually all sheet producers are prepared to serve their customers through some plan of allocation after Sept. 30 when CMP expires. Because of the extremely tight situation, only in this way can users be assured of equitable treatment. Pressure for cold-rolled, light hot-rolled, hot-rolled pickled, and galvanized sheets is particularly acute. Much of the tonnage on mill books at the end of the war has remained and schedules are filled well into first quarter. A number of military items, such as small arms ammunition boxes, portable hospitals, etc., fabricated from sheets, have so far not been canceled. Furthermore, production of prefabricated houses for Great Britain has not been stopped, suggesting that the previous lend-lease procedure has been supplanted by some other form of financing.

Buffalo — Mills have difficulty forming schedules, with a flood of civilian orders coming in while cancellations are far short of expectation. Galvanized sheets are booked solidly to the middle of next year. A leading producer could ease this situation if labor were available to reopen an idle unit. Deliveries on other grades extend into December and January.

St. Louis — Sheet and strip mills have passed the worst of war cancellations and less than 10 per cent of mill capacity now is on government orders. Volume of civilian orders is heavy and schedules are filled far ahead. Old customers have been checked and few cutbacks resulted, the principal change being alteration of specifications. New customers are coming in rapidly, with few inquiries except those based on firm orders. Galvanized sheets are in most demand, mainly from farm areas.

Cincinnati — Sheet mills are faced with the problem of allocating available tonnage, with demand considerably in excess of supply. Strong pressure for early delivery is being encountered and mills strive to do their part in speeding reconversion. Confusion created by military cancellations is being cleared, but continues to be a factor in forming schedules. Backlogs are extended but accurate figures are unavailable. Some ordering anticipates deliveries one year hence.

Birmingham—Sheet production maintains the increased pace evident ever since the end of the war. Pressure for delivery is maintained as strongly as during the war.

Boston — Strip and sheet buying by fabricators of household appliances is heavy, including sheets for electric ranges, soft drink cabinets, washers and a growing number of light consumer products. There is no easing in carbon sheet schedules and deliveries of cold-finished, hot-rolled pickled and galvanized are extended through fourth quarter. Plain hot-rolled carbon sheets are available for October delivery. Labor is the main production problem on pickling lines, some operating under 70 per cent of capacity. Few producers can promise stainless sheets before December and polished stainless in first quarter. In addition to strong sheet demand for reconversion, warehouses are pressing for shipment of all tonnage in with mills. Buying of both sheets and strip in the Springfield and Connecticut areas for household goods is notably active. Pressure by automotive builders, including parts, is increasing. Orders for sheet material for 275-gallon household tanks are also numerous and well maintained in volume. Although some mills are beyond, narrow hot strip deliveries are in November and October for cold-rolled. Others range into December for cold-rolled. For October and probably November hot strip producers are planning schedules to maintain tonnage to converters in the same volume as before expiration of CMP.

Producers of anti-friction bearings are confronted with a price squeeze if forced to sell at 1942 prices. This has been a mild delaying factor in reconversion to meet heavy postwar demand, which more than balances cancellations in aircraft and war equipment. The automobile industry will require a tremendous volume of bearings, for some time, fully 60 to 75 per cent of the production of some plants as before the war. The average passenger car needs 30 or more bearings of the anti-friction type.

Cleveland — Sheet steel order books remain muddled, although clerical staffs have been working at top speed to rearrange rolling and delivery schedules. The companies are still canvassing the trade to determine the exact status of orders, as they are unwilling to risk rolling orders only to have them rejected on the basis of canceled war contracts.

Many mills are not guaranteeing delivery on any new orders placed pending clarification of the situation and at best first quarter delivery is earliest available with the exception of unpickled. Demand continues pressing with manufacturers anxious to get into civilian production quickly.

Pittsburgh — Sheet and strip output has recovered rapidly the past ten days, with most schedules now near capacity. Demand continues to exceed outp accentuating the necessity of promp putting into effect some type of vol tary distribution system to spread av able supply as fairly as possible. most instances company quota syst become operative Oct. 1. Galvani sheets are under heavy pressure for livery, with shipments extended January and February. McLouth S Corp., Detroit, is now making stain steel sheets and strip, the first time material has been produced in that trict. Up to late last week the basing points established on hot-ro stainless steel strip were at Chic Youngstown and Reading, Pa.; c rolled stainless strip at Clevel Youngstown and Reading, Pa.; and sl at Chicago, with Pittsburgh retaine

Steel Bars . . .

Bar Prices, Page 196

Bars are tightening with many ducers sold for the year, in both hot cold-rolled, December being quote the earliest. Some alloy bar users changing from NE steel analyses to S going back to the material they before the war. Alloy bar schedules easy at 30 to 60 days.

New York — Carbon bar sched continue to tighten, with most produ now quoting December and Janu and with some, in fact, virtually ou the market for the remainder of year. Cold-drawn bar producers find schedules tightening, with de eries in general quoted for Decem Some November tonnage can be had the amount is relatively small. drawers declare that despite heavy cellations since the end of the their civilian backlogs have increase an extent that they now virtually o canceled tonnage. Meanwhile, alloy schedules are relatively easy at ar 30 to 60 days.

St. Louis—Pressure for merchant is strong, with new civilian orders setting military cancellations. A 10 per cent of capacity is still u CMP ratings, mainly for utilities farm implements. Bar mills, in con to sheetmakers report improved conditions, though full employment not been reached. Merchant bars booked to January.

Boston — Revisions in alloy bar sp fications from NE grades to double a formerly used are mounting with sumers and by warehouses in some c although in case of forge shops thi not yet so apparent. Although well low the war peak, demand for carbon and alloy bars tends to mo New buying includes an NE tonn for die-lock chain for the Navy Y Hot-rolled alloy bar delivery is in O ber, cold-finished alloys in Noven and cold-finished in December. Ca bars are tighter than alloys, freque in November. Alloy volume is maintained but increased capacity flects the relatively easy position of eral producers. Forward promises carbon stocks are still indefinite, du uncertainty as to the volume of s finished for bar finishing beyond next few weeks.

Cleveland — Bar sellers are scan incoming orders carefully to limit chasing to nearby needs and in pro tion to customers' normal rate of bu

Demand has been heavy from all classes of consumers, but especially from the automotive, house appliance and farm implement industries. Special requirement steel bar demand also continues heavy, although it now originates with flatware and similar manufacturers.

The 8-inch mills are filled well into 1946 but some space is still available on 10 and 12-inch mills. Delivery remains much more extended on cold-rolled than on hot-rolled.

Pittsburgh — Orders are developing in good volume, particularly from the automotive, railroad and farm equipment industries. Requirements for alloy items also are on the upturn, and cold finishers report active demand, with deliveries extended into November. With most cancellations now out of the way, sellers report most merchant bar sizes fall into October and November, although some mills can promise late September shipment on large rounds. Electric furnace and open-hearth alloys are available in September. In addition to the Pittsburgh base on cold-finished stainless steel bars, up to late last week new bases have recently been established at Chicago, Cleveland, Philadelphia, Reading, Pa., and Dunkirk and Watervliet, N. Y. New bases on hot-rolled stainless bars have also been made at these points, with the exception of Cleveland.

Steel Plates . . .

Plate Prices, Page 197

Plate demand is increasing and some observers believe fourth quarter shipments will be at the best rate for several months. Buying is rather irregular, shipyards still taking some tonnage, with miscellaneous users increasing their demands. Some producers are sold for the remainder of the year. Placing of United Fruit Co. ships will call for about 20,000 tons of steel, mainly plates. Tanks, barges and railroad cars and locomotives call for substantial tonnages.

New York — Plate buying is fair, although spotty. Shipyards still specify a reasonably good tonnage, with much going into repairs, but demand from these sources is tapering. Jobbers appear to be pressing for tonnage on order, although making far fewer new commitments. Tank fabricators are specifying a little heavier than a fortnight or month ago, but have not as yet felt the impact of various civilian requirements that they anticipate. A moderate demand is coming out from car builders and from railroads themselves, the latter principally for equipment repairs. Most plate mills now have little to offer before November, and some trade leaders would not be surprised if plate shipments during the last quarter averaged 500,000 to 550,000 tons a month.

Chicago — Pressure for steel has now followed plates, and while a week or two ago, this was easiest of all products, specifications since are finding some makers sold out for the remainder of the year. One interest, however, is able to make late November and December delivery. Even floor plates are sharing in the renewed strength. The overall situation is a surprise to steel producers.

Boston — Plate buying by boiler and small tank shops is more active, with backlogs of these fabricators substantial in some instances. Lighter plates are more active than heavier. Oil and gasoline station tank requirements are notably higher while miscellaneous industrial inquiry has increased. Buying by shipyards continues to slacken. For nine additional ships for United Fruit Co., Boston, contracts are being distributed, requiring about 20,000 tons of steel, mainly plates. Railroads are buying sparingly. Wrought iron plates have been advanced $10 per ton from 3.80c to 4.30c, Pittsburgh.

Pittsburgh — Some improvement is noted in orders for storage tanks, barges, railroad cars, locomotives and heavy construction lines. Miscellaneous requirements for export are an increasing factor in overall improvement in plate demand. The Dravo Corp. is making good progress on the construction of a large drydock for the Navy at its Neville Island yard, scheduled to be completed March 1. Company also has contract for construction of a fleet of five 175-foot coal barges. Order backlogs on both universal and sheared plates generally extend through November, although some eastern mills have openings in October.

Birmingham — Plate production is held at approximately 80 per cent of capacity, in spite of cancellations, a rate expected to continue. Railroad car builders and shipyards are principal consumers of current production.

Philadelphia — While plate demand is irregular and some producers still can book tonnage for shipment within 30 to 45 days some trade leaders expect plate shipments to average 500,000 tons per month in fourth quarter. This would be 1,500,000 tons for the quarter against 2 million tons for third quarter. Present capacity is estimated at more than 700,000 tons per month compared with the wartime peak of more than 1,100,000 tons, when strip mills were counted on for about 550,000 tons per month. Thus shrinkage in demand is being accompanied in part by decline in capacity and there may be further decline soon, depending on decision to suspend all operations at the government-owned plant at Geneva, Utah.

Tubular Goods . . .

Tubular Goods Prices, Page 197

Boston — Demand for merchant steel pipe is well maintained but most tubing is slower. Buying is mainly through distributors, with larger direct shipments subsiding. Most electric weld mills are sold through fourth quarter, with butt-weld, including 4½-inch, in December. Boiler tubes also are in December. Wrought iron pipe is less active but a mild late season flurry involves about 1000 tons of cast iron pipe, which has advanced $3 per ton.

Cleveland — Cancellation of pipe orders during the past month has been small, leaving mills with heavy backlogs. This applies to line and merchant pipe and boiler tubes.

Pressure on mills is heavier than before the end of the Japanese war with heavy inquiry from the gas and oil, chemical and public utilities industries. In addition jobbers' stocks are low and must be replenished. Mill officials doubt that the industry will be able to meet the expected heavy demand next year from the building industry and export interests. Even the more conservative estimates place home construction at a million units a year for five years, indicating a market for about 2 million tons of steel a year, a large part of which would be for pipe.

Pittsburgh — Establishment of a basing point at Chicago by National Tube Co. on its price schedule M, covering stainless steel seamless tubing for mechanical and pressure purposes, for the range of sizes and finishes produced there, will result in saving in freight charges of about 37 cents per hundred pounds for consumers in the Chicago and surrounding area. It is also reported that Canton, O., has been established as a basing point on alloy seamless pressure tubing.

Philadelphia — Merchant pipe producers are sold well to the end of the year and some now are placing distributors on a quota basis in an effort to meet demand as equitably as possible.

Pittsburgh — National Tube Co.'s McKeesport, Pa., works now is offering to the trade pipe up to 26 inches in diameter with wall thickness of 5/16 and 9/32-in.

Wire . . .

Wire Prices, Page 197

Boston — Some wire products, notably fine wire specialties, are being rationed on a monthly basis to consumers, many of whom ask substantially more tonnage than before the war. Buying of spring wire is strong and razor blade steel demand has increased sharply. Rescheduling continues at wire mills, with frequent revisions, but volume for fourth quarter against postwar orders will be higher than predicted earlier. Gaps left by heavy wire rope cancellations are filling rapidly. Extent of duplicate buying in wire is still in doubt as deliveries in volume and definite promises have not improved sufficiently to bring out the facts. Nails and other merchant products are tight. Some mills quote March delivery on nails. Shipments to the automobile industry are increasing under pressure for material, including valve-spring wire and other specialties. Large lots of music wire spring stock are still offered as surplus.

Pittsburgh—Practically no cancellations have developed on merchant wire items and a heavy influx of new orders, exceeding production in most instances, is reported by producers. With production quotas scheduled to be eliminated Oct. 1, many dealers and consumers are placing orders for substantially larger tonnage than was the practice during the war, when production was restricted. Order backlogs of fencing, barbed wire, nails and other merchant wire items are now in February and March. In some instances backlogs are more extended than before Japan's collapse. To meet the heavy pent-up demand for these items during the early reconversion period, sellers will have to control closely the distribution to jobbers and dealers. A reduction in dealers' inventories of merchant wire items has occurred in recent weeks, and on the basis of prospective demand and production through the remainder of the year, the likelihood of bolstering inventories during this period is not promising. Increasing number of export inquiries is noted, with a substantially larger tonnage for

barbed wire and fencing involved than under the prewar economy.

Chicago—Little progress is being made in relieving tightness in wire and wire products. In manufacturers' lines, high carbon spring wire is far short of demand. Public utilities and electrical jobbers are buying in larger quantities. Requirements for bale ties are increasing and supply is inadequate. Many distributors are revising their specifications for nails, reducing or eliminating coated types and substituting building types.

Buffalo—Heavy merchant wire orders are filling any gaps left in backlogs because of cancellations. Delivery schedules are being adjusted gradually and there is less confusion. Cushion wire for automobile seats and furniture is in increased demand.

Tin Plate . . .

Tin Plate Prices, Page 197

Pittsburgh — Substantial increase in demand and production of black plate is indicated for fourth quarter, when lifting of CMP regulations will permit unlimited output of steel products, with the exception of tin-coated items still controlled according to end uses of pig tin. However, the supply outlook for pig tin has improved with the report that some producing units in the Far East are available for immediate operation. WPB is preparing a report on the tin situation and is likely to announce its findings soon. Despite probable increase in pig tin imports in the near future considerable concern continues over adequacy of prospective tin plate production.

Granite City has been established as basing point on electrolytic tin plate at $4.60 per hundred pound base box on 0.50-pound tin and $4.75 on 0.75-pound tin. Bases on 0.25-pound tin have been established at $4.35 per hundred pound base box at Pittsburgh and Chicago while Granite City base price is $4.4

Chicago — Tin plate producers in this district are sold out for the remainder of this year. Furthermore, it is indefinite when many of the orders already entered for next year can be scheduled. Aside from tin, which remains in limited supply, other factors which serve to limit production are manpower shortage and inadequate tonnage of cold-reduced plate.

Rails, Cars . . .

Track Material Prices, Page 197

New York — Car buying is lagging with principal orders involving 50 seventy-ton hopper cars for the Missouri Kansas & Texas and 25 seventy-ton covered hoppers for the Texas & Pacific, both orders to American Car & Foundry Co. Little new inquiry is noted, with the railroads apparently further sizing up reconversion prospects of industry in general before stepping up purchases.

Meanwhile several inquiries are pending for passenger car equipment including sizable list for the New York Central railroad, on which bids were opened late in August. Relatively, there is substantially more interest in passenger than freight cars, due primarily to the complete restriction on coach building for a long period during the war. Locomotive buying includes ten 400 horsepower diesel-electric passenger locomotives for the Chicago, Burlington & Quincy, placed with the Electro-Motive Division, General Motors Corp., La Grange, Ill.

Domestic freight car buying in August comprised 7240 units, compared with 3500 in July, and brought the total for the first eight months up to 25,5 Comparisons follow:

	1945	1944	1943	19
Jan.	7,200	1,020	8,365	4,5
Feb.	1,750	13,240	350	11,7
March	2,500	6,510	1,935	4,0
April	1,120	4,519	1,000	2,1
May	1,526	1,952	870	
June	670	1,150	50	
July	3,500	795	4,190	1,0
Aug.	7,240	3,900	8,747	1,8
Sept.	....	400	6,820	
Oct.	....	2,425	5,258	
Nov.	....	1,065	870	
Dec.	....	16,245	2,919	1
Total	....	53,221	41,355	26,0

Structural Shapes . . .

Structural Shape Prices, Page 197

Structural mills are filling schedu further ahead as building projects c tinue to come out, in spite of short of engineering workers, which del some work. Fabricators in many stances have sufficient work for the mainder of the year.

Pittsburgh — Demand for structu steel items has increased somew

reflecting the lifting of WPB building regulations. Most new inquiries are for small miscellaneous plant expansion programs, with requirements from this source not expected to reach full-scale proportions for a couple of months. Prospective heavy volume of municipal work also will be delayed in getting under way, due to the time required in completing plans. Railroads are already taking increasing tonnage of structural items and still further improvement is anticipated as freight car and locomotive shops step up production. Producers are booked into December and later on most structural items and despite indicated increase in production, upturn in construction work is expected to augment order backlogs.

Boston—Inquiry for shapes is slightly more active, with shortage of draftsmen and estimators retarding openings on some tonnage. Structural mill schedules are extended through fourth quarter on some sizes, with limited openings for late November and December delivery. This situation tends toward continuance of premium payments permitted by eastern producer with better deliveries, including some from stock. In general mill schedules contain most of former rated CMP orders, which are supplemented by increased postwar tonnage.

Birmingham — Structural shapes are in heavy demand, with cancellations having little effect. Fabricators report prospects excellent, with bookings reasonably heavy for the remainder of the year.

New York — Structural activity is increasing, with various new projects coming out for bids. These include 200 tons for a plant addition for Triangle Conduit & Cable Co., New Brunswick, N. J., Turner Construction Co., Graybar Bldg., New York, general contractor and 100 tons for a mechanical shop building for Colgate-Palmolive-Peet, Jersey City, N. J., same general contractor.

Comptroller McGoldrick has recommended that New York City advance $53,789,532 for an immediate construction program involving 37 projects. Without waiting for financial assistance from the federal government, he said there are projects which could be started immediately by amendment to the 1945 capital budget. He listed among other projects 11 schools or additions to schools, $12,958,700; three health centers, $282,652; eight hospital projects, $12,254,059; one terminal market, $1,307,921; three sewage treatment plants, $4,214,800; one sanitation garage, $298,000; and four miscellaneous projects, $1,872,000. Comptroller McGoldrick pointed out the list had been previously approved by the Board of Estimate and that, in fact, almost $10,000,000 had already been spent on sites, plans or partial construction of these projects.

Cleveland — Acute shortage of engineers, draftsmen, etc., is restricting activity in structural shapes. Some fabricators report several months' lag between inquiries and the time they can submit estimates. While extensive plans are being formulated for bridge and large-building construction, this work is not expected to get into high gear until late in 1946.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 197

New York — Reinforcing steel buying is headed by the award of 800 tons for a factory building for Schulton Inc., Clifton, N. J., through Walter Kidde Constructors Inc., to Bethlehem Steel Co. Another contract involves 276 tons for the Bell Laboratories, Murray Hill, N. J., awarded through the Mahoney Troast Construction Co., Passaic, N. J., to Truscon Steel Co. Still pending are 500 tons for a hospital building in Hartford, Conn., on which George A. Fuller & Co. are the general contractors. New inquiry is principally in small lots, although sizable work is in prospect for later in the year.

Seattle—New interest appears in reinforcing bars and less in merchant bars as steel becomes available for other than military purposes. Washington state has placed a 157-foot reinforced concrete bridge in Lewis county and culverts in Pend Oreille county, requiring 105 tons of steel. Bids are called for Sept. 25 for concrete bridges in Whatcom, Okanogan and Yakima counties, requiring 120 tons of reinforcing steel and a small tonnage of structurals.

Pig Iron . . .

Pig Iron Prices, Page 199

Pig iron supply is tight, with melters

increasing requirements as labor becomes slightly more plentiful. Efforts to build inventories for winter meet little success but the effort causes full production to be shipped and reserves at furnaces are not being accumulated.

Boston — While small volume of foundry iron is being shipped into this territory by two integrated steelworks furnaces, little additional tonnage is in sight and supply is tight. There seems to be only slight possibility the district furnace will go into blast before winter, thus eliminating that source of supply for emergencies, as was the case last year. Meanwhile Buffalo furnaces are delivering all the iron possible under current conditions and removal of the 30-day inventory limit may prevent stocking of supply against winter needs. Melt tends upward slightly, limited by labor shortage. Several larger consumers, notably in the textile machinery field, are subcontracting castings widely.

St. Louis — Supply of pig iron is tighter, due to relining of furnaces and labor shortage. Declining scrap supply also has contributed to increased use of iron. Deliveries are delayed a month and shortage of open railroad cars threatens further delay this winter. Foundries have shifted to civilian production easily and only shortage of molders and common labor prevents enlarged output and consequent heavier melt of iron.

Buffalo — Pig iron melt is increasing as manpower supply improves. Orders indicate increased foundry operations in fourth quarter. Sellers report supply tight, with consumer inventories generally low. Discretion is used in shipments to assure material to all melters. Consumers are trying to build up winter stocks but production has not allowed sufficient. Railroad castings producers have substantial backlogs.

Birmingham — Pig iron production was down momentarily over the week end for repairs to a Sloss-Sheffield blast furnace but is back on an 18-stack basis. Merchant iron producers see no easing in demand.

Pittsburgh—Indicated steady increase in foundry operations may largely offset reduced demand for pig iron in steelmaking operations. Foundry interests note increased demand from the automotive, railroad and farm equipment industries and expect still further gains. The No. 3 blast furnace at the Clairton works of Carnegie-Illinois Steel Corp. was blown in last week after being down for repairs since June 6. At present 44 out of 54 units are pouring iron in this district, compared with 49 furnaces active just prior to V-J Day.

Philadelphia — Although sufficient pig iron is available to meet requirements the general undertone is strong as it is believed by most producers that demand will increase. Any easing in labor supply, especially at foundries, would result in increased melt and considerable export demand is pending. Producers generally have opened fourth quarter books, some earlier than usual in an effort to gage domestic requirements and obtain a better idea of ability to handle export tonnage. Disposition of all is to make sure they can handle domestic needs first.

New York — Sentiment in pig iron here is stronger. While there is enough to meet current requirements, the feeling is that within another month iron will be in tight supply. District iron foundries have heavy backlogs and if they are able to increase their labor over the next few weeks, as many hope will be the case in view of war cancellations and cutbacks at various plants, they will be able to increase their requirements.

One Buffalo furnace, which has been down since the early part of the year for repairs, and which, it was thought might be ready to go in blast in August is still out. The delay is reported to be inability to get certain needed equipment. However, even should this furnace go in blast soon it may not be of any immediate help to eastern consumers of foundry iron as another in the district might promptly be switched over to silvery iron.

Scrap . . .

Scrap Prices, Page 200

Pittsburgh — Leading consumers are still out of the market except for taking in tonnages on old orders. An occasional car of turnings is moving at 50 cents below ceiling, but this particular grade never has been a significant factor in indicating overall market trends. In a few instances consumers refuse to pay the full springboard on this item. Eastern mills are paying full springboard and commission on all grades as they are leading consumers just outside the district. WPB is still allocating scrap the recent Baltimore & Ohio railroad

list involving only 2000 tons of heavy melting steel to Otis Steel Co., Cleveland, and the 8000 tons of heavy melting steel on Pennsylvania railroad's list allocated to Youngstown Sheet & Tube Co., Youngstown.

Cleveland—Scrap prices are at ceiling on all grades, though borings and turnings show some weakness, which is not fully apparent as supply is small and demand light. Dealers and brokers find difficulty in obtaining sufficient material to apply on contracts and all scrap available is being taken promptly. In view of the scarcity shipments are off fully 60 per cent from the level of 90 days ago. Yards have relatively little stock and mill reserves are light. Foundries are seeking more tonnage but are unable to obtain usual supplies of rails and angle bars, which seem to be scarcer than for a long time. Electric furnace operators also are in the market for additional scrap but do not find tonnage available.

Boston — Except for machine shop turnings steelmaking scrap on limited buying moves at ceiling. Turnings and mixed borings and turnings are down to $8, shipping point, with demand light and production smaller, except textile shop turnings, some of which are briquetted and used in equipment builders', foundries. Most shipyard scrap appears to have been liquidated, although there are scattered lots to be sold. Unprepared steel scrap is fluctuating at about $9, with supply for yards limited. Strong demand holds for cast and other foundry grades.

Detroit — Easing of prices on blast furnace grades from ceiling levels by about $1 per ton is taken to be more a reflection of the withdrawal of Pittsburgh and Valley furnaces from the market than any local condition. Some surplus is developing here as a result of these buyers cancelling tonnages, but it is not considered serious, and they are expected back in the market momentarily, followed by a return to ceiling prices on borings and turnings. Weakness is developing in low-phos plate for electric furnaces, which is understandable in the face of wholesale cancellations of alloy tonnages allocated for aircraft uses. However, this has not developed to the point where any revision of the published price is indicated.

Philadelphia — Steel scrap prices are steady at ceilings, except on unprepared material, which has declined further. When there is sufficient labor to process this scrap there may be an easing but this is not expected unless there is a break in upward trend in steelmaking.

New York — Scrap demand continues brisk with Bethlehem Steel Co. principal buyer, covering for practically all its plants. Some export demand is noted, with some business in specialties, such as axles, concluded for shipment to South America.

St. Louis — Scrap shipments to this area show no improvement and are at least 75 per cent less than six weeks ago. Supplies of all but cast grades are sufficient, however, due to mill cutbacks and furnace repairs. Most melters have 30 to 45 days supply. Melters are placing no orders and cancelling none. Labor shortage gives little hope of improved supply. Prices remain at ceilings except for machine shop and short turnings, which have eased to $8.50 and $10.50, respectively, though Chicago orders continue to be filled at the Chicago ceiling of $10.60 and $12.60. Diminishing supply due to ordnance plant closings had maintained prices.

Cincinnati — The iron and steel scrap market is still marking time, but the approach of winter and assurance that steelmaking will be maintained at high level are two factors bringing strength despite rather dilatory demand. Some softness has crept into lighter grades. Good railroad scrap, cast, and some of the specialties, however, are actively sought. Labor problems in yards have not yet been solved.

Buffalo — Additional strength has developed in steel and iron scrap as two consumers broke the deadlock in turnings by purchases at ceiling, offsetting refusal of a leading consumer to accept turnings in current deliveries. Movement is considerable as dealers make shipments against recent substantial contracts. Much tonnage is expected by lake before navigation closes, a cargo of 5000 tons having just arrived, with 2500 tons by barge canal and another on the way.

Steel in Europe . . .

London — (*By Radio*) — Production of steel in Great Britain is increasing as industry reconverts to civilian work. Export business covers sheets and railroad material for European countries.

Light foundries need more pig iron. Scarcity of semifinished steel is becoming more marked. The sheet market continues its high activity.

Warehouse . . .

Warehouse Prices, Page 198

Buffalo — Although demand for warehouse items is well sustained inventories are improving as a result of better mill shipments. Galvanized and hot-rolled sheets and steel bars are among the tightest items, with deliveries into next year.

Boston — Steel demand for warehouses is slightly heavier, mainly for flat-rolled spot lots for reconversion fill-ins. Jobbers are short of most sheet grades, strip and wire products. While there are some mill order revisions, practically all warehouse orders on mill books for delivery this year are firm. A leading alloy distributor has revised specifications with suppliers, replacing considerable NE tonnage with SAE grades.

By-Product Coke Ovens Are Ordered for Lorain Works

Contract for 177 by-product coke ovens to be installed at its Lorain, O., works has been placed by the National Tube Co., U. S. Steel subsidiary, with the Wilputte Coke Oven Corp., New York. The addition will consist of three batteries of 59 ovens capable of producing 850,000 tons of coke annually. Facilities will include by-product recovery equipment. The project will be completed in 18 to 22 months. At present the Lorain works has 208 by-product ovens.

Bolivian Tin Prices To Decline Under New Contrac

A new Bolivian tin purchase contract has been signed, covering deliveries from July 1, 1945, to June 30, 1946 with all Bolivian producers except the Patino interest, Foreign Economic Administration announced last week.

Price for the three months ending Sept. 30, 1945, is based on the previous contract price of 63.50 cents a pound for refined tin in the United States and for the three succeeding quarters at 62.0 cents, 60.50 cents and 58.50 cents, respectively. Half of the Patino tin production for 1945 is being purchased by the United States Commercial Co., a government agency, under a separate contract and discussions are being held regarding a similar purchase contract for 1946.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

2840 tons, axle plant building No. 5, Pontiac Mich., for Pontiac Motor Division, General Motors Corp., to Bethlehem Steel Co., Bethlehem, Pa.; bids Aug. 28.

1200 tons, mill building for Lees Cochran Corp Glasgow, Va., to Belmont Iron Works, Eddystone, Pa.

600 tons, plant addition for Merck & Co Elkton, Va., to Belmont Iron Works, Eddystone, Pa., through Merritt, Chapman Scott, New York.

600 tons, building for Westinghouse Electric Corp., East Springfield, Mass., to Bethlehem Steel Co., Bethlehem, Pa.; Stone & Webster Corp., Boston, engineer, contractor.

400 tons, power plant, Chicago, for Sherwin Williams Co., to Hansell-Elcock Co., Chicago.

300 tons, building for Dehydrated Orange Juice Co., Orlando, Fla., to Ingalls Iron Works Co., Birmingham, Ala.

300 tons, plant addition for Caloric Gas Stove Works, Topton, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

160 tons, addition for Merck & Co., Rahway, N. J., to Bethlehem Fabricators, Bethlehem, Pa., through Merritt, Chapman & Scott, New York.

Unstated tonnage, structural work, crane runway, north of building 541, Navy Yard, Philadelphia, to American Bridge Co., Pittsburgh, $15,300, spec. 17013, Bureau of Yards and Docks, Navy Dept.

STRUCTURAL STEEL PENDING

1800 tons, bus service station, Detroit, for Great Lakes Greyhound Lines.

1000 tons, four warehouse buildings, various locations, for Lloyd C. Fry Roofing Co., Chicago.

900 tons, box factory, Hinde & Dauch Paper Co. at Waltham, Mass.

650 tons, repairs to First street bridge, Louisville, for Illinois Central Railroad; bids Sept. 17.

500 tons, warehouse, Chicago, for Lafayette Steel Corp.

500 tons, pilot building, Argo, Ill., for Corn Products Refining Co.; general contract to Ragnar Benson Inc., Chicago; bids Aug.

500 tons, Wynnewood Apartment, Philadelph

500 tons, Vincent memorial building, Massachusetts General Hospital, Boston.

400 tons, dairy mill building and warehouse, St. Mary, Kans., for American Salt Corp., subsidiary of Cudahy Packing Co.

400 tons, warehouse, Memphis, Tenn., for J. E. Dilworth Co.

400 tons, paint and test building, La Grange, Ill., for Electro Motive Division, General Motors Corp.; bids Sept. 14.

300 tons, bleach plant, Cloquet, Minn., for Northwest Paper Co.

298 tons, state bridge over Erie railroad tracks at Warren Point, N. J.; bids Oct. 3.

250 tons, addition to maintenance shop, New York, New Haven & Hartford railroad, at New Haven, Conn.

158 tons, plate girder span, route 35, section 38B, over New York & Long Branch railroad, Morgan, N. J.; bids Sept. 26, state highway commissioner, Trenton, N. J.; work takes approximately 25 tons reinforcing steel.

150 tons, New Jersey state highway bridge over New York & Long Branch railroad, Sayerville, N. J.; bids Sept. 26.

130 tons, state bridge at Templeton, Mass.

100 tons, lighting towers, Braves Field, Boston.

100 tons, two bridges, Arlington Mills, Lawrence, Mass.

REINFORCING BARS . . .

REINFORCING BARS PLACED

900 tons, Schulton Inc., Clifton, N. J., through Walter Kidde Constructors Inc., to Bethlehem Steel Co., Bethlehem, Pa.

780 tons, two warehouses for North American Warehouse Co., Linfield, Pa., to American Steel Engineering Co., Philadelphia.

276 tons, addition, Bell Laboratories, Murray Hill, N. J., through Mahoney Troast Construction Co., Passaic, N. J., to Truscon Steel Co., New York.

218 tons, diagnostical hospital, Elgin, Ill., for U. S. Veterans Administration, to Bethlehem Steel Co., Bethlehem, Pa.; W. E. O'Neil Construction Co., Chicago, contractor; bids Aug. 14.

130 tons, grain elevator, Reading, O,. for Cooperative G.L.F. Mills Inc., to Truscon Steel Co., Youngstown, O.; James Stewart Corp., Chicago, contractor.

118 tons, building 100, Pullman-Standard Car Mfg. Co., Chicago, to Ceco Steel Products Corp., Cicero, Ill.; Sumner S. Sollitt & Co., Chicago, contractor; bids Aug. 30.

REINFORCING BARS PENDING

838 tons, new plant, Newman-Rudolph Litho Co., Chicago; bids Sept. 13.

778 tons, wire fabric, for Illinois State Highway Commission; 301 tons, FA route 13 Sec. 2-2, Lawrence county, Ill., and 171 tons, Sec. 3-2, same route; 185 tons, FA route 5 Sec. 20-R, Logan county, Ill., and 321 tons, Sec. 18-R and 17-R-1, same route in McLean county, Ill.; bids Sept. 14.

465 tons, tumor treatment hospital, Hines, Ill., for U. S. Veterans Administration; bids Sept. 11.

400 tons, bars for road project for state near Camden, N. J., Route 25, sections 2-D and 3-D.

376 tons, bridge, Milan, Ill., SBI route 3 Sec. 17-B, for State Highway Commission; bids Sept. 14.

300 tons, state bridges in Whatcom, Okanogan and Yakima counties, Wash.; bids to highway commission, Olympia, Sept. 25.

265 tons, 157-foot concrete bridge and culverts in Lewis and Pend Oreille counties, Washington; general contracts to Rumsey & Co., Seattle, and Henry Hagman, Cashmere, Wash.

PIPE . . .

CAST IRON PIPE PLACED

755 tons, 8-inch, Boston, to Warren Foundry & Pipe Co., Everett, Mass.

312 tons, 6, 8 and 12-inch for Boston & Maine railroad, to United States Pipe & Foundry Co., Burlington, N. J.

CAST IRON PIPE PENDING

1000 tons or more, 15,000 feet 12-inch and 7000 feet 7-inch Class 150, for Everett, Wash.; second bids opening Sept. 12.

600 tons, 4 to 16-inch pit-cast, for Navy Yard Annex, South Boston, Mass.

Unstated, 2000 feet 16-inch steel pipe, for Bremerton, Wash.; bids Sept. 12.

RAILS, CARS . . .

RAILROAD CARS PLACED

Canadian Pacific, 75 seventy-ton air-dump cars, to National Steel Car Corp., Hamilton, Ont.

Chicago, Burlington & Quincy, two stainless steel streamlined passenger trains, to Edward G. Budd Mfg. Co., Philadelphia; each train will consist of four chair cars, a diner, a combination baggage and buffet car and a parlor-lounge car.

Missouri, Kansas & Texas, 50 seventy-ton covered hopper cars, to American Car & Foundry Co., New York.

Texas & Pacific, 25 seventy-ton covered hopper cars, to American Car & Foundry Co., New York.

LOCOMOTIVES PLACED

Chicago, Burlington & Quincy, ten 4000-horsepower diesel-electric passenger locomotives, to Electro-Motive Division, General Motors Corp., La Grange, Ill.

RAILS PLACED

Southern Railway System, 40,000 tons, to Ensley, Ala., mill of Tennessee Coal, Iron & Railroad Co., Birmingham.

CONSTRUCTION AND ENTERPRISE

OHIO

BELLEVUE, O.—General Electric Co., Lamp Works, 1133 East 152nd St., Cleveland, has let contract to Steinle-Wolfe, Inc., Fremont, O., for an addition to cost about $260,000.

CLEVELAND—Titan Valve & Mfg. Co., 9913 Elk Ave., has bought site at East 222nd St., and Tungsten Rd., Euclid, O., and will build modern plant to which it will remove.

CLEVELAND—United States Compressor Co., 5300 Harvard Ave., has been bought by Harold O. Schott and associates, Cincinnati, who will continue operations with same personnel. Company manufactures air compressors. R. L. Bacher continues as president.

CLEVELAND—Ohio Bell Telephone Co., Warren H. Chase, chief engineer, 750 Huron Rd., has plans for $100 million statewide expansion, including service to 950,000 new subscribers.

CLEVELAND — Colonial Refining & Chemical Co. has been incorporated with $25,000 capital to manufacture paints and chemicals. S. A. Lloyd, 1600 Williamson Bldg., is agent.

CLEVELAND—H. & P. Stamping Co. has been incorporated with $50,000 capital and 1000 shares no par value by H. & P. Mfg. Co., 13945 Triskett Rd., Edw. W. Petranek, president.

CLEVELAND—Parma Stamping & Die Co., Robert J. Vanstone, president, 5265 West 130th St., is having plans made for a one-story plant building to cost about $30,000.

CLEVELAND—Transformer Engineering Corp., Fulton Rd., will build a one-story machine shop 100 x 100 feet at Brookpark Rd.

COSHOCTON, O.—General Electric Co., Pittsfield, Mass., plans erection of a plastics plant here at cost of over $4 million.

DAYTON, O.—General Motors Frigidaire, Division, General Motors Bldg., Detroit, plans an 880-foot addition to plant No. 4 at Moraine City, to cost about $1,532,000.

ELYRIA, O.—Elyria Foundry Co. will build plant addition for use as a core room.

LIMA, O.—Lennox Furnace Co., 651 North Baxter St., has let contract to H. U. Tuttle Construction Co., Elm and Central Sts., for a one-story 70 x 235-foot plant addition, cost about $50,000.

SANDUSKY, O.—Procter & Gamble Co., Cincinnati, will build soap products plant here at West Market and Pearl Sts., to cost about $ million.

WARREN, O.—City, City Hall, will vote November election on $200,000 bond issue for a municipal incinerator plant. W. Harvey, City Hall, is city engineer.

WILLOUGHBY, O.—Ohio Rubber Co., Bo Hur Ave., plans a one-story 150 x 480-fo coal storage addition costing $350,000; on story 44 x 92-foot boilerhouse addition, cluding coal slides, conveyor, power boil and ash-handling system, costing $190,00

MASSACHUSETTS

EVERETT, MASS.—Monsanto Chemical Co 1700 South Second St., St. Louis, plans plant here for manufacture of a chemic product at its Merriman plant, estimated cost $450,000.

INDIAN ORCHARD, MASS.—Monsanto Chemical Co., Monsanto Ave., plans a power plan addition, including boiler, to cost over $50 000.

WALTHAM, MASS.—Public works departmen City Hall, has plans by J. R. Worcester Co 79 Milk St., Boston, for a rubbish and refus disposal incinerator. Whitman & Howar 89 Broad St., Boston, are engineers.

CONNECTICUT

BRIDGEPORT, CONN.—Hemco Plastics D vision of Bryant Electric Co., 1421 State St has plans for a manufacturing building add tion costing $300,000.

WALLINGFORD, CONN.—Wardens an burgesses, Town Hall, are having plans mad for a sewage disposal plant to cost abou $200,000.

RHODE ISLAND

PROVIDENCE, R. I.—New Method Platin Co., 112 Elm street, has plans by Barker Turoff, 1022 Grosvenor Bldg., for a two story 62 x 80-foot plant on Allens Ave., cost $40,000, including equipment.

PROVIDENCE, R. I.—Genser Mfg. Co., 4 Waldo St., has let contract to Joseph Flynn, 112 Lenox Ave., for a one-story 60 60-foot boiler plant and chimney, to co about $40,000.

VERMONT

ST. ALBANS, VT.—National Carbon Co., Inc Box 6087, Cleveland, has let contract Gillmore-Carmichael, Olson Co., Box 11 Cleveland, for a one-story 160 x 500-fo factory building, to cost about $300,00

NEW YORK

BUFFALO—Hinde & Dauch Paper Co., h bought site for erection of a plant addition cost about $150,000.

SCHENECTADY, N. Y.—American Locomo tive Co., Erie Blvd., will build a tool build ing costing about $300,000. J. L. Otte heimer, 373 State St., Albany, N. Y., is eng neer.

SYRACUSE, N. Y. — General Electric Co

River Rd., Schenectady, N. Y., has plans by Giffels & Vallett Inc., Marquette Bldg., Detroit, for superstructure for industrial development, to cost about $8 million.

NEW JERSEY

LINDEN, N. J.—Standard Oil Co. of New Jersey, 30 Rockfeller Plaza, New York, has let contract to George A. Fuller Co., 597 Madison Ave., New York, for a research center of eight buildings, estimated to cost about $8 million.

NEW BRUNSWICK, N. J.—Triangle Conduit & Cable Co. Inc., Jersey Ave., New Brunswick, has let contract to Turner Construction Co., 420 Lexington Ave., New York, for a one-story 100 x 325-foot plant addition at Jersey and Triangle Aves., to cost about $275,000. Alexander D. Crossett & Associates, 512 Fifth Ave., New York, are architects.

PENNSYLVANIA

ALBION, PA.—Hays Mfg. Co., 801 West Twelfth St., will build a one-story foundry for gray iron castings manufacture, at cost of about $40,000.

CORRY, PA.—Corry-Jamestown Mfg. Corp., 36 North First Ave., plans alterations and additions to cost about $51,000.

ERIE, PA.—Merwin Mfg. Co., William Decker, president, 1819 German street, is rebuilding steel stampings plant recently burned, at cost of $50,000 or more.

MEADVILLE, PA.—Palmer Bros. Tool & Forge Co. will build a tool shop addition costing about $20,000.

PITTSBURGH—Heppenstall Co., 4620 Hatfield St., will build a two-story research laboratory at Hatfield and 46th Sts., costing about $170,000.

SHARON, PA.—Mercer Tube Co. has plans for a one-story plant building 75 x 175 feet, to cost about $75,000.

MICHIGAN

DETROIT — Micromatic Hone Corp., 8100 Schoolcraft Ave., will build a one-story plant addition for grinding machine parts, to cost about $175,000.

DETROIT — Packard Motor Car Co., East Grand Blvd., plans a structural steel motor plant addition costing about $200,000.

FLINT, MICH.—Chevrolet Motor Co., Flint, will build a 73 x 875-foot plant addition costing about $400,000.

PONTIAC, MICH.—Pontiac Division, General Motors Corp., will build a plant addition for axle manufacture, costing about $200,000.

ILLINOIS

FREEPORT, ILL.—City, City Hall, is having plans made for a one-story water softening plant to cost about $140,000. Consoer, Townsend & Associates, 211 North Wacker Dr., Chicago, are engineers.

INDIANA

FORT WAYNE, IND.—Spicer Mfg. Co., 4100 Bennett St., Toledo, O., has let contract to Wermuth Inc., 1036 St. Marys St., for a one-story 400 x 500-foot factory building, 50 x 100-foot cafeteria and 50 x 300-foot office building, estimated to cost $1,250,000. Bentley & Sons, 201 Belmont St., Toledo, O., are engineers.

FORT WAYNE, IND.—Wayne Pump Co., Tecumseh St., has let contract to Buesching & Buesching, 1426 St. Joe St., for a one-story 40 x 80-foot shop building, to cost about $40,000.

KOKOMO, IND.—Delco Radio Division, General Motors Corp., Home avenue and Belt Line, plans a two-story plant costing over $100,000.

MARYLAND

RELAY, MD.—J. E. Seagram Sons, Seventh Street Rd., Louisville, Ky., have let contract to Baltimore Contractors, 711 South Central Ave., Baltimore, for a four-story boiler plant 54 x 195 feet, to cost over $200,000.

VIRGINIA

ELKTON, VA.—Merck & Co., Inc., 126 East Lincoln Ave., Rahway, N. J., has let contract to Merritt-Chapman & Scott Corp., 17 Battery Pl., New York, for additions to Stonewall plant, to cost about $3 million.

WISCONSIN

MILWAUKEE—Marquette Cement Mfg. Co., 150 South Dearborn St., Chicago, plans a 25 x 92-foot reinforced concrete cement storage building with eight silos, to cost about $250,000.

LA CROSSE, WIS.— Northern States Power Co., 122 Fifth Ave., plans a power plant to cost about $1,285,000.

WAUWATOSA, WIS.—Western Metal Specialty Co., 3043 North 30th St., Milwaukee, has let contract to W. W. Oeflein Co. Inc., 5345 North Hopkins St., Milwaukee, for a one-story 200 x 425-foot plant, to cost about $138,000. H. L. Mesmer, 231 Wisconsin Ave., Milwaukee, is architect.

MINNESOTA

HOPKINS, MINN.—Superior Separator Co., C. G. Gray, president, 1179 Fifteenth Ave., S.E., has let contract to H. N. Leighton Co., 716 South Seventh St., Minneapolis, for a one-story 90 x 340-foot factory portion and two-story 40 x 100-foot office portion, estimated to cost about $100,000. C. W. Farnham, 7028 Oak Grove Blvd., is architect.

INTERNATIONAL FALLS, MINN.—Minnesota & Ontario Paper Co., Minneapolis, Donald D. Davis, president, is building a two-story research laboratory 95 x 140 feet, to house laboratories and research facilities for paper, pulp and insulation and space for pilot plants.

MINNEAPOLIS—Midwestern Metal Products Co., 3232 East 40th St., manufacturer of tools and metal stampings, has let contract for a one-story plant addition.

MINNEAPOLIS — American Refrigerator & Machine Co., 615 North Third St., has let contract to L. Pavlo, 6413 19th Ave., for a one-story 140 x 162-foot plant and warehouse at 2700 University Ave., N.E., to cost about $50,000. Long & Thorsov, 1200 Second Ave., S., are architects. (Noted Sept. 10.)

MOORHEAD, MINN.—Minn-Kota Foundry Mfg. Co., 201 North Second St., Fargo, N. Dak., has let contract to J. E. Krieg & Son, 1920 Front St., Fargo, for a part one-story 60 x 150-foot and part two-story 80 x 120-foot foundry, to cost about $50,000. A. R. Melander, 603 Alworth Bldg., Duluth, is architect.

ST. CLOUD, MINN.—Franklin Transformer Mfg. Co., Minneapolis, manufacturer of battery chargers and testers, welders, motors and other electrical equipment, has bought former Pan Motor Co. plant for manufacture of frozen food cabinets and other household equipment. Guy L. Pugh is president.

WILLMAR, MINN.—City, E. H. Brogren, clerk, will open bids Oct. 8 for steam generating unit in extension to municipal power plant. Pfeifer & Schultz, Wesley Temple Bldg., Minneapolis, are engineers.

WORTHINGTON, MINN.—City, G. S. Thompson, clerk, has let contract to Power Service Corp., Wesley Temple Bldg., Minneapolis, for extensions and improvements to municipal power plant, on bid of $405,700. Ralph D. Thomas & Associates, 1200 Second Ave. South, are engineers.

KANSAS

KANSAS CITY, KANS.—Oliver Corp., manufacturer of agricultural machinery will let contract soon for one-story branch plant 200 x 356 feet, to cost about $300,000.

KANSAS CITY, KANS.—Colgate-Palmolive-Peet Co. plans six-story plant addition 75 x 120 feet. Albert Kahn Inc., Marquett Bldg., Detroit is architect and enginee Cost is estimated at $1 million.

KANSAS CITY, KANS.—Cities Service Gas Co Oklahoma City, Okla., plans 31 miles 20-inch domestic gas line at cost of $700,00 also expansion and improvement of co pressor station at Welda, Kans., at cost $200,000.

MULLINVILLE, KANS. — Northern Natu Gas Co., Omaha, Nebr., plans natural g compressor station here, to cost over $10 000.

WICHITA, KANS.—Wichita Wire Products C has let contract for a one-story plant 40 70 feet.

TEXAS

BURKBURNETT, TEX.—City, City Hall, pla sewage disposal plant costing $35,000 a sewer collection lines costing. $40,000. J. Ward, Harvey-Snider Bldg., Wichita Fa Tex., is engineer.

CALIFORNIA

BURBANK, CALIF. — Johnson Aircraft In Fort Worth, Tex., will build an aircraft f tory near Burbank for production of roc civilian sports planes. R. S. Johnson is pre dent.

BURBANK, CALIF.—Coast Sheet Metal Wor has building permit for a concrete sh building 75 x 138 feet at 59 East Oran Grove Ave., to cost about $24,000.

LOS ANGELES — Ace Plating Works, 7 Crocker St., has let contract to Robert Stewart, 4346 Allott Ave., Sherman Oa Los Angeles, for a factory and warehou building at 719 Towne Ave., 50 x 110 fe to cost about $16,000.

POMONA, CALIF.—Pomona Machine Work 163 East Commercial St., has building pe mit for a plant addition covering 2700 squ feet.

SOUTH GATE, CALIF.—General Motors Cor 2700 Tweedy Ave., has awarded contra estimated at $1,500,000 to Swinerton & W berg, 605 West Olympic Blvd., Los Angel for plant reconversion to motor car manufa ture.

VENICE, CALIF.—Aero Components, 36 West Century Blvd., has let contract to Wright, 6238 San Vicente Blvd., Los Angel for a plant addition 50 x 100 feet.

OREGON

PORTLAND, OREG.—Northwest Sales C distributor of metal conduits, wire and el trical equipment, has low bid of $35,0 from Charles Shoblom for a 100 x 100-f reinforced concrete warehouse building.

SALEM, OREG.—State highway commiss plans survey for proposed steel bridge o Willamette river at Independence, Oreg., cost an estimated $600,000.

SALEM, OREG.—Oregon Pulp & Paper Co. let contract to Donald M. Drake, Portla Oreg., for rebuilding of burned plant w loss of about $200,000. Shapes and reinfo ing steel will be involved.

SPRINGFIELD, OREG. — Willamette Val Wood Chemical Co., through F. J. Twa industrial engineer, has rejected bids and w readvertise for steel and copper pipe.

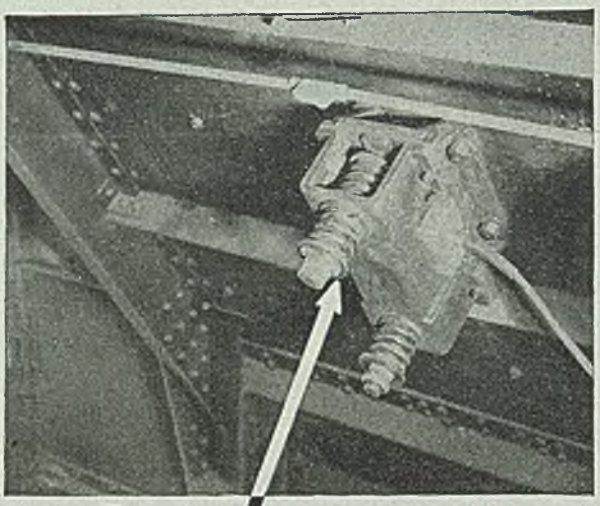
WASHINGTON

BELLINGHAM, WASH.—Bellingham I Works has received priorities for a propo $280,000 cold storage plant. Hovind Ulrich, architects, are preparing plans. frigerating equipment is understood to h been awarded to York Ice Machinery Co York, Pa.

EVERETT, WASH.—American Ice & C Storage Co., M. A. Lewis, manager, is h ing plans made for an addition 80 x feet, to cost about $200,000.

STEE

STEE



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Eliminate arched-over and plugged bins, hoppers and chutes—assure a steady, free flow of material.

The vibrator shown above is facilitating the flow of ore through an 8 ft. by 24 ft. chute, made of 1⅜" plate.

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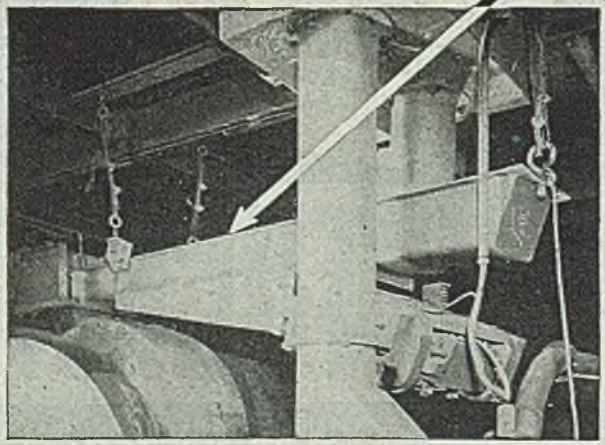
Provide rheostat control of flow of ore, sinter, chemicals, etc., to ball mills, crushers, driers, belt conveyors. Capacities of from OUNCES to 500 TONS per hour.



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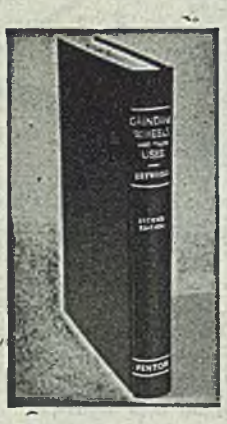

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