STEEL

The Magazine of Metalworking and Metalproducing

OCTOBER 30, 1944

Volume 115—Number 18

NEWS

Large-Scale Building Boom Seen for Postwar Era 40
Million homes annually will be needed in first decade

Formula for Voting 39
Present, Past and Pending 42
War Production 43
Railroads 44
Production Statistics 45
Machine Tools 46
Meetings 47
Controlled Materials 52
WPB-OPA 53
Men of Industry 58
Obituaries 60
West Coast 61
Prefabricated Harbors 66
Activities 68

TECHNICAL

Scientists at Metal Congress Review Technical Progress of Year 72
An outline of some significant topics covered in technical sessions

One-Shot Forging Produces Thin-Walled Shell in Single Stroke 74
Problems of metal flow, stroke, punches, dies, lubrication solved

Redesigned Bearing Separators Lighten Weight of Navy Equipment 78
Channel-shaped, rolled steel gun-mount components prove effective

Proper Joint Design Essential for Sound Welds in Aluminum 80
Features V-type butt joints to minimize weakness and distortion

Brazing Assemblies for Submersible Pumps Takes Close Control 96
Jigs and fixtures specially designed aid joining and handling

Create "Tempered" Air for Plants by Burning Fuels in Air Stream 102
Use of all heat, lower initial and operating costs recommend plan

Wiremakers' Meeting Deals with Drawing and Finishing Practices 107
Alloy pickling, hook wear, galvanizing and dies are discussed

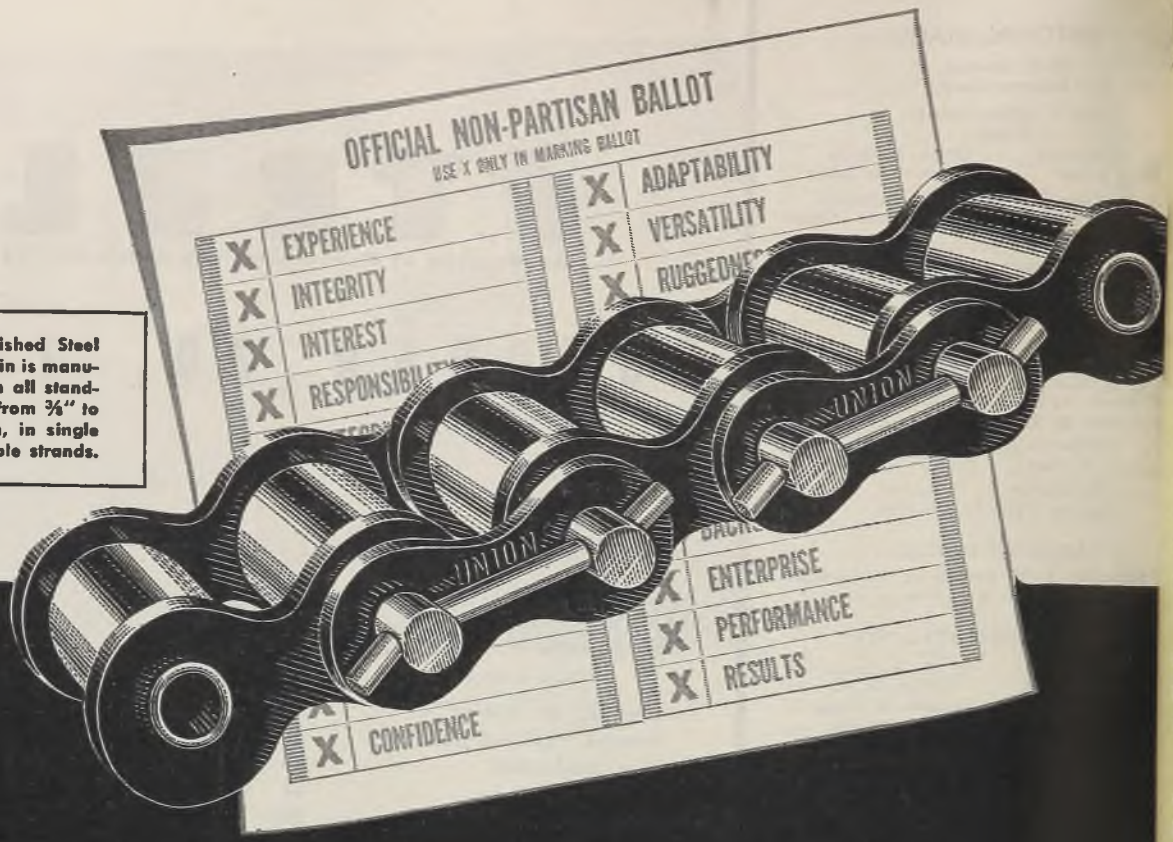
FEATURES

As the Editor Views the News 35
Postwar Previews 47
Windows of Washington 48
Mirrors of Motordom 55
Wing Tips 62
The Business Trend 70
Industrial Equipment 112
Construction and Enterprise 146

MARKETS

War Needs for Steel Still Heavy, Says WPB 129
Market Prices and Composites 130

Index to advertisers 153



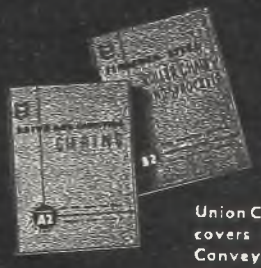
Union Finished Steel Roller Chain is manufactured in all standard sizes from ⅜" to 2½" pitch, in single and multiple strands.

LOOK OVER THE BALLOT, THEN VOTE

☆ Every time you specify or purchase a quantity of chain by its brand name, you are voting your preference for it over the other brands with which it competes. Just as you ponder over the qualifications of every candidate for the political office to which he aspires, consider the plus values which Union Chain can bring to the jobs of power transmission and materials handling in your plant or as an integral part of the product which you manufacture.

Union's aim is to win your vote for your chain requirements and to hold your support by seeing to it that you get the proper chain for every application, that you are instructed how to install it properly and that you are informed how to lubricate it efficiently in order that you may receive the longest service possible. This is Union's bid for your vote.

The Union Chain and Manufacturing Company . . . Sandusky, Ohio, U. S. A.



Union Catalog A-2 covers Drive and Conveying Chains. Catalog B-2 covers Finished Steel Roller Chain and Sprockets. Ask for your copies.

UNION CHAINS

Union Chains for Every Application

Drive and Conveying Chains and Sprockets

- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

★

Finished Steel Roller Chains and Sprockets

- All manufacturer's standard sizes ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

★

Silent Chain and Sprockets

- All sizes ⅜ in. to 1½ in. pitch

★

Flexible Couplings

- Roller chain type
- Silent chain type

STEEL
October 30, 1944

Engineers for Industry

It must be apparent to everybody that American industry will emerge from this war stronger, more capable and more resourceful than it has ever been before. It will be an industry keyed more to scientific developments and less to hit-or-miss methods than ever before. To maintain it in smooth running order and to insure continuing progress and refinement will require more research than ever before. To staff it adequately in all departments will necessitate a larger proportion and a greater number of technically trained men and women than it has ever required before.

Knowing in advance that industry must rely more heavily upon technically trained personnel, industrial leaders will do well to examine the nation's facilities for supplying this need. Can industrial employers count upon a continuing, steady flow of graduates from technical schools and universities?

The shocking answer is an emphatic "no." Through what appears to be inexcusable bungling on the part of officials in Washington, no adequate provision has been made for maintaining technical education even on a token basis. In a spell of unnecessary panic, the authorities—against the counsel and entreaties of some of the nation's outstanding educators in technical fields—swept aside the remaining provisions of selective service which would have insured a restricted but helpful flow of technical graduates to industry's mills, shops and laboratories.

The result is that today the enrollment in technical institutions is but 12 to 15 per cent of normal, and this includes thousands who will be subject to draft before they finish their first term. The cold fact is that American industry faces a period of several years during which time only a trickle of competent engineering graduates will be available.

This situation is tragic in several ways. England, Canada, Russia and even China did not make our error; they provided for a continuance of technical training. Secondly, the scuttling of engineering education in the United States has made it difficult and in some instances impossible for technical schools to hold their faculties intact. Industry will feel the adverse effects of this situation for many years to come.

The damage never can be fully repaired. However, industry should go to the aid of the heads of the technical schools, who almost single-handed are trying to induce Washington to modify its policy. After all, industry has a tremendous stake in this problem. Its leaders should get into it with both feet.

STEEL AT —250 FAHR.: On the afternoon of the last day of the Metal Show in Cleveland scores of visitors about to enter Public Auditorium looked to the east and saw acres of flames high up in the sky. They were witnessing a most unusual accident, which exacted a heavy toll of life and property and which may involve some questions as to the behavior of steel at low temperatures.

This is what happened. A steel container in which liquefied natural gas was stored at 250 degrees below zero, Fahr., gave way. The wreckage of this container, which in turn damaged another container, released large quantities of liquefied gas. Upon exposure to the air, it regasified and ignited from unknown causes.

Naturally the question arises as to whether or not the exposure of the steel plates to a sub-zero temperature for an extended period could have had any bearing upon the failure of the containers. Probably not. Metallurgists have made exhaustive tests

(OVER)

of steel at low temperatures, but do these reflect the effect of prolonged exposure? In view of the increasing number of applications in which steel is subjected to low temperatures, and wholly aside from the Cleveland disaster, we really need more positive data on its behavior under such circumstances.

—p. 45

° ° °

EIGHT DAYS TO GO! Election day is only eight days away. It goes without saying that every employer should do everything possible to encourage all employes who are eligible to vote to cast their ballots on Nov. 7. WLB has ruled that employers can give employes time off to vote, with pay, without incurring penalties for violating wage stabilization regulations.

Some employers, in addition to making it easier for employes to get away to vote, may wish to emphasize the importance of casting one's vote intelligently and in accordance with the individual's best judgment. Anything that can be said to encourage independent thinking is all to the good.

We have eight days in which to work—eight days in which to get out the heaviest vote and the most intelligent vote that we can muster. This should be a "must" assignment for all progressive industrialists.

—p. 39

° ° °

CAN WE MATCH IT? An analysis of outstanding papers presented at the meetings comprising the National Metal Congress in Cleveland and at a number of conventions held in other cities during the past two weeks indicates that 1944 will be recorded as a memorable year for engineering progress in the metalworking industries.

It is noteworthy that this progress is widely distributed throughout many divisions of the industries. Apparently the influence of war has stimulated new developments in even the most backward sectors of industrial activity at the same time it has accelerated research in the more progressive sections. It would be difficult, indeed, to find a phase of metalworking which has not benefitted in some way from wartime developments in materials, equipment or processes.

How to apply these new advantages to peacetime conditions soon will be one of industry's major problems. We know we have the technological skill to meet the challenge, but do we have the managerial ability and the proper knowledge of economic, social and political forces to match it? —pp. 46, 72, 107

NOT OUT OF WOODS: That smashing naval victory in Philippine waters and the rather static situation on the western front in Europe tend to emphasize the uncertainty of war. Possibly we are getting ahead of schedule in the Pacific and falling behind on the continent.

At any rate, these events affect the production picture at home. They warn us that we dare not go too deeply into reconversion until we have first provided for every contingency on the battle fronts. For this reason, WPB's resume of production of key items in the war program is timely. There were shortages in September, some of which verged upon serious dimensions. Cutbacks since June 15 have affected only 85,000 employes of prime contractors.

We are not out of the woods on war production and it is important that we retain a proper sense of balance as to the relative priority of war needs and reconversion.

—p. 43

° ° °

WAGE VARIATIONS: A study by the Bureau of Labor Statistics of wage rates prevailing in 1943 in manufacturing establishments in 31 cities shows greater variations than one would expect.

On the basis that the average of wages in all areas equals 100, Detroit leads with an index of 131. Other high-index cities are Portland, Oreg., 117; Seattle, 116; San Francisco, 114; Pittsburgh, 113; Cleveland, 111; Philadelphia, 107; and Los Angeles, 103. Kansas City, Mo., stands at par with 100, Buffalo and Chicago at 99. Low-index cities include St. Louis, 87; Boston, 86; Birmingham, 78; and Atlanta, 70.

Manufacturers seeking advantageous locations for future operations should not take these ratings too seriously. They ignore efficiency of labor. Also the relation of labor supply to labor demand in 1946 may be quite different from what it was in 1943.

Nevertheless, the study raises interesting questions. For instance, what accounts for the spread of 13 points between St. Louis and Kansas City and between Philadelphia and Baltimore? We need to know more about the factors entering into wage scales.

—p. 50

E. L. Shaner

EDITOR-IN-CHIEF

Call Ryerson When You Need Steel

Every type of steel from stainless to structurals is immediately available from Ryerson stock. Just reach for the phone and call any one of the eleven conveniently-located Ryerson service plants. Our operators will connect you at once with an experienced service man who will see that you get the steel you need—when you need it.

JOSEPH T. RYERSON & SON, INC. Steel Service Plants: Chicago, Milwaukee, Detroit, St. Louis, Cincinnati, Cleveland, Pittsburgh, Philadelphia, Buffalo, New York, Boston.

QUICK, DEPENDABLE SHIPMENT

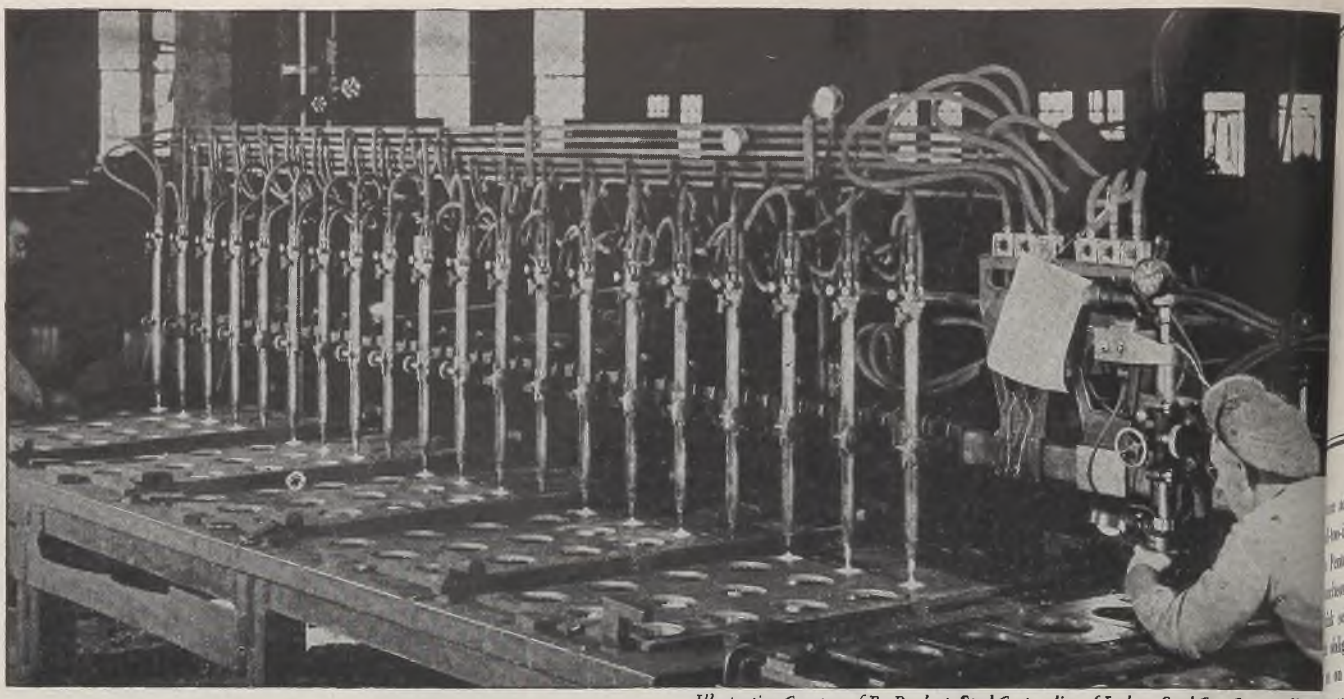
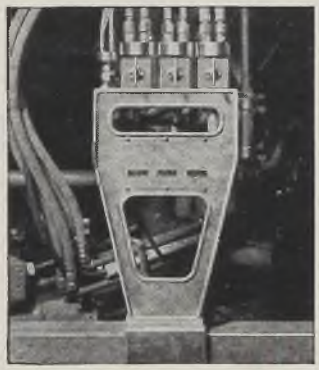
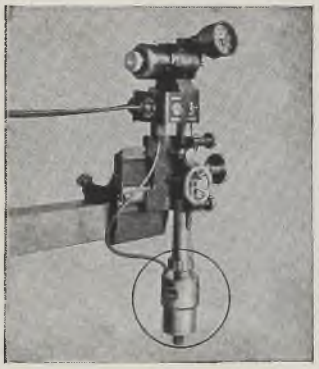


Illustration Courtesy of By-Products Steel Corp., div. of Lukens Steel Co., Coatesville, Pa.



CENTRALIZED GAS CONTROL UNIT

Gives the operator remote control of the pilot light, acetylene, preheating and cutting oxygen from his station at the tracing device.

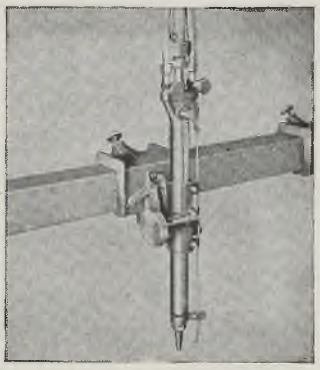


MAGNETIC TRACING DEVICE

An exclusive Airco feature, this device guides cutting torches by automatically following the contour of a steel cam or template.

INDEX SPEED CONTROL

Permits easy, accurate adjustment of torch travel speed during cutting. Speed is visible on the Tachometer attached to the unit.



ADJUSTABLE TORCH HOLDER

Allows torch to be moved easily and locked tightly at any desired position along the bar or tilted up to 45° for bevel cutting.

CUTTING METAL PARTS CUTTING COSTS

with the

AIRCO No. 6A OXYGRAPH

The motor-driven Airco No. 6A Oxygraph is designed to provide the speed, flexibility and accuracy essential to lowest cost production of flame-cut steel shapes in any quantity.

It quickly cuts steel plate of light and heavy sections to any shape and size. It can be used for beveling, squaring, straight cutting, stack cutting—changing from one job to another in minimum time—using up to eight torches with standard equipment.

The listing below of some of the plus factors of the No. 6A Oxygraph provides an inkling of its wide acceptance throughout the metal working industry as an important production tool.

1. Extreme accuracy under load—the pantograph design provides maximum resistance to torsion and deflection.
2. The rigid, sturdy base gives trouble-free support to the stout vertical posts and pantograph assembly.
3. Manual, magnetic or spindle type tracing devices can be used.
4. Ball-bearing mounted arms provide uniform, friction-free response to tracing device movement.
5. Centralized gas control unit for individual flame control saves operator's time.
6. Hose or cable lines can't snarl or pinch.

For further details write Department IA, New York Office for Catalog ADC-628—or ask your local Air Reduction office.

AIR REDUCTION

General Offices: 60 East 42nd Street, New York 17, N. Y.
In Texas: Magnolia Airco Gas Products Co. • General Offices - Houston 1, Texas
Offices in All Principal Cities

AIRCO

Gas Cutting Machines

A Type and Size for Every Cutting Need

IDEAL TOOLS FOR SPEED, FLEXIBILITY AND ACCURACY IN METAL SHAPING

Formula for Voting

on November 7th

• Before adjourning this meeting, which has been one of the all-too-infrequent occasions when most of the people of the Penton Publishing Co. could be assembled around the luncheon table at one time, it seems appropriate that we think seriously for a moment or two about the important obligation which will confront us on Tuesday, Nov 7. On that day, as American citizens, it will be our duty to vote in a national election. That duty consists not only of actually casting our ballots, but also of voting intelligently, according to our best individual judgment and on the basis of the best information obtainable.

How should we vote?

I think the best answer is to say that each of us should vote in the way that he or she thinks will result in benefits to the greatest number of deserving American citizens.

Unquestionably this is the ideal formula for voting, but there are persons who will say it is too idealistic. They will contend that one's first obligation is to his family and to himself. After all, self-preservation is the first law of nature. How can a voter reconcile his idealistic desire to vote for the common good with his selfish urge to vote for his own interest?

Fortunately that question need not concern members of the Penton organization. It happens that our own selfish interests as individuals run parallel and are identical with the interests of the great majority of deserving citizens in this nation. We have no clash of interests to confound our thinking.

Let me illustrate. We of the Penton companies belong to that section of the population which is generally known as the "middle class." None of us rates as a member of the idle rich, with incomes derived from inheritances. None of us belongs in income brackets so low that he is dependent upon the public purse. We are in the substantial, responsible and self-reliant middle class. History shows that throughout the entire period of man's struggle for existence a nation in which the middle class holds the balance of power is a nation with a high standard of living.

Certainly we do not wish to live in a country ruled or dominated by a few persons at the top of the social and economic scale. Nor do we wish to live in a country ruled or dominated by those at the bottom. Instead we wish to live in a country in which the middle class—our class—holds the balance of power.

Therefore, in voting on Nov. 7, we will want to ask ourselves which candidate and which party will be most likely to preserve the balance of power for the middle class.

There is a second important reason why our selfish interest runs parallel to the public interest. The Penton Publishing Co., perhaps to a greater extent than most business corporations, depends for its prosperity upon the American system of private enterprise. The primary mission of our publications and the objective of our work as individuals is to serve industry to the best of our ability. Our company and our talents and abilities as members of that company are integral parts of the private enterprise system. Just as the preservation of this system is of vital importance to the welfare of the nation as a whole, just so is it important to us and to our company.

Therefore, in voting on Nov. 7, we will want to ask ourselves which candidate and which party will be most effective in preserving private enterprise in the nation.

Permit me to emphasize one more point. I do not feel that I could be very proud if after the election is over it could be said that every Penton employe who is eligible to vote had voted for Mr. Roosevelt. Nor could I feel very proud if after Nov. 7 it could be said that every employe who was eligible to vote had cast his ballot for Mr. Dewey. In either case the unanimous vote would smack of regimentation or failure to do one's own thinking.

But I would be exceedingly proud if after election day it could be said that every person identified with the company who was eligible to vote had cast his ballot and had voted—not hastily or blindly—but carefully and intelligently, according to his or her best judgment.

YOU CAN HELP TO GET OUT THE VOTE!

On Friday, Oct. 13, about 250 employes of the Penton Publishing Co. and subsidiary companies met at lunch in the ballroom of Hotel Cleveland primarily for the purpose of honoring Ben K. Price, associate editor of STEEL in New York, on the completion of 30 years of continuous service with the Penton organization.

At the conclusion of the luncheon meeting, E. L. Shaner, president of the company, emphasized to the assembled employes the importance of voting on Nov. 7—not hastily or blindly—but carefully and intelligently, according to one's best individual judgment. The following text of Mr. Shaner's remarks is presented here in the hope that it will be of suggestive value to other employers who are desirous of talking to company personnel on the importance of voting.

—The Editors of STEEL.

Large-Scale Building Boom Seen

Million homes annually will be needed in decade following war's end. Each to take about 5 tons of metals. Total construction backlog estimated at $10.5 billion. Prefabrication to increase substantially, though gradually

By W. J. CAMPBELL
Associate Editor, STEEL

MOST fascinating of all potential cushions against postwar depression and of all hopes for full employment are the prospects for large-scale construction activity in the decade following the war.

A backlog of construction projects awaiting the relaxation of government controls and the availability of manpower and building materials now exceeds $10.5 billion, according to a survey by the leading fact-finding organization in the field.

The National Housing Authority estimates the building of 12.6 million nonfarm houses and apartment units will be required in the first ten years after the war to meet the needs of American families and to make substantial progress in replacing substandard structures.

Added to what is considered a certain heavy volume of residential building will be a heavy demand for school and college buildings, hospitals, manufacturing and office structures, churches and municipal buildings.

Heavy engineering construction, comprising largely public works and utilities, also promises to be considerable. F. W. Dodge Corp. has a list of contemplated or planned projects in the latter field totaling $6.8 billion. Streets and highways represent the bulk of the heavy engineering construction, although a substantial volume is indicated for dams and reservoirs, sewage systems, electric light and power plants and airports.

What a decade of high-volume construction markets would mean to postwar employment was outlined recently by Henry J. Kaiser, speaking before the *New York Herald Tribune* forum. Mr. Kaiser estimated the construction program alone would provide jobs for 11.5 million persons directly and reminded his listeners that the activity of each of these workers would provide jobs for two in the service industries. Thus a total of at least 30 million jobs could be provided.

Housing Would Provide Employment

Discussing the problem of building homes, Mr. Kaiser announced his conviction that 2 million could be built in the first 18 months after conversion. This would mean, by his estimates, an expenditure of $8 billion and immediate employment for 4 million workers. In addition, he believes there is a demand for $3 billion in repairs to existing houses which would provide employment for an additional 1.4 million.

Mr. Kaiser's estimate of the market for repairs coincides with that by the Federal Housing Authority, which points out that the repair demands are the most urgent and the ones that can be most readily satisfied.

The consensus of most construction authorities, borne out by various fact-finding surveys, is that total construction in the postwar decade will be appr mately double that in the 1930s and ahead of that in the 1920s.

In the residential building field, predicted postwar activity will be least three times that in the 1930s.

F. W. Dodge Corp. estimates h building in the first ten postwar y will average 820,000 units annually. figure is somewhat lower than National Housing Authority's estimat needs. The latter agency, however, its report is an "earnest effort to j the size of the nation's housing ne —not an announcement of a prog

Between the Dodge estimate of 8 000 homes annually, and the NHA mate of 1,260,000 needed, are m others. The average most generally g is 1 million annually. These estim are predicated on the measure of defe demand, the housing needs of retur servicemen and others establishing families, greater prosperity and war ings, an expected favorable mort market and probable continuation of p ulation trends toward the suburbs outlying districts.

Owing to numerous transition pr lems, it is likely the number of n farm homes to be built in the first months after restrictions are lifted not reach the average predicted for postwar decade. Numerous compon will not be available in sufficient qua ties. Builders' finish hardware in tories, for example, are badly deple The 110 manufacturers producing th items have been heavily engaged in work and a considerable time will required to reconvert and build stocks. The same applies in large meas to manufacturers of plumbing suppl heating equipment, electric supplies

Turning an eye to the end of the war, Great Britain's Ministry of Works has built a number of prefabricated, steel-frame, brick-and-mortar houses, which are expected to serve as models in the postwar reconstruction. Shown below are two of the homes at Northolt, Middlesex. NEA photo

Seen ostwar Era

lighting fixtures, miscellaneous iron and steel items such as sash, medicine cabinets, etc., and domestic appliances. A large percentage of new home buyers are expected to insist on new appliances and many will want the built-in types.

Other delays are expected immediately due to general confusion of readjustment, by a general scarcity of materials, and possibly by hesitation as to price trends.

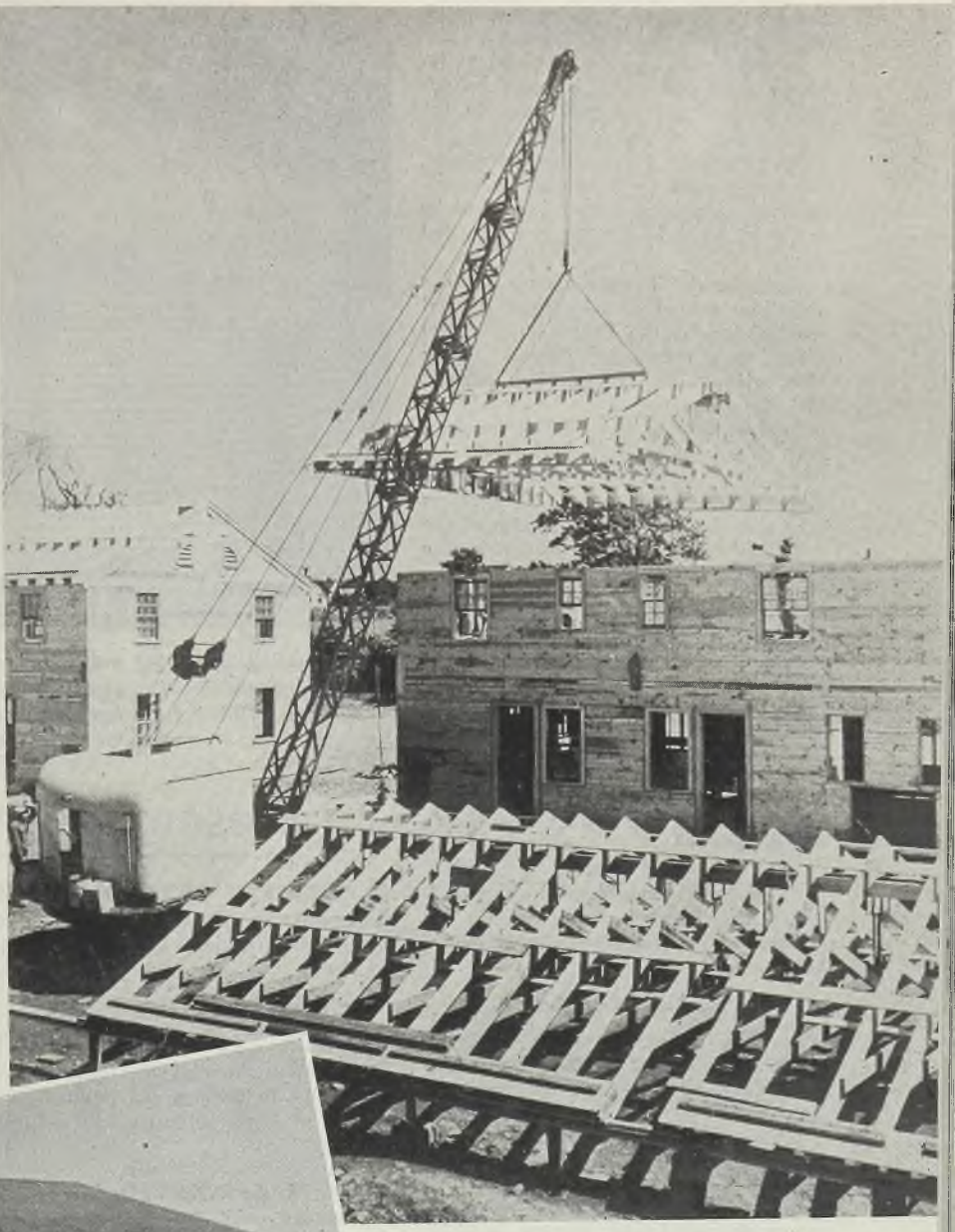
Most of the homes built directly after the war will be owner-occupied. Investor-builders are expected to wait a while to observe price trends and new building methods. The investor builders also will await the lifting of rent ceilings.

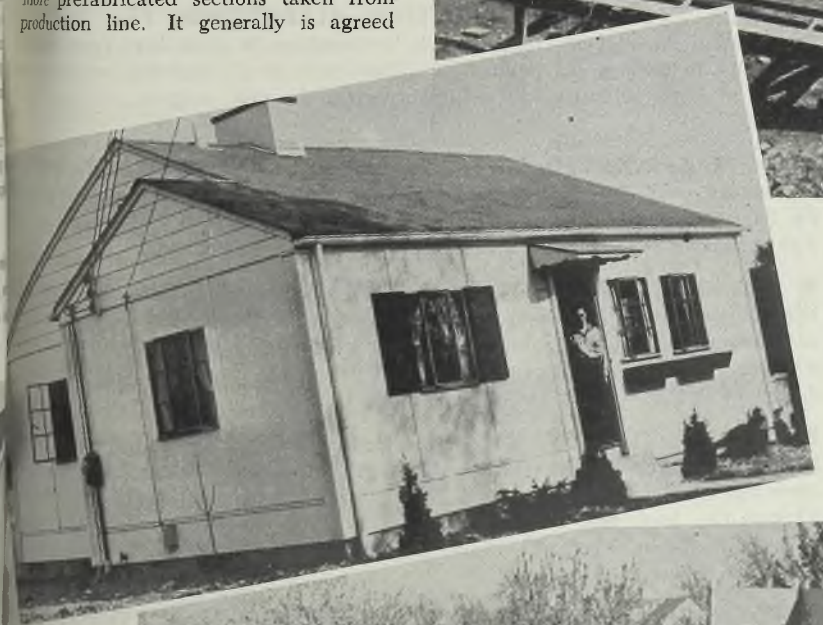
Single Houses, Apartments in Demand

Most of the postwar homes are expected to be one family units or multiple unit apartments. Construction experts note declining trend in demand for two and three-family houses.

Although much has been said and printed about the "dream house of the future," most authorities believe it is only a dream. Practical improvements in design and construction are a matter of evolution rather than revolution and they insist the first postwar houses, like the first postwar automobiles, will be practically 1942 models.

Most new houses will be built by the conventional builder using improved on-site methods. This may mean the use of more prefabricated sections taken from production line. It generally is agreed





More prefabrication is expected in America's postwar homes. Above a roof section is lifted into place.

At left is a four-room house, prefabricated and constructed to be erected in a day. Cost is less than $4000. Below the house at start of erection is shown

the typical house will contain five or six rooms and will cost $6000 or more.

Prefabrication appears destined to increase, although most builders believe the greatest increase will come in the form of prefabricated sections rather than entire houses. Preparations, however, are being made by a number of manufacturers, including some newcomers to the field, to build entirely prefabricated units.

One significant development in this direction was the acquisition several months ago by the United States Steel Corp. of a substantial interest in the Gunnison Housing Corp., New Albany, Ind. Gunnison, one of the better builders of prefabricated houses, has for the most part used wood and plywood almost entirely. When U. S. Steel bought a major share of the company, many observers read into the action the intention of the combined outfit to use more steel in the homes they produce.

This was partially substantiated by a statement by B. F. Fairless, U. S. Steel president, at the time of the purchase:

"One of the best means of meeting the large postwar demand for homes for people of modest means will be through the application of mass production methods in the prefabricated housing field. To this end U. S. Steel believes that steel will make an important contribution wherever it meets the requirements of design, utility and cost."

A possible foreign market of considerable proportions is envisioned for the prefabricated types, especially in devastated areas.

Limited Favor Here

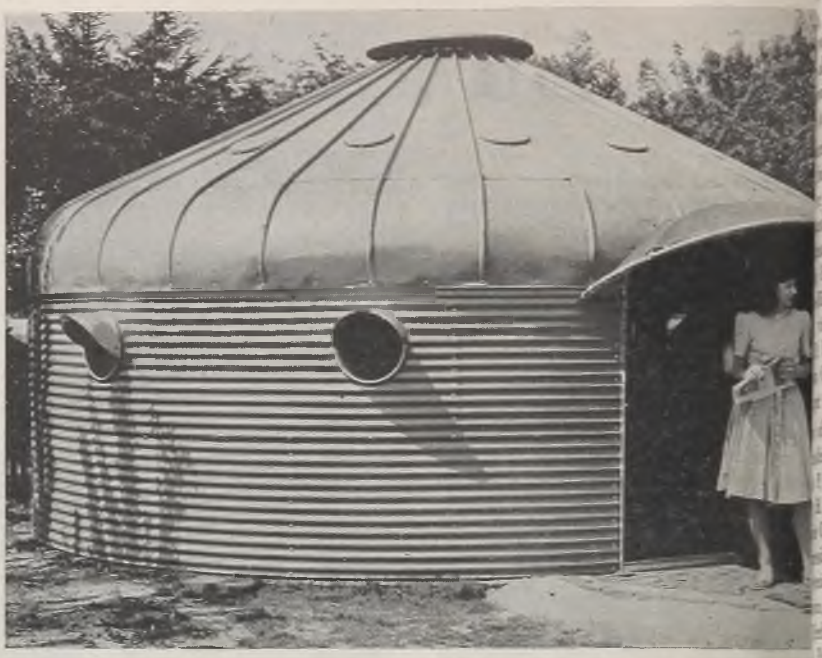
For American consumption, most authorities believe the completely prefabricated house will find limited acceptance. As one authority has said: "It is not a question of how many houses will be prefabricated, but how much prefabrication will go into each house."

Regardless of the extent of prefabrication, the residential housing program of the next ten years will be a more important market for iron, steel, copper and other metals than ever before. A probable shortage of lumber will encourage greater use of steel beams and in many cases entire steel frames than before the war. This should increase the average use of metals per house considerably.

In prewar years, the average five-room house costing about $4000 required about 4 tons of iron and steel, according to the American Iron and Steel Institute. The postwar house will take about one ton more per house.

Thus, 10,000,000 new homes in the postwar decade will require approximately 50,000,000 tons of iron and steel, 5,000,000 tons a year.

It generally is agreed the postwar house will cost more. Building costs since the beginning of hostilities have been riding the escalator and now are some 30 per cent above the 1935-40 level. The minimum advance in costs, builders say, will be 25 per cent.



This radical-appearing prefabricated steel house was designed to house de fense workers. Chief features are the rapidity with which it can be built. Man doubt that this type of low-cost dwelling (about $750) will find wide accep ance in the postwar period. NEA photo

Present, Past and Pending

■ CAPACITY OF SHELL FORGING PLANT IN ALABAMA DOUBL

BIRMINGHAM—Capacity of Tennessee Coal, Iron & Railroad Co.'s 155-mm shell f ing plant at Ensley, Ala., has been doubled by the completion of a second The plant will operate at about 40 per cent of capacity until additional machi is received.

■ MACK TRUCKS RECONVERTING ALLENTOWN, PA., PLANT

ALLENTOWN, PA.—Mack Trucks Inc. is reconverting its plant here from airpl production to civilian bus production. Plans have been completed for the ma facture of city-type buses and requirements for the new program are now be figured.

■ HOYT APPOINTED DIRECTOR OF SALVAGE DIVISION, WPB

WASHINGTON—W. Thomas Hoyt of New York city has been appointed director the Salvage Division, War Production Board, effective Nov. 1. He was forme deputy director of the division and succeeds Herbert M. Faust.

■ DPC PLANTS TO REMAIN IN OPERATION AS LONG AS NEED

WASHINGTON—Jesse H. Jones, secretary of commerce, made it clear recently t announcement that a war plant is to be offered for future lease or sale by the Rec struction Finance Corp., does not mean that production for war is to be stopped that plant or that workers are to be laid off.

■ JOHN T. TIERNEY, CHAIRMAN OF KOPPERS CO., DIES

PITTSBURGH—John Thomas Tierney, 61, president and chairman of the executi committee of the board of trustees, Koppers United Co., and board chairman Koppers Co., here, died Oct. 25 in New York after a brief illness. He also was director of Westinghouse Air Brake Co., Wilmerding, Pa., and Union Switch Signal Co., Swissvale, Pa.

■ CARNEGIE-ILLINOIS BLOWS OUT NO. 2 MINGO BLAST FURNAC

MINGO JUNCTION, O.—Carnegie-Illinois Steel Corp. blew out No. 2 blast furnace its Mingo works here Oct. 21.

■ WPB RELAXES RESTRICTIONS ON ALLOY STEEL SCRAP

WASHINGTON—WPB has revoked direction 4 to order M-21-a (which had restricte use of alloy steel scrap to specified percentages for certain kinds of steel) and orde M-24-c (which had provided for segregation of specified types of alloy scrap), plac ing observance of these procedures on a voluntary basis.

ent in affairs which affect us.
so doing, we will help our own
esses, we will strengthen our indus-
above all we will have the sat-
on of knowing that we have served
untry in a fundamental way."

r speakers who addressed the
tool builders were: John S.
director, Tools Division, War
ion Board; Robert M. Gaylord,
t, National Association of Manu-
; John H. Abbink, vice presi-
cGraw-Hill Publishing Co.; Wil-
. Kirk, vice president, Pratt &
; B. D. Kunkle, vice president,
Motors Corp., and Tell Berna,
manager of the association.

officers of the association, in ad-
to President Joseph L. Trecker,
William P. Kirk, first vice presi-
Herbert H. Pease, president, New
Machine Co., New Britain, Conn.,
vice president; and Crawford N.
ick, president, Landis Machine
aynesboro, Pa., treasurer. New
rs are: Herbert Pease; A. M. John-
president, Barnes Drill Co., Rock-
Ill., and H. W. Brockhoff, presi-
National Automatic Tool Co., Rich-
, Ind.

Hardware Industry Groups Name New Officers

At the eighty-ninth annual meeting of the American Hardware Manufacturers Association held recently in Atlantic City, N. J., John S. Tomajan of the Washburn Co., Worcester, Mass., was elected president, succeeding S. T. Olin, Western Cartridge Co.

Vice presidents named are: H. P. Ladds, National Screw & Mfg. Co., Cleveland; G. H. Halpin, Minnesota Mining & Mfg. Co., St. Paul; and H. P. Seymour, Columbian Vise & Mfg. Co., Cleveland.

Elected to the executive committee for three years were: H. B. Megran, Starling Inc., Harvard, Ill.; B. E. Strader, Remington Arms Co. Inc., Bridgeport, Conn.; and R. L. White, Landers Frary & Clark, New Britain, Conn. F. A. Bond, McKay Co., Pittsburgh, was elected chairman of the executive committee, and Charles F. Rockwell, New York, was again named secretary and treasurer.

Edward F. Pritzlaff, John Pritzlaff Hardware Co., Milwaukee, was named president of the National Wholesale Hardware Association. Other officers are: Henry J. Allison, Allison & Erwin, Charlotte, N. C.; John H. Mize, Blish, Mize & Stillman Hardware Co., Atchison, Kans.; and Bruce Haines, E. E. Souther Iron Co., St. Louis. E. H. McGin, Union Hardware & Metal Co., Los Angeles, has been named to fill a term expiring this year on the executive committee. Named to terms on this committee expiring in 1947 were: Charles L. Hildreth, Emery Waterhouse Co., Portland, Me.; I. H. Stauffer, Stauffer, Eshleman & Co., New Orleans; and E. W. Hardin, Amarillo Hardware Co., Amarillo, Tex.

Radium and X-Ray Society Elects New Officers

Roy W. Emerson, Pittsburgh Pipe & Equipment Co., Pittsburgh, was elected president of the American Industrial Radium and X-Ray Society Inc. at its fourth annual meeting held recently at the Hotel Hollenden, Cleveland, in conjunction with the 1944 National Metal Congress.

Other officers elected were Kent R. Van Horn, Aluminum Co. of America, Cleveland, vice president; and Alvin F. Cota, A. O. Smith Corp., Milwaukee, treasurer. Newly elected directors are Leslie W. Ball, Triplett & Barton Co., Burbank, Calif., and Don M. McCutcheon, Ford Motor Co., Detroit. Phillip D. Johnson, Radium Chemical Co., Chicago, continues as secretary of the group.

POSTWAR PREVIEWS

HOUSING—Large-scale construction boom anticipated in postwar decade. Million new homes annually will be needed. Building activity seen as most important single cushion against depression and aid to full employment. See page 40.

MACHINE TOOLS—Builders' association president says prices must be low enough to assure continued large-scale buying. See page 46.

CONGRESS—Postwar problems will occupy major attention when Congress reconvenes Nov. 14. See page 48.

AUTOMOBILES—Ford Motor Co. to spend $150 million for reconversion and expansion. Pilot models of new cars displayed to regional managers. See page 55.

VETERANS' SENIORITY—United Automobile Workers make bid for support of returning servicemen by proposing seniority clause for incorporation in union contracts. See page 56.

AVIATION—Hundreds of American colleges will offer aviation courses after the war. Educators invited to join with industry in helping to formulate plans for disposing of surplus aircraft materials. See page 62.

DIRIGIBLES—Lighter-than-air ships proposed to supplement airplanes and surface ships in postwar international trade. See page 62.

TECHNIQUES on PARADE—Technical sessions at Metal Congress focus attention on possibilities of many war-stimulated improvements in methods, machines and metals. Stressed are conversion of equipment, simplification of formulas and equations for lay use and utilization of new research tools. See page 72.

ONE-SHOT FORGING—Process for production of 155-millimeter shell creates thin-walled shape with single stroke of press. Solves problems of metal flow, stroke, punches, dies, and lubrication. See page 74.

"TEMPERED" AIR—Use of all heat, lower initial and operating costs recommended early adaptation of direct-fired unit heaters and other types of space heaters to scheme for tempering industrial plant air by burning fuel directly in air stream. See page 102.

MEETINGS . . .

Coal Division, American Institute of Mining and Metallurgical Engineers, Central Appalachian Section, A I.M.E. and West Virginia Section, American Society of Mechanical Engineers: Fuel conference, Hotel Daniel Boone, Charleston, W. Va., Oct. 30-31.

American Institute of Steel Construction: Twenty-second annual meeting, Claridge hotel, Atlantic City, N. J., Oct. 31-Nov. 2.

Packaging Institute: Sixth annual meeting, Hotel New Yorker, New York, Nov. 1-2.

Industrial Management Society: National Time and Motion Study Clinic, Chicago. Nov. 2-3.

American Zinc Institute Inc.: Fifteenth meeting of the Galvanizers Committee, William Penn hotel, Pittsburgh, Nov. 9-10.

Institute of the Aeronautical Sciences Inc.: Fall meeting, Dayton, O., Nov. 9-10.

Society of Automotive Engineers Inc.: National fuels and lubricants meeting, The Mayo, Tulsa, Okla., Nov. 9-10.

International Business Conference, sponsored by American Section, International Chamber of Commerce, Chamber of Commerce of the United States, National Association of Manufacturers, and National Foreign Trade Council Inc.: Westchester Country Club, Rye, N. Y., Nov. 10-18.

American Machine Tool Distributors' Association: Fall meeting, The Homestead, Hot Springs, Va., Nov. 13-14.

National Chemical Exposition, sponsored by Chicago Section, American Chemical Society: Coliseum, Chicago, Nov. 15-19.

National Founders Association: Annual meeting, Stevens hotel, Chicago, Nov. 16-17.

American Society of Mechanical Engineers: Annual meeting, Hotel Pennsylvania, New York, Nov. 27-Dec. 1.

Sixteenth National Exposition of Power & Mechanical Engineering: Madison Square Garden, New York, Nov. 27-Dec. 2.

Congress Faces New Legislative Tasks When It Reconvenes Nov. 14

Several major questions slated for early attention after Nov. 7 elections. Include legislation pertaining to small business, foreign trade, taxation, federal grants, postwar military program, new federal agencies

NO MATTER which party emerges from the November elections with a majority in Congress, certain legislative tasks are slated for early attention by that body after it reconvenes Nov. 14. These tasks fall into a number of classifications, as follows:

SMALL BUSINESS—The Smaller War Plants Corp. will need more money. This organization has been making war loans which generally have been repaid as soon as the contractors and subcontractors involved were paid by the procurement agencies. But after V-E Day, when contracts are terminated in large volume, and new contracts are placed sparingly, borrowers will not be able to pay so promptly and receipts will fall off; at the same time it is expected applications for loans will increase. While the SWPC has $18,000,000 left in its treasury, its officers say this amount will be inadequate to meet needs after V-E Day, particularly because SWPC has no power to issue bonds or borrow money at the banks.

The Senate approved a bill increasing the SWPC's original $150,000,000 to $350,000,000. This bill now is before the House Banking and Currency Committee. Before Congress gets through, it is possible the appropriation may be increased still further; it will be recalled that one of the Senate bills called for $1,000,000,000 for the SWPC.

The Smaller War Plants Corp. is in a splendid position to ask for whatever amount of money it feels it needs. Not only is this corporation, as the guardian of small business, one of the particular pets of Congress, but its duties and responsibilities have been considerably enlarged by provisions of some new laws. The Contract Settlement act, the War Mobilization and Reconversion act, and the Surplus Property act all designate the SWPC as one of the principal instruments to carry out their objectives.

Fears Effect on Postwar Economy

The above should not be taken to imply that there are no mental reservations whatever in Congress about the Smaller War Plants Corp. Fears have been expressed on a number of occasions as to the eventual effect of this agency's activities in siphoning government money into small business; such a policy, followed over an indefinite period, it has been said, might turn out to have the effect of further undermining private business and of increasing the government's control of, and participation in, business. The question also has been raised in Congress whether the SWPC may be serving to weaken the economic structure by keeping alive many companies that ought be liquidated.

To questions of this nature, SWPC rector Maury Maverick has been abl return answers that have proved s factory to Congress. He has demonstr that small business is absolutely dep ent on private initiative, so that the the government can do for small bus is help it lick its financial and other p lems. The SWPC director has sh how the SWPC has converted many v companies into strong, self-sustai ones, converting poor risks into customers for private banks.

In addition, Mr. Maverick has knack of adding new strings to his Of late, the SWPC has finished scree out of the Alien Property Custod file several hundred patents whic considers particularly promising for s business; the SWPC regional offices prepared to explain these patents in tail to small companies interested in t SWPC now is working on a numbe new activities aimed at: 1—Setting permanent peacetime counterpart of wartime Office of Production Rese and Development, for use in invest ing products and processes in the int of small industry; 2—improving participation of small business in ex trade; 3—lowering rates of int charged by the banks on loans to smal dustry; also, a number of others.

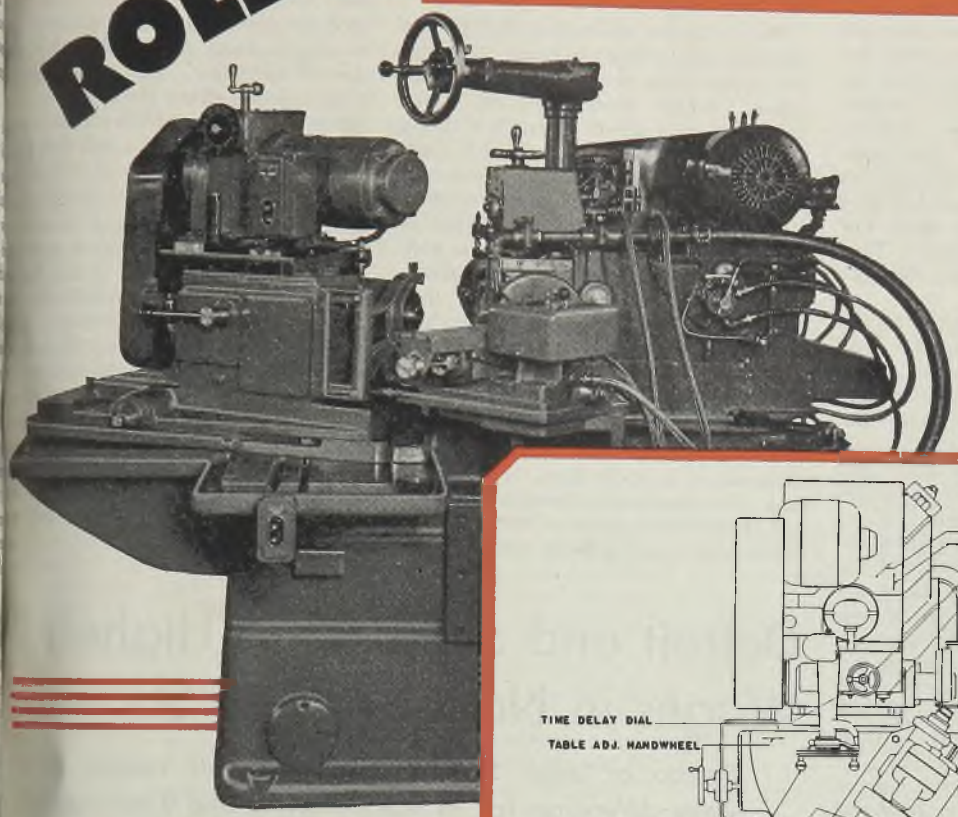
In addition to such action as ma taken to benefit the Smaller War Pl Corp., Congress is expected to de considerable study to the eventual us some large government-owned plant which there now are no buyers in s While it is too early to discuss the gram that will develop, it now is expe the Senate Small Business Comm will conduct an investigation of the s aluminum and machine tool industr with a view to analyzing the possibil for providing employment in plant those industries by subdividing them occupancy by small firms.

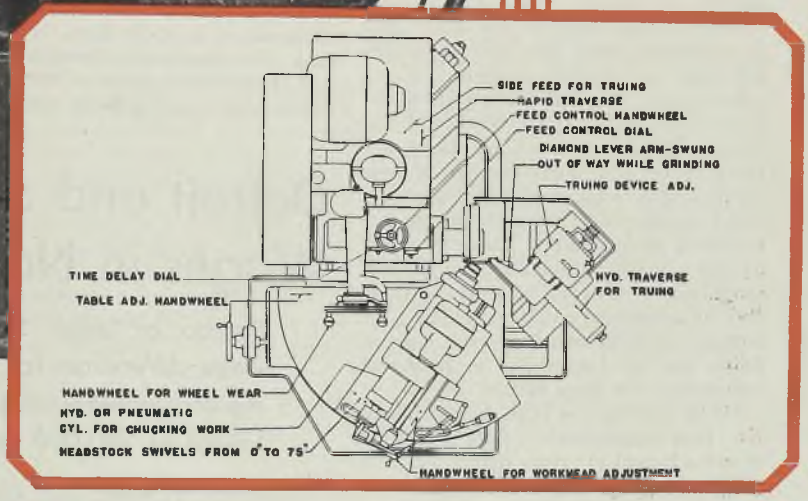
FOREIGN TRADE—Congressiona terest in the formulation of postwar eign trade policies at present is cent in the Subcommittee on Foreign T and Shipping of the House Special C mittee on Postwar Economic Policy Planning. One of the few congressi groups to hold hearings during the p ent recess, this subcommittee has rece suggestions and complaints from pr interests concerned with foreign t and shipping, also from representative a number of interested governm agencies. Now this subcommittee has ceived word from State Department resentatives that they expect to be re about the middle of November to re details of foreign trade agreem reached tentatively during the re Dumbarton Oaks conference. It is pected that the information to be revea at that time will be of great importa

TAXATION—The congressional position, as reflected by statements ing the month prior to the fall adjou ment, appears to favor a fiscal and fi

POSTWAR PLANNERS: Active in formulating regulations for the postwar era are these senators, left to right, front row: Joseph C. O'Mahoney, Wyo.; Alben Barkley, Ky.; Walter F. George, Ga.; Charles L. McNary, Oreg.; Arthur H. Vandenberg, Mich. Standing: Robert A. Taft, O.; Claude Pepper, Fla.; Scott W. Lucas, Ill.; Warren R. Austin, Vt.; and Carl Hayden, Ariz. NEA photo

GRIND ROLLER BEARING RACES ON A FITCHBURG





...and other Chucking Grinding Operations

THE latest Fitchburg Roller Bearing Race Grinder employs a single standard Fitchburg Bowgage Grinding Wheelhead Unit. The workhead is adjustable from 0 degrees to 75 degrees so that the machine can be used for many other straight or taper grinding jobs.

The Fitchburg Roller Bearing Race Grinder is completely automatic. By pressing a single button the wheelhead goes through its standard automatic cycle — rapid traverse to the work, proper grinding feed, spark-out time, and rapid return. Work is held to limits of .0002" in production.

The workhead can be arranged either hydraulically or pneumatically for collet clamping or other chucking devices.

In this taper grinding application, the wheelhead is mounted on a 45° slide for trueing. The trueing device is mounted on the side of the base parallel to the wheelhead, and is hydraulically operated for trueing, with micrometer adjustment for positioning.

For grinding roller bearing races a Fitchburg grinds them faster and more accurately than other methods. A leading American manufacturer reports enthusiastically on the quality and low production cost of this machine. Write us today for complete information.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

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

cial policy that will: 1—Hold down federal expenditures; 2—raise enough money through taxation to service the debt and pay current expenses; 3—reduce taxes on industry and business to encourage business activity and employment.

After months of backing and filling as to the practicability of considering a postwar tax program while the war still was in progress, ranking members of the House Ways and Means Committee and the Senate Finance Committee, both Republicans and Democrats, in June organized themselves into the Congressional Joint Committee on Internal Revenue Taxation. For this joint committee able Colin F. Stam is the director of research. Mr. Stam and his staff since have been working steadily with Roy Blough, director of the Treasury's Division of Tax Research, and Mr. Blough's staff. Among other things, these two groups recently held a series of conferences at which representatives of small business, by invitation, expressed criticisms and suggestions in connection with the federal tax system. Mr. Stam and Mr. Blough are due to report to the joint committee some time in the latter part of November when the joint committee will agree on a further program.

Indications are that the recommendations to be made by Mr. Stam and Mr. Blough will be far-reaching. There appears to be agreement that the excess-profits and the capital-stock and declared-value excess-profits taxes should be repealed in their entirety. Also, the entire income tax system should be drastically simplified to eliminate present confusion and uncertainties, and to reduce the amount of work required, not only in filling out tax forms, but in preparing information for these forms.

While nothing has been decided about the joint committee's future activities, it seems logical to expect that it will hold public hearings at which taxpayers in general can express their grievances and advance their suggestions.

Mr. Blough spoke as follows to the American Institute of Accountants in St. Louis on Oct. 19: "The next few years promise to be an auspicious time to promote simplification in the corporate tax structure. As revenue requirements recede, it will be possible to make some tax reductions. The task of reducing the number of taxes and eliminating provisions which cause major difficulties will be easier after the war when reductions are being made than during the war when revenue requirements are so high."

FEDERAL GRANTS—A pronounced economy wave was reflected in Congress, among both Democrats and Republicans, in the three or four weeks prior to the fall adjournment. There is no reason to believe that this trend will have lost any of its force when Congress reconvenes on Nov. 14. Attempts will be made to broaden the social security system and embark the government in other spending; proponents of such schemes are sure to encounter difficulties.

At the same time, some expenditures must be authorized. For example, title V of the War Mobilization and Reconversion act authorized expenditures for public works projects; an appropriation will have to be voted to make these expenditures possible. Indications are that title V will be broadened to permit federal expenditures to cover planning of public works, and also for housing construction.

There also are indications that further attempts will be made to equate the position of the states in the financing of education, public works, security, etc., through federal grants. There is a strong feeling that if the states are left to shift for themselves the eventual result will be a deepening of depressed conditions in the poorer states. This is a subject of vital interest to many manufacturers with national distribution of their products. Undoubtedly hearings at which they may express their views will materialize.

The House is due to consider a Senate-approved bill which would authorize expenditure of $450,000,000 of federal funds annually for three years for highway construction, with state matching of funds on a 50-50 basis. It will be a case of compromising between this bill and H. R. 4915, approved by the House, which also would provide federal funds for extensive highway construction.

POSTWAR MILITARY PROGRAM—Current indications are that Cong eventually will vote to maintain the c pulsory military training system, and adequate Army and a big Navy in postwar period. The issue, therefore one of much interest to business and dustry, since maintenance of a big A and Navy would call for much la procurement programs by these ser in the postwar period than has normal heretofore. This whole pro is in the hands of the House Special C mittee on Postwar Military Policy w is expected to include a series of p hearings in its activities on this sub

NEW AGENCIES—Congress wil vote considerable attention to scrutin the activities of the agencies creat carry out the provisions of the Su Property act, the War Mobilization Reconversion act, the Contract S ment act, and the Contract Termin act. The various congressional con tees charged with surveillance of the ministration of these laws will hold ings from time to time. Manufact and businessmen thus will have a opportunity to express complaints make suggestions about these laws their administration.

Detroit and Seattle Pay Highest Wages in Nation, Study Shows

Bureau of Labor Statistics' report reveals various inter- wage differences for 26 manufacturing and 9 nonmanufac ing occupational classifications in 31 American cities with po lations of 250,000 or more

MANUFACTURERS interested in relocating their plants, or in establishing branch plants, during the reconversion or postwar periods, can get some helpful information from a study of inter-city wage differences recently completed by the Bureau of Labor Statistics, Washington.

In this study, wages for 26 manufacturing and 9 nonmanufacturing occupational classifications were examined in 31 American cities of 250,000 population or more. In order to discount the influence of varying industrial composition among these areas, identical occupations with uniform weights were studied in all areas. The manufacturing occupations were selected mainly in the metalworking industries, while financial institutions and power laundries accounted for 5 of the 9 nonmanufacturing jobs. Since these industries are not equally representative of all areas, says the report, the wage levels indicated should be recognized as rough approximations.

Detroit and Seattle were found to have the highest wages among the areas studied, Detroit ranking first in manufacturing occupations and Seattle first in non-manufacturing. Other areas in w wage rates are 10 per cent or more a the general average for both group occupations are San Francisco, Port Oreg., and Cleveland.

Atlanta, Ga., Dallas, Tex., Birm ham, Ala., San Antonio, Tex., Mem Tenn., and New Orleans, were foun be the lowest-wage urban areas. H ton, Tex., and St. Louis are at leas per cent below the average for groups.

Most of the urban areas not menti above pay wages somewhere near average, either in manufacturing or manufacturing, or in both. The v levels of some of these areas, in fact, clustered within a very narrow range

Areas in which the pay is higher average but less than 110 per cent of average for one or both groups Toledo, O., Pittsburgh, Philadelphia, Angeles and Milwaukee.

"It is probable," says the report, New York city would fall in this clas sufficient data were available to pe classification."

Wage rates in Indianapolis, Min apolis-St. Paul, Cincinnati and Washi

ton (rated only in private nonmanufacturing) appear to be about average. Columbus, O., Baltimore, Louisville, Ky., and Boston are relatively low-wage areas, but surpass 90 per cent of the average for one or both occupational groups. Denver, Colo., for which nonmanufacturing wage data alone are available, pays wages about 10 per cent below the average and "should probably be added to this group of cities." Buffalo and Chicago, which pay about average wages in manufacturing, pay relatively high wages in nonmanufacturing jobs. Kansas City, Mo., pays average wages in manufacturing but somewhat lower wages in nonmanufacturing, while Providence, R. I., wage levels are below the average for the first group and slightly above for the second.

In general, the level of wages in the highest wage areas is almost twice as much as in the lowest wage areas, both in manufacturing and nonmanufacturing. But the report makes no allowance for labor productivity; the wages found to prevail in the 31 cities are reported merely as wages, and the report contains nothing to indicate total labor costs on the basis of productivity in these cities. While manufacturing wages average nearly twice as high in Detroit as in Atlanta, for example, the report makes no allowance for any difference in labor efficiency that might characterize the two cities.

Productivity of Labor Varies

"The labor available in some communities is more efficient than that in others," says the report. "Changes in the localization of industry, such as those associated with the war production program, create labor shortages in some communities and leave surpluses in others. The level of wage rates is also influenced by local differences in the extent of unionism, the regularity and security of employment, alternative opportunities for earning a living, the cost of consumer goods, the availability of capital equipment, the efficiency of management, and other factors. To some extent, therefore, geographic differences in wage rates may serve merely to offset differences in the productivity of labor or the attractiveness of employment. Wage differences also help to induce workers to move from the trades and localities in which surpluses exist to those in which labor is scarce. Other differences reflect the influence of monopolistic forces, while still others are largely fortuitous."

The ranking of the different areas is based upon comparisons of average hourly rates, or straight-time hourly earnings; they do not measure differences in weekly or annual incomes, since they take no account of hours worked or of supplementary income.

Weighting was done as follows: After determining the average wage rate for each occupation in each area, these averages were combined into a composite occupational average for all areas, using as weights the estimated number of employes in that occupation in each area. Next, the average rate for each occupation in each area was expressed as a percentage of the composite occupational average. The resulting series of relatives for each area were then combined into general index numbers for manufacturing and nonmanufacturing separately, the relative for each occupation being weighted in proportion to the estimated number of workers in that occupation in all areas combined.

For convenience in interpretation, these index numbers were then adjusted so that the simple average for all areas would equal 100. As an additional step each area was ranked according to its wage rate for each separate occupation, and average ranks (unweighted) were then determined for each city for comparison with the index numbers described above.

Table I, herewith, lists the 31 cities and shows their index figures and rank by level of wage rates in selected occupations. Table II lists the occupational groups, weights, and average hourly wage rates used in arranging Table I.

The report was prepared by Louis M. Solomon of the Bureau's Division of Wage Analysis, with statistics prepared under the direction of Joseph H. Mayer.

Table I—Indexes and Rank of 31 Urban Areas, by Level of Wage Rates in Selected Occupations, Spring-Summer of 1943

Area	Indexes (average, all areas =100) Manufacturing	Indexes (average, all areas =100) Nonmanufacturing	Rank of area, based on index† Manufacturing	Rank of area, based on index† Nonmanufacturing
Detroit, Mich.	131	116	1	4
Toledo, Ohio	127	104	2	11
Portland, Oreg.	117	121	3	3
Seattle, Wash.	116	136	4	1
San Francisco, Calif.	114	135	5	2
Pittsburgh, Pa.	113	105	6	10
Cleveland, Ohio	111	110	7	8
Philadelphia, Pa.	107	103	8	12
Los Angeles, Calif.	103	114	9	6
Milwaukee, Wis.	102	106	10	9
Indianapolis, Ind.	101	100	11	17
Kansas City, Mo.	100	88	12	22.5
Buffalo, N. Y.	99	115	13.5	5
Chicago, Ill.	99	112	13.5	7
Washington, D. C.	*	102	*	13.5
Cincinnati, Ohio	98	101	16	15
Columbus, Ohio	98	95	16	19
Minneapolis-St. Paul, Minn	98	100	16	17
Baltimore, Md.	94	93	18	20
Denver, Colo.	*	90	*	21
Louisville, Ky.	92	86	19.5	24
Providence, R. I.	92	102	19.5	13.5
Houston, Tex.	90	83	21	25
St. Louis, Mo.	87	88	22	22.5
Boston, Mass.	86	100	23	17
Birmingham, Ala.	78	*	24	*
Dallas, Tex.	76	80	25	26
New Orleans, La.	*	78	*	27
Memphis, Tenn.	*	72	*	28
Atlanta, Ga.	70	*	26	*
San Antonio, Tex.	*	70	*	29

† In cases where 2 or more cities have the same index, the rank given represents the average of the ranks in which they would fall; i.e., 13.5 is the average of ranks 13 and 14, 16 is the average of ranks 15, 16, and 17, etc.

* Data not available.

Table II—Occupational Groups, Weights, and Average Hourly Wage Rates Used in Constructing Composite Index Numbers of Wage Rates

Occupation, class, and sex	Weight	Average hourly wage rates*
Manufacturing		
Manufacturing, total	100.0	....
Metalworking:		
Assemblers, bench:		
Class A, male	3.8	$1.13
Class B, male	7.2	1.00
Class C, male	6.1	.85
Class B, female	3.8	.87
Class C, female	17.5	.68
Coremakers, hand, bench:		
Class A, male	1.8	1.22
Class B, male	1.1	1.10
Drill-press operators, single spindle:		
Class A, male	1.0	1.09
Class B, male	2.3	.95
Class C, male	2.6	.84
Class C, female	2.5	.72
Electricians, maintenance:		
Class A, male	2.2	1.25
Class B, male	1.2	1.03
Engine-lathe operators:		
Class A, male	4.0	1.22
Class B, male	4.7	1.06
Class C, male	2.7	.95
Class C, female	.9	.85
Shake-out men (foundry), male	2.6	.87
Tool and die makers:		
Class A, male	6.7	1.48
Class B, male	2.9	1.23
Food products:		
Bakers, all-round (bench hands), male	1.4	$0.98
Bread wrappers:		
Male	.4	.79
Female	.2	.61
Miscellaneous industries:		
Janitors:		
Male	10.8	.75
Female	1.1	.71
Truckers, hand, male	8.5	.75
Nonmanufacturing		
Nonmanufacturing, total	100.0	....
Financial institutions:		
Paying and receiving tellers:		
Male	8.8	1.06
Female	4.5	.78
Power laundries:		
Feeders, catchers, and shakers (flatwork), female	32.2	.39
Markers, female	10.5	.45
Washers, male	4.0	.72
Miscellaneous industries:		
Elevator operators, passenger:		
Male	10.2	.65
Female	6.0	.48
File clerks, class B, female	11.0	.51
Switchboard operators, female	12.8	.56

* Weighted average representing areas covered by study; wage rates as of spring and summer of 1943.

WPB Issues Rules on Warehouse Purchases of Excess Materials

Direction 5 to CMP regulation No. 4 establishes special treatment for purchases: For resale from distributor's commercial stock; for sale by him as agent for Metals Reserve Co.; for resale from earmarked stock established for him by WPB

PROCEDURE which must be followed in the procurement, delivery and reporting by warehouses and distributors of idle or execess controlled materials which they get from sources other than controlled material producers, warehouses and distributors, was established recently by the War Production Board.

The new rules, containeed in direction No. 5 to CMP regulation No. 4, provide that separate treatment must be accorded by a warehouse or distributor to idle or excess controlled materials:

(1) Purchased from a holder for resale from his own commercial warehouse stock; (2) which are government-owned and received into his stock for sale by him as an agent for the Metals Reserve Co.; and (3) purchased from a holder for resale from an earmarked warehouse stock established with him by WPB.

Commercial Stocks Replenished

Controlled materials may be purchased by a warehouse or distributor from a holder of idle or excess inventories, including the Metals Reserve Co., for resale from his own commercial warehouse stock. All deliveries to consumers of such materials must be made in accordance with CMP regulation No. 4. In addition, a distributor may deliver steel to other distributors as provided in orders M-21-b-1 and M-21-b-2, and may apply to the WPB for permission to deliver steel to a customer ex-allotment under the provisions of direction 44 to CMP regulation No. 1.

Steel purchased by a distributor for his commercial warehouse steel from a holder of idle or excess inventory, when sold, may be replaced by ordering from a producer or another distributor in accordance with provisions of orders M-21-b-1 and M-21-b-2.

Copper wire mill products purchased by a warehouse for his commercial stock from a holder of idle or excess inventory, when sold, may be replaced in accordance with direction 4 to CMP regulation No. 4 while other controlled materials may be replaced in accordance with the specific directions received by the warehouse or distributor from WPB.

In filing required reports, any controlled materials purchased from holders of idle or excess inventories for commercial warehouse stock should be included as receipts of "idle or excess materials" and, when sold, should be included along with deliveries of materials purchased from producers, warehouses, or distributors. However, aluminum distributors need not report such sales, and receipts of aluminum separately but may report them in the same way they report other sales and receipts of aluminum.

To assist with the disposal of government-owned stocks of controlled materials resulting from design changes, cutbacks, and cancellations of war contracts, the Metals Reserve Co. may contract with various warehouses and distributors to receive such materials into their stocks and to act as agents for the Metals Reserve Co. in the sale of material to qualified purchasers.

All controlled materials received by a warehouse or distributor into his stock which remain the property of the MRC may be sold subject to provisions of priorities regulation No. 13. In addition, such materials may be delivered on orders bearing the allotment symbol Z-1-E, but the other provisions of CMP regulation No. 4 do not apply to the sale of controlled materials owned by the MRC.

If special permission of a regional office of the WPB is required to make a particular delivery, the warehouse or distributor, acting as agent for the MRC, may apply in the name of the MRC to the nearest regional office of WPB for permission to make delivery.

No deliveries of steel made by a distributor from a stock owned by the MRC but held in his warehouse for sale by him as agent for that company may be used to support purchase orders for the replacement of his commercial or earmarked warehouse stocks.

A warehouse or distributor accepting a stock of controlled materials from the MRC need file no report with the WPB covering the activity of such stock, and he must not include any data on receipts into, deliveries from, or inventory on hand in such stock in any report which he is required to file regularly with the WPB regarding the activity of his commercial or earmarked warehouse stocks.

If a warehouse or distributor wishes to purchase controlled materials from a holder of idle or excess inventory, or from materials held by him for sale as agent of the MRC for an earmarked warehouse stock established with him by the WPB, he may do so, but all such purchases, and all subsequent deliveries of such material from the earmarked stock, must be made in accordance with the terms of the earmarked warehouse stock directives issued to him.

Deliveries of controlled materials b warehouse or distributor from a W earmarked warehouse stock may be placed only in accordance with the te of the earmarked warehouse stock di tive issued to him.

Any controlled materials purchase a warehouse or distributor from a ho of idle or excess inventory for an marked warehouse stock must be ported as a receipt and, when sold a delivery from stock on any re which the warehouse or distribute required to file with WPB covering a ity of his earmarked warehouse st

Single Standard for Scre Threads Sought by Missi

Combined Production and Reso Board, the Anglo-American Cana economic high command, has repo that a joint mission in London is ma progress in trying to find a common st ard for screw threads. Existence of separate systems which are not at pre interchangeable has caused consider difficulties in the production of iten equipment for common use in the p cution of the war.

FEA Lists Metals That Mc Be Exported to Middle E

Commodities, including metals, may be exported to the countries of Middle East from the United S have been listed in a bulletin by Foreign Economic Administration. information has not heretofore made public.

Standards Established for Describing Surplus Prope

Surplus War Property Administra has issued the first installment o *Handbook of Standards for Descri Surplus Property*. Purpose of the ha book is to establish the minimum information that should be supplie listing surplus property while at the s time furnishing enough description commercial terms to form an adeq basis for resale.

When the handbook has been c pleted, it will consist of 22 sections c ering all major groups of commodit Sections I and II, just issued as installment, cover metals and metal b products, and wood and finished pr ucts. Copies are available at the off of the superintendent of documents Washington.

Appointments-Resignations

Jerome M. Ney has been appoint director of the Consumer Goods Divisi Office of Price Administration, succeedi Byres H. Gitchell, resigned.

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

POSTWAR PURCHASES: A purchaser may ... or a manufacturer may accept now a ...twar purchase order which is not to be filled ...til after the removal of applicable WPB re...ctions, provided the manufacturer does not ...edule such an order for production, order ...terial or place material in production to fill ...ch orders until after the applicable WPB ...triction is removed.

E ORDERS

MACHINE TOOLS: Ratings for machine ...ls costing more than $500 will be assigned ...e only if the tools are required for military ...poses, or are needed urgently for purposes ...ntial to the war effort. Nonmilitary pur...sers now will be required to place unrated ...ority orders. They must furnish proof that ...equate delivery dates cannot be obtained ...on that basis before any WPB consideration ...ll be given to the assignment of a rating ...or the tools desired. Full justification must ...e given for delivery dates requested by con...mers in advance of dates that can be prom...ed by producers on unrated orders. No change ...e rating policy has been made affecting ma...chine tools costing less that $500. (E-1-b)

L ORDERS

USED AMUSEMENT MACHINES: Produc...on of parts for the repair or renovation of ...sed automatic phonographs and used amuse...ment or gaming machines is again permitted, ...but only to the extent that the use of materials ...for the purpose is permitted by valid conserva...tion orders. Manufacture or assembly of these ...types of machines from either new or old parts ...is still prohibited by the order. However, per...sons who wish to make or assemble these prod...ucts or to make or transfer parts for other than ...epair or renovation purposes may apply for ...permission under terms of priorities regulation ...No. 25.

...Order L-21-a has been revoked since its ...terms have been incorporated into L-21. Pro...duction and delivery of weighing machines, ...previously controlled by L-21 and L-21-a as ...well as by L-190, are now controlled by L-190 ...only. Production and delivery of merchandise ...vending machines continue to be controlled ...under L-27. (L-21, 21-a)

FURNACES: Provision that required each ...manufacturer to produce furnaces only in fuel ...ypes he made in the three-year period ended ...April 11, 1942, has been removed. Restriction ...heating casings for furnaces of less than ...150,000 B.t.u to 26 gage and lighter steel has ...been eliminated. (L-22)

PLUMBING FIXTURES: Restrictions on the ...se of metal in production of shower stalls and ...shower receptors have been removed. Produc...tion is permitted of the following previously ...prohibited plumbing fixtures: Cast iron frost-...ed of water closet bowls and cast iron high ...tanks for hopper combinations. Limitations have ...been removed on the weight of metal rein...forcements that could be used in various sizes ...of concrete laundry trays. Amount of copper or ...copper-base alloy that may be used in producing ...a nonmetallic wash fountain has been increased ...from one pound to five pounds. Legs or stands ...for laundry trays and scullery sinks and drain ...boards for scullery sinks are permitted to be ...made from ferrous metal. Schedule XII has ...been changed to make it conform with the zinc ...order which now permits use of zinc for plumb...ing fixtures, fittings and trim. Plumbing fixtures ...made for use by the Veterans Administration ...and for hospitals and all buildings in a hospital ...group, for food packing and processing plants ...and for railroad cars and prisons and correc...tional institutions, are no longer subject to the restrictions of schedule XII. (L-42)

TRACTORS: Control over the sale of non-critical repair parts for track-laying tractors has been relaxed. Manufacturers of these tractors who also manufacture repair parts are no longer required to reserve 65 per cent of all repair parts production for the military. All manufacturers of parts are still required to ship up to 65 per cent of production to the armed services if necessary to fill orders. A repair part is considered critical when a producer has unfilled purchase orders calling for immediate delivery exceeding his inventory of that part.

Quota restrictions have been removed on sales by producers to export dealers and to dealers and distributors in the United States and Canada. (L-53-b)

INDEX OF ORDER REVISIONS

Subject	Designations
Amusement Machines, Used	L-21, 21-a
Copper	M-9-c
Crucibles, Graphite	M-61-a
Furnaces	L-22
Hardware	L-236
Housing	P-55-c
Laboratory Equipment	L-144
Lighting Fixtures	L-212
Lubrication Equipment	L-314
Meters	L-151
Plumbing Fixtures	L-42
Tools, Hand	L-157
Tools, Machine	E-1-b
Tractors	L-53-b

LABORATORY EQUIPMENT: The number of types of laboratory equipment that may be sold or delivered only upon authorization of WPB has been reduced. Only the preference ratings assigned on the approved applications (form WPB-1819) may be used in purchasing these types of equipment, enumerated in list A of order L-144. Substitution of a different model than the one authorized, whether made by the manufacturer or a different one, is prohibited. Types of equipment subject to these controls are: Analytical balances; centrifuges, having a value of more than $80 each; hydrogen ion meters (electrometric type); metalloscopes and metallographs; microscopes, stereoscopic wide field; Abbe refractometers; spectrographs (quartz), spectrophotometers (quartz) and spectro meters (infra red); and vacuum pumps (one micron or higher vacuum). No WPB authorization is required for purchasing items of laboratory equipment not in list A. (L-144)

METERS: Veterans Administration has been added to the list of agencies that may accept deliveries of new domestic watt-hour meters without being subject to the restrictions of order L-151. Standards for approval of applications for the purchase of new watt-hour meters have been removed. New standards will be communicated to its regional WPB offices by WPB. All applications to purchase these meters must be addressed to WPB regional offices, instead of to the regional utility inventory control offices, which have been abolished. (L-151)

HAND TOOLS: Manufacture of four types of mine blasting tools (copper needles, copper-headed tamp drills, copper-headed tampers, and copper-headed scrapers) is now permitted by an amendment to schedule IV of order L-157. The amended schedule also clarifies permitted uses of both carbon steel and NE alloy steels for hot and cold chisels, railway track chisels, and certain types of mauls and blacksmiths' double-faced sledges. All other items covered by the schedule may be made of only one kind of steel.

WPB Restrictions limiting the volume of production of special purpose saws, such as mitre box saws, cabinet and back saws, compass and keyhole saws, and pruning saws, have been removed in an amendment to schedule 111 of order L-157. Manufacture of grade C handsaws and the use of any kind of screws in attaching the blades of handsaws to the handles are now permitted. (L-157)

LIGHTING FIXTURES: Order L-212, which controlled the manufacture and distribution of incandescent lighting fixtures, has been revoked. Production of these lighting fixtures still will be limited by allotments of controlled materials, and by availability of labor, shipping cartons, and components, such as sockets, copper wire, and glass. (L-212)

HARDWARE: Certain types of brass plating now may be used on cabinet locks, padlocks and builders' finishing hardware with the exception of door hangers, tracks and related items. Nickel, chrome and cadmium plating are still prohibited. (L-236)

LUBRICATION EQUIPMENT: Distributors and jobbers no longer need a preference rating to obtain lubrication equipment. Use of form WPB-547, distributors' application for preference rating, has been discontinued for lubricating equipment. (L-314)

M ORDERS

COPPER: Restrictions have been removed on the use of copper and copper-base alloy in the manufacture of the following 17 civilian and commercial items:

(1) Supply and return water lines for radiators for passenger carriers having a seating capacity of not less than 11 persons; (2) brazing rod for motorcycles and motor-driven power cycles; (3) plating of light fixtures; (4) solder bushings for plumbing installations; (5) door knockers; (6) checks, (7) pulls and (8) stops for passenger transportation equipment, for repair and replacement purposes; (9) carburetors for beverage dispensing units and soda fountain equipment; (10) engraved burning branding dies; (11) watch cases; (12) metal sponges for use in dairy product processing plants and by the canning industry; (13) gears for can openers; (14) gears and bushings for egg beaters; (15) adjustable stencils; (16) M-4 jackets for the Navy; (17) snap fasteners for nurses uniforms.

Permission to manufacture copper and copper-base alloy sheet, roll, strip and rod for building construction, for repair and replacement purposes, and to fill United States military contracts now will be granted. Buttons and insignia for military uniforms also are permitted to be manufactured from idle and excess inventory without WPB authorization. Manufacturers of products still on the prohibited list may use inventory which was on hand on or before June 30, 1942. (M-9-c)

GRAPHITE CRUCIBLES: All restrictions on the manufacture of graphite crucibles have been removed by the revocation of order M-61-a. The order had prohibited the manufacture of certain listed sizes of standard crucibles and the manufacture of any type not being made at the time of issuance. (M-61-a)

P ORDERS

HOUSING: Restrictions have been relaxed on the use of materials that will permit construction of houses approximating prewar standards. Any materials that can be obtained without a rating now may be incorporated in the construction, unless specifically prohibited in the War Housing Critical List, as amended. The plumbing items have been condensed and simplified and the heating section has been completely revised. (P-55-c)

A NEW AVIATION CATALOG!

Weatherhead "A-N" Fittings—Now and Postwar

The Weatherhead Company were pioneers in the manufacture of aircraft fittings. Many of the most important design changes on aircraft fittings were originated by Weatherhead. Our facilities, now and *in the future,* will be directed to the volume production of high-quality fittings, hose assemblies, valves, and actuating cylinders. All of the necessary designs, specifications, and photographs on these products are contained in our new Aviation Catalog.

SAVE TIME SAVE MONEY SAVE EFFORT

Write for this handy source book today.

SIX SECTIONS
for quick reference

- **AN Fittings**
- **AC 811 Fittings**
- **Flexible Hose**
- **Hose Assemblies**
- **Valves and Cylinders**
- **Complete Engineering Data**

Weatherhead Engineers will be glad to work with you to solve your fittings and hose assemblies problems. Our new Development Laboratory is at your disposal for the creation of new fittings and other products to meet your special requirements.

Look Ahead With

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

One of the Oldest and Largest Manufacturers of Vital Parts for the Aviation Industry

MIRRORS of MOTORDOM

By A. H. ALLEN Detroit Editor, STEEL

Ford Motor Co. to spend $150 million for reconversion and plant expansion, bulk going for machine tools and equipment. Two new plants, one for manufacturing and one for assembly, to be built. One will be located in St. Louis

FIRST concrete details of postwar plans of Ford Motor Co. were released a week or so ago in connection with a meeting of company officials and regional sales personnel. While sketchy in some respects, projected activity involves expenditure of $150 million for reconversion and plant expansion, the bulk going for machine tools and other plant equipment. Two new plants, one for manufacturing and one for assembly, will be built. A start has been made on one of them by acquiring property in St. Louis, details of the second were not disclosed, although it may be at Memphis, Tenn., where a $500,000 postwar addition has been announced to provide 74,000 square feet of additional manufacturing space, permitting a 30 per cent increase in production and a 20 per cent boost in employment. The plant now is engaged in machining some 35 parts for Pratt & Whitney aircraft engines built at the Rouge plant here.

It was announced that pilot models of the first postwar Ford cars have been assembled and previewed by regional managers, and they include a so-called "second line" of postwar models and the new low-price series about which some talk has been heard. The latter will be introduced some time in the interval between when the first postwar car is in production and the final or ultimate postwar model is evolved. No actual price has been set on the economy series, but it is expected to be 20-25 per cent below that of the regular Ford model. If $900 is taken as the base price of the regular 1942 Ford, and a 15 per cent increase allowed to meet higher postwar costs, then the indicated price of the "economy" model would be around $800, or some distance from the $500 figure which has been bandied about loosely as reflecting Ford thinking.

Ford officials appear quite confident as to the extent of the oncoming automotive market. They incline to the belief other producers may be too pessimistic in their forecasting, and predict production of 7 million cars annually by the industry within a few years after the close of the war. They anticipate car registrations will climb to around 40 million or nearly 8 million beyond the highest figure in the past and comparing with about 25 million currently.

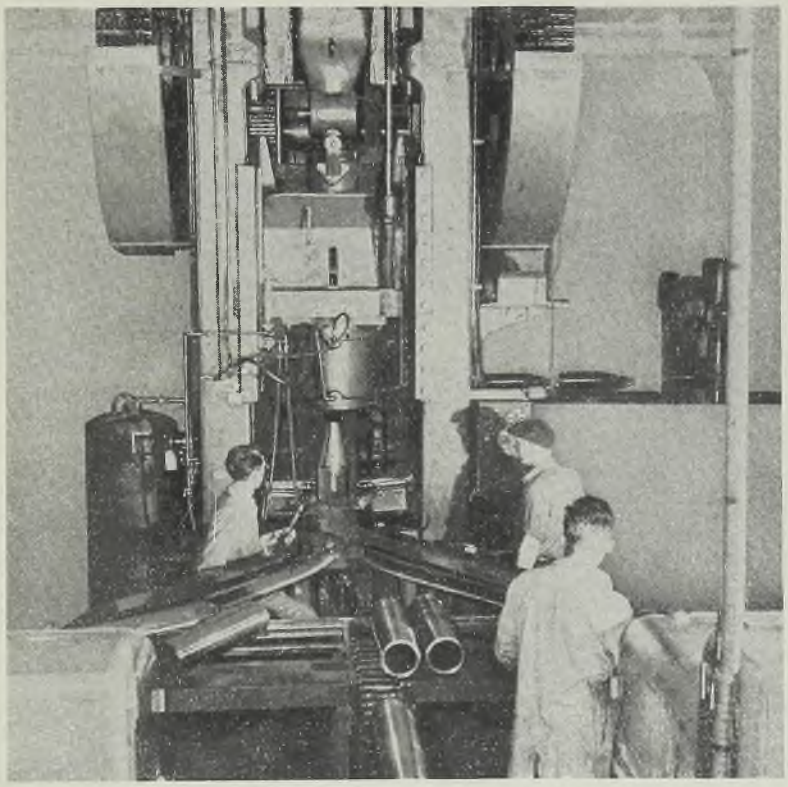
These rosy figures are far ahead of a statistical analysis made by Nash Kelvinator Corp. which indicates that by 1950 there will be 34 million passenger cars in use, comparing with 27.6 million before the war. Nash mathematicians calculate that by the end of this year, the nation's reservoir of passenger cars will stand at 24.9 million, including 1.7 million in storage, which means a net gain of 9.1 million over and above these cars scrapped between now and 1950. A figure of 3.5 million cars scrapped annually is used, against annual production of 6 million for the first two years after the war, dropping to 5 million in the third year and 4 million in the fourth year.

Reshuffling Engineering Personnel

Under direction of R. H. McCarroll, Ford has been engaged in a reshuffling and expansion of its engineering personnel and activity, centering the refurbished department in what has been called the airplane building at the Ford airport. Reason for the move is the effort to effect a closer tie-in between engineering research activity carried on at the Dearborn laboratory and the production engineering department formerly located at Gate 4 of the Rouge plant. Although his part in the reorganization would appear to make him chief engineer, it is understood Mr. McCarroll does not hold this title "officially." His two principal assistants are Dale Roeder and Jack Wharam.

Another new development, at least as far as Ford is concerned, is the organization of a dealer advisory council, comprising three men from each of the six sales regions, which will meet with factory representatives each year at the time when new model planning is undertaken. This council will bring in reports from the field, covering such things as public preference for various styles of cars and types of accessories, service troubles, faulty designs, etc., thereby furnishing valuable data for planning the succeeding model.

As to the first postwar Ford models to make their appearance, Henry Ford II told his regional managers they need have no fear the cars would be only face lifted versions of the 1942 vintage but rather would carry more improvements than ever were incorporated in a normal year-to-year model change. This is comforting information to take back to



PRESS "NOSES" SHELL: Shown above is a 350-ton press used at Fisher Body's Grand Rapids stamping division to shape the nose on a 155-millimeter shell. Production of artillery shells started in this plant within four months after the plant received an initial letter of intent. In the foreground are shown two induction heating units where the open ends of the shells are heated to 1600 degrees Fahrenheit for the press operation

anxious buyers, but the plain facts must be that basically the cars will have to remain identical with 1942 models if for no other reason than competitive ones. Broad opportunity exists, however, for many changes in such things as grilles, hardware, interior appointments and gadgetry.

It is a comforting sign that a return of the old competitive spirit among automobile builders is beginning to show up here and there. Co-operation has been the keynote of war production and through it miracles have been achieved, but the basis of sound progress in peacetime has been competition and it must continue so in the future. Hence many of the statements, opinions and pronouncements currently being uttered by the automotive hierarchy need to be weighed in the light of the competitive position of the spokesmen.

What looks to be a strong bid by the UAW-CIO for the support of returning veterans is a plan the union has drawn up in the form of a model contract clause which is being forwarded to all local unions with instructions that they undertake negotiations with managements for incorporation of the clause into existing contracts. Essentially, the clause would extend seniority benefits and rights to service men who were not employed at the time they entered the armed forces and to those who were employed in temporary positions. Reemployment provisions of the Selective Service act seemingly do not cover such men and it has been estimated that 80 per cent of the men now in service either did not hold jobs or were in temporary classifications and thus would not be entitled to seniority "protection."

TANK ASSEMBLY LINES: Production of the new M-18 tank destroyer has reached volume production in Buick's former new car assembly plant. Moving conveyors lug the 19-ton monsters down the production line as assembly progresses, with finished combat vehicles rolling off the end of the line under their own power

With respect to veterans not previously employed receiving seniority credit for service subsequent to May 1, 1940, the UAW proposal attaches several provisos:

1. Such veteran shall apply for and obtain such employment within 12 months from the time he is relieved from training or service, and if disability prevents this, his application may be made within 90 days from the time his disability has ended.

2. Such veteran shall not have previously exercised this right in any other plant.

3. Such veteran shall not be employed for the purpose of bringing about the displacement of another worker. (Try to figure that one out.)

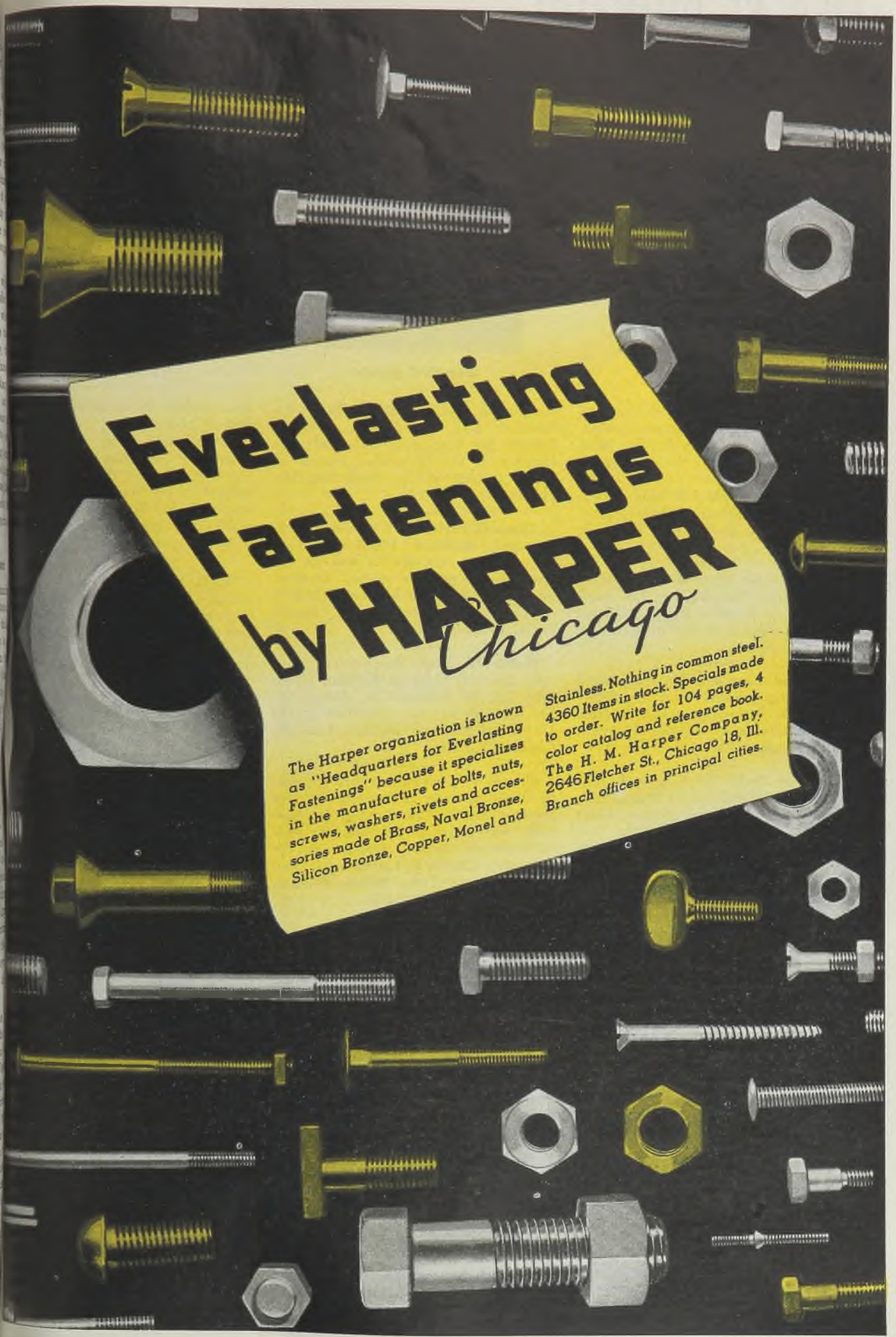
There has been considerable hue and cry over returning veterans displa war workers, and the union is place the confounding position of trying t a job for both veteran and worker w is no simple trick. Furthermore t has been considerable bitterness a veterans over war plant strikes (wit the breaking up of picket lines at Kansas City plant of North Ame Aviation by veterans a couple of w ago.) The UAW-CIO is keenly a of this bitterness and the above con clause doubtless is part of a progra counteract the ill-feeling.

Seniority credit for veterans will b little avail if the supply of jobs is sufficient to take care of all who to work, which is likely to be the To attack the problem directly, it w appear the first step is to acknowl that many thousands now working w not normally be employed, and to consider them in the postwar p as unemployed and entitled to job an equal basis with returning vet will never work, seniority or no. An confusing problem is that among t veterans who did have jobs before entered the service, a large proportio not want their old jobs back.

Workers Defying Management

While the veteran proposal emana from UAW-CIO headquarters basi may have some merit, when it is sta up against such sordid incidents as curred last week at the Graham p here, it becomes lusterless. In defi of a no-gambling rule, ten employes gan matching pennies, in effect da supervision to discipline them. T were laid off for two days as a re but the next day an entire polish department and subsequently a mac ing department began matching p nies, playing cards and rolling dice, p lyzing operations and forcing the c pany to send 600 home. On the r shift the horseplay resumed, but missal of 16 men stopped the trou Now this is of course a trivial incid but in one form or another it is happ ing in virtually every war product plant and union officials cannot hide fact that workers are using the organi strength of the union in open defi of management.

All talk of postwar production pl was given a severe public jolt the ot day by Carsten Tiedeman, regional W director, who, returning from a Washi ton meeting with military officials, s the WPB had "completely blueprinte but temporarily pigeonholed—all pl for reconversion." He called for an e to talk of cutbacks and reconversion a concerted attention to lagging producti schedules on items such as heavy truc ammunition and radar. The WPB h renamed cutbacks "contract revisions" the interests of morale, and suggests th industry's plans for expenditures on po war expansions and investment in equi ment must be shelved, if for no oth reason than to preclude increased co placency on the part of the public.


Everlasting Fastenings by HARPER Chicago
The Harper organization is known as "Headquarters for Everlasting Fastenings" because it specializes in the manufacture of bolts, nuts, screws, washers, rivets and accessories made of Brass, Naval Bronze, Silicon Bronze, Copper, Monel and Stainless. Nothing in common steel. 4360 Items in stock. Specials made to order. Write for 104 pages, 4 color catalog and reference book. The H. M. Harper Company, 2646 Fletcher St., Chicago 18, Ill. Branch offices in principal cities.

MEN of INDUSTRY

J. B. KINTNER

ALLISON L. BAYLES

W. H. WILSON

J. B. Kintner, formerly manager of sales, Union Steel Castings division, Blaw-Knox Co., Pittsburgh, has been named vice president of the division.

—o—

Harold G. Cutright has been elected vice president in charge of the machinery division, R. Hoe & Co. Inc., Dunellen, N. J.

—o—

Larry E. Gubb, chairman of the board, Philco Corp., Philadelphia, has been elected to the board of trustees, Cornell University, Ithaca, N. Y., to serve for five years.

—o—

J. Russell Gnau has been appointed office manager, Ford Motor Co., Dearborn, Mich., succeeding **A. G. Coulton,** who has been named assistant Dearborn branch manager.

—o—

E. Leslie Merkle has been made purchasing agent for the Terre Haute, Ind., plant of the Stran-Steel division, Great Lakes Steel Corp., Ecorse, Mich.

—o—

Ed Berliant has been appointed manager of the Atlanta, Ga., branch, Concord Radio Corp., Chicago and Atlanta. For the past three years Mr. Berliant has been general manager, Aeronautical Radio Mfg. Co.

—o—

Capt. William F. Silsby, on military leave of absence from Pittsburgh Lectromelt Furnace Corp., Pittsburgh, has been awarded the Legion of Merit for "exceptionally meritorious conduct in the performance of outstanding service as officer in charge of the Hawaiian Department and Central Pacific Area Searchlight Repair Shop." Capt. Silsby is a member of Pittsburgh chapter, American Society for Metals.

—o—

R. H. Musser has been appointed assistant general manager of sales, Heppenstall Co., Pittsburgh, pending the recovery of **W. P. Ritenbaugh,** who has been ill for some time.

—o—

Dave W. Choate has been named industrial manager at Atlanta, Ga., for Minneapolis-Honeywell Regulator Co., Minneapolis, and its division, Brown Instrument Co., Philadelphia. **W. S. Robards** has been made industrial sales engineer of the Milwaukee branch of Brown Instrument Co., succeeding Mr. Choate.

—o—

Allison L. Bayles has been elected vice president, American Engineering Co., Philadelphia. Mr. Bayles will be responsible for postwar product development. Previously he had been director of research and development, Rogers Diesel & Aircraft Corp.

—o—

Walter W. Vogt, development manager, tire and chemical division, Goodyear Tire & Rubber Co., Akron, O., has been elected vice chairman of the Division of Rubber Chemistry, American Chemical Society.

—o—

Thomas W. Cunnea has been appointed branch manager in Houston, Tex., for Westinghouse Electric Supply Co., New York, succeeding **C. M. Mackey,** now southwestern district manager of the company. **Charles G. Lammers** has been made manager of the Indiana division, with offices in Indianapolis.

—o—

H. E. Grout, manager of manufacturing, has been assigned the entire responsibility for all small motor factory operations, Lima, O., Small Motor division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. **N. H. King** has been appointed manager of production planning, reporting to Mr. Grout.

—o—

Col. Robert P. Glassburn, U.S.A., retired, has been made general manager of the newly-created international department, Dictaphone Corp., New York.

—o—

William R. Teller, formerly associated with the testing laboratories of American Gas Association, has joined Bryant Heater Co., Cleveland, as director of research and development.

—o—

Frank I. Kemp, formerly manager of Worthington Pump & Machinery Corp.'s San Francisco district office, has been named manager of the corporation's Vertical Turbine Pump division. **J. P. Arthur** becomes San Francisco di office manager, and during the emergency continues as Pacific C manager, Marine division. **Harry Sargent,** of the Marine division at H son, N. J., has been named assistant cific Coast manager of that divi with headquarters in San Francis

—o—

W. H. Wilson has been made ea territory manager, Ferro Enamel C Cleveland, and will make his head ters in the office to be opened by company Nov. 1 at 17 East Forty ond street, New York.

—o—

Godfrey H. Atkin, special repres tive, Chicago branch, Electric St Battery Co., Philadelphia, has honored by the National Electrical M ufacturers Association for his half tury of service to the industry.

—o—

Drayer & Hanson Inc., Los Ang has announced four appointments connection with postwar expansion p **Albert Hanson** has been made vice

H. T. PLATZ

Who has been appointed district mana Sciaky Bros., Chicago, for the state of and eastern and northern Indiana, with o in Cleveland, noted in STEEL, Oct. 2, p.

ident in charge of engineering; **J. C. Lombardi** has been appointed vice president, director of sales; **Scott M. Hauser,** vice president, has become director of sales promotion and advertising, and **A. H. Witt** has been made air conditioning and refrigeration sales manager.

—o—

John F. Gilligan, manager of the priorities division, Philco Corp., Philadelphia, has been appointed advertising manager.

—o—

A. H. Krut, formerly New York sales manager, C. G. Hussey & Co., Pittsburgh, division of Copper Range Co., has been named director of sales, with headquarters in Pittsburgh.

—o—

Norman J. Henke has joined the staff of Saginaw Malleable Iron division, General Motors Corp., Plant No. 2, Danville, Ill. For the past eight years he has been associated with the Saginaw division at Saginaw, Mich.

—o—

New directors of United States Pipe & Foundry Co., East Burlington, N. J., are **V. C. Armstrong,** board chairman, Mail Joint Co., New York, and vice president, Poor & Co., Chicago; **H. Newton Walker,** vice president, Walker Bros., Conshohocken, Pa., and **S. Bayard Colgate,** board chairman, Colgate-Palmolive-Peet Co., Jersey City, N. J.

—o—

George Green has been appointed vice president in charge of sales, Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill., division, H. K. Porter Co. Inc., Pittsburgh. For the past year Mr. Green has been railway sales manager, Elastic Stop Nut Co., Union, N. J.

—o—

Paul C. Capstick, formerly president, Richmond Iron & Steel Co., Richmond, Va., has joined the scrap brokerage organization of Charles Dreifus Co., Philadelphia, and will be in charge of that company's new office in the American Bank building, Richmond.

—o—

John L. Neudoerfer has been made president, Wheeling Corrugating Co., Wheeling, W. Va., subsidiary, Wheeling Steel Corp. Mr. Nuedoerfer is vice president in charge of sales and a director of the parent company.

—o—

Walter A. Meyer, manager of dealer sales, Allis-Chalmers Mfg. Co., Milwaukee, has been elected president of the Multiple V-Belt Drive Association.

—o—

Gwilym A. Price, vice president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been elected to the board of trustees, Allegheny College, Meadville, Pa. Mr. Price will serve for an indefinite tenure.

—o—

G. W. Onksen, for the past 32 years associated with General Motors Corp., Detroit, recently serving as supervisor of process engineering in the Guide Lamp division, has joined Solventol Chemical Products Inc., Detroit, as manager of industrial engineering and service.

S. L. EASTMAN

F. E. LEIB

—o—

S. L. Eastman has been appointed chief engineer, Cleveland Worm & Gear Co., Cleveland. He has been associated with the company since 1927 and for the past two and one-half years has been assistant chief engineer.

—o—

Hermann D. Mysing has been made manager of sales and engineering service, auto radio department, Radio Corp. of America, New York.

—o—

John T. Urban, formerly manager of the Indiana division, Westinghouse Electric Supply Co., New York, has been named general appliance manager.

—o—

Robert M. Stanley, chief test pilot and director of the flight research division of Bell Aircraft Corp., Buffalo, has been appointed chief engineer, succeeding **Harland M. Poyer,** resigned. **Jack Woolams** becomes chief test pilot.

—o—

David J. Finn has been made manager of the Chicago region for R. C. A. Victor division, Radio Corp. of America, New York, and **James W. Cocke** has been appointed manager, Dallas-Atlanta region, with headquarters in Dallas, Tex.

—o—

Marshall Houck has joined American Safety Razor Corp., Brooklyn, N. Y., as divisional sales supervisor, with headquarters in Chicago. He succeeds **J. C. Coen,** who has resigned, effective Dec. 31.

—o—

Joseph G. Magrath has been appointed manager of the Chicago district sales territory for American Machine & Metals Inc., East Moline, Ill. Headquarters of the new Chicago district office are located at 310 South Michigan avenue.

—o—

Burton H. Witherspoon has been appointed director of business research, Curtiss-Wright Corp., with headquarters at Buffalo, succeeding **Dr. Donald H. Davenport,** resigned. **Charles W. France,** vice president of the corporation, returns to St. Louis as general manager of the plant there, succeeding Mr. Witherspoon. **N. F. Vanderlipp** succeeds Mr. France as general manager, Buffalo plant, and **Ralph A. Fuhrer** becomes factory manager at Columbus, O., to succeed Mr. Vanderlipp.

—o—

F. E. Leib, formerly in charge of the Washington office of Copperweld Steel Co., Glassport, Pa., has been appointed assistant general manager of sales. **C. H. Jensen** has been named electrical engineer.

—o—

Benedict J. Goltra has been appointed superintendent of the No. 5-10 blast furnace department, South Chicago plant, Carnegie-Illinois Steel Corp., Chicago, succeeding **Evan R. Yundt,** resigned.

—o—

Victor Failmezger, previously application and field engineer, H. K. Porter Co. Inc., Pittsburgh, has been appointed sales manager of the company's subsidiary, Quimby Pump Co., Newark and New Brunswick, N. J.

—o—

Edward C. Fales has joined American Welding & Mfg. Co., Warren, O., as assistant to the president. Previously Mr. Fales had been assistant to the general manager of operations, Sylvania Electric Products Co., Salem, Mass.

—o—

Daniel E. Wise has been named assistant chief engineer, Clairton works, Carnegie-Illinois Steel Corp., Clairton, Pa. He was formerly project engineer in the company's Youngstown district.

—o—

Edward Laing has been appointed division manager in the Headquarters Application Data and Training department, Westinghouse Electric & Mfg. Co., Pittsburgh. Formerly Mr. Laing was sales promotion manager of the company's Eastern district.

—o—

William Gaertner, founder and president, Gaertner Scientific Corp., Chicago, celebrated his eightieth birthday anniversary Oct. 24. A pioneer in the sci-

entific instrument industry in the United States, Mr. Gaertner established his business in Chicago in May, 1896. He was closely associated with S. P. Langley in the period when the latter's fundamental experiments in aeronautics were under way.

—o—

Gray Iron Founders' Society announces re-appointment of the following to the executive committee: **W. B. Crawford,** president, Atlas Foundry Co., Detroit; **C. R. Culling,** president, Carondelet Foundry Co., St. Louis; **H. L. Edinger,** president, Barnett Foundry & Machine Co., Irvington, N. J.; **R. E. Kucher,** vice president, Olympic Foundry Co., Seattle, and **R. D. Phelps,** president, Francis & Nygren Foundry Co., Chicago. **Walter L. Seelbach,** secretary-treasurer, Forest City Foundries Co., Cleveland, president of the association, is chairman of the executive committee.

—o—

John M. Curley has been elected chairman of Eastern Stainless Steel Corp., Baltimore, succeeding **James A. Downey,** resigned. **Gordon W. Russell,** treasurer of the corporation, has been elected secretary also, and **Laclan McKenzie** has been elected assistant treasurer. **Edward F. Byrnes** was elected a director. **J. Earl Weaver** and **J. E. Aldred** have resi as directors, and **Z. O. Fiscus** ha signed as assistant treasurer and secre

—o—

Eben G. Crawford, president, C land Electric Illuminating Co., C land, has become a director of C land-Cliffs Iron Co., Cleveland, suc ing **Crispin Oglebay,** president, Ogl Norton Co., also of that city.

—o—

W. K. Schweickhardt has been p in charge of the Chicago sales opened by Walsh Refractories Cor Louis, in the Midland building, Adams street, Chicago 3.

OBITUARIES

Charles Campbell Worthington, 90, formerly president of International Steam Pump Co. and the Henry H. Worthington Corp., now Worthington Pump & Machinery Corp., Harrison, N. J., died Oct. 21 in Washington. At the death of his father, Henry H., who 40 years earlier had invented the first direct-acting steam pump, Charles Worthington took over the affairs of Worthington Pump and brought about many improvements and new developments in pumps, compressors and similar types of equipment with the result the company set up plants in four European countries. Nineteen years later he sold control of the company to International Steam Pump Co. and was its president for a year. In 1900 he retired from the pump business and founded Worthington Motor Co., manufacturing first steam and later gasoline engines. Among various companies in which he played an important part was the Holley Steam Pump Co., Buffalo, which he owned and controlled.

—o—

Mrs. Everett J. Hall, 68, widow of Everett J. Hall, who from the time of her husband's death in 1931 until 1943 was president of the Metals Disintegrating Co., Union, N. J., which Mr. Hall founded, died recently in New London, N. H.

—o—

Albert B. Doran, 39, head of A. B. Doran Engineering Co. and consulting engineer for Douglas Aircraft Co. Inc., Santa Monica, Calif., died Oct. 16 in Los Angeles.

—o—

Alfred Hallet, 58, automotive engineer and designer, and head of Hallet Mfg. Co., Inglewood, Calif., died Oct. 20 in Los Angeles.

—o—

Fred Krebs, 89, who retired in 1912 as general sales manager and a director, Cambria Steel Co., which was taken over by Bethlehem Steel Co., died Oct. 13 in Johnstown, Pa. For many years he had charge of operations and sales of the Gautier department of the old Cambria Iron Co. Mr. Krebs was active in the early development of special shapes for automobile rims, window sash, and cold finished specialties. Following his retirement from the steel industry Mr. Krebs was active in the banking business and in civic affairs of Johnstown until his illness two weeks prior to his death.

—o—

Fred H. Clausen, 68, president, Van Brunt Mfg. Co., Horicon, Wis., subsidiary of Deere & Co., and vice president of the Chamber of Commerce of the United States, died Oct. 20 at Green Lake, Wis.

—o—

William Bausch, 83, chairman, Bausch & Lomb Optical Co., Rochester, N. Y., and last surviving son of John Jacob Bausch, founder of the optical company, died Oct. 19 at his summer home near Rochester. Mr. Bausch, who was active in the firm's scientific research until his death, was named board chairman in August to succeed his brother, Edward, who died July 30.

—o—

Joseph S. Pendleton, secretary-treasurer, Carpenter Steel Co., Reading, Pa., died Oct. 7. Active in civic and state affairs, Mr. Pendleton was a member of the Pennsylvania committee for public safety and of the public service committee of the Pennsylvania State Chamber of Commerce.

—o—

Le Roy Whitmer, 64, who had been employed in the sales division of Atlas Bolt & Screw Co., Cleveland, for more than 30 years, before retiring in 1939, and who had returned to Atlas last January to help ease the manpower shortage, died Oct. 17 in Cleveland.

—o—

H. Parke Thornton, 48, vice president and controller, White Motor Co., Cleveland, died Oct. 24 in that city.

—o—

Harry A. Ritter, 58, manager, western division, American Laundry Machinery Co., Chicago, died Oct. 20 in that city. He had been associated with the company since 1910.

—o—

Elmer W. Wiggins, 65, founder, E. W. Wiggins Airways Inc., Providence, R. I., and former general manager at various plants of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., died Oct. 18 in Columbia, Mo. After his association with du Pont Mr. Wiggins was sales manager, Viscoloid Co., and England representative of Nixon tion Works, Nixon, N. J. Late founded his own company.

—o—

Charles W. Streckenbach, 82, w 1903 organized the Western Steel & Works in De Pere, Wis., which con later merged with H. D. Hudson Chicago, died Oct. 20 in Green Wis. Prior to his retirement ten ago Mr. Streckenbach served as Pere branch manager of H. D. H Co.

—o—

Edgar Highley, 63, superinte Allegheny Ludlum Steel Corp.'s kirk, N. Y., wire mill, died in tha Oct. 16. Mr. Highley has been i fied with Jones & Laughlin Steel Pittsburgh, for a number of years. ty-six years ago he founded a wir in Dunkirk which later became a of Allegheny Ludlum.

—o—

Joseph L. Vergilio, president owner, J. L. Vergilio Co., Cleve metering and engineering organiz died Oct. 17 in Lakewood, O. Mr. gilio was a member of the America stitute of Electrical Engineers an Cleveland Engineering Society.

—o—

James Lyle Crandall, 77, head o Crandall Engineering Co., Me Mass., died Oct. 18. Mr. Crandal tablished the Crandall engine works in 1891. At various times h consulting engineer to the United S Navy, the Canadian government the United States Shipping Board.

—o—

Albert C. Bishop, 69, president- urer, Ohio Ice Machine Co., Cleve until his recent retirement, and o the leading authorities in the countr commercial refrigeration, died Oct in Indianapolis.

—o—

Patrick O. Casey, 64, sales repre ative for Gardner Mfg. Co., May Wis., radiator cover makers, died rec in Milwaukee.

—o—

Jacob H. Holub, 50, superinten Holub Iron & Steel Co., Akron, O., Oct. 20 in Akron.

Expanded Screw Machine Industry Relying on Postwar Developments

Screw machine investment increased from $500,000 prewar to $10 million. Postwar automotive and parts manufacturers are expected to provide outlet for screw machine products produced by Coast plants

LOS ANGELES

UPON postwar development of new industries on the West Coast as well as upon continuance of a large postwar aircraft industry depends the future of the vastly expanded screw machine industry here.

Prior to war demands upon local aircraft manufacturing plants, the screw machine industry in the Los Angeles area was very small. Capital investment was probably less than $500,000 and but a few hundred workers were employed in shops that for the most part were very small.

The war, however, has changed all that. Today the automatic screw machine industry in this area is exceeded in importance in only three other national centers, the New England States, Michigan and in Ohio.

In a recent conference held by leaders of the local automatic screw machine industry, spokesmen for the industry disclosed that this area has now at least 7 per cent of the total number of all automatic screw machines in the country, and 10 per cent of all the most modern machines of the automatic type. It was also disclosed that more than 200 companies are engaged in this highly specialized type of production with 5000 employes on the payrolls. The capital investment has expanded to $10 million and the combined production of screw machine products here amounts to 300 million individual items every twelve months.

Although perhaps 90 per cent of the present screw production goes to the aircraft industry, screw machine operators believe that expansion in other fields is within the range of possibility. The postwar automotive industry is expected to provide an expanded outlet for screw machine products. It is probable that local industry is more interested than the screw machine industry in the anticipated expansion of the automotive industry in this area.

Although many of the major automobile manufacturers maintaining assembly plants in Los Angeles have in past years bought tires, batteries, springs, etc., manufactured locally, there are many more parts that go into an automobile that would be manufactured here on a competitive basis with eastern plants. It is anticipated that Los Angeles will supply a far greater percentage of the parts that go into the postwar car to be sold in this territory, than heretofore. It is likely the production of these parts that the screw machine industry expects to share.

In discussing the conversion problems of the industry with its leaders, C. B. Tibbetts, chairman, Los Angeles Chamber of Commerce Manufacturing and Industries Committee, promised that his organization would undertake market surveys, comparative labor costs and transportation cost studies necessary to determine outlets for products and competitive positions.

DPC May Help Put Geneva Steel in Saleable Condition

PROVO, UTAH

The federal government, through Defense Plant Corp., is willing to spend up to $35 million to put the Geneva Steel Co. in "saleable condition" for postwar operation, it was reported here by Rep. J. W. Robinson, (Dem., Utah).

Agency officials concerned with reconversion planning have indicated to him, Representative Robinson said, that good business practice would demand that the Geneva mill be converted from wartime production of plates and structural steel (for West Coast shipyards), to peacetime types of output.

Belair Shipyard Closed; Plant To Be Dismantled

SAN FRANCISCO

With completion of its contract for concrete barges for the Maritime Commission, the Belair shipyard at South San Francisco, Calif., ceased operations and will be dismantled.

Since shortly after the outbreak of the war, the Belair yard, operated by Barrett & Hilp Co., has been working on a contract for 20 barges, made of concrete and shaped in the form of ordinary cargo vessels. These barges are capable of handling about 6000 tons of freight. They have no motive power, are towed by tugs and manned by a small crew.

Postwar Planning Projects Make Rapid Progress

SAN FRANCISCO

Planning for postwar projects continues to make rapid progress in the San Francisco Bay area.

Oakland's city-wide work pile survey has passed the $50 million mark and indications are the total will be more than doubled by mid-November, according to the Oakland Postwar Planning Committee. The $50 million of potential work thus far has been reported by business establishments in 39 separate classifications.

At present more than 165 new buildings are included in the $50 million. Included in the classifications of work to be done are: $5,950,000 by industrial establishments; $6,227,000 by commercial firms; $1,201,000 by businesses performing personal services; $16 million for housing facilities; and $16.5 million for communications and utilities. The Oakland metropolitan area's goal is $200 million.

In San Francisco, the City Planning Commission has turned over to Mayor Lapham recommendations for 277 postwar projects to cost $131 million over a six-year period.

V-E Day Cutbacks To Have Minor Effect on Bay Area

SAN FRANCISCO

V-E Day contract cutbacks in the San Francisco Bay area will affect less than 2 per cent of the thousands of war workers in this district, according to estimates by civilian personnel officers of the Twelfth Naval district. These employes immediately will be absorbed by expansion in other war work, they said.

Victory in Europe most likely will bring cutbacks in such items as small arms, ammunition, tanks, certain heavy artillery, bombs, military clothing, personal effects and some aircraft manufacturing, the naval authorities believe. However, they point out that comparatively few of these war products are made in the San Francisco area.

On the other hand, they forecast that work on ships, transportation, fleet supply will expand sharply during the closing phases of the campaign against Japan.

Reach Compromise on Ship Repair Wages

SAN FRANCISCO

The Shipbuilding Stabilization Conference, at a recent meeting here, reached an apparent settlement of the ship repair wage controversy which has led to several wartime strikes. The agreement as finally worked out is a compromise of previous proposals.

Resolutions were adopted by the conference providing that work on new vessels, when placed in a drydock in a ship repair or combination yard, shall be deemed repair work drawing a premium rate of pay. It also provided, however, that employers may continue new construction work on such a vessel while in drydock.

The settlement largely gives machinists the premium wage rate they demanded.

The agreement now must go to the National War Labor Board for final approval.

WING TIPS

Bendix Aviation survey shows 307 American colleges planning postwar aviation courses. Schools preparing to put aircraft surpluses to constructive peacetime use. Formulation of economical plan for useful disposition of surplus needed

RESULTS of a nation-wide survey of higher educational institutions show 307 out of 455 American colleges and universities which replied, plan postwar courses in aviation, Ernest R. Breech, president, Bendix Aviation Corp., disclosed last week.

Mr. Breech said these 307 schools and others who expressed definite interest indicated they will want and need substantial quantities of usable government-owned aircraft equipment, which can be made available to them under the Surplus Disposal law.

The survey showed that 237 colleges now teach some aspects of aviation, that 212 of these schools are definitely planning to continue or expand their curricula after the war and that 95 additional schools among 140 colleges which do not at present teach areonautics are planning to establish postwar courses.

In reply to his company's survey, Mr. Breech stated, 76 institutions said they now have the necessary facilities for a permanent program of aviation education and 160 institutions said they have fairly adequate or at least "limited" facilities—but will need modern equipment and other teaching aids developed as part of the immense wartime expansion of aviation. Educators were invited by Mr. Breech to join with the aircraft industry in helping to formulate efficient, economical plans for useful disposition of aircraft surpluses, as provided by the law, under federal regulations to be drawn up and administered by a surplus board.

The law, he explained, provides that "surplus property which is appropriate for school, classroom or other educational use may be sold or leased "under regulations to be prescribed by the surplus board to states, "their political subdivisions and instrumentalities and to t supported or non-profit institutions."

The law further provides for disp tion of surplus aircraft materials use in R.O.T.C. programs, he stated.

Suggestions received by Bendix fr scores of air-minded educators, Breech said, make it apparent that " future plans and actions of indus the government and education must thoughtfully and practically co-ordi ed to work out a policy of Ameri air power in terms of national welfa

FORGING B-29 CRANKCASES: Hammers, striking a blow of 56,000 tons, are being used at Chrysler's Dodge Chicago plant to forge crankcase sections for the huge B-29 engines. Shown above is the bottom part of one of the forge hammers with which the finishing touches are being put on a large forging

Urges Dirigible Suppleme Airplane and Steamship

Huge lighter-than-air ships were jected into the air transport picture cently with a memorandum filed with Civil Aeronautics Board at the start o hearings on North Atlantic routes by W. Litchfield, president, Goodyear craft Corp., Akron, O., long active in dirigible field.

While no commercial airships of dirigible type now are available, Litchfield stated his belief that they h great potential usefulness to the nat and asked that the board take no ac which would prejudice their even inclusion in international air trade. airship would supplement the airpl and the steamship, giving the natio service none of the three could perf alone, Mr. Litchfield said.

Duplicate German Robot Bomb Here in 60 Days

Germany's vengeance weapon—the robot bomb—has been exhaustiv studied, completely reconstructed even fired by the Air Technical Serv Command, Wright Field, O., which seeking effective methods to stop bomb and use its "secrets" to the All advantage.

The robot consists of a highly strea lined fuselage with stubby wings o which is mounted a tube containing impulse jet engine. Fuel used is ga line. Motive power comes from a se of rapid explosions in a combustion cha ber. The force of these explosions f lows the line of least resistance— open rear end of the tube—and drives aerial bomb forward. The front end the tube is equipped with an ingenic "gate" which opens to admit air combustion and closes with each exp sion to prevent loss of power. In acti the engine sounds like a giant outboa motor.

The fuselage contains a war head, fu automatic control equipment and t spherical compressed air tanks for ru ning control units. Overall the bom measures about 17 feet in span and feet in length.

Parts used in studying the robot we collected in England. Some were take from duds and, even though no expl

THE B-29

STARTS LIFE IN A CAMERA'S LENS!

A correspondent asks: "How can they make so many B-29 parts in so many different plants and still get a perfect 'fit' on the assembly line?"

Photo templates are the answer. In one of the big Boeing plants draftsmen draw details of the Superfortress on a series of master patterns. These are ARMCO Galvanized PAINTGRIP sheets—painted pale green.

PHOTOS ON STEEL

Next the master steel patterns are sent to the copying rooms. Negatives are made and a camera "shoots" the drawings on other PAINTGRIP sheets coated with photographic emulsion. These templates then go to subcontractors in all parts of the country.

This method insures faster template production; reproductions are accurate to one-thousandth of an inch per foot; more Superforts are ready to bomb Japan.

Here are six reasons why thousands of tons of ARMCO PAINTGRIP have been used for aircraft templates: *1. It has a protective galvanized coating. 2. The neutral phosphate coating on the zinc takes and holds the paint. 3. It is smooth, flat and easy to work. 4. There is no flaking or peeling of paint along scribed lines. 5. There is no chance of error in copying. 6. Extra wide sheets are available.*

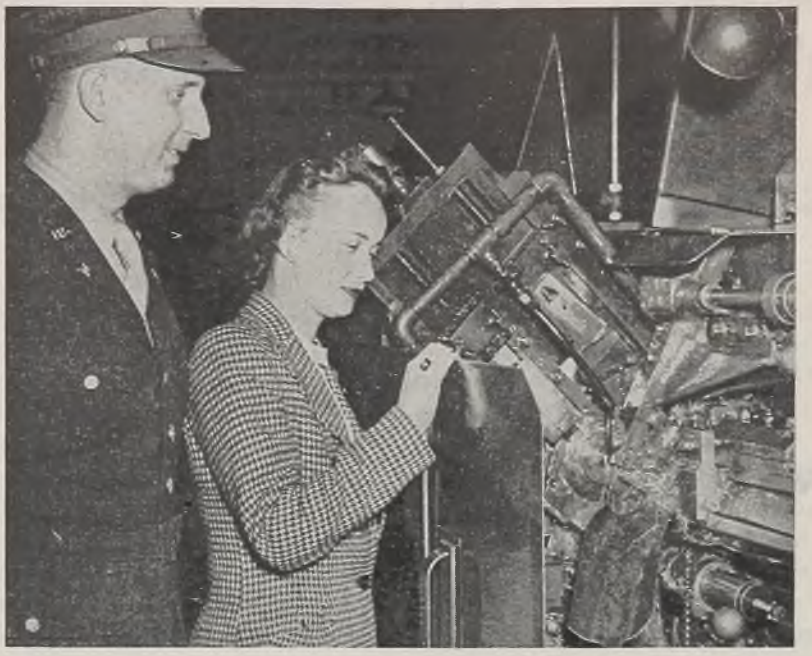
Whatever you make of sheet steel that is to be covered with an *attractive and durable* paint or enamel finish, ARMCO Galvanized PAINTGRIP sheets are a wise choice. Let us show you just why. The American Rolling Mill Co., 3231 Curtis St., Middletown, O.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

Checking contour of a body frame section.

GALVANIZED PAINTGRIP ARMCO STEEL

THE AMERICAN ROLLING MILL COMPANY



DEVISE BEARING CONSERVATION PLAN: Beverley Fawver, chief inspector of the bearing department at the Spokane Air Technical Command, and Lieut. K. M. Glaesner, bearing expert at the ATSC at Wright Field, O., watch an automatic lathe machining bearings at the Fafnir Bearing Co., New Britain, Conn. They were among a group of 31 Army experts who conferred with the industry's engineers and devised a master plan for conserving bearings in military aircraft

sions had occurred, high speed impact had ripped them apart. Under the supervision of the engineering division, aircraft projects section, five of the Command's twelve laboratories—Power Plant, Aircraft, Equipment, Aircraft Radio, Materials—and the Engineering Shops, worked on the V-1 project.

First problem was the jet impulse engine. Power plant engineers doped it out in record time, had it running only 17 days after the pieces arrived, despite the fact it was necessary to fabricate all parts after construction and design had been solved. The complete robot was fabricated and in working condition less than two months after the original parts arrived from England.

These parts, including the heavy "boiler-maker" steel tube, were machined and assembled in the Command's engineering shops. To make the fabricated engine an exact replica of the German original, all metals were analyzed for alloys.

Completed, the engine was mounted on a dynamometer stand for test runs. A spark plug was used to ignite fuel for the first several minutes of running after which heat from the engine provided ignition. Meantime, the aircraft laboratory made tests of a robot model in the Command's famous five-foot wind tunnel to determine aerodynamic reaction and characteristics. A full scale impulse engine was also tested in the giant 20-foot tunnel to determine speed thrust characteristics and fuel flow rates.

Solution of the complicated directional control system was worked out by the Jack & Heinz Co., Cleveland, under supervision of the equipment laboratory's special weapons branch. It was revealed that the bomb, after being launched from a track, is controlled through a compass device pre-set for a desired direction. A gyro control functions as an automatic pilot. Accuracy is difficult since cross winds cause the bomb to drift.

Firing tests are to be carried on at sites constructed by the Corps of Engineers. Some of the robots will be fired with war heads provided by the Ordnance Department. Special electrical equipment designed by the Air Technical Service Command aircraft radio laboratory will "track" the robots from launching to final landing. Soon we will know fully as much about the V-1 as the Germans do.

Over 450,000 Separate Items Inspected by AAF

There are over 13,000 Army Air Forces inspectors in the aircraft plants where the 450,000 separate items of AAF equipment are manufactured. These inspectors are responsible for the high quality of the component parts which go to make up the materiel of the AAF.

At headquarters of the Air Technical Service Command, Wright Field, O., is an organization, with equipment valu at over a half-million dollars, for t sole purpose of insuring proper stan ards of inspection. Under guidance Col. Bryant L. Boatner, chief, Quali Control Section, Procurement Divisio the miscellaneous equipment laborato branch, headed by Capt. G. F. Hoov has the world's finest and most accura equipment in the tool and gage and i strument laboratories.

The Instrument Laboratory's prima job is to insure the procurement of i struments with a high degree of acc racy under all conditions. Constant che is kept on the 125 different types of struments subject to AAF inspecti There are barometers which can be re to .0039 of an inch, potentiometers wh are accurate to one-millionth of a v resistance thermometers which will co sistently check to within one one-tho andth of a degree. There are also v uum chambers and cold chambers wh simulate conditions of flight at varyi altitudes and temperatures. Every eff is made by this laboratory to see to it t world's greatest air force has the worl best instruments.

Wright Plans Powerful Gas Turbine Aircraft Engines

Gas turbine aircraft engines of as mu as 10,000 horsepower will be availa for giant aircraft within the next deca according to G. W. Vaughan, preside Wright Aeronautical Corp., who a nounced in New York recently on t occasion of the twenty-fifth anniversa of the company that Wright will produ aviation turbines as well as conventio type engines in the postwar period.

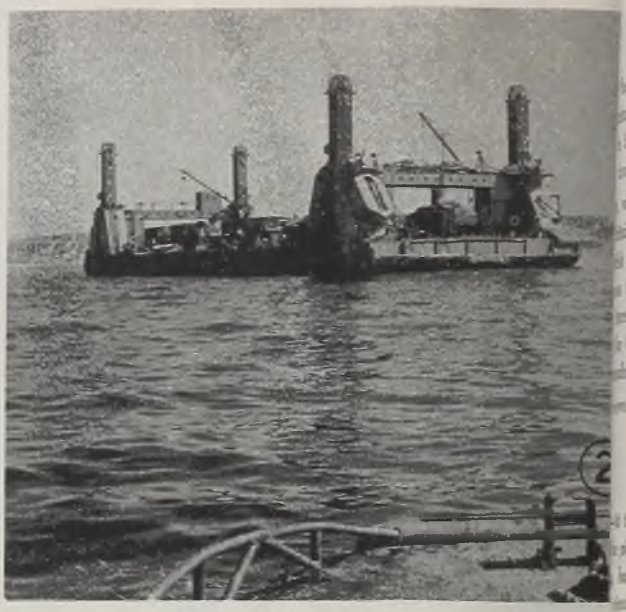
Development of a turbine of this pow would mean more energy in one u than in all four engines of the large bomber now in use, the Boeing B-2 Superfortress which carries four Cyclon totaling 8800 horsepower.

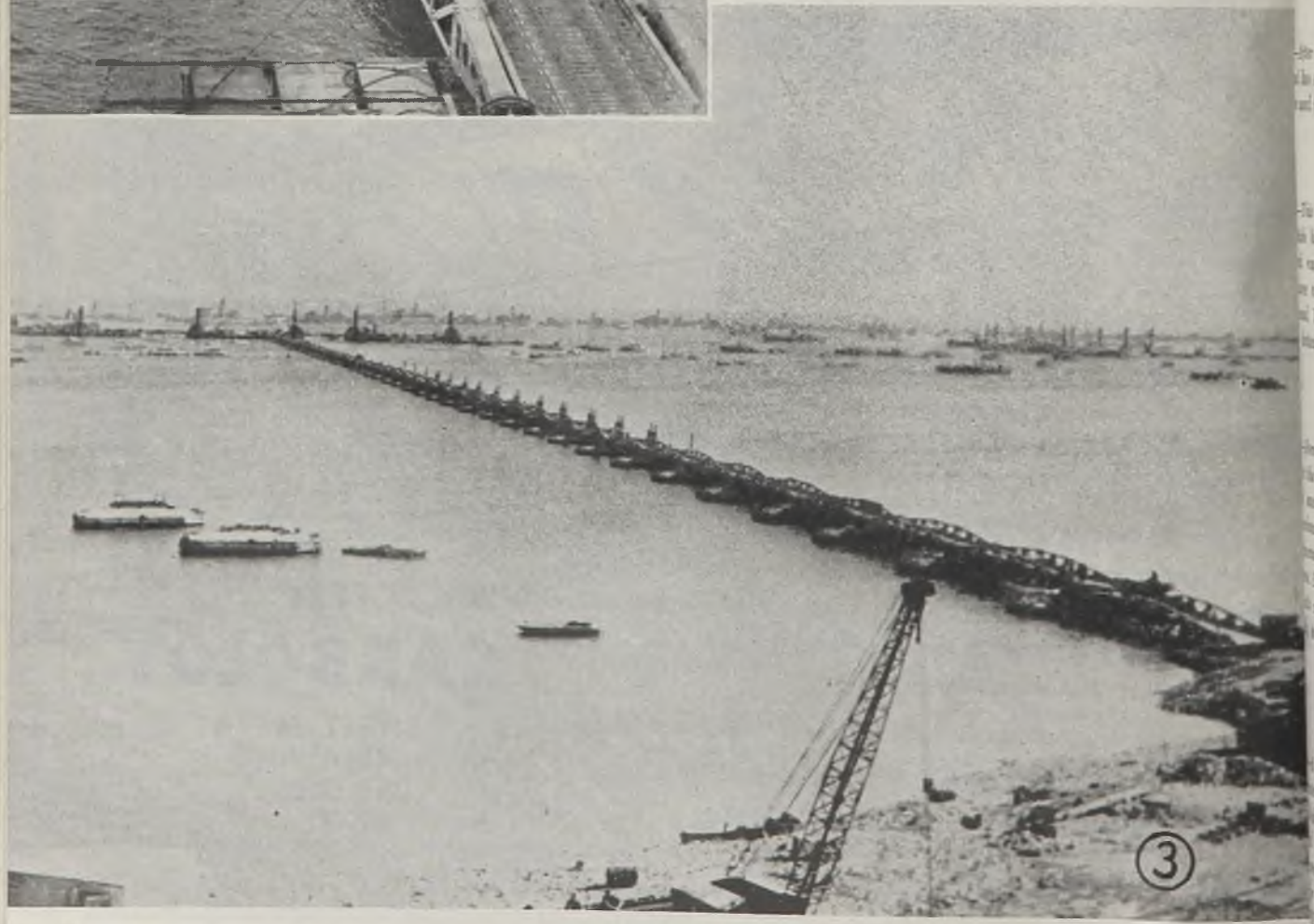
At a press conference, Mr. Vaugha indicated research and development pr grams are now under way on turbi units. Marking one of the most significa advances in aviation since the radial e gine first appeared, one type of Wrig gas turbine will be an engine of hig power, built to drive a propeller, as co trasted with the turbine units of basical similar principle used in jet propulsio planes. This type of engine has bee proposed for many years, but so far h never been flown.

Mr. Vaughan stated that while the pri ciples of gas turbines had been know for years, it was only recently that re search had improved their efficiency to point of practical use and only recentl that advances in metallurgy had pro vided the metals to withstand the hea and power stress of such engines.

Wright will continue production o air-cooled radials, according to Mr Vaughan, as well as continuing develop ment and research work on other proj ects as yet not announced.

Tow Prefabricat





arbors to France

ONE OF the most remarkable engineering feats of the war was the erection of two prefabricated harbors on the coast of Normandy to facilitate the movement of troops and supplies during the invasion of western Europe.

The ports, which are the size of Dover, were prefabricated in Great Britain by British manpower from plans drawn up by the British War Office and Admiralty. They then were towed across the channel. One harbor, for use by the American forces, was set up by the United States Navy; the other, for the British, was a combined Royal Navy and Army responsibility.

Various views of the installations are shown in these pages.

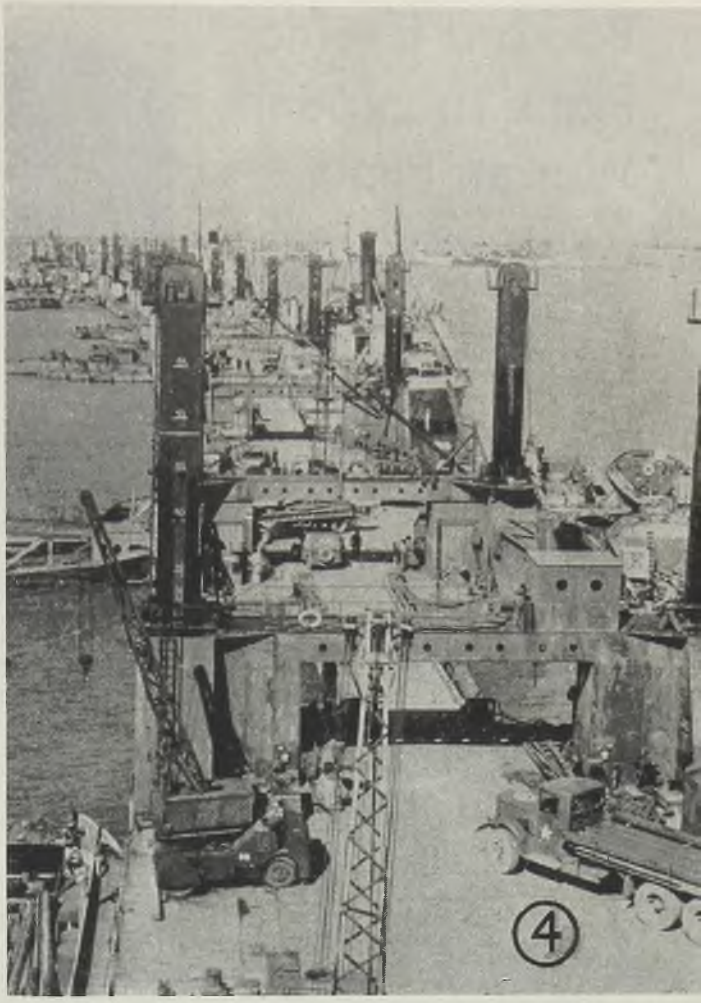


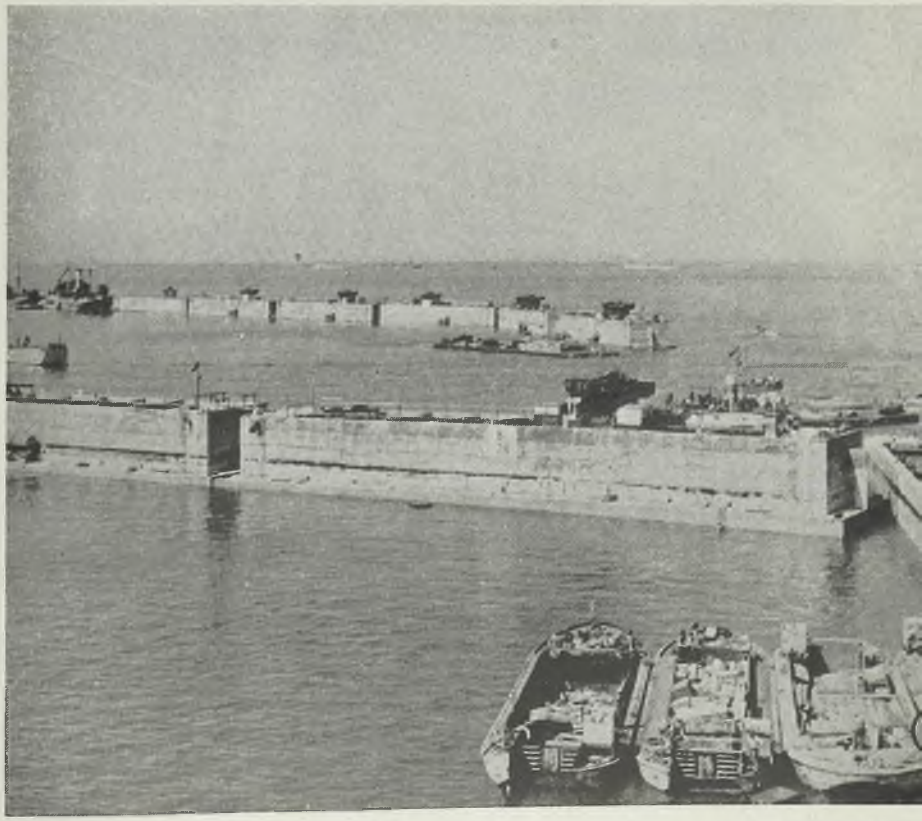
Fig. 1—At the British Harbor ambulances move along one of the pier roadways leading to the wharf. This steel roadway, hundreds of feet long, is a series of small bridges joined together by special means to give flexibility and to permit it to rise and fall with the 20-foot tide

Fig. 2—After being towed across the channel, this spud pierhead lies off the French shore at Normandy. It will be used for forming a wharf at the British port

Fig. 3—This panorama view of the British harbor shows one of the steel roadways which leads from shore to the wharf in the background. The breakwaters are dotted with ships

Fig. 4—Here is a view of the wharf at the British port. It consists of seven specially designed spud pierhead, steel pontoons with a displacement of approximately 1000 tons. Each pierhead is complete with crew quarters, generating sets, storage accommodations, etc.

Fig. 5—A balloon floats above the breakwater made of concrete caissons which protect the harbor. One hundred forty-six of these caissons were made in six different sizes for various depths of water. NEA and Acme photos



Packard Electric Plans To Expand Warren Plant

General Motors division to spend $2.5 million to boost employment level 91 per cent above prewar

A $2.5 MILLION postwar expansion for Packard Electric division, General Motors Corp., Warren, O., which is expected to boost the division's employment level approximately 91 per cent above prewar and 35 per cent over the present mark was announced recently.

Highlights of the proposed program are:

1. Expenditure of $1.5 million for rearrangement of plant facilities and new equipment.
2. Expenditure of $1 million for new buildings, including a new boiler house and four-story building to house personnel offices, general offices and an enlarged cafeteria.
3. Increase of employment requirements for 2700 persons in prewar and about 4000 persons currently to approximately 5200 persons.
4. Increase in capacity of wire and bulk cable manufacturing facilities by 43 per cent, of assembly departments about 45 per cent, and of motor manufacturing departments about 50 per cent.

Sheldon Machine Co. Acquires Vernon Line

Sheldon Machine Co. Inc., Chicago, builder of precision lathes and arbor presses, announces acquisition of the Vernon line of machine tools.

This line includes the Vernon horizontal milling machines, vertical milling machines and jig borers, 12-inch back geared shapers and universal tool and cutter grinders heretofore built and sold by the Machinery Mfg. Co., Los Angeles.

All manufacturing of these machine tools has been transferred to the Sheldon plant in Chicago where production will soon start to permit deliveries shortly after the first of the year.

Diamond Alkali Purchases Emeryville Chemical Co.

Diamond Alkali Co., Pittsburgh, has purchased the Emeryville Chemical Co., 405 Montgomery street, San Francisco. Manufacture of silicate of soda, sodium metasilicate, and silicate compounds will be continued at the plant which is located at 1269 Sixty-sixth street, Emeryville, Calif.

MORE EXPLOSIVES: Navy officers and officials of the Blaw-Knox Co., Pittsburgh, watch the ring being put on one of the first 16-inch naval shells made in the Pittsburgh district in this war at the plant of the Lewis Foundry & Machine division, Blaw-Knox Co., Groveton, Pa.

BRIEFS . . . .

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

George S. May Business Foundation, Chicago, moved its offices from 111 South Dearborn street to 840 North Michigan avenue on Oct. 1.

—o—

Logansport Machine Co. Inc., Logansport, Ind., announces appointment of Rudel Machinery Co. Inc., Boston, as its exclusive representatives in the New England territory, including Massachusetts, Maine, Vermont, New Hampshire, Rhode Island and Connecticut.

—o—

Continental Can Co. Inc., New York, reports its directors have approved the acquisition of the assets and business of Owens-Illinois Can Co., a subsidiary of Owens-Illinois Glass Co.

—o—

Michigan Tool Co., Detroit, announces appointment of L. E. Phelps as direct factory representative with offices at 638 Baker building, Minneapolis.

—o—

Allied Radio Corp., Chicago, has been appointed exclusive midwestern distributors for Creative Plastics Corp.

—o—

Nordberg Mfg. Co., Milwaukee, acquired controlling interest in the Northern Processing Machinery Co., Cleveland, a firm of specialty engineers. It will operate as a subsidiary of Nordberg under the name of Nordberg Process Machinery Co.

—o—

Colonial Tool Co. Ltd., Windsor, Ont., now has in operation what is believed to be the most complete and modern commercial heat-treating plant in Canada.

—o—

Brass Forging Association, New York, has published a new bulletin titled, *Non-Ferrous Forgings Digest.*

—o—

Minnesota Mining & Mfg. Co., St. Paul, Minn., has acquired the Mid-States Gummed Paper Co., Chicago.

—o—

General Electric Co., Schenectady, N. Y., announces plans to purchase a 12-acre plot for a postwar manufacturing plant in Anaheim, Calif., for production of plastic parts for airplanes.

—o—

American Society for Testing Materials, Philadelphia, has been awarded the Ordnance Distinguished Service Award for its outstanding contributions to ordnance progress in the war.

—o—

Sullivan-Rayhawk, Pittsburgh, is a new and complete market and sales promotion organization which was formed recently with offices at 743 Oliver building, Pittsburgh.

—o—

General American Transportation Corp., Chicago, has established scholarships at the University of Chicago to be made available to children of any of its 6500 employes as a memorial to its

employes who have lost their lives in the war.

—o—

Clyde Iron Works, Duluth, Minn., had its outstanding preferred stock retired and canceled on Oct. 1, according to J. A. Sisto, chairman of the board, Barium Steel Corp., Canton, O., which purchased control of the Duluth concern in August.

—o—

Florence Stove Co., Gardner, Mass., has purchased the electric and gas range business of Cavalier Corp., Chattanooga, Tenn.

—o—

Dravo Corp., Pittsburgh, received the "S" flag from the National Safety Council for outstanding achievement in plant safety and accident reduction.

—o—

Hills-McCanna Co., Chicago, announces appointment of D. D. Foster Co. as its representative in the Pittsburgh area with offices at 412 Peoples Gas building, Pittsburgh.

—o—

Wright Aeronautical Corp., Paterson, N. J., celebrated its twenty-fifth anniversary of business on Oct. 9.

—o—

Black & Decker Electric Co., Kent, O., recently changed its name to Lamb Electric Co.

—o—

Chicago-Latrobe Twist Drill Works, Chicago, announces opening of a branch warehouse and sales office at 2043 Santa Fe avenue, Los Angeles.

—o—

Heppenstall Co., Pittsburgh, reports removal of its Boston office to Chamber of Commerce building, 80 Federal street, Boston.

AWARDS . . .

Peden Steel Co., Raleigh, N. C.
Star Drilling Co., Akron, O.
Silent Hoist & Crane Co., Brooklyn, N. Y., receives fourth award.
E. I. du Pont de Nemours & Co., Perth Amboy plant, Perth Amboy, N. J., adds second white star.
Anaconda Wire & Cable Co., Sycamore, Ill.
Macwhyte Wire Rope Co., Kenosha, Wis., receives third "E" award.
Hamilton Foundry & Machine Co., Hamilton, O., receives second renewal.
Cooper Alloy Foundry Co., Hillside, N. J.
Jenkins Bros., Bridgeport, Conn., receives fifth award.
Philco Corp., Storage Battery division, Philadelphia, receives fifth award.
Copperweld Steel Co., Glassport, Pa., receives third award.
Titeflex Inc., Newark, N. J., receives second award.
Altoona Factories, Altoona, Pa.
M. Backes' Sons Inc., Wallingford, Conn.
Belmont Casket Co., Columbus, O.
Brook Mfg. Co., Scranton, Pa.
Chrysler Corp., Utica, Mich.
Chrysler Motors of California, Los Angeles.
City Pattern Foundry & Machine Co., Detroit.
W. B. Davis & Son Inc., Ft. Payne, Ala.
Douglas Aircraft Co. Inc., Oklahoma City, Okla.
E. I. du Pont de Nemours & Co. Inc., New Martinsville, W. Va.
Federal Laboratories Inc., Tunnelton, Pa.
Frantz Mfg. Co., Sterling, Ill.
Geometric Stamping Co., Cleveland.
Hays Mfg. Co., Erie, Pa.
Hoover Ball & Bearing Co., Ann Arbor, Mich.
Hyland Laboratories, Los Angeles.
Minneford Yacht Yard Inc., City Island, N. Y
National Cypsum Co., McGregor, Tex.
National Iron Works, San Diego, Calif.
Panocular Corp., Cincinnati.
Q-O-S Corp., New York.
Remington-Rand Inc., Tonawanda, N. Y.
Rudy Furnace Co., Dowagiac, Mich.
Seeger Refrigerator Co., St. Paul, Minn.
Stephens Bros. Inc., Stockton, Calif.
Sylvania Electric Products Inc., Brookville, Pa.
Truscott Boat & Dock Co., Cleveland.
Westinghouse Electric & Mfg. Co., Bloomfield, N. J.
Marshal Chemical Warfare Service plant, E. I. du Pont de Nemours & Co., Moundsville, W. Va.
Ingalls Iron Works Co., Verona, Pa.
Union Chain & Mfg. Co., Sandusky, O.
Ferro Enamel Corp., Cleveland, wins fourth "E."
Allen Wales Adding Machine Corp., Ithaca, N. Y.
Day & Zimmermann Inc., Iowa Ordnance plant, Burlington, Ia.
Farah Mfg. Co., El Paso, Tex.
General Motors Corp., Hyatt Bearing division, Rahway, N. J.
La Crosse Trailer & Equipment Co., La Crosse, Wis.
Minneapolis-Honeywell Regulator Co., Aero division, Chicago.
Nolde & Horst Co., Reading, Pa.
Pharis Tire & Rubber Co., Newark, O.
Photo Utilities Inc., New York.
Odenbach Shipbuilding Corp., Rochester, N. Y.
Scullin Steel Co., St. Louis, Mo.
Sta-Rite Ginnie Lou Inc., Shelbyville, Ill.
Truck Engineering Corp., Cleveland.
Vita Var Corp., Newark, N. J.
Westinghouse Air Brake Co., Swissvale, Pa.
Union Switch & Signal Co., Swissvale, Pa.

Stops Operations At Sharpsville Blast Furnace

Stack sold to Hetz Construction Co. last January. Built in 1847, furnace rebuilt in 1923 with 150,000 ton capacity

PITTSBURGH COKE & IRON CO., Pittsburgh, has suspended operation of its blast furnace at Sharpsville, Pa., one of the oldest in the Youngstown district. This stack was sold in January of this year to the Hetz Construction Co., Warren, O., for dismantling, but was continued in service under lease, to use up stocks of iron ore. It is understood the Hetz company will seek a buyer or will dismantle the stack.

The furnace was built in 1847 and for many years was operated by the Sharpsville Furnace Co. It was rebuilt in 1923 and capacity increased from 120,000 to 150,000 tons annually. In addition to the stack the plant consists of four stoves, three steam blowing engines and a single-strand pig-casting machine.

Sharpsville Furnace Co. disposed of the stack to Davison Coke & Iron Co. The latter company changed its name to Pittsburgh Coke & Iron Co.

QUARTER CENTURY CLUB: A. E. Walker, chairman and president, National Supply Co., Pittsburgh, presents a Spang-Chalfant Quarter Century Club service pin to Charles Theil, 69, who has been with the Etna, Pa., pipe mill for 55 years. Mr. Theil holds the distinction of having the longest service record at the oldest operating pipe mill in the country, which was founded in 1828. Four other veterans who all have been with the company 50 years or more are, left to right, A. D. Jones, Henry Schaefer, H. C. Moeller and Charles Lenhart

THE BUSINESS TREND

Most Business Indexes Tending Upward

RENEWED emphasis on stepping up production schedules among lagging war programs in recent weeks is reflected in the slight upward tendency of a number of industrial indicators. Order backlogs are still large although they have tended downward lately, and pressure for prompt delivery on practically all war programs has shown no signs of easing.

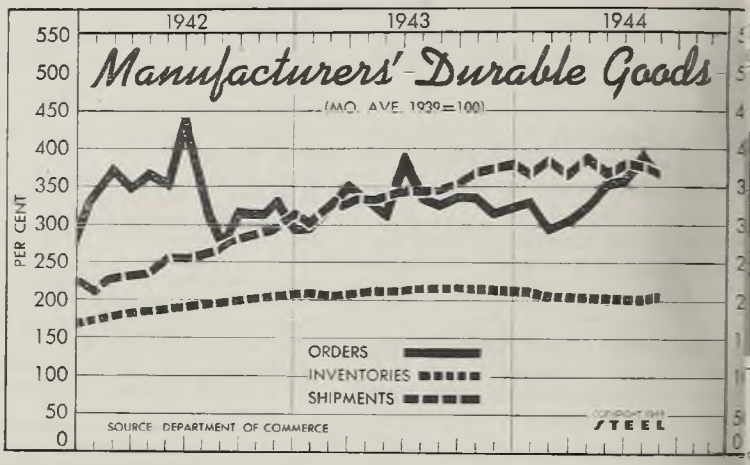
Gains were registered in revenue freight carloadings, petroleum production, heavy truck assemblies, and steel ingot production during the latest period. Money in circulation also increased, while business failures recorded a slightly higher percentage decline from a year ago than in the preceding period. Loans and investments were off moderately during the latest week, but bank clearings recorded a slight gain.

CONSTRUCTION — Sharp upturn in residential and non-residential construction awards during September more than offset the decline in public works and utilities construction. Total construction during September amounted to $175,739,000, regaining only a portion of the decline recorded during August and remained well below that registered in the like 1943 month. Public works and utilities construction receded to $64,094,000 last month, while residential and non-residential building of $111,645,000 was at the highest level registered since last March.

INVENTORIES — The steady liquidation of inventories which occurred during the first seven months this year was not extended during August. The gain in inventories in that period was largely accounted for by the marked increase in the transportation equipment industry, and here the increase was due to the further accumulation of goods in process stocks. At the end of August the value of the raw materials inventories of all manufacturers was almost a billion dollars below a year ago, whereas goods in process and finished goods stocks were nearly a half billion above the August 1943 total.

Manufacturers' shipments in August continued to r the stability which has characterized the economic s tion during 1944. The steps which have already taken toward reconversion, including some slight inc in the allotment of raw materials for the manufactu civilian products, will not affect the flow of goods to sumers significantly in the remaining months this Contrasting movements will occur among manufact industries in line with war production schedules, ar labor surpluses appear in some areas while shortages tinue in others.

SCRAP—Suppliers' and producers' iron and steel stocks declined slightly during August, while those of sumers were up moderately. Total stocks increased per cent to 5,975,000 tons during the month. The de in scrap salvage over the past 16 months indicates this source of material is rapidly being depleted, and suppliers are more dependent on production scrap.



Index of Manufacturers Durable Goods

	Orders		Shipments		Inventories	
	1944	1943	1944	1943	1944	1
January	331.5	293.5	365	208	212.0	2
February	294.4	326.6	384	337	208.6	2
March	309.7	349.2	369	330	207.2	2
April	325.0	329.8	387	338	204.9	2
May	351.6	313.0	369	338	204.0	2
June	358.9	392.7	378	343	203.6	2
July	392.7	338.7	375	346	201.9	2
August	362.9	325.0	368	354	202.4	2
September	362.9	325.0	368	354	202.4	2
October	....	339.5	...	371	....	2
November	....	316.1	...	374	....	2
December	....	324.2	...	380	....	2
Average	....	332.3	...	339	....	2

...ers heretofore built and sold of Owens-Illinois ...
...inery Mfg. Co., Los Angeles.
...facturing of these machine... Michigan Tool Co.

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96.5	95.5	96	99.5
Electric Power Distributed (million kilowatt hours)	4,345	4,355	4,377	4,415
Bituminous Coal Production (daily av.—1000 tons)	1,965	1,971	1,921	1,937
Petroleum Production (daily av.—1000 bbls.)	4,745	4,727	4,744	4,410
Construction Volume (ENR—unit $1,000,000)	$20.8	$57.7	$19.2	$50.8
Automobile and Truck Output (Ward's—number units)	20,660	19,435	20,880	17,785

*Dates on request.

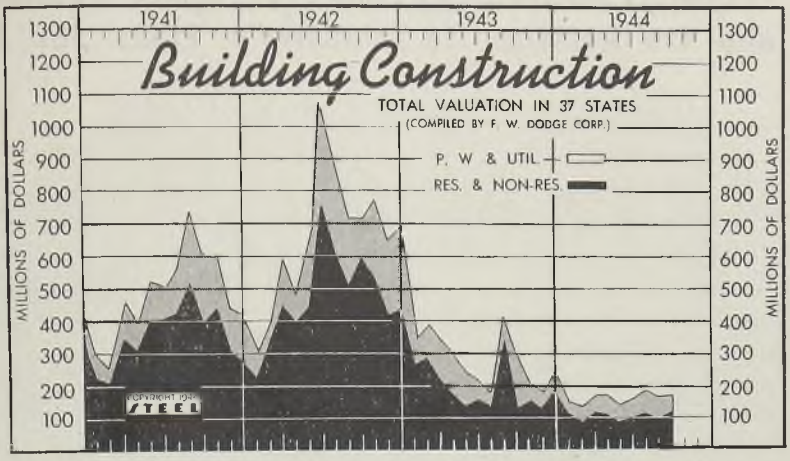
TRADE				
Freight Carloadings (unit—1000 cars)	905†	899	899	905
Business Failures (Dun & Bradstreet, number)	12	15	23	34
Money in Circulation (in millions of dollars)‡	$24,157	$24,099	$23,558	$19,019
Department Store Sales (change from like week a year ago)‡	+16%	+12%	+14%	+9%

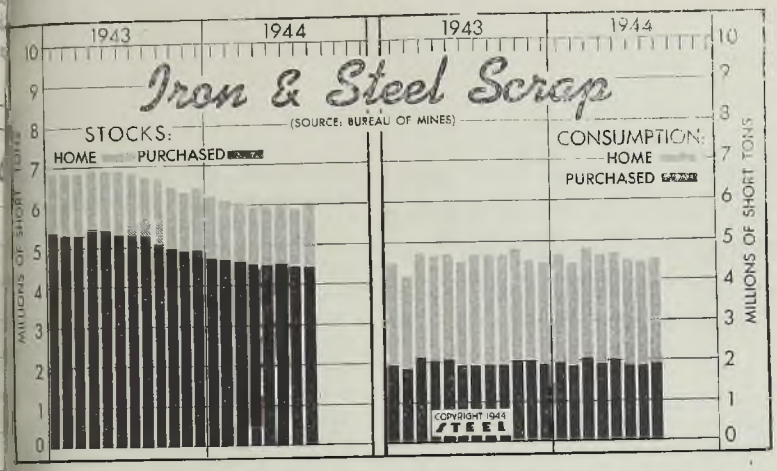
†Preliminary. ‡Federal Reserve Board.

Construction Valuation In 37 States

(Unit—$1,000,000)

Total	Public Works-Utilities 1944	Public Works-Utilities 1943	Residential-Non-Res. 1944	Residential-Non-Res. 1943
159.2	50.3	85.8	108.9	264.3
137.2	55.1	112.9	82.1	280.5
176.4	61.3	123.0	115.1	216.7
179.3	72.0	127.7	107.3	175.6
144.2	55.8	95.8	88.4	138.6
163.9	70.7	73.3	93.1	156.8
190.5	80.5	50.0	110.0	133.7
169.3	69.4	73.4	99.9	340.8
175.7	64.1	175.1	111.6	125.0
....	....	63.5	....	150.0
....	....	59.0	....	125.4
....	....	67.4	....	184.9
....	....	1,106.9	....	2,106.4





Iron and Steel Scrap Bureau of Mines

(Gross Tons—000 omitted)

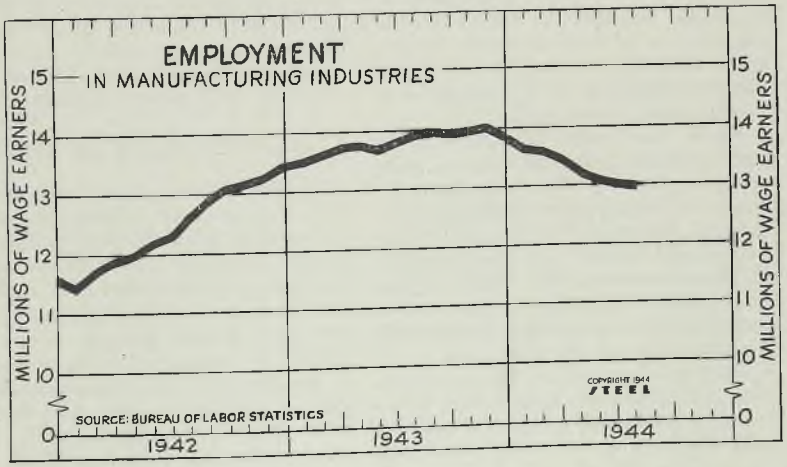
	Consumers' Stocks 1944	Consumers' Stocks 1943	Total Consumption 1944	Total Consumption 1943
Jan.	6,214	6,877	4,616	4,492
Feb.	6,134	6,871	4,414	4,178
Mar.	6,027	6,850	4,827	4,787
Apr	5,932	6,918	4,629	4,642
May	5,966	6,905	4,683	4,723
June	5,991	6,916	4,460	4,493
July	5,909	6,860	4,423	4,670
Aug.	5,976	6,778	4,533	4,686
Sept.	....	6,613	....	4,657
Oct.	....	6,456	....	4,830
Nov.	....	6,391	....	4,581
Dec.	....	6,448	....	4,449
Mo.Ave.	....	6,740	....	4,599

Factory Employment†

(000)

	1944	1943	1942
Jan.	13,669	13,503	11,456
Feb.	13,594	13,633	11,654
March	13,406	13,727	11,821
April	13,173	13,735	11,988
May	13,024	13,700	12,127
June	12,989	13,827	12,282
July	12,923	13,911	12,564
Aug.	....	13,990	12,869
Sept.	....	13,935	13,079
Oct.	....	13,965	13,166
Nov.	....	14,007	13,267
Dec.	....	13,878	13,474

†Source: U. S. Dept. of Labor



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,417	$9,049	$10,859	$10,222
Federal Gross Debt (billions)	$211.3	$211.2	$210.6	$168.6
Bond Volume, NYSE (millions)	$46.4	$31.2	$29.2	$68.8
Stocks Sales, NYSE (thousands)	4,092	2,959	3,175	3,238
Loans and Investments (millions)†	$54,087	$54,436	$55,041	$51,648
United States Government Obligations Held (millions)†	$40,130	$40,506	$41,113	$36,698

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	248.6	249.0	250.7	247.6
Industrial Raw Materials (Bureau of Labor Index)‡	113.2	113.7	112.8	112.2
Manufactured Products (Bureau of Labor index)‡	101.2	101.2	101.1	100.3

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

Technical Societies Review Progress of Memorable Year and Its Relation to Industry's Plans for Peace at

NATIONAL METAL CONGRES

Conversion theme dominates displays, meetings and panel discussions of American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers, Society for Stress Analysis and Industrial Radium and X-Ray Society at 26th national conclave in Cleveland

NATIONAL Metal Congress which met Oct. 16-20 in Cleveland for the twenty-sixth time in the history of American Society for Metals, a principal sponsor, again provided the opportunity for introduction of new technical thought and interchange of ideas for implementing the adjustment to a condition once loosely called "normalcy".

There was ample evidence—in the well attended group meetings of ASM, American Welding Society, American Institute of Mining and Metallurgical Engineers, Industrial Radium and X-Ray Society and Society for Stress Analysis—of keener interest in the wealth of data on successful laboratory experiments and new production procedures progressively developed through the war period.

Subjects discussed by research scientists and technicians ranged from metallurgy to production of finished products with ferrous and nonferrous metal components, with emphasis on improvement of physical properties by mechanical as well as chemical means. Latest techniques for joining, metallurgy of welding, and modern inspection procedure were given equal prominence by participating societies. Excerpts from some of many excellent ASM papers presented follow.

HARDENABILITY OF STEELS

Hardenability and hardenability tests for steel continue to hold interest and two sessions were devoted to these and related subjects. A hardenability test bar selectively quenched from both ends has been developed to provide correlations with thermal histories of quenched plates that correspond more closely than is possible with the standard single end quench specimen. This was described in a paper by Charles R. Wilks, assistant metallurgist, Earnshaw Cook, chief metallurgist, and Howard S. Avery, search metallurgist, American Brake S... Co., Mahwah, N. J.

For those steels in which the pearl... reaction may be avoided but which tra... form partially or wholly under the se... cooling conditions to acicular structu... of the Barnite type, this test should ... useful in predicting behavior of the s... tion center, since the mechanical pr... erties at the center of symmetrical d... ble end quench specimens may be fou...

Effect of Excess Carbide

At normal hardening temperatures, ... hardenability of a given alloy series ... creases with carbon content to a ma... mum value corresponding to the positi... of the AC_m line under the conditio... of testing imposed and then decreas... with further increase in carbon conte... This decrease is due to the nucleati... effect of the excess carbide on the ... composition of austenite on quenchi... These conclusions were arrived at ... E. S. Rowland, J. Welchner, R. G. E... and J. J. Russ, metallurgical departme... Steel & Tube Division, Timken Rol... Bearing Co., Canton, Ohio, following ... investigation in which end quench hai... enability determinations were made ... two base analyses, namely, SAE 52X...

and SAE 46XX, with the carbon ranging in 0.20 per cent increments from approximately 0.20 to over 1.00 per cent.

The 1-inch diameter solid cylinder end quenched has become widely accepted as the standard method for determining hardenability of medium carbon alloy steels. But the variety of methods in use for shallow hardening carbon steels and car-steels of all grades indicates that no one method in current use has been found to be entirely suitable for testing all these grades.

Jet Quenching One Face

O. W. McMullan, chief metallurgist, Bower Roller Bearing Co., Detroit, conducted experiments by jet quenching one face only of tapered or wedge-shaped specimens and taking hardness readings along the other face of the wedge. By taking readings on a face oblique to the quenched face, rather than on one perpendicular to it as in the standard end quench method, the hardened zones are greatly widened. This permits more readings and less error from inaccuracy of spacing. No cutting after hardenability is necessary. The author reported that consistent results have been obtained on several different kinds of steel.

Air Hardening Test

According to research conducted by J. B. Post, M. C. Fetzer and W. H. Westermacher, metallurgical department, Carpenter Steel Co., Reading, Pa., in general the variation in air hardenability of air hardening steels is negligible from heat to heat for a given type analysis. The center cooling velocity of regular shapes during air hardening was shown to be controlled by the area per unit volume relationship and is independent of treating temperature.

The authors described a gradient air hardenability test which enables a determination of the air hardening properties of a given air hardening steel to be made ranging from the equivalent of a 1-inch round by 8-inch cylinder to a 6-inch round by 6-inch cylinder. In most cases it is possible to make a good approximation of the area per unit volume value of the tools to be heat treated. Combining this value with the hardenability of the steel to be used, it is a simple matter to estimate with accuracy the hardness to be obtained throughout the tools by air treatment.

Edward A. Loria, Carnegie-Illinois Steel Corp., Pittsburgh, contributed a paper on the effect of cobalt on the tempering characteristics of carbon-cobalt steels studied by means of hardness measurements. Changes during the tempering of such steels were shown to be similar in nature to those of a plain carbon steel. The cobalt promotes a small increase in hardness following tempering due to its solid solution hardening of ferrite. One steel showed a very slight secondary hardening in 525-725-degrees-Fahr. range, but this behavior was not general.

At the session on surface hardening, a paper by W. E. Benninghoff, manager, and H. B. Osborn Jr., research director,

(*Please turn to Page* 82)

Although exhibitors at the Metal Show de-emphasized the importance of individual company contributions to the war effort, there was considerable interest in war-time improvements in methods, materials and machines. Visitors carried away many ideas for utilization in postwar production

One-Shot

process worked out by J. I. Case Co. in production of 155 millimeter shell produces thin-walled shapes with single stroke of press and provides solution of problems such as metal flow, stroke, punches and dies and lubrication

DEMAND for heavy artillery to smash German concrete, has put the forging of heavy shell once more in the limelight. It will be our purpose in this article to discuss the so-called "one-shot" process as applied to the manufacture of 155-millimeter shell by the J. I. Case Co., Racine, Wis.

Dr. M. D. Stone, chairman of the Special Research Committee of the American Society of Mechanical Engineers on the Forging of Steel Shells, had this to say in a paper presented before the last annual meeting of the society in New York.

"The ultimate in simplicity in shell-forging, as has been said earlier, would involve piercing to completion in one stroke. As early as the last war, attempts along such lines reached commercial proportions. The difficulties presented by attempting to produce a shell in "one shot" are (1) thin walls (2) long pressure stroke, resulting in greater tendency of punch to bend and punch tip to fail and (3) long taper of punch tip, since the punch must conform to the final finished cavity. The consequences of (1) and (3) are greatly to increase the required piercing pressures, which when coupled with (2) will mean greater tendency for lubrication failure and longer time in contact with the hot metal, tend to decrease tool life disastrously, not to mention worse eccentricities and rough cavities."

Dr. Stone proceeds to point out, h ever, that a recognition of the large played by friction in metal flow, ope a way to a successful solution of the herent problems of this process. In war of 1914-1918 the approach consi in a die having a fixed base and a portion which was free to float axially this way friction between the die w and the forging was minimized. H ever, this method proved less than quate to the production of shell hav forge-finish cavities and the closer to ances demanded by the practice of present war. Instead of holding the l and allowing the die wall to float, now fix the latter and permit the bas descend against a controllable resista

Time and Labor Saved

The J. I. Case Co. has met all of difficulties connected with the one-str method in a manner that compares fav ably with the best of any of the ot methods of making 155-millimeter sl forgings, as to investment, man-hours forgings, maintenance, power, final sc losses, and gross steels required. Althou the shell is pierced in one stroke, pressure per square inch required to pie is no greater than good practice by ot methods and is less in most cases. C centricity and cavity finish compare w the best.

As practiced at the J. I. Case Co., process starts out with round-corner

Fig. 1—Billets are unloaded directly from open gondola cars and deposited on the cutoff saw roller tables by means of a bridge crane equipped with dual magnets

Fig. 2—Racks are provided at the saws. The first billet is held in the special holder shown beneath the operator's right hand and deposited on the rack last so that billets from each end of the bar later may be checked by etching

Fig. 3—The two end billets from each rack are etched in the acid tanks shown here

Fig. 4—After etching, billets passing inspection are transported to the forging department on this conveyor

Fig. 5—Billets arrive by gravity at the left side of the heating furnace and are dropped one at a time into the receptacle by a counterbalanced transfer arm to facilitate charging into the furnace

Forging

By ARTHUR F. MACCONOCHIE
Contributing Editor, STEEL

-inch square billets, 14¾ inches long. The corner radius is 1 1/16 inches. The bars me from the steel mills in lengths of feet or less, 25 feet being preferred. weight of the shell billet is 119 nds, plus or minus half a pound. The nace loss is approximately 1½ pounds. finished shell, ready for loading, ighs 78 pounds.

The billets are unloaded directly from pen gondola cars and deposited on the ut saw roller table by means of a rface crane equipped with dual magnets shown in Fig. 1. The billets are sawed length on eight heavy-duty power saws in an average sawing time of minutes per saw.

Racks are provided at the saws (Fig.) to take all the billets cut from one ar of steel. The first billet cut, however, is held in a special holder, seen below the operator's right hand in Fig. 2, where it is held until the last billet is cut. The first and last billets then go to the hot ch, the entire rack being lifted by a ulley hoist and moved to the etching quipment. The two end billets from each rack are transferred to the acid tanks for etching as shown in Fig. 3.

The etching solution consists of a 50-50 mixture of water and hydrochloric acid, maintained at 212 degrees Fahr. Prior to the introduction of the billets into the hot bath, the ends are heated to around 350 degrees Fahr. to accelerate the action. In only 7 minutes an etch can be secured in this way which is equal in quality to a 20-minute etch when billets are cold when introduced.

Following inspection of each pair of end billets, the corresponding racks of billets are ready for removal to the forging shop. This is accomplished by releasing a holding device on the lower end of the inclined rack and allowing the billets to slide on to a drag conveyor at floor level as seen in Fig. 4. On this conveyor the billets travel end to end up a sharp incline to an overhead high point, from which they proceed by gravity to the heating furnace. Virtually all conveyors are installed overhead in order to avoid interference with manufacturing.

The billets arrive by gravity at a point

Fig. 6—This is the etched cross section of a shell forged from a billet in which steel rods were employed to show flow lines of the metal in the forging process

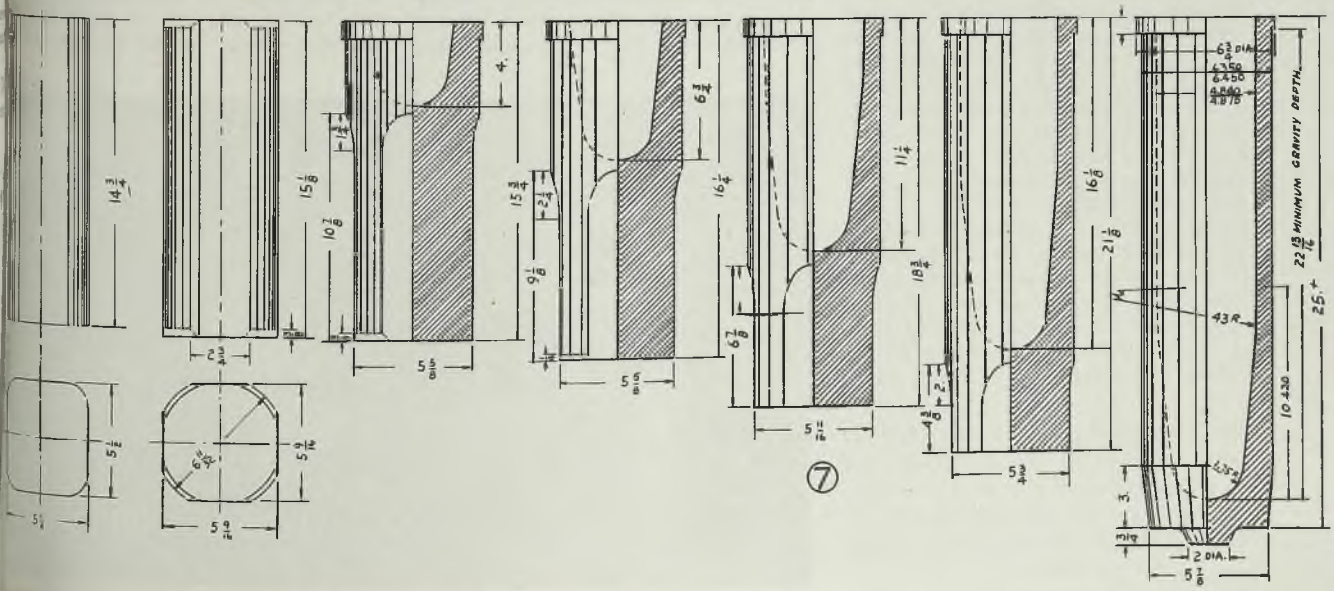


Fig. 7—These diagrams provide an accurate record of what happens during the forging of a 155 millimeter shell. First, is the sized billet; second, the sized and descaled billet; Third to seventh, inclusive, are drawings of specimens made by stopping the press at various stages of the stroke

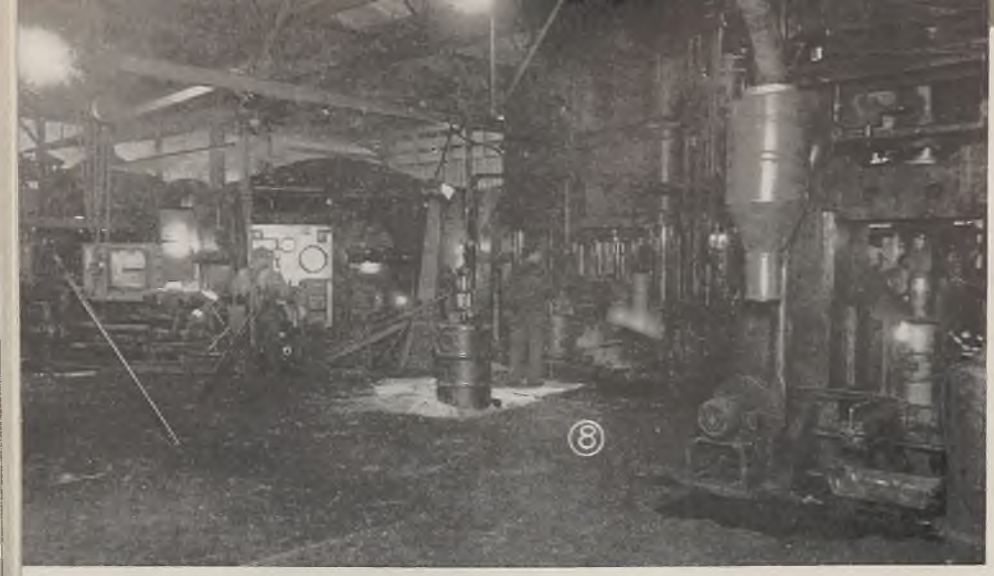


Fig. 8—The general arrangement of forge press and other equipment in J. I. Case Co. plant is shown here

to the left of the front of the heating furnace and at furnace roof level, as shown in Fig. 5. Here the billets are released, one at a time, into the receptacle of a counterbalanced transfer arm. When the operator has released a billet into the receptacle, the weight of the billet causes the arm to descend to the right and deposit the billet on end on the charging platform of the furnace. Release of the billet is automatic, whereupon the transfer arm returns to the loading position automatically.

In its position on the furnace loading platform, the billet is gripped in the jaws of air-operated swiveling tongs under the control of a single operator (Fig. 10) who places the billet on the furnace hearth. The tongs are water-cooled, even to the jaws and hinge pin; and are provided with a counterbalancing bail which, upon actuation, automatically picks up the billet gripped in the jaws. Thus the operator has no lifting to perform except at the instant of pickup. After placing the billet on end on the furnace hearth, the operator swings the tongs to the right and removes a heated billet ready for subsequent processing.

Furnace Is Rotary-Hearth

The heating furnace is of the rotary-hearth type. The hearth is 17 feet in diameter and rotates clockwise. It is fired with No. 3 fuel oil. The hearth has a capacity of 37 rows of 6 billets in each row, making a total of 222. The temperature is maintained at 2280 degrees Fahr., plus or minus 20 degrees, the billet on removal being around 2250 degrees. The heating time at the minimum is 1 hour and 40 minutes.

The nine burners of the furnace are so arranged that the flame enters the chamber in an upward and tangential direction to the furnace wall, and the height of the burner is such that there is no direct flame impingement on the billets. The component of flame travel, due to the angular disposition of the burners is opposed to the direction of hearth travel. The furnace walls are of insulating firebrick, and the hearth is laid with a special tile of high grade fireclay refractory. Scale is removed once daily with a hoe.

In operation, the heated billet is picked up from the furnace hearth as shown in Fig. 10, swung to the right and deposited in a transfer bucket or receptacle for transfer to the descaler. To minimize scaling, this transfer from the furnace hearth to the receptacle is performed within a metal shield. When the billet has been placed in the transfer bucket, the arm supporting the latter is tipped over 90 degrees in order to deposit the billet in line with the descaler ram.

A pair of cupping dies now move into position from below and contact the billet ends as illustrated in Fig. 11. The descaler ram now upsets the billet, chamfering the corners and cracking the scale in the process. Thereafter the ram retracts, the cupping dies drop down; and the ram again advances pushing the billet through the sizing rolls shown in Fig. 12. In addition to sizing the billet accurately for the forging die, this operation provides a second and thorough descaling.

Emerging from the sizing rolls, the billet drops into a receptacle on the end of a transfer arm, which swings through a vertical arc of 180 degrees and places the billet directly over the die of forging press seen in Fig. 13. The op tor now scrapes the upper end of billet to remove any secondary sc and applies a dry mixture of salt, grap and mica—about one heaping teaspc ful per billet. The interior of the pc lubricated with a spray of Houghton's 181, diluted with paraffin oil on a 5(basis. The billet then is dropped into open bottom die and rests in the mc of the tapered boat tail section. The t perature of the billet is now about 2 degrees Fahr.

The first movement in the forging o ation is the rise of the lower arm thro the bottom of the die and the carr of the billet up to the initial forging p tion in which the upper end of the b extends into the counterbore of the g per ring. The punch now desce expanding the metal into the gripper and forming a collar which serves locate the billet during the subsequ pierce.

Stops Permit Finish Forming

As piercing progresses, the for elongates and the lower ram desce against hydraulic pressure which is trolled by a spring loaded relief v actuated by a cam rail, fastened to press platen. At the end of the st of the press, the lower arm reache positive stop, thereby permitting finish forming of the shell, including boat tail and centering lug.

Fig. 7 provides an accurate record what happens during the forging of millimeter shell by the one-shot proce First is the sawed billet; second sized and descaled billet; from third seventh, inclusive, are the drawings specimens made by stopping the pr at various stages of the stroke, fron pierced depth of 4 inches to the finish shell. It should be especially noticed t in each stage the disappearance of flats on the sides of the billet bears definite relation to the bottom of

Fig. 9—Following shot blasting, the forgings are given a final inspection and moved by means of this special handling device to a roller conveyor outside the building which deposits them in open gondola cars

pierced cavity, thereby indicating that no "slugging" and no rearward extrusion has taken place. This may be explained by the fact that only about 20 per cent of the total pressure is carried by the base, the remainder of the resistance being distributed along the body of the punch. The nature of the flow of metal during the action is shown in Fig. 6. The success of the modern approach to the solution of one-shot shell forging lies in careful consideration of the flow of the steel.

Details of Press Set-Up

Fig. 8 presents a general arrangement of the forging press and other equipment. Under the press two dies are mounted in a carrier which rotates through an angle of 180 degrees. When one die is ready for loading, the other is in forging position under the press ram. The press has four punches, mounted on an indexing punch holder, which indexes automatically on the upstroke. While the operating punch is in the forging position, the four punches preceding it are positioned over a coolant tank, containing a mixture of water and aquadag and the fifth over a lubricant tank containing Houghton's No. 181, full strength. Under this arrangement, each punch gets four cooling immersions and one for lubrication.

The die consists of an alloy steel water-cooled die body, lined with ⅜-inch of cast iron in the straight cylindrical section. At the upper end this liner is clamped in a gripper ring, also of cast iron. The lower end is held by the section which forms the boat tail. This is made of alloy steel. It is this boat tail section which prevents the billet from falling through the die when first placed in position for forging.

In removing the finished forging from the press, an ejector rises through the bottom of the die, raising the forging so that it may be gripped by the tongs suspended from the monorail. As the pierced shell is removed from the forging press, its temperature is approximately 2060 degrees Fahr. Gripped in the monorail tongs, the forging coasts under gravity to the next operation in a sizing press. This is, in a measure, a coining operation, inasmuch as the shell cavity is left shallow by about ¼-inch.

From the sizing press the forging is lifted by a pair of tongs, transported on the monorail and unloaded into an unbalanced tilting device which tips to a stop at a convenient angle for cavity inspection. Scale is blown out by an air jet. After making the inspection, the operator removes the stop to permit the shell to drop on to a power-driven roller conveyor (Fig. 14). This conveyor is hooded and contains a blower to hasten the removal of heat.

On this conveyor the shells roll to an inspection station where each is removed and checked for concentricity, cavity depth and base thickness. The testing device is so arranged that it functions as a handling medium to transfer inspected shells from the roller conveyor to a ram-type push up, installed as part of an overhead gravity system on which the shells travel end to end to a shot blasting and inspection loft in another section of the building. On arrival at this point a special handling device lowers the shell and deposits it on a conveyor with the cavity facing the inspector.

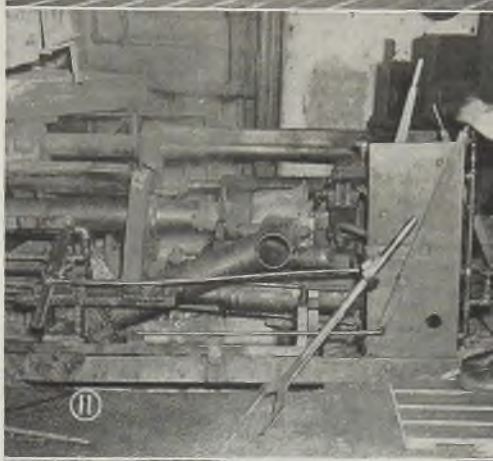
Following shot blasting, shells are inspected for cavity finish and checked for cavity diameter and cavity base contour. Inspection having been completed, the operator turns the shell through 90 degrees and drops it on to a special handling device seen in Fig. 9 which, when actuated by the foot pedal, elevates the shell to pass it through the wall of the building to a gravity roller conveyor, supported by the building and overhanging three gondola freight cars on a switch. The shells roll down the conveyor side by side and can be dropped into any one of the three cars by removing three of the conveyor rolls. The cars move the shells from this point to another Case plant in Racine for machining and finishing.

Special Cast Iron Punches

Punches for the piercing press are made of cast iron having the following composition: Total carbon, 3.00 per cent; nickel 1.50; chromium, 0.50, molybdenum, 0.50 and manganese arround 0.70. Noses are centrifugally cast from cupola metal, while sleeves are cast from electric furnace metal. Sleeve and nose are supported by a steel mandrel for rough machining and finish grinding. After the first few forgings are made with a punch, it heat checks and grows. This growth makes regrinding possible. The average production with a new punch is 700 shells. Another 700 can be made after regrinding.

The die lining and gripper ring are also

(*Please turn to Page* 126)



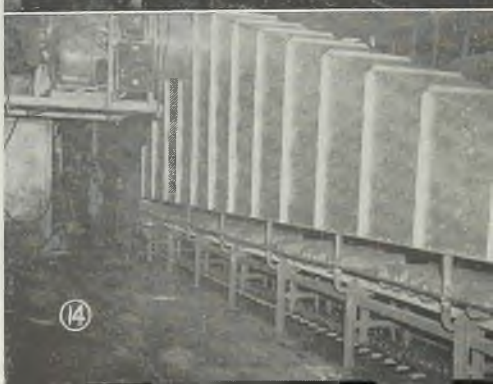


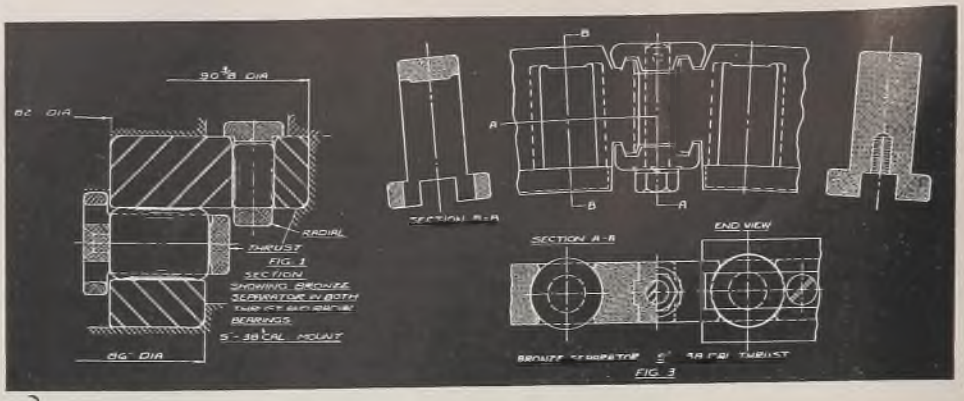
Fig. 10—Air operated swivel tongs are used by operator to charge and unload billets from the furnace

Fig. 11—Heated billets are transported to this machine for descaling by upsetting

Fig. 12—As the billets emerge from the descaler, they are sized on the rolls shown here

Fig. 13—Fully descaled billets are moved by means of a transfer arm directly over the die of the forging press

Fig. 14—After inspection, the finished forgings are dropped on this power-driven roller conveyor which is hooded so that heat may be removed by a blower



Figs. 1 and 3—Original design of separators for thrust and radial bearings

Redesign Bearing Separators...

to lighten weight of Navy equipm

Channel-shaped, rolled steel bearing retainer rings and gun-mount bearing separators of alternate material effectively reduce overall ship weights to permit heavier armor plating

By S. R. THOMAS
Chief Engineer
Bantam Bearings Division
Torrington Co.
South Bend, Ind.

THE Bantam Bearings Division of The Torrington Co. was called upon by the Navy Department to investigate the matter of gun mount bearing separators. It was desirable to reduce weight to a minimum. Development of more powerful guns made heavier armor imperative. To carry more armor, it was necessary for ships to be lightened otherwise. With the same armor, increased ship speed was impossible without eliminating all possible weight.

The purpose of a roller bearing separator is to space the rollers of a bearing and retain them in fixed relationship to each other so that they may properly function upon their roller paths, the hardened and ground surfaces between which the rollers operate.

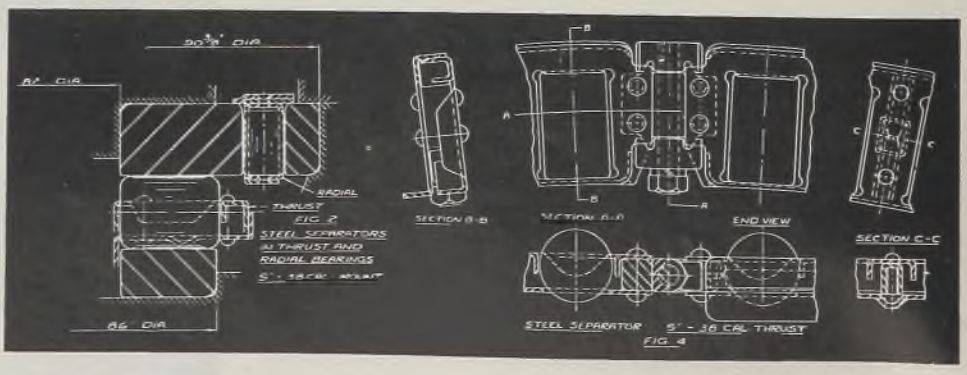
Work was started in designing a light pressed steel cage for the 5-inch, 38-caliber, single gun mount thrust bearing. This principle was next applied to the 3-inch, 50-caliber gun mount in both thrust and clip bearings. After conference with the Navy Design Section a contract for stamped steel pilot mount separators was placed. These were built and tested in their respective mounts by the Navy and approved with minor changes in the case of the thrust bearings for the 5-inch mount and with no changes in either of the bearings for the 3-inch mount.

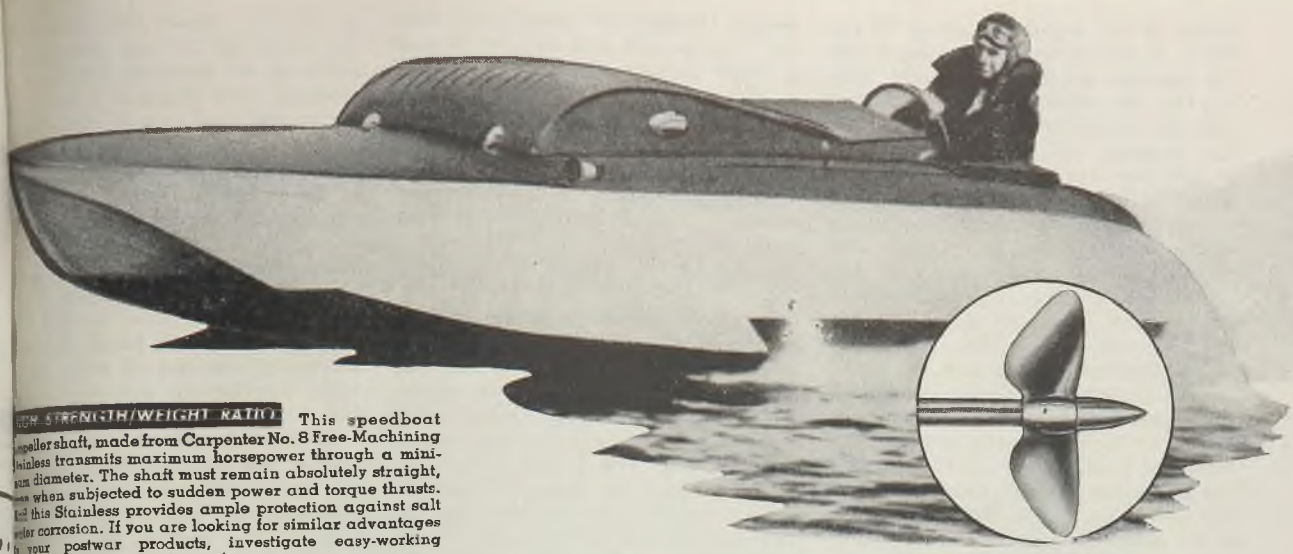
For the balls of the 40-millimeter Bofors azimuth bearings, a rolled, channel-shaped steel retainer ring was created. Rings were rolled from flat strip steel, holes perforated for ball pockets, and ends welded.

Separators presented the only part of the bearings that could be lightened, as the race rings were already as light as was consistent with their duties. Development of the 5-inch, 38-caliber single gun mount was chosen first, because of its wide use, and also because it happened to be the principal equipme the particular type of ship under struction. The thrust cage offerec best chance to find out what coul done in the way of weight saving. A grammatic sketch (Figs. 1 and 3) s original assembly of both the thrust ing and also the radial bearing bronze separators. The sections o thrust bearing, of which there are are held together by clamps as trated. Here, also, are shown se sections. Each roller pocket fully closes the roller and the cage weig carried on the rollers. The section made as such, to facilitate handlin it will be noted the assembly i large diameter, approximately 87 in

Complete weight of the eight sect as cast is 224 pounds. The eight tions finished, plus eight clamps to m one complete assembly, weighs pounds. Diagram at left in Fig. lustrates both thrust and radial arators of the new design. Secti plan view is shown of the steel sta ing development at right, Fig. 4 tions at various points also are sh to more clearly illustrate the const tion. This thrust separator comp with eight sections and clamp assemb weighs 54 pounds. Thus a weight ing was made in this one thrust

Figs. 2 and 4—Redesigned separators in pressed steel



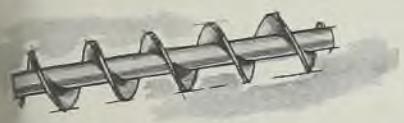


HIGH STRENGTH/WEIGHT RATIO. This speedboat propeller shaft, made from Carpenter No. 8 Free-Machining Stainless transmits maximum horsepower through a minimum diameter. The shaft must remain absolutely straight, even when subjected to sudden power and torque thrusts. And this Stainless provides ample protection against salt water corrosion. If you are looking for similar advantages in your postwar products, investigate easy-working Carpenter Stainless Steels now!

You get corrosion resistance, plus these...

SPECIAL PHYSICALS

with Carpenter Stainless Steels



WEAR RESISTANCE. Stoker worms like this in thousands of homes and industrial plants can be installed and forgotten. Carpenter Stainless Steels Nos. 4 & 6 provide the wear and corrosion resistant qualities necessary to keep them constantly on the job.

HEAT RESISTANCE. Carpenter Stainless No. 4-Ti or No. 4-Cb used in aircraft exhaust manifolds like that shown above, are typical of a variety of Stainless grades that meet specific high temperature service requirements.

Have you considered the many advantages that can be obtained for your new or redesigned products through the special physical properties provided by Carpenter Stainless Steels? Right here may be the answer to giving your postwar products greater utility, broader sales appeal.

Carpenter, as pioneer in the development of soft and ductile Stainless Strip and inventor of Free-Machining Stainless bar stock—has always made a specialty of producing Stainless Steels to do specific jobs. Our experienced representatives can help you select the Carpenter Stainless grades whose physical properties most fully meet your requirements. Careful laboratory control and exacting inspection assure uniformity, lot after lot, in the Stainless you receive.

Call in your nearby Carpenter representative now and take full advantage of his diversified experience in helping to get the best results with Stainless. But do it today, for planning time is getting short.

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

Carpenter STAINLESS STEELS

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

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

arator of 122 pounds, or almost 70 per cent. It will be noted from sketch that the separator is not carried on the rollers, but rides on projecting shoes stamped into the lower plate, and which contact the raceway. It requires little effort to turn this separator with its rollers in place. Thirteen gage metal is used in both the top and bottom stampings of this separator, and an extremely stiff and rigid section results. It is kept concentric with the race rings by a vertical flange drawn downward from the lower stamping—see Section BB.

Development of the 5-inch, 38-caliber radial separator in pressed steel followed the approval of the thrust separator and they are closely related in design. The rollers at assembly are kept from sliding completely through their pockets to the outside by the narrower perforations in the outer stamping. The bronze separator was made in four sections weighing 35½ pounds each as cast or 112 pounds per bearing. As machined, this weight becomes 92 pounds per bearing. The pressed steel assembly is made in eight sections of 4½ pounds each, or 36 pounds per bearing, a saving in weight of 56 pounds or 61 per cent. Upper and lower halves of the 3-inch, 50-caliber mount are held together by brass rivets. Inverted "U" shaped spaces, similar to those in Section CC, separate them.

No Top Projections Needed

It will be further noted that no top projections are needed on this separator to prevent its "float" because the roller pocket perforations in the lower stamping are of less width than the diameter of the rollers. As the rollers are straight, they naturally tend to run tangent to the roll paths of the races, therefore flat contact surfaces are provided for the outer end as well as both sides of each roller. These are merely formed lips as shown in Fig. 4. Before assembly of the halves of each section, parts are heavily zinc plated, thus circumve the probability of any subsequen action of the electrode, had the ri assembly been plated as a unit. ing of the steel cage is similar to of the bronze type. The pressed separators are made in several se as stampings and alternate top and tom sections are staggered at asse to provide joining to the adjacent These overlapping sections are w together to form one complete rin parts as well as those for the 5 38-caliber mount are heavily zinc p to prevent rust and all rollers are vided with flat side and thrust end tacts.

In pressed steel, the larger (or bearing separator) weighs 7 pound the smaller 4½ pounds. These s ings are made from 16 gage stock their box-like sections give rema rigidity. Critical materials of c and zinc are, outside of the rela few rivets, replaced by sheet steel.

Proper Joint Design

Essential for Sound Welds in Aluminum

ALUMINUM has certain characteristics that require welding techniques, design, preparation, and finishing that are quite different from those for welding steel.

It has three properties that may be troublesome. First, it does not give warning that it is approaching the welding temperature by a distinguishable change in color, but collapses suddenly upon reaching the melting point. Second, it is hot-short, or weak when hot; therefore, all areas that will be heated appreciably, either by the actual flame or by the rapid conductivity of the metal, should be supported during welding. Third, the oxide coating from which aluminum derives its corrosion resistance must be removed in order to make a sound weld. This oxide has a higher melting point than the base metal, but it will combine with a suitable flux and form a fusible slag that floats on the puddle during the welding action and can be readily removed.

Butt-type joints are satisfactory for welding aluminum sheet that is 16-gage or thinner. This type of joint design requires only that the edges be straight and square.

Flange-type joints are preferable for welding aluminum sheet which is 16-gage or thinner. The flange should be about the same height as the thickness of the sheet or slightly higher. The flange can be turned up by means of a bending brake or it may be prepared by hammering the edge over a steel block while the sheet is clamped, using a wooden mallet.

Notched butt-type joints are used for sheet aluminum from 15- to 5-gage in thickness. The edges of the sheet are notched through their entire thickness about 1/16-inch deep and about $\frac{3}{16}$-inch apart. The notches, such as those sketched in Fig. 1, can be easily made with a hammer and cold chisel. Notched edges aid in obtaining full penetration and the flux has a better chance of working down to the full thickness of the material. In addition, there is less chance of melting holes through the sheet and the notches act as small expansion points to prevent local distortion.

Lap-type joints are not recommended for aluminum unless no other type of joint can be used. A single lap should never be used as it is practically in sible to remove the flux and oxide ticles that have been left along th closed side of the weld in this ty joint. If it should be necessary to a lap-type joint, a double lap wel be used. Both overlapping edges s be welded completely to the adj metal and the ends of the joint shou sealed by welding so that no mo can get in between the overlapped p Thus the area that cannot be thoro cleaned of oxide and flux is seale from the air.

The single V, notched butt-type j (see Fig. 1) are used for welding al num plate between $\frac{1}{16}$-inch and $\frac{1}{8}$- thick. The plate edges should be be to form a V having an included a of 90 degrees. A square shoulder of a 1/16-inch to ⅛-inch should be le the base of the V. This shoulder sh be notched before welding in the s way as was done for the aluminum s

Double-V, notched butt-type j should be used for material that is thi than $\frac{1}{8}$-inch whenever welding can done from both sides. The inclu angle for each bevel should be 90 grees, and an unbeveled shoulder of 1/16-inch to ⅛-inch should be lef the center of each edge. These unbev shoulders should then be notched.

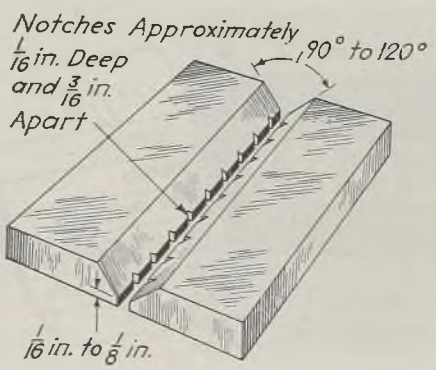


Fig. 1 (Left)—V-notched butt type joint prepared for welding aluminum plate. Illustrations and data from Oxy-Acetylene Tips

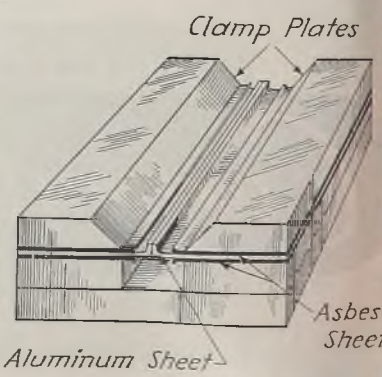


Fig. 2 (Right)—Jig with asbestos to minimize weakness, distortion and buckling

AMERICAN SOCIETY FOR METALS

Technical Proceedings

(*Continued from Page* 73)

of Tocco Division, Ohio Crankshaft Co., Cleveland, had for its purpose the presentation of data and information to serve as a guide in the selection of the correct frequency as well as approximate time cycle to accomplish a certain result in induction heating. Stress has been put on the 9600 cycle motor-generator equipment because it occupies the leading place in industry and is adaptable to a wider range of applications than other frequencies and is not hampered by power limitations.

The authors pointed out that conversion of the available induction heating equipment to postwar work is of extreme importance today. Equations given were simplified to permit use by the layman and all control data must be applied knowing that the variations in metallurgical structure and their behavior will often necessitate modifications. However, with the full knowledge of limitations, one can quickly arrive at cycles for standard production and hold to close tolerance limits.

D. L. Martin and Florence E. Wiley, research laboratory, General Electric Co., Schenectady, N. Y., presented results of an investigation of the effect of temperature, composition and prior structure upon the induction hardening characteristics of plain carbon steel. The basic metallurgical principles of induction hardening were observed to be no different from those for conventional hardening methods. Properties of induction hardened steel frequently are different but that is due to the surface layer of martensite and the lack of nomogenization in the austenite.

Maximum Heating Temperature

Maximum heating temperature was found to be the important variable in induction hardening. To obtain satisfactory properties, it is necessary to heat the steel to a high temperature where diffusion of carbon is rapid. Increasing the carbon content facilitates formation of austenite during induction heating, and increases maximum hardness in the quenched samples. Distribution of cementite in the ferrite matrix greatly influences hardening characteristics. A sorbitic structure was found to transform to austenite at a lower heating temperature than either a furnace cooled or air cooled structure.

Shot for metal peening was discussed by Oscar E. Harder, assistant director, and James T. Gow, assistant supervisor, Battelle Memorial Institute, Columbus, O. Materials known to have been used include chilled iron shot of the type used in metal cleaning, malleableized iron is too soft. Heat treated shot is subjected to heating to decompose the massive carbides and cooled so as to produce different hardnesses in the range of 200 to over 500 brinell equivalent, or may be quenched to a martensite structure and then tempered to hardness.

Heat treated shot has improved resistance to fracturing in service, according to the speakers, and can be produced in hardness ranges suitable for the majority of metal peening applications but may find limitations with materials of high hardness such as about 50 to 55 rockwell C and above, because as the hardness of the shot is increased into this range there is a loss in toughness. Steel shot is not known to be available and burnishing balls and ball bearings are costly.

PHYSICAL PROPERTIES

At a session devoted to physical properties, C. L. Clark, research metallurgical engineer, Steel & Tube Division, Timken Roller Bearing Co., Canton, O., and J. W. Freeman, research engineer, department of engineering research, University of Michigan, Ann Arbor, Mich., reported results obtained from a metallurgical examination of 18-8 chrome-nickel cracking still tubes which had been in service for periods ranging up to 97,520 hours. In the "as-service" condition, these tubes possessed entirely different characteristics—some were still ductile on the basis of the flattening test, others were brittle but could have their ductility restored, while others were permanently brittle.

On the basis of results obtained in the investigation, the authors believe that the deterioration and possible actual failure of tubes in service is due to structural changes at the grain boundaries which are progressive in nature and are dependent on time, temperature and stress. These structural changes consist first of the precipitation and growth of highly alloyed ferrite due to the decomposition of austenite. When these precipitated areas have grown to a certain size, cracking, at first nearly submicroscopic in nature, will occur under certain conditions of time, temperature and stress. When this cracking has occurred, the tube is permanently brittle but at any time prior to the cracking the tube is either ductile or can have its ductility restored.

Capillarity of Surfaces

As a result of an investigation on the capillarity of metallic surfaces, E. R. Parker, University of California, Berkeley, Calif., and R. Smoluchowski, research laboratory, General Electric Co., Schenectady, N. Y., conclude that liquid metal spreads best on finely ground or on polished and etched surfaces both of which have fine capillary structure; it does not spread on polished surfaces under the same conditions.

The authors pointed out that certa phenomena observed in brazing co ing operations can be correlated roug on the basis of a simple considerati of surface energies and geometrical f tors. They showed that the balance changes of the solid-liquid, solid- and liquid-air surface energies depe upon the capillary roughness of the n tallic surface. Experiments were ma with liquid silver spreading on vario ly treated 6 per cent molybdenum i surfaces at 2190 degrees Fahr. Groo of 60, 90 and 120 degrees were n chined in the surface.

MELTING AND SPECIAL ALLOY

Strain aging of low-carbon steel mel in an induction furnace, deoxidized w silicon, aluminum or titanium, and for from small ingots, was studied by Geo F. Comstock, metallurgist, and J. Lewis, associate metallurgist, Titani Alloy Mfg. Co., Niagara Falls, N. They reported the results as affected differences in forging practice and h treatment, as well as by different deo dation.

The three methods of testing were (the work brittleness method, involvi impact tests after cold drawing with a without subsequent aging; (2) imp tests after tensile straining, with a without aging; and (3) brinell hardn tests at increasing temperatures up 500 degrees Fahr.

According to the investigators, th methods gave results in close agreeme the work brittleness test being prefer as the most informative. Strain aging e brittlement can be eliminated as eff tively with titanium deoxidation as w aluminum, if sufficient titanium is use Minimum amount required to equal 2 3 pounds of aluminum per ton depen on the forging practice and heat trea ment, 15 pounds of ferrocarbon-titaniu per ton being effective generally, a though 10 or 12 pounds per ton appe to be sufficient with the best conditio of forging and heat treatment.

Electric Melting Problems

Basic electric melting problems high quality alloy steels were discusse by A. L. Ascik, metallurgical engine and superintendent of steel plant, Sor Industries Ltd., Sorel, Canada. Aft taking cognizance of the lack of agre ment between steelmakers as far as stan ard melting procedure is concerned, an pointing out that heterogeneity of th ingot is not always clearly shown b photomicrographs and photomacrograph and, particularly, that this property not measured by figures, the speake took as a determining basis of this hete rogeneity the difference between th longitudinal and transverse physica properties found in the forged ingots an described the influence of the meltin method on this heterogeneity.

Mr. Ascik then defined and discusse white and carbide slags, their chemica and physical advantages and disadvan tages, the decisive influence of the physi-

The Cold Metal Products Company has proved that it can supply ... consistently ... unvaryingly ... light gauge precision cold rolled strip steel of required physical characteristics in any temper and a variety of finishes. You can be confident in your purchasing ... as are hundreds of others ... that CMP gauges, widths, and physicals ALWAYS run true to specification. And while we consider it no reflection on our product to have shipments tested, we feel sure that sooner or later you will grant that such examinations are simply routine.

CMP Precision makes manufacturing processes easy to control, protects dies and intricate machinery, and guarantees to your consumers a uniform product. Write today for literature.

CMP PRECISION COLD ROLLED STRIP STEEL

GIVES MAXIMUM PRODUCTION PER TON

THE COLD METAL PRODUCTS CO.

SUBSIDIARY OF THE COLD METAL PROCESS CO.

YOUNGSTOWN, OHIO

cal processes on the quality of steels, the solution of nonmetallic particles in the fluid steel at a high temperature and the fact they are not precipitated when the steel solidifies in the ingot molds. In conclusion, he asserted that addition of aluminum is harmful to the cleanliness of steel and a high silicon content is helpful to surface condition of the ingots.

TOOL STEELS

In view of the general usage of low temperatures for dimensional stabilization of heat treated gage steels, it becomes essential to obtain a more precise picture of the subatmospheric decomposition of retained austenite than is available at present.

In a paper on this subject, Stewart G. Fletcher, research associate, and Morris Cohen, associate professor of metallurgy, Massachusetts Institute of Technology, described a combined X-ray and dilatometric procedure for making a quantitative study of subcooling transformations.

The authors presented detailed charts to show the extent of austenite decomposition as a function of subatmospheric temperature and time of prior aging at room temperature. Room temperature aging lowers the temperature at which the retained austenite starts to transform and reduces the amount of decomposition attained by cooling to any selected temperature. However, the cooling transformation continues down to minus 250 to 260 degrees Fahr., irrespective of the aging treatment.

Ordinary vs. Sub-zero Hardening

Effects of cooling to sub-zero temperatures on hardened molybdenum high-speed steel have been studied by dilation, specific volume, hardness, static torsion, mutual indentation hardness tests at elevated temperatures, and by metallographic examination and tool performance tests. A paper contributed by Ralph G. Kennedy Jr., research metallurgist, Cleveland Twist Drill Co., Cleveland, reported on the study of effects on physical properties of such factors as the sub-zero temperature reached, the time of holding at this temperature and the time of aging at room temperature before sub-zero cooling.

The effect of sub-zero cooling before and after tempering was examined in conjunction with the usual heat treatment variables of hardening temperature, tempering temperature, and quenching temperature attained before tempering. Tensile, torsion and transverse bend tests were made with specimens from the same heat of high-speed steel to furnish correlation factors with which the static torsion test results of the present experiments could be compared with results of tensile and transverse bend tests previously published for various types of high-speed steels. Tool performance tests in which all variables were controlled as closely as possible were run with ordinary hardening comparing to various types of sub-zero hardening.

John McIntyre, manager, heat treating department, International Business Machines Corp., Rochester, N. Y., described experimental work on the cyaniding of three types of high-speed steel prior to hardening. Hardness values of rockwell C 68-70 were obtained throughout sections of 1-inch diameter. Following a cyanide treatment at 1450 degrees Fahr. for 1½ hours, the experimental pieces were hardened and tempered in accordance with normal high-speed practice. It was found that pieces retained hardness values of C 70 with drawing temperatures as high as 1150 degrees Fahr.

Tools treated in the manner described showed unusually long life in production service during an 8-month period. Photomicrographs of structures obtained in the experimental pieces showed a marked difference from structures obtained by hard casing procedures as applied to high-speed steel. With this work as a beginning, the author is making further studies.

FRACTURE AND GRAIN SIZE

Fractography is the name applied by Carl A. Zapffe, assistant technical director, and Mason Clogg Jr., assistant metallurgist, Rustless Iron & Steel Corp., Baltimore, to the technique of studying untouched cleavage facets at high magnification. They contend that as a supplementary metallurgical tool, fractography by definition offers many of the advantages of single-crystal methods, since the field is oriented about the cleavage plane; the field is nascent and untouched and therefore reveals much of the internal structure of the grain which cannot be seen after polishing and etching; the plane of weakness, which is often the plane of greatest interest, becomes ipso facto the field of observation; time may be saved by avoiding mounting, polishing and etching; and tiny chips and otherwise unusable fragments are suitable for fractographic examination. As a research tool, fractography has especially interesting aspects, for cleavage facets abound in detail, most of which remains to be explored.

Cleavage Patterns of Alloys

In a companion paper on cleavage structures of iron-silicon alloys, the same authors pointed out that the cleavage patterns, or fractographs, of these alloys, besides being useful as supplementary metallographic information, resist explanation on classical grounds of deformation and cleavage and clearly point to the pre-existence of an intracrystalline imperfection structure which must exert a tremendous influence upon the entire nature of the material.

The method of fracture studies has been applied to examination of the physical characteristics of "hard soldered" joints. A paper by F. Berman, research assistant, and R. H. Harrington, research metallurgist, General Electric Research Laboratories, Schenectady, N. Y., described an investigation in which small pieces of copper were soldered end to end under various conditions, and were bent at the joint to encourage fracture.

In the case of vacuum application heating of the joint in air in the r of 930 to 1290 degrees Fahr. will subsequent fracturing disclose oxi surfaces, indicative of joints that w leak. In any case, much can be lea from the exposed fracture surface conjunction with metallographic e ination and occasional leak tests. investigation showed, relative to vac tight assemblies, that some coppe copper joints are best made with e tic silver-copper alloy by solderin 1470 degrees Fahr. rather thar the conventionally higher tem tures.

Grain Shape and Growth

Arguments were presented by I Harker, research laboratory, Ge Electric Co., Schenectady, N. Y., Earl R. Parker, college of engine University of California, Berkeley, C to demonstrate that the ability of a to show grain growth depends not on grain size but only on grain s When all grains in a metal have faces making 120-degree angles adjacent faces, there can be no growth, no matter what the grain Distribution of the angles at which boundaries meet on the surface of a allurgical specimen provides a crit for the growth stability of its grain ture. This distribution is calculate the ideal stable structure in which 120-degree angles exist between adj faces.

The authors showed experime that the distribution of grain bou junction angles approaches the calcu one as a metal is annealed, no m what the final grain size. Some s mens show grain growth on anne others do not, but the grain shape al approaches that of the ideal s structure.

ROLLING AND GRAPHITIZATI

Investigation of the behavior group of iron binary alloys has extended to include study of the resp to strain hardening by cold rolling the behaviour of the cold-rolled during annealing. Charles R. A professor of metallurgy, and R. W. I say, assistant professor of metall Pennsylvania State College, State lege, Pa., and Louis A. Luini, mat laboratory, Wright Aeronautical C Paterson, N. J., presented data for alloys of iron with nickel, chrom cobalt, silicon, manganese and moly num. These alloys were reduced thickness by 5, 20, 40, 75 and 90 cent and the cold-rolled alloys were nealed subsequently at temperat ranging from 625 to 1400 degrees F employing a constant annealing p of 1 hour at each temperature.

The authors indicated results on alloyed iron to be in agreement other investigations upon the subjec cold working and annealing of m and alloys, as regards the effect of amount of deformation and the proc

STERLING

Tomorrow's *"Wheels of Industry"* *Are Being Created* Here Today!

The pioneering spirit that started the manufacture of Sterling Grinding Wheels over a half-century ago still lives in the modern laboratories of our company. Here, technicians are studying new ways to advance the quality of the "Wheels of Industry" even higher than it is today!

It is a continuous process—this laboratory development of items and methods new to grinding departments in all types of industry. That is why your Sterling Grinding Wheels always seem to possess the latest advancements . . why your grinding seems easier and costs lower when Sterling is working for you.

Sterling's reprinted Catalog 44 is just off the press . . write on your letterhead and this big book full of important grinding data is yours for the asking.

Post-war problems are going to find us ready to solve them. Already, in our laboratories, we have found many new ideas that are going to mean better grinding of the new alloys which peace is going to bring. You can place confidence in Sterling's technical development; it is going places these days!

Ask for the free, on-the-job advice of a Sterling engineer. If necessary, your problem will be handled by both our advisory committee and our laboratory staff. Then, it will be translated into the correct combination of grain, bond, structure, size, and shape that finally becomes the finished Sterling Grinding Wheel . . tailor-made to your specific requirements! May we serve you?

• STERLING ABRASIVES •

THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

es of recovery, grain growth and recrystallization. In most cases the binary alloys behaved similarly to unalloyed iron in their response to cold rolling. There were significant differences in behavior during annealing, with molybdenum, chromium and manganese being effective in displacing the softening of the cold-worked samples to higher temperatures in comparison with the softening temperature of iron.

Cold Rolling Hadfield Manganese

In a paper on the effect of cold rolling on the structure of Hadfield manganese steel, Norman P. Goss, research metallurgist, Cleveland, reported that X-ray surface diffraction diagrams of cold-rolled 14-per cent manganese strip steels given a reduction of 87 per cent remained austenitic. Diffraction lines due to alpha iron could not be observed on the diffraction patterns. X-ray technique was adjusted so that the intense (110) line of the alpha iron could be detected if present.

In view of the evidence, Mr. Goss said it is believed that the extreme hardness attainable by cold rolling is due to the smallness of the crystallites as suggested by Niconoff. Maximum hardness obtainable by cold rolling is of the order of rockwell C-58.

Previous researches in a series of papers have demonstrated the effects on graphitization of carbon steels of certain factors such as method of manufacture, chemical composition, martensitization prior to annealing, and internal oxidation. A new investigation by Charles R. Austin, professor of metallurgy, Pennsylvania State College, State College, Pa., and M. C. Fetzer, research metallurgist, Carpenter Steel Co., Reading, Pa., throws more light on the effects of both mechanical treatment and of thermal treatment above the critical, prior to subcritical graphitization, and develops the role of environment on the progress of graphite formation.

Martensitization of Carbides

Importance of martensitization in rendering the carbides unstable has been confirmed and the concept of increased solubility of a phase promoting graphitization appears to have received further direct support. It has been shown that while compressive stresses have little effect, tensile stresses may profoundly increase carbide instability as revealed by subsequent tempering.

The role of atmosphere also received experimental consideration and it is clear that while the presence of oxygen in the environment used in tempering promotes graphitization, the increased susceptibility is dependent on prior austenitization followed by rapid cooling. Indeed, the furnace atmosphere during graphitization has been shown to play a part as demonstrated by peripheral rein effects on subsequent subcritical treatments.

Results obtained by Messrs. Austin and Fetzer appear to lend strong support to the suggested role of aluminum (calcium and silicon) oxide in promoting subcritical graphitization, when present in suitable form and suitable degree of dispersion.

RADIOGRAPHY AND TESTING

The Tukon and Eberbach testers have extended the range of hardness tests to small areas, thin surface layers and brittle materials. In a paper comparing microhardness indentation tests, Dougles R. Tate, engineering mechanics section, National Bureau of Standards, Washington, stated that indentation numbers obtained with these machines are not, however, independent of load—a fact which makes advisable an examination of the reasons for this lack of uniformity.

Summing up his investigation, Mr. Tate said that both the Tukon and Eberbach testers are satisfactory devices for applying indenting loads of 1000 grams and less. The former can be used with both Vickers and Knoop indenters when a suitable adapter is provided, and the two machines give results in good agreement for indenting loads of 200 grams and greater. There is reason to believe, he continued, that the Knoop number of a specimen increases with decreasing loads due to elastic recovery in the long diagonal. This would occur in a perfectly homogeneous specimen, although some famous surface hardening is probably always present. The results of an indentation test made at low loads must be regarded from the operational viewpoint. They are functions dependent on the indenting and have little meaning without specification of the load.

Double-Exposure Radiographs

To overcome the decreased sensitivity inherent in double-exposure radiographs, James Rigby, radiologist, Ford Motor Co. of Canada, Windsor, Ont., described work in which return was made to the stereoscope method of exposing two separate films. That precise measurements might be made of the shift of a flaw image to determine the vertical position of the flaw, the image of a lead marker was used as a reference point. The measurement then may be corrected for the known shift of the marker image and used as in the case of double-exposure radiography.

In experiments with cast aluminum and steel blocks up to 2 inches thick, Mr. Rigby found that the consequent increased possible error in measuring the image shift does not appreciably alter the accuracy with which the position of the flaw is determined. Sensitivity is improved from 4 to 1 per cent, while errors in results remain, in most cases, much better than 10 per cent of the specimen thickness. Maximum possible error in the actual measurements is calculated at about 14 per cent. Tests with actual production specimens gave similar results.

Interpretation of radiographs, particularly of aircraft parts, was the subject of a paper by Leslie W. Ball, assistant technical director, Triplett & Barton Inc., Burbank, Calif. In this he outlined basic policy and procedure for interpretation and stated the objective radiography in the aircraft industry system of identifying radiographic im with metallurgical defects was prese and methods suggested for assessing acceptability of defective parts.

Mr. Ball emphasized his thesis "the future of radiography is depen on its providing a more reasonable economical method of performing ce tasks than any alternative. The rea ableness of radiography is much in hands of interpreters. So, develop of professional status and recognitio them is of vital importance. Is development taking place? The an is "yes, but all too slowly."

CHROMIUM AND MOLYBDENU ALLOYS

An investigation to determine ef of chromium on such characteristic low-carbon steel as resistance to at pheric corrosion and oxidation at vated temperatures, and susceptibilit air hardening, was reported upon by sell Franks, Union Carbide & Ca Research Laboratories Inc., Niagara F N. Y. The steels contained up to a 25 per cent chromium. The work sho that wrought 3 per cent chromium s containing up to about 10 per cent bon are at least five times as resi to atmospheric corrosion in indus atmospheres as ordinary low-ca steel. These steels are relatively of air-hardening, as demonstrated tests on samples air-cooled from degrees Fahr.

After this treatment, the steels soft, ductile and tough. Annealing subcritical temperatures, 1340 degr also softens them and imparts high d tility and toughness. The steels so treated have good toughness at tempe tures down to minus 190 degrees Fa but their toughness is not so high at th low temperatures when the steel been previously normalized at 1650 grees.

Mr. Franks stated that the low-car 3 per cent chromium steel can be we ed; and the welds have good toughn at room temperature and at temperatu down to minus 40 degrees. Resistan to atmospheric deterioration makes suitable for use in the form of artic such as roofing, gutters, drain pip and other parts exposed to weatheri Fence wire represents an article to made from the steel, as well as certa structural parts for application in wh atmospheric corrosion is a serious m ace.

Copper-Manganese-Nickel

Hardenable copper-manganese-nick alloys containing 22 to 24 per cent ma ganese and equal amounts of nickel ha the ability to harden to rockwell C and higher. This was brought out a paper by R. S. Dean, J. R. Long, T. Graham and C. W. Matthews, all ass ciated with the Bureau of Mines, t first three in Washington, and the latt

TOOL-TIPPING ... 5 TIMES AS FAST WITH "TOCCO"

IN the brazing of carbide tool tips, a large automobile and aircraft manufacturer formerly required 5 men at 8 hours each, or a total of 40 man-hours per day . . . Today, with TOCCO, 1 man does the same amount of work in 8 hours . . . Saving 32 man-hours per day.

TOCCO brazes tool tips with the same efficiency that it does a multitude of heat-treating tasks. At the push of a button, it heats standard size tool tips to brazing temperature in 10 to 30 seconds for a tight, uniform braze. Clean, cool and compact, the TOCCO machine can be located handy in tool room or production line to speed output and minimize motions.

NEW LOW-COST TOCCO

The 7½ K.W. TOCCO JR. shown above is ideal for brazing tool tips and heat-treating many small machine parts. Power unit can be located under a bench, out of the way. Detachable work unit can be mounted on work bench as shown above. Like larger TOCCO units, it is of rugged motor-generator type, assuring dependable, low-cost operation. Fully described in Bulletin 16A, free on request.

THE OHIO CRANKSHAFT COMPANY • CLEVELAND 1, OHIO

TOCCO

INDUCTION
HARDENING . . BRAZING
ANNEALING . . HEATING

Need an ANTI-CAN'T weapon?

TRY THIS ON THOSE DIFFICULT AND HIGH COST GRINDING JOBS

Where precision parts in volume are the order of the day, this small, compact, sleek steel cylinder is playing a vital part in the successful production program of innumerab war plants. It is the quill, the heart of the Dumore Precision Grinder, whose precision and stamina transfor standard machine tools such as lathes, planers, and millers into production grinders of high precision . . . *and at remarkably low cost.* Exceptionally high speeds (up to 42,500 r. p. m.) and vibrationless operat (precision to ±.0001") are Dumore characteristics which lend themselves to internal grinding of small diame holes, an operation at which the Dumore is unsurpassed. External cylindrical, too, as well as surface and thread grinding are handled with equal precision over the Dumore's wide range of capacity. Changes in producti requirements are made easily, with slight cost, when you rel on this dependable, versatile tool. Consult your distributor for ways of applying the Dumore Grinder to your specific operations, or write direct to The Dumore Company, Tool Division, Dept. TK39 Racine, Wisconsin.

The Dumore, with a spindle speed of 42,000 r.p.m. facilitates grinding a half-inch hole to a tolerance of plus or minus one-ten-thousandth of an inch. Such work can be satisfactorily accomplished only with the combination of high speed and vibrationless precision which characterize the Dumore.

Numerous methods of speeding production and cutting costs on precision grinding are shown in Catalog 42. You'll want a copy . . . Write for it today!

DUMORE

PRECISION AND OFF-HAND GRINDERS

SOLD BY AUTHORIZED INDUSTRIAL DISTRIBUTORS IN ALL PRINCIPAL CITIES

Salt Lake City, Utah. The op- treatment consists of a solution tment at 1200 degrees Fahr. fol- ed by aging at 660 to 840 degrees. dness may be controlled by regula- of aging times.

was shown that material hardened the cold worked condition re- sponds more rapidly than the simple solution treated material. The physical properties of the alloy compare favorably with those of copper-beryllium alloys. The alloy made with electrolytic manganese has greater elongation at all hardness levels than when made with ordinary commercial manganese.

AIME PROCEEDINGS

ron and Steel Division

IRON and Steel and Institute of Met- divisions of American Institute of Min- and Metallurgical Engineers held arate technical sessions. The former ered two general sessions on Monday Tuesday mornings and a symposium "Recent Developments in Dilatometric lysis" and another on "Steelmaking" day and Wednesday afternoons, re- ively. Institute of Metals Division, ting on Monday and Tuesday, built program generally around magnesium, p of nonferrous metals and alloys, nonferrous production metallurgy.

Tin-Lead Substitute Solders

Among the many excellent reviews of recent work of research scientists and nicians was the paper on "Substitute lers of the 15-85 Tin-Lead Type." Au- red by J. B. Russell and J. O. Mack of e Division of Physical Metallurgy, Naval Research Laboratory, Anacostia Station, Washington, D. C., this investigation had for its purpose the development of an al- loy containing a maximum of 15 per cent in with no cadmium or bismuth, hav- ing solder properties equivalent to or bet- ter than those of substitute solders now specified containing 18-20 per cent tin, or even approaching the properties of the standard 40-60 tin-lead solder.

The wartime restriction of bismuth and cadmium, elements that have beneficial effects on fluidity, solidification range and strength, makes it increasingly difficult to develop a general-purpose solder con- taining a maximum of 15 per cent tin.

In the course of this investigation, 11 elements were used in various combina- tions with the basic 15-85 tin-lead alloy. These elements were antimony, silver, copper, indium, thallium, lithium, cal- cium, barium potassium, sodium and arsenic. In all, 116 low-tin solders were investigated with the idea of developing a solder that will give satisfactory working properties, specifically in regard to wet- ting of copper, brass and iron, solidifica- tion range, capillarity and shear strength of a soldered joint.

The relative importance of these vari- ous properties plays an important role in the search for substitute solders, since it is almost impossible to retain all of the desired qualities of a high-tin solder and still make drastic changes in the alloy composition. Because of the expected uses of a general purpose solder, it is necessary that it have properties, especial- ly in regard to wettability, that will en- able it to be used on the metals in com- mon use.

Of the 49 alloys examined, nine passed property requirements. A second group of 15 closely approached desired levels. Many showed special applicability for use with higher temperatures or under various other conditions. It was noted that to produce a 15 per cent tin solder contain- ing neither cadmium nor bismuth, and having solidification and wetting proper- ties comparable with those of a high-tin solder, is only a remote possibility. Rea- sons for this are: (1) Of the addition ele- ments available, antimony is the only one that has an appreciable effect on the solidification range; (2) addition of silver, alone or with other elements, is limited to 2 per cent because of excessive formation of a silver-tin compound with ratio of 3:1; (3) use of indium is limited by its high cost; (4) of remaining addi- tion elements, none was found to im- prove to a satisfactory extent the wetta- bility of a 15 per cent tin alloy containing antimony.

As a result of this investigation, 15 per cent tin solders having a solidification range comparable with or slightly above that of an 18 to 20 per cent tin substi- tute solder—all other properties being satisfactory—have been developed.

Magnetic Property Changes

The changes in magnetic properties such as coercive force, remanence, and permeability can be used to study the ef- fect of cold-work and recovery in alumi- num iron, according to J. K. Stanley, re- search engineer, Research Laboratories, Westinghouse Electric & Mfg. Co., who has been engaged in studying how these magnetic properties change during the annealing below the recrystallization tem- peratures. His research in "Recovery of Cold-Worked Aluminum Iron as De- tected by Changes in Magnetic Proper- ties" was carried on to find in what man- ner strains are relieved in aluminum iron at low temperatures and to shed some light on our understanding of what takes place in the deformation of metals.

Expressing changes in coercive force and permeability by equations of form suited for the tests conducted, Mr. Stan- ley found that coercive force increased and permeability and remanence de- creased with increasing cold-work. The annealing of cold-worked (4, 6 and 8 per cent elongation) aluminum iron at 350 degrees Cent. results in a rapid relief of strain and then appears to reach limiting values for the respective elongations.

The annealing of cold-worked (6 per cent elongation) aluminum iron at 250, 350, 450 and 550 degrees Cent. results in a very rapid relief of strain at all tem- peratures except 150 degrees, at which nothing occurs. The higher the tempera- ture, the greater is the recovery and the closer is the approach of magnetic prop- erties to the original annealed material. No recrystallization was found in samples.

"Creep Properties of Cold-Drawn An- nealed Monel and Inconel" was a study made and reported by B. B. Betty, for- mer testing engineer; H. L. Eiselstein, metallurgist; and F. P. Huston Jr., metal- lurgist, all of Huntington Works, Inter- national Nickel Co. Inc., Huntington, W. Va. Data were presented on cold- drawn annealed Monel and Inconel showing them to be suitable for use at elevated temperatures. The Inconel was found to have approximately twice the load-carrying capacity of Monel at all the test temperatures. However, Monel compares favorably in creep strength with many low-alloy steels and should not be classed with copper alloys, although it contains a large percentage of copper. Neither of the two alloys ex- hibited signs of stress-time embrittlement.

Slag-Metal-Oxygen Relationships

Discussing "Slag-Metal-Oxygen Rela- tionships in the Basic Open-Hearth and Electric Processes," J. S. Marsh, engi- neer, Development and Research Depart- ment, Bethlehem Steel Co., Bethlehem, Pa., found that in such a study it must be assumed that the carbon-oxygen prod- uct in the metal is exceeded, on the average, only when the carbon reaction is in progress (supersaturation being the one exception). The carbon reaction is inherently very rapid; consequently, its controlling factor is rate of supply of oxygen. Extent of departure found by experiment depends upon the depth of bath at which bath is sampled and upon other factors such as type of process. For a given process, extent of departure depends upon presence or absence of unreacted ore, and of lime or bottom boils.

There is no distribution of iron oxide between an oxidizing slag and metal in the sense that would be true of slag and metal in equilibrium. Distribution ratio depends only upon slag basicity, being greatest for a pure iron oxide slag, and increasingly less for slags of increas- ing basicity.

The electric-furnace finishing period differs in behavior in that slag does not contain sufficient iron oxide to supply the required potential to transfer oxygen to the metal. Oxygen in excess of the equilibrium value is consumed quickly and the only controller of oxygen content appears then to be carbon content, as- suming no addition of a deoxidizer.

AMERICAN WELDING SOCIETY

Technical Proceedings

OF the 57 papers presented at the 18 technical sessions of the annual meeting of the American Welding Society held in conjunction with the 1944 National Metal Congress and Exposition, some of the most interesting were devoted to a discussion of various control methods.

"All automatic machine welding processes have certain advantages and disadvantages, and automatic welding itself is not a cure-all for every welding problem, as there are still many services for which manual welding is more desirable", was pointed out by A. E. Bedell and J. B. Quigley, chief engineer and welding supervisor respectively, of Graver Tank & Mfg. Co. Inc., E. Chicago, Ind., in their discussion of procedure control of automatic welding processes. However, they go on to state:

Automatic Machine Welding

"Automatic machine welding, in the field for which it is applicable, is better, faster and more economical than manual welding. In order to take full advantage of any automatic welding process, a proper welding procedure must be developed, but such procedure is an individual shop problem. While the procedure control will necessarily vary with the type of process adopted and the actual fabrication requirements of a particular shop, certain fundamental factors invariably apply. . . . . Physical tests on a properly deposited automatic machine weld are better in most respects than those of the parent metal."

They also emphasized the importance of careful and uniform plate beveling in preparation for welding. As far as workmanship is concerned, the most important step in any automatic welding work is the plate joint preparation.

Another important factor greatly influencing weld quality was covered by E. C. Brekelbaum, welding superintendent, Harnischfeger Corp., Milwaukee, in his discussion of production control problems. Most companies engaged in welding, he reports, are at a loss as how to arrive at the most efficient welding methods because of the complexity of manual operations.

In the future however, much greater attention is going to be demanded if new savings are to be shown by welding for now welding is competing with welding, not against other types of fabrication where it was comparatively easy to show valuable savings. This means increased effort must be focused on the tremendously powerful influencing factor—the human element. Whereas most companies have relied upon piece rate, day rate, or a base-rate-plus-premium method of compensating workers, production welding control systems based upon actual recording of arc time offer an improved method with advantages.

Mr. Brekelbaum pointed out that recording actual arc time provides a production control system that immediately shows up an excess or shortage of deposited weld metal or other departure from established procedure, thus affording an accurate procedure control as well as an equitable basis of compensation.

Such a system consists of a single unit arc timer on each machine or a centralized arc time recording system with electrical timers, relays and graphic recorders. The latter is preferable because in addition to recording total arc time for each operator, it provides a fool-proof system for production welding control. Each graphic recorder handles up to 20 timers or welders by use of multiple inking pens, and makes a permanent record on paper charts.

The system also provides a direct check on operator efficiency for ratio of total arc time to total elapsed time tells how good the operator is in actually laying down weld metal which of course is the criterion of performance.

Compared to piece work which affords no procedure control, arc time control causes the operators to lean toward quality welds rather than fast welding with possible skimping of weld metal deposited. Quality is also assured because each operator is given sufficient time to apply the proper amount of welding to each job.

Mr. Brekelbaum reported the arc time control system has been employed in his shop for the past 5 years, controlling 150 operators on over 25,000 different jobs ranging from a few pounds up to 40 tons in straight production welding, work on high carbon and alloy steels, and on welds that must pass rigid X-ray inspection.

Welded Ship Failures

An interesting comment on welded ship failures was made in Admiral Vickery's paper on welding in shipbuilding: "There has been much publicity given to the relatively few instances of serious fractures occurring on our ships. The causes of these fractures are not fully known, but it is generally agreed that no one factor is the predominant reason. We still have a lot to learn about stress distributions and behavior of an all-welded ship's hull under service conditions. It is of interest to note that the small all-welded ships have been practically free from serious failures. This is probably due to the relatively light plates used and to less beam action of the hull due to waves. Every effort is being made to add to our knowledge. . . . .

"Research, especially in respect to fundamentals, is necessarily time consuming. When the Commission was confronted with a number of serious fractures on Liberty ships last winter, it was imperative that something be d immediately. . . . .

"Records indicated that most of serious fractures had started ar hatches No. 2, 3 and 4, especially No. 3 hatch. . . . . Instructions wer sued to round the corners of t hatches on both existing vessels those under construction. It is felt this step will greatly diminish chances of cracks starting around hatches due to resultant better stress Also on new ships, the insert typ deck plating at the hatch corners is ing avoided, as experience has sh that it is extremely difficult to pro weld such a structure."

Admiral Vickery pointed out va other measures are being taken to a cracks, including substitution of do riveted gunwale angles port and board sides on the upper deck for continuous welded connection. prevents cracks that start in either deck or sheer strake from progres into each other, and provides a de of flexibility needed in the other rigidly welded hull. Later, a crack rester slot was installed on the u deck. Other steps are being taken. danger of so-called "notches" is also preciated. The welding of large s is here to stay, reports Admiral Vick

Technical Control—Shipwelding

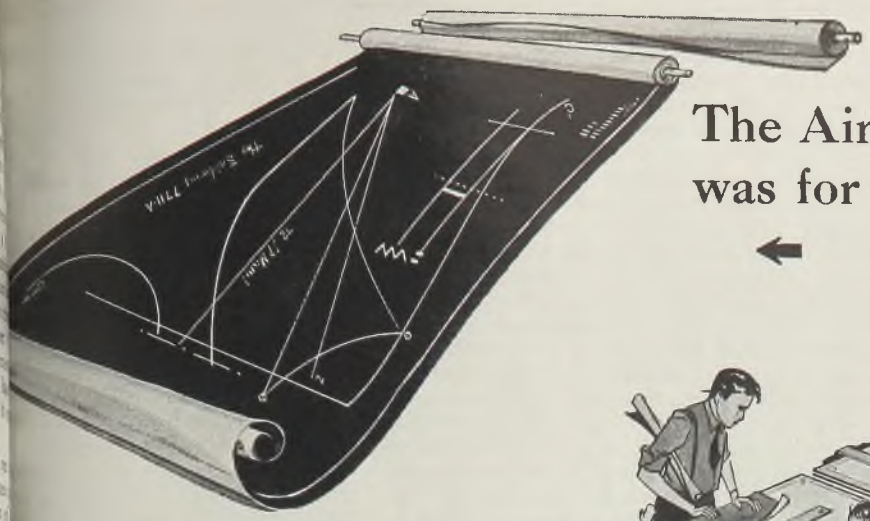
In his discussion of the technical trol of welding in ship construction, H. MacKusick, assistant shipyard su intendent and welding engineer, C fornia Shipbuilding Corp., comme on the place of automatic welding eq ment in such operations. He said:

"Most shipyards organize a sepa welding department to handle their tomatic welding. The use of submerg arc automatic welding is principally c fined to subassembly operations, though some yards do certain types joints on the shipways. At Calship, use of automatic welding is confined the plate shop and subassembly, all sh way welding is done manually. The of E6030 type manual electrodes p the fact that less movement of equ ment is involved has prompted our c cision to eliminate the use of automa welding on the ways.

"It was found that delays in sched ing an automatic machine for a certa weld plus the cost of handling the equi ment to and from each joint exceed the cost of welding the same joint hand. Also many joints could not completely welded by machine due clearance for the machine at hatch coa ings and side shell ends of deck bu so that a certain amount of chipping a manual welding was required on a nu ber of the welds in any case.

"It is our conclusion, therefore, th shipyards working to a fast launchin schedule will find that automatic wel ing should be entirely concentrated c subassembly work for economical an fast production results.

One of the new types of weldin equipment recently developed was de



The Air Conditioning was for the blueprints . . .

But their efficiency increased 51.4% ➡

A war plant drafting room was air conditioned—strictly in order to protect valuable blueprints and drawings. (It is well known that extremes of temperature and humidity can have surprising and unpleasant effects on paper.)

Now, nobody even considered the draftsmen who worked there when this air conditioning job was approved. In fact, equipment for "comfort" air conditioning is not now available, and won't be for the duration. Yet the efficiency of the draftsmen increased 51.4% after their drafting room was air conditioned!

The moral is clear. Remember to investigate air conditioning *as a means of increasing human efficiency* in your business after the war.

Better yet, write *now* and we'll see that you get complete information at the earliest possible moment. *General Electric Company, Air Conditioning and Commercial Refrigeration Divisions, Section 4411, Bloomfield, N. J.*

☆ BUY...and hold...WAR BONDS ☆

Air Conditioning by

GENERAL ELECTRIC

Hear the General Electric Radio Programs: The "G-E ALL-GIRL ORCHESTRA," Sundays, 10 P. M., E W T, NBC..."THE WORLD TODAY" News, Every Weekday, 6:45 P. M., E W T, CBS

scribed by E. M. Callender, Edward G. Budd Mfg. Co., Philadelphia, as a small portable condenser welding set for handling the joining of a large spot-welded assembly where the welder must be taken to the work. With a 5-kilovolt-ampere plant, the welder complete with extension cables and its transformer weighs only 775 pounds. The welding transformer may be located 75 feet from the welder with an additional 15 feet of secondary cable to the welding gun. Condenser is rated 360 microfarads and 3000 volts peak charge. Machine can be operated from a standard 115-volt alternating-current wall receptacle. It will weld two thicknesses of 0.040-inch stainless steel and up to eight pieces of 0.020-inch, with weld shear strengths comparable to those from conventional alternating-current resistance welds.

Such a unit is particularly suitable for requirements of an airborne machine. No water cooling is required. Only low power is demanded even with a fair welding speed of 30 welds per minute. Thus unit can be used on rural lines without undue voltage dips. Being completely portable, the welding gun can be carried all over the assembly being joined.

Kickless or low-reactance cable for portable resistance welders was a development described by Myron Zucker of Mackworth G. Rees Inc., Detroit. Cables ordinarily used with gun type welders tear themselves to pieces by the continued abrasion and fatigue from recurring kicks produced by the reaction of the heavy currents, he pointed out. This does not happen in low-reactance cables for the kick is absent.

He described an interleaved type of cable in which the electric motor action of currents flowing in opposite directions is nullified by dividing the current into three parallel paths reducing the forces between all conductors to one-ninth. The hexagonal pattern of wires results in forces that oppose each other. In addition, spiraling of ropes makes each rope act as a structural member that resists motion by means of its tensile strength.

Other advantages besides the improved mechanical behavior are found in lower power requirements, lower power factor and reduced cost of accessory equipment. Transformer sizes can be halved in some instances.

On one job, reinforcing channels 10 feet long were to be welded to steel sheets. Using two ordinary gun welders, so much cable was needed and so much iron included in its field, that resulting high reactance made it impossible to get enough current to make a weld. Use of low-reactance cable made it possible to produce excellent welds in the same job and with half the transformers.

RADIUM AND X-RAY SOCIETY

Technical Proceedings

TECHNICAL sessions of the fourth annual meeting of the American Industrial Radium and X-Ray Society Inc., held in Cleveland in connection with the 1944 National Metal Congress, included presentation of 13 papers and the 1944 Mehl Lecture. Chairmen of the three technical sessions were Dana W. Smith, Aluminum Co. of America; R. E. Lorentz, Combustion Engineering Co. Inc.; and R. F. Thompson, Dodge Div. of Chrysler Corp., Chicago.

In discussing the field coverage of industrial X-ray tubes and X-ray beam intensity distribution, George A. Russ, Claud S. Gordon Co., pointed out that whereas the standard X-ray tube with its beam of 20 degrees included angle has certain advantages, the tube designed to have a 45-degree beam produces complete coverage of film, tending to allow more uniform distribution. Also use of such a tube does away with the anode shadow that causes a certain amount of difficulty when using the 20-degree tube.

He presented charts that showed beam intensity measurements taken at points equidistant from the focal spot. These data revealed that beam intensity is not uniform throughout the field, thus intensity of beam varies considerably over the film area.

Data were presented showing values taken in a line crosswise and also a line parallel to the tube axis. Because of the much greater variation lengthwise the tube axis, Dr. Russ pointed out that the film should always be placed with its long dimension crosswise the tube axis in order to obtain the minimum amount of variation in beam intensity. Of course, the ideal beam would be one that produced equal intensity at all points of the film, for this then would obviate variations in thickness of the developed negative due to beam intensity variations.

Dr. Russ and others in subsequent discussion mentioned that the importance of this film placement procedure apparently was not fully realized and many operators did not know which was the tube axis and many more did not fully realize the effect of the so-called anode shadow. This knowledge of the anode position is particularly important in making angle shots, for positioning with anode toward film results in much uniformity of beam intensity; whereas if the anode is turned away from the film, beam intensity will vary much more widely. Beam variations due to anode shadow range from 95 to 77 per cent of maximum intensity, he revealed.

Dr. Russ also presented calculations showing falling off of beam i sity over the film area due to the in square law which says that the inte of radiation from a point varies a square of the distance from the p On this basis, he compared beam i sity from nearest point (where ve line from film will intersect focal of tube) to farthest corner of film showed that resultant intensity w be only 71 per cent of the maxim an extremely important reduction using contrast film which gives variation in negative thickness for variations in beam intensity.

If these two possible maximum tions occurred at the same poin the film, resultant intensity of 5 cent means that there would be a a 2:1 variation in beam intensity. ever, subsequent discussion from floor pointed out that actually suc treme variations in beam intensity seldom encountered. First, the film located as to minimize effect of shadow, this not being hard to do the technician has a chart showing mal beam intensity distribution the tube. Second, the use of th verse square law is not strictly ap ble for the energy source is not a but a plane having definite dimen in addition, the energy is directed the anode in a beam rather tha lowed to disperse uniformly in all tions as does light from a candle.

However, it was emphasized th thorough knowledge of the tube radi characteristics would enable the radi pher to plan his setups with a knowledge of the results that wou obtained, thus it is an important in eliminating much "cut-and-try".

It was also pointed out that f are available which equalize the b intensity so it is the same at all p on the film. However, this is done reducing the beam intensity all the film to the value found at the lo point, which of course means a los maximum effectiveness over much the film area. Also filters can onl used for certain types of applicat and are not suitable for all indus uses of the X-ray.

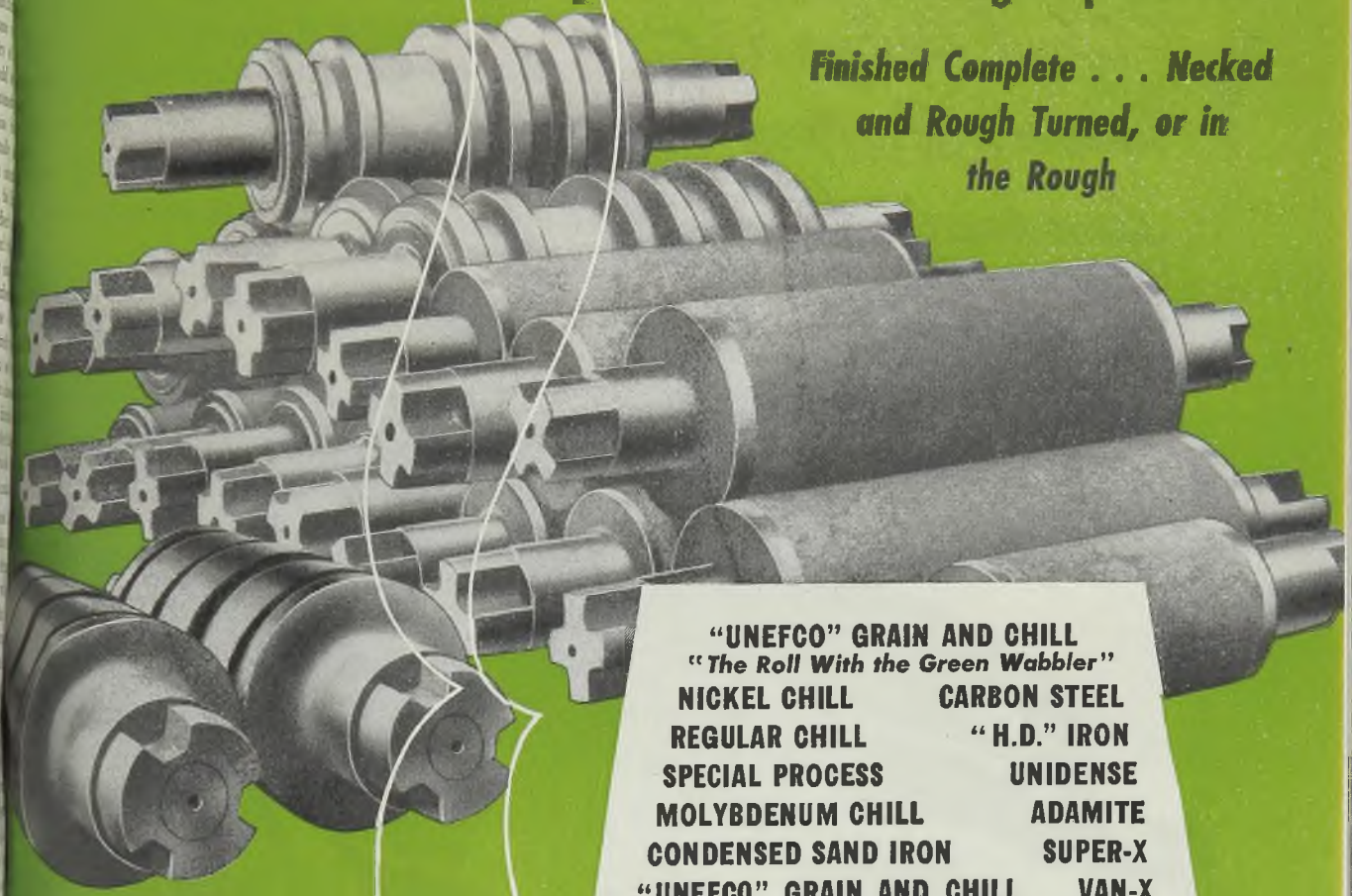
A highly important part of the cussion was devoted to Army-Navy Corps specifications which now call placing the penetrameter (used to ch exposure and processing) at the far ner of the film, the very point wh beam intensity is the lowest. This far from most satisfactory position was pointed out, and efforts are being made to get specifications rev to permit better placing of the pene meter.

Static tests for determining the diographic classification of castings w presented by F. S. Wyle of Trip & Barton Co., Burbank, Calif. Casti as a whole, he said, can be divided two classes—those used with a h safety factor (of 10 or more) in wh no portion is stressed to more than per cent of its ultimate strength; a

UNITED ROLLS

All types, grades and designs for every Hot or Cold Rolling requirement

Finished Complete . . . Necked and Rough Turned, or in the Rough



"UNEFCO" GRAIN AND CHILL
"The Roll With the Green Wabbler"

NICKEL CHILL	CARBON STEEL
REGULAR CHILL	"H.D." IRON
SPECIAL PROCESS	UNIDENSE
MOLYBDENUM CHILL	ADAMITE
CONDENSED SAND IRON	SUPER-X
"UNEFCO" GRAIN AND CHILL	VAN-X
SPECIAL ALLOY STEEL	"UX" "D.U."

From the above famous UNITED ROLL LINE, comprising *15 principal classifications* and *more than 150 distinct variations of composition*, we can furnish the exact combination of characteristics for your specific need, whether you roll *steel, non-ferrous metals, rubber, synthetic resins or other materials.*

UNITED ROLLS are the product of constant metallurgical research, advanced technological skill, modern production facilities and more than 40 years experience in roll design and manufacture. Their pre-eminent position in the rolling industry throughout the world is your assurance of complete satisfaction.

UNITED ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

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

Davy and United Engineering Company, Ltd., Sheffield, England · Dominion Engineering Works, Ltd., Montreal, P. Q. Canada.

U&D REG. T. M.

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

No buck-passing . . . that's one of the first things you will notice, when you begin to do business with Bristol Brass. You get your answers promptly and straight from the shoulder, and you get them backed up with performance. For we figure that if we can save your time as well as our own, then we're both that much farther ahead, and can get more done to our mutual satisfaction. As a matter of fact, what could be easier to do without than outworn formalities, red tape, and "buck fever" in the face of responsibility?

This seems no unusual philosophy at Bristol, because it's been practised here for 94 years. But once in a while someone drops a remark that it's something new in his experience *actually to enjoy* doing business with a supplier. All of which is deeply appreciated.

You'll find your business will not pass from hand to hand at

Bristol Brass

And it's passed on to you simply for what it's worth . . . on the chance that you see things the same way. *And if you do, then we certainly hope to be seeing you.*

Makers of Brass since 1850 The **Bristol Brass** Corporation

BRISTOL, CONNECTICUT

hose stressed to higher percentages of their ultimate strength. The first class does not require radiographic examination, the latter class being the only one concerned with that method.

He described various methods of making mechanical static tests for setting radiographic standards. R. F. Thompson, technical chairman of this meeting, in the subsequent discussion pointed out that there are three pitfalls that must be avoided before mechanical testing such as Mr. Wyle described: First, assurance must be provided that the metal thickness in the area being surveyed (by the X-ray) is the same from piece to piece; second, heat treatment given the work must be uniform from piece to piece; third, castings must have uniform grain size. Of course, in most plant inspection setups, the above factors are controlled and checked before parts are X-rayed.

Mechanical tests are necessary for setting radiographic standards because they can be employed to determine which defects can be allowed and which ones call for rejection. One method is to take from a lot the three castings that show up poorest when examined radiographically. Then if these pass mechanical tests satisfactorily, they can be judged as minimum standards for subsequent radiographic inspection of other lots of the same casting.

When asked how they make static tests that require application of loads in three or more planes simultaneously, Mr. Wyle described the use of hydraulic jacks to apply such loadings as the design might require. Also mechanical linkages connected to the standard testing machine (that applies loads in one plane only) can be utilized to apply loads in other planes. He mentioned that such accessory equipment could be calibrated easily to accuracies of close to 1 per cent or less.

STRESS ANALYSIS SOCIETY

Technical Proceedings

SHOT PEENING to improve fatigue distance, discussed in a paper by O. J. ger and H. R. Neifert of Timken er Bearing Co., Canton, O., consid- conditions of shot blasting as to size and time under the blast relato their influence on the fatigue th of 1½-inch diameter specimens a ¼-inch fillet. An SAE 1045 ormalized and tempered, was used, pecimens were tested as rotating ever beams. Endurance limit of peened fillets was increased by er than 50 per cent over polished but not shot peened specimens.

Photo—Grid Methods

An analysis of plastic flow problems photo grid methods, utilizing a new thod of preparing photo grids, and trations of the use of the new method, was presented by C. P. O'Haven and J. F. Harding of the Armour Research Foundation, Chicago.

Part I described the new method, said to be superior to any method heretofore used. The technique of preparing the photo-sensitive coating was discussed, and techniques for applying the grid to specimens of various shapes were explained. Stated points of superiority were: Easily applied in subdued light; adherent to highly polished surfaces, including a large percentage of elongation; highly resistant to abrasion; does not etch or corrode specimen.

Part II illustrated the use of the new method in application to tensile specimens. The region of the neck and variation in per cent of elongation was studied in specimens of both rectangular and circular cross-section. Plastic deformations about holes in tension members also were measured and compared at various average stress levels.

Load distribution in riveted and spot-welded joints, measured by deformations indicated by a ring extensometer, was the subject of a paper by B. J. Aleck, M. Goland, and L. D. Morris of Curtiss-Wright Corp., Buffalo. The extensometer could be modified for use with any gage length, from zero to large values. Its essential elements were a thin aluminum alloy ring and two electric, resistance-type strain gages cemented to the ring. Joint deformation compresses or extends the ring, and activates electric strain gages. Methods for mounting the ring gage on the specimen to measure deformation were described. Extensometer accuracy was stressed.

Load distribution in multi-spot and multi-rivet joints were considered from both experimental and simplified analytic viewpoints. A summary of results was presented for individiual fastener loads in joints of differing patterns, sheet gages, and number of fasteners.

The paper concluded with a brief report on progress being made in studying three-dimensional stresses in the vicinity of a loaded spotweld. Photoelastic methods are being used in this research, with the stresses analyzed by utilizing composite models made from two different plastics.

Fatigue Life—Surface Treatment

Residual stress studies of life improving surface treatments are important in accurate determination of the fatigue life of metal parts, according to R. W. Greaves, E. C. Kirtowsky, and C. Lipson of Chrysler Corp., Detroit. Increase in the fatigue life of metal parts due to surface treatments, such as shot blasting, frequently is attributed to residual stresses of a compressive nature. The authors mentioned, however, that very little is known about the magnitude and distribution of such stresses, and that extensive fatigue testing or service experience must be resorted to before various treatments may be evaluated. The residual stress data presented, therefore, was an attempt to provide an index for evaluating the relative effectiveness.

Residual stresses resulting from several surface operations were compared in terms of their effect on fatigue life. Surface operations studied were shot-blasting, nitriding, carburizing, induction hardening, and barrel tumbling. Experimental techniques included Sach's boring out method, the split ring method, and modifications of several other mechanical methods.

New approaches to engineering design, with the adoption of new methods in stress analysis in development work, were discussed by E. E. Stilson, R. H. Peterson, and R. C. Pocock of Bendix Aviation Corp., South Bend, Ind. Methods involved the use of electric devices such as oscillographs and resistance strain gages.

Stress Models for Construction

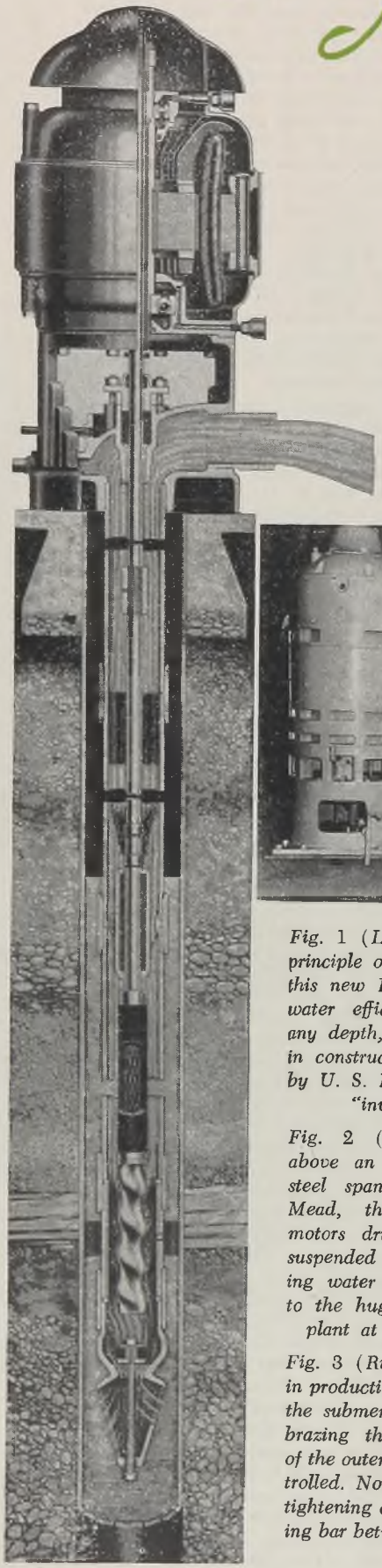
The application of stress models to specific structural problems as a solution to widely varying problems of stress analysis was discussed by S. F. Tingley of Goodyear Aircraft Corp., Akron, O. The author cited many notable examples in the past where such problems have been met by the use of suitable stress models. Certain fundamental laws were found to govern the behavior of all such models, regardless of the type of investigation planned.

A very complete example of such a problem was illustrated in the solution of the structure of a cylindrical space framework having a high degree of redundancy. Model laws for the design of individual members, coupled with practical considerations of the scale and handling involved, were applied. The ultimate design of a specific member was said to be only an embodiment of stiffness characteristics, commensurate with the instrumentation desired for strain measurement and overall dimensional limitations. Expected accuracy may be derived from instrumentation. Loading also follows the model laws so that loading system design also is determinate.
stringers and loaded in the plane of the

An electrical analogy for shear lag problems was given by R. E. Newton of Curtiss-Wright Corp., St. Louis. The basic problem was stated as the determination of stress distribution in flat sheets longitudinally reinforced by sheet by longitudinal forces. A correspondence was established between the axial loads (and shear forces), deformations, and axial (and shear) flexibilities of a sheet stringer combination with the currents, potentials, and resistances, respectively, of a direct-current network.

Brazing Pump Assemblie

By G. ELDRIDGE STEDMAN



DE-WATERING the 796-foot Potrero shaft of the San Jacinto Tunnel section of the aqueduct between the Colorado River and Los Angeles was a tough problem. But it was accomplished in record time by the world's largest turbine pump of its type, having a 700-horsepower vertical hollow shaft motor mounted with it on a heavy duty pump head with capacity of 3000 gallons per minute against a total head of 800 feet. Weighing more than 100,000 pounds, this unit was lowered into the shaft from the surface.

Production of such pumping equipment for de-watering mines, tunnels, coffer dams and quarries has led Peerless Pump Division, Food Machi Corp. into fabrication of similar pu under lend-lease for the Russian gov ment. Because of these, Hitler howled with dismay over the Ger army's inability to flood Russian m permanently.

The new Peerless Hi-Lift prin (see Fig. 1) of squeezing water a to its destination rather than to ce fugally lift it has likewise won distinc in pump design, achieving maxim capacity with tremendous pressure f small diameter wells.

But the purpose of this article i describe unusual operations in proc tion of the Peerless submersible pu now doing outstanding work on our phibious battle fronts. Rated at 120 lons per minute at 63 feet total h powered by a 4-horsepower electric m at 3200 revolutions per minute, the p with strainer weighs only 120 pounds is equipped as a single compact unit special cable and controller for port use anywhere . . . in bilges, ponto hatches, aboard ship in leaking or floo compartments. Designed for quick in any emergency, it requires onl power source and fire hose discharg easily handled and operated by one m

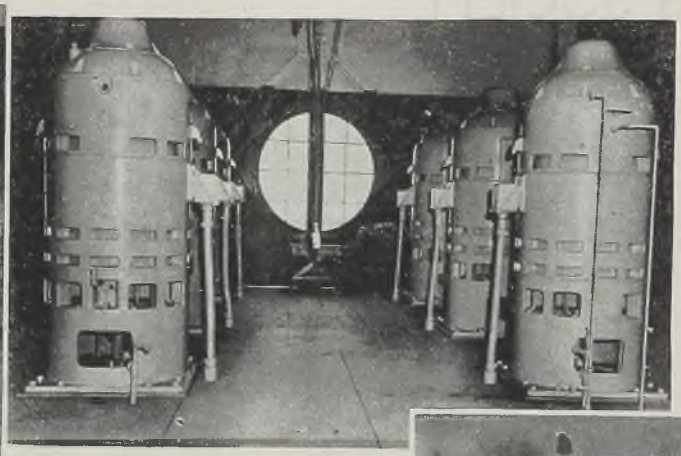
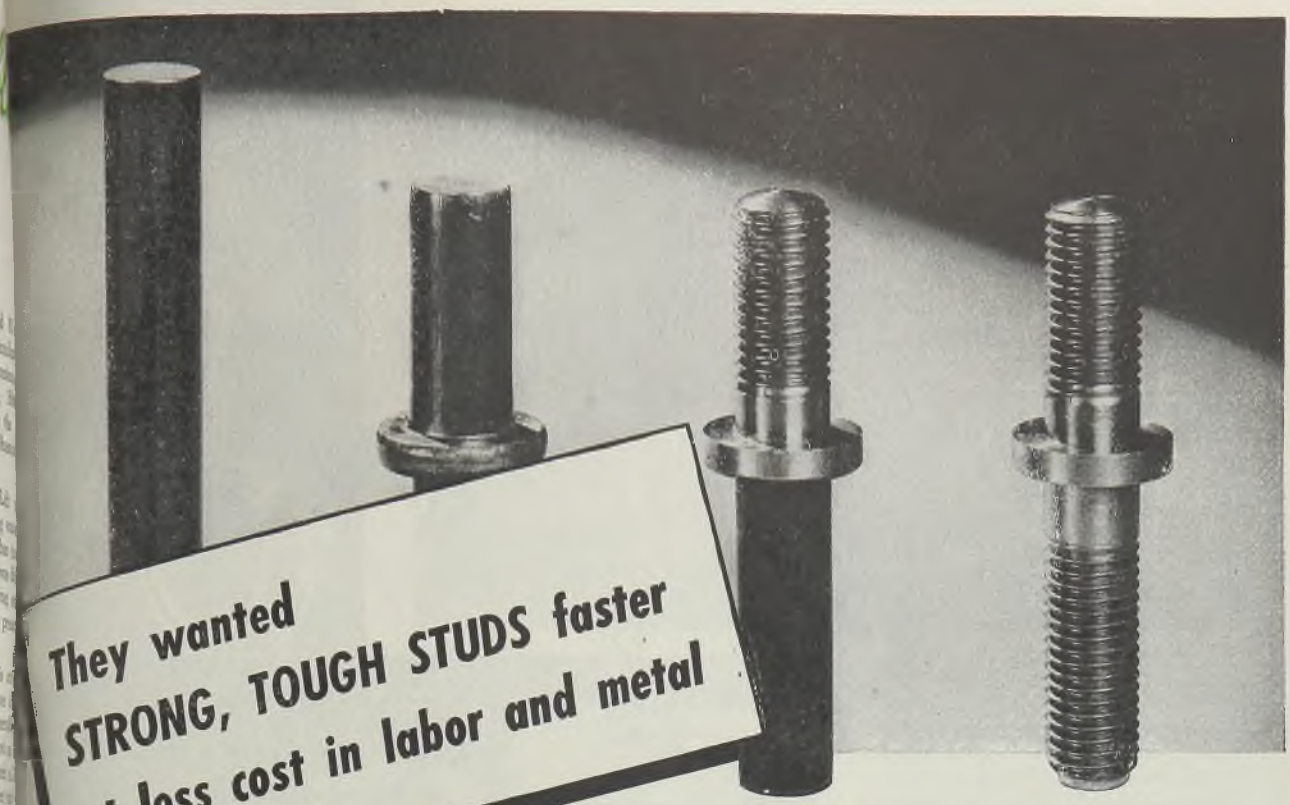


Fig. 1 (Left)—Because of its principle of "squeezing" water, this new Peerless pump raises water efficiently from almost any depth, is extremely simple in construction, so was chosen by U. S. Marine Corps as the "invasion" pump

Fig. 2 (Above) — Mounted above an ingenious cantilever steel span overhanging Lake Mead, these 400-horsepower motors drive rows of pumps suspended in the lake, supplying water from Boulder Dam to the huge Basic Magnesium plant at Las Vegas, Calif.

Fig. 3 (Right)—First juncture in production of double case for the submersible pump is silver brazing the overlapping ends of the outer case. Jig is foot controlled. Note special clamp for tightening outer case, and backing bar between inner and outer shells



They wanted STRONG, TOUGH STUDS faster at less cost in labor and metal

H. M. Harper Co. finds answer in high strength and ductility of cold-upset Monel

A quicker less costly method of turning out strong, corrosion-resistant collar studs was sought.

They were needed for rust-free fastenings on "sub" hulls and heat transfer units where high ductility combined with strength are necessary to meet stresses encountered in this service.

Studs with all the desired mechanical properties could be machined from cold-drawn Monel rod. But machining time was high, and scrap loss ran up to 60%.

After considerable study, Harper developed a method for cold-upsetting of hot-rolled Monel rod. The following mechanical properties were observed:

DUCTILITY MEASUREMENT ON HARPER MONEL COLLAR STUDS

(Tests pulled at Technological Institute, Northwestern U. on Baldwin Southwark Machine at rate of 5,000 pounds per minute.)

Total reduction diameter	33%
Elongation measured over reduced area	28.3%
Tensile strength	120,600 p.s.i.

The cold-upset Monel studs have mechanical properties comparable to the machined cold-drawn Monel rod. Many materials with properties similar to Monel work-harden to brittleness in operations as severe as this cold-forming.

The *ductility of* Monel... coupled with its strength and corrosion resistance ... makes it ideally fitted for cold-formed studs, bolts and other fastenings.

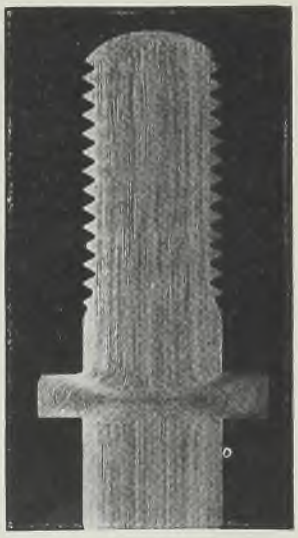
Monel may be the answer to some metal problem in *your* shop or on *your* drafting board.

Monel is strong. It is tough. It fights corrosion. It is ductile. Monel is invaluable where a *combination* of these properties is essential.

• • •

For further information, write for INCO Technical Bulletin T-1 "Engineering Properties of Monel Bolts." Address:

Four stages in production of Monel collar studs by H. M. Harper Co., Chicago, Ill. A specially tooled cold header, powered by 50 h. p. motor exerting approximately 250 tons of energy produces 50 studs per minute.



Uniform grain flow shows controlled fabrication and homogeneous structure that provides uniform mechanical properties.

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

MONEL • "R" MONEL • "K" MONEL • "KR" MONEL
"S" MONEL • INCONEL • "Z" NICKEL • NICKEL

INCO NICKEL ALLOYS

Sheet...Strip...Rod...Tubing...Wire...Castings

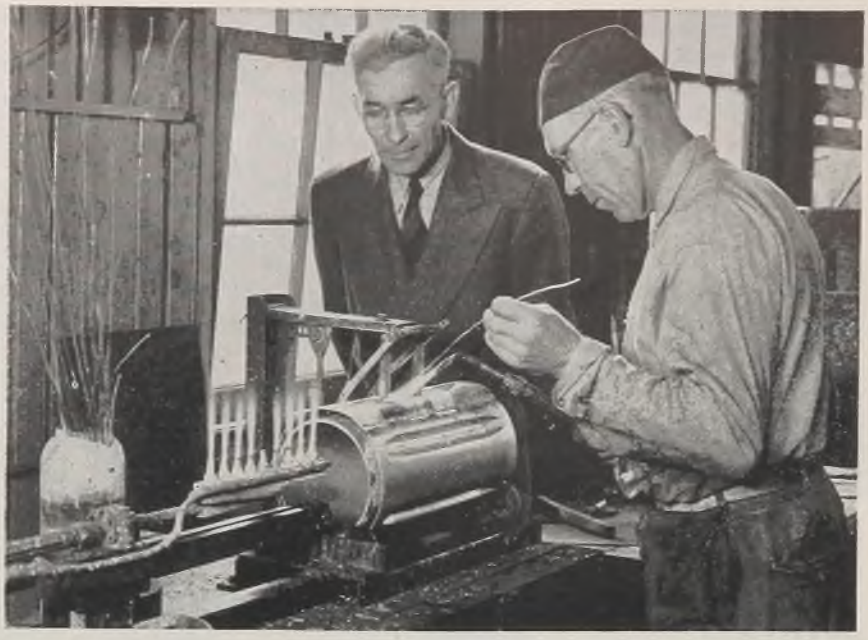


Fig. 4 (Above)—Second joining job is brazing outer shell to inner shell. Brazing alloy is fed through holes in outer shell along ribs contacting inner shell, is drawn throughout joint by capillary action. Multiflame torch heats inner shell. Work rolls in jig to position wanted, is clamped by foot operated lever. J. B. Wade, research and design engineer, watches

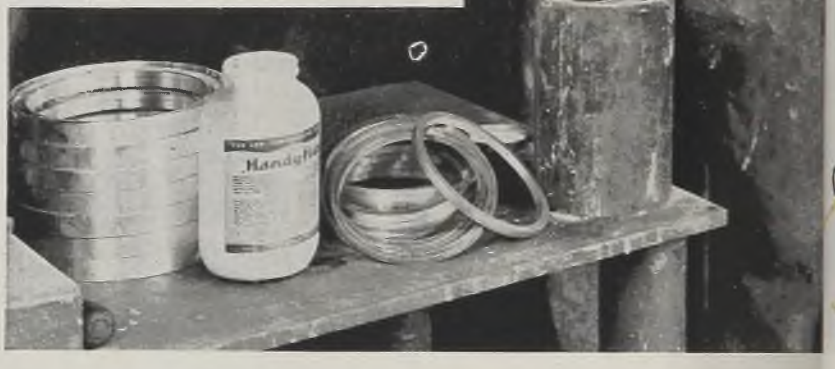
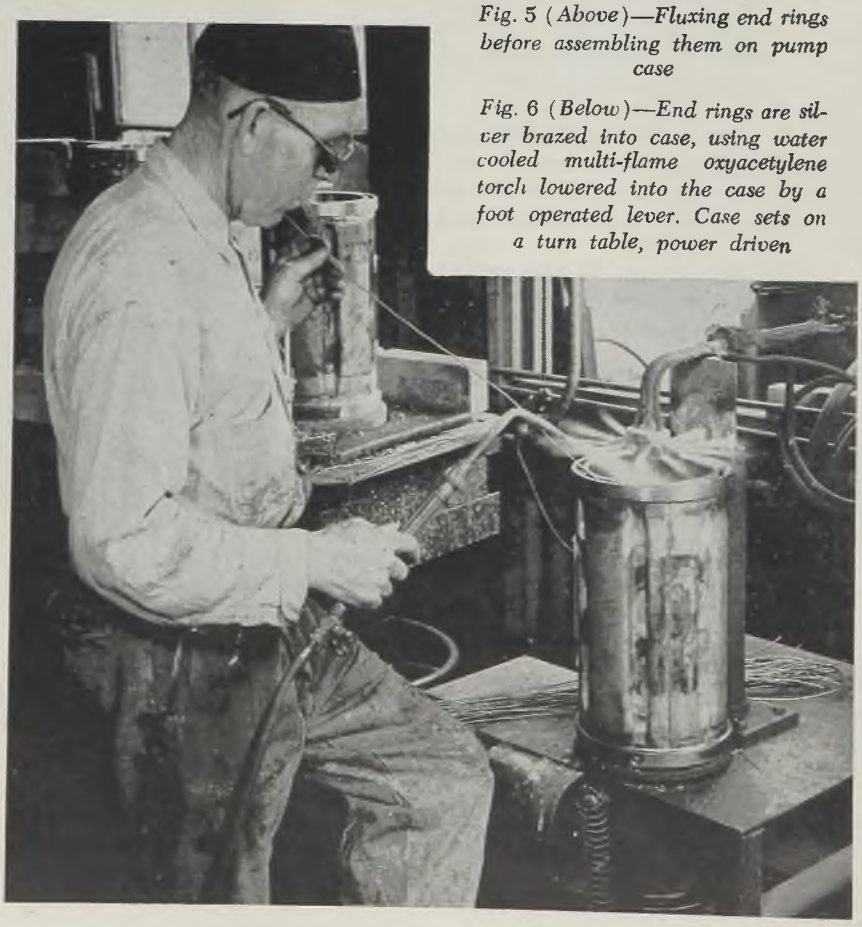


Fig. 5 (Above)—Fluxing end rings before assembling them on pump case

Fig. 6 (Below)—End rings are silver brazed into case, using water cooled multi-flame oxyacetylene torch lowered into the case by a foot operated lever. Case sets on a turn table, power driven



It will operate submerged or free at a angle.

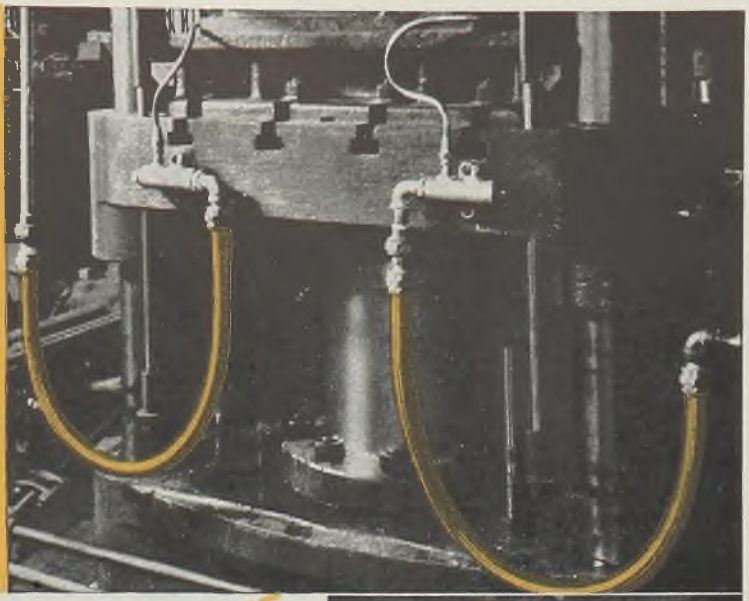
Water enters the pump through strainer and is impelled through the di fusor into the active water cavity b tween the inner and outer walls of t motor case. The motor is thus cool as the water passes between the inn and outer shells.

Unit is about 23 inches long by inches in diameter. Motor case of out and inner shells with flanged end rin is made to Navy specifications fro rolled brass stock. Water is discharge between these shells so they must b tight and allow no water to leak into th motor. Outer case is 14 inches long b 8¼ inches diameter, is die-formed wit ribs firmly silver-brazed to the inne shell. This method of construction pr vides great rigidity and excellent he transfer.

Cleanliness Important

First step in fabrication is to clam the outer case in a special fixture an silver-braze the outer seam. All fixture and special apparatus mentioned in thi process were designed by J. B. Wade company research engineer and originato of this pump. This initial braze is mad with an oxyacetylene torch, the fixtur holding the work in place. Success i silver brazing this job depends largely on cleanliness, the work being pickled im- mediately before brazing. Handy & Har-

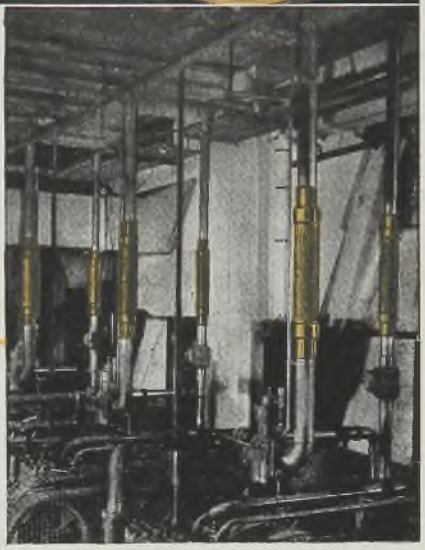
SEAMLESS FLEXIBLE METAL TUBING

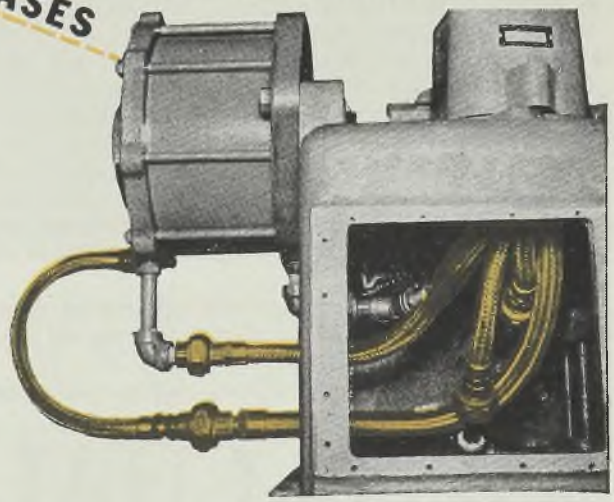


CONNECTS MOVING PARTS

ISOLATES VIBRATION

CONVEYS LIQUIDS AND GASES





• *Where absolute tightness is essential,* American Seamless Flexible Metal Tubing is the most reliable type of flexible conveyor obtainable.

In literally thousands of industrial applications, American Seamless is solving a multitude of connecting problems where movement of parts, vibration and misalignment of machinery are factors . . . and in conveying gases, liquids and steam under a wide range of temperatures and pressures.

Our Technical Department is experienced in designing flexible metal assemblies for specific applications. If you have an unusual one, perhaps we can be of assistance. 44203

ANACONDA

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY • General Offices: Waterbury 88, Conn.
Subsidiary of Anaconda Copper Mining Company • *In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ontario*

BUY WAR BONDS . . . Buy all you can . . . Keep all you buy!

How to make PACKING Last Longer . . .

The *kind* of packing and *how* you use it have a lot to do with maintaining pe pumping efficiency. Here, at left, is a step-by-step outline of the correct way to stall pump packing — saving you vital man-hours and money as well.

MOST PACKING TROUBLE traces back to *lack of "know-how"* in caring for stuffing boxes. This is wasteful — time and money-wise — especially since *correct* packing procedure is so simple for maintenance men to understand and practise.

Another class of trouble traces to misalignment of pump and motor. For when shaft is deflected, sleeve is apt to wobble — greatly accelerating packing wear. To eliminate this problem, A-C engineers developed, for many applications, the "Electrifugal" pump — in which both motor and impeller are mounted on *one* shaft, in *one* frame. This means fewer parts, fewer bolted connections — no chance for misalignment.

Regardless of type of pumps you use, here is an outline of correct packing procedure — plus a few tips on what to look for when trouble *does* arise . . .

▶ Make certain packing is suitable for service it must perform . . . that it's the right size and made of the right materials. Be cautious of so-called "all-purpose" packings. If in doubt, check with your pump manufacturer.

▶ Don't force in new packing against the old. It's apt to displace lantern ring and plug sealing liquid opening. First remove *all* old packing; clean stuffing box thoroughly; then insert new packing.

▶ Put each ring of packing in separately, seating it firmly before adding the next. Stagger adjacent rings so that joints are at 180° angle to each other. If lantern rings are used, be careful that sealing liquid openings aren't blocked as new rings are installed.

▶ After required number of rings have been inserted, tighten gland nuts. Gland should be taken up evenly to *finger-tightness*. If compressed too tightly, packing will burn o or sleeves become scored.

▶ Finally, until shaft turns over freely, operate pump fo about 1-minute intervals — permitting packing to coo Then put it into continuous operation.

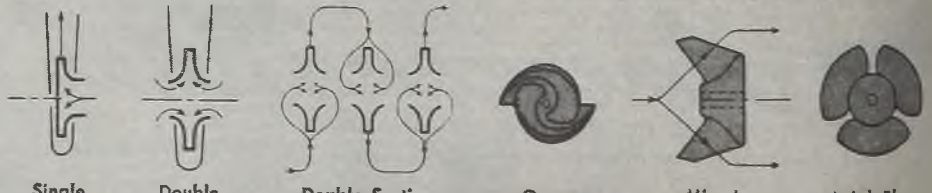
▶ What to check for if packing wears too quickly — (1) Che shaft sleeves. If badly scored they grind down packing ra idly; (2) Check position of lantern ring. It may be displace (3) If water seal piping is used, check liquid. If it contain grit a separate source of sealing liquid should be obtaine

▶ Send for your *free* copy of Allis-Chalmers' "Handboo for Wartime Care of Centrifugal Pumps". It's the basi easy-to-understand guide to efficient centrifugal pump mair tenance. Contains *no* advertising; applies to *all* make ALLIS-CHALMERS, MILWAUKEE 1, WIS. A 17

♪ *Tune in the Boston Symphony, Blue Network, every Saturday at 8:30 pm, EWT.*

ALLIS-CHALMERS PUMPS

Allis-Chalmers builds all types and variations of pumps shown at right. Capacities from 10 to 150,000 gpm—heads to 2500 lbs.



main flux is used. If temperature is too low, the brazing alloy will not flow; if too high, it will oxidize to dirty the metal. The temperature used is controlled at 1175 degrees Fahr.

The inner shell is of 16-gage brass. The outer shell has a series of six 8-inch die-sunk ribs. The two shells are joined by silver brazing. This construction saves metal as compared to that required if the part were cast. Also such a shape would be extremely difficult to cast properly because of the thin sections involved.

The silver brazing fixture for the second operation of joining consists of a multiple torch (nine heads) on a moving track operated by a foot pedal. As the foot pedal is depressed, the torch assembly moves horizontally into place inside the shell. The rib and case are preheated. The bottom of the rib is heated simultaneously by this multi-torch, achieving a 1175 degrees Fahr. metal temperature quickly.

There are three 3/16-inch holes drilled in the bottom of the rib through which the silver alloy is applied. Capillary attraction at the brazing alloy's free flowing temperature (1175 degrees Fahr.) causes it to flow through these holes to fill the entire joint of the two contacting faces. The torch is then pulled and the holes are filled by a hand operation. This double shell case is given a 45-pound hydrostatic test.

Third operation is the installation of one flange on each end of this intricately shaped case. The inner case is relieved about 0.003-inch to allow for brazing. A flange lip extends slightly over the outer case to provide good brazing contact. The work is still hot, coming from the multi-torching, when it is located on a revolving table.

The brazing alloy is applied by hand torch to accomplish this joining of the flange. Upon application, it flows by capillary action into the joint flange at top and bottom. Done on the moving table, this capillary action causes a very smooth flow around the periphery.

The water passage of the pump is formed by the flutes between the ribs thus joined form the water cavity being between the outer and inner case and the motor housed within the inner case.

The vital problem of commutation and heat transfer in the direct-current motor is solved by a "diffusor" mounted on the suction end of the pump. It consists of a centrifugally cast bronze piece and in-

(*Please turn to Page* 127)

Fig. 7 (*Above right*)—*After case is ready, motor and pump parts are assembled into it*

Fig. 8 (*Right*)—*The baffled end cover assembly with brazing wire in place being loaded into muffle-type gas fired furnace. At* 1200 *degrees Fahr., the preplaced brazing alloy flows into all the joint areas*

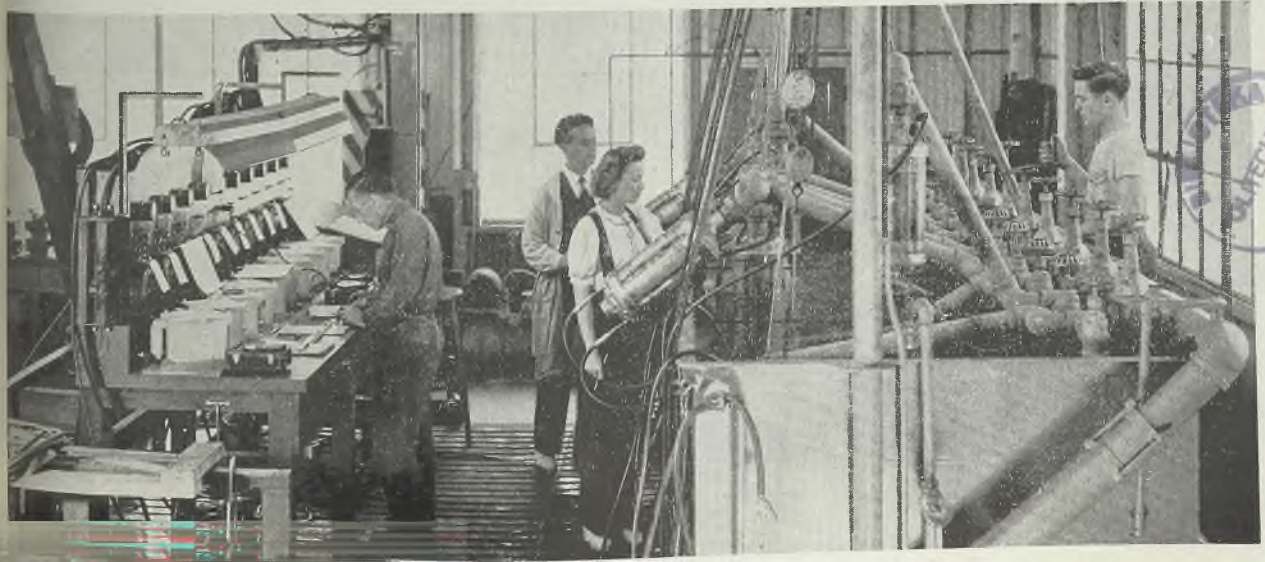


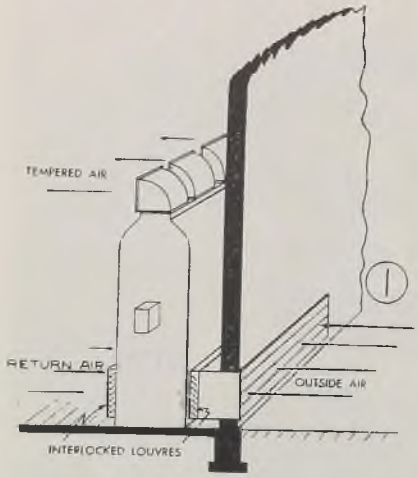
Fig. 9 (*Below*)—*Inspector* (*in smock*) *supervises testing of completed submersible pumping units in this special testing setup where* 10 *pumps are handled simultaneously. Attached to flexible connections for easy handling, pumps are immersed in tank for* 1-*hour running test and given a check for capacity, pressure and efficiency*

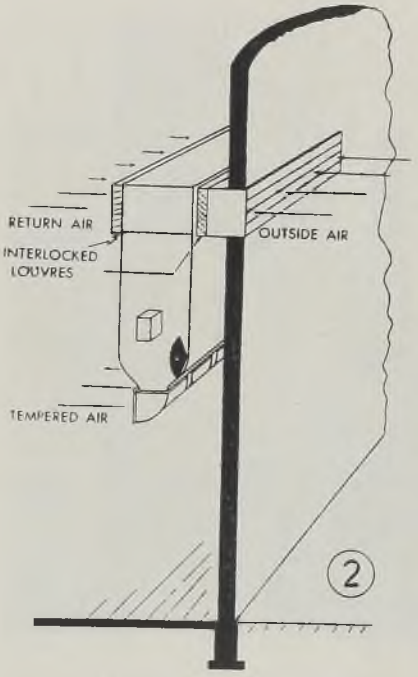
Figs. 1 and 2—Adaptation of conventional industrial type of direct fired unit heater to tempering air
Fig. 3—Battery of two coal fired heaters using stokers
Fig. 4—Diagram of tempering station with fuel burned directly in the air stream

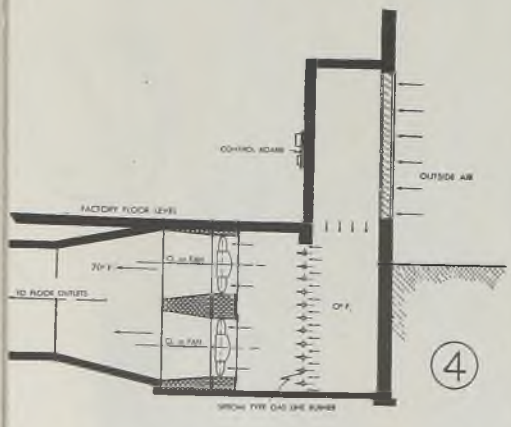
"Tempered" Air

For heating industrial buildings is produce by burning fuels directly in the air stream

By DAVID HENDERSON
Sales Engineer
Dravo Corp., Pittsburgh







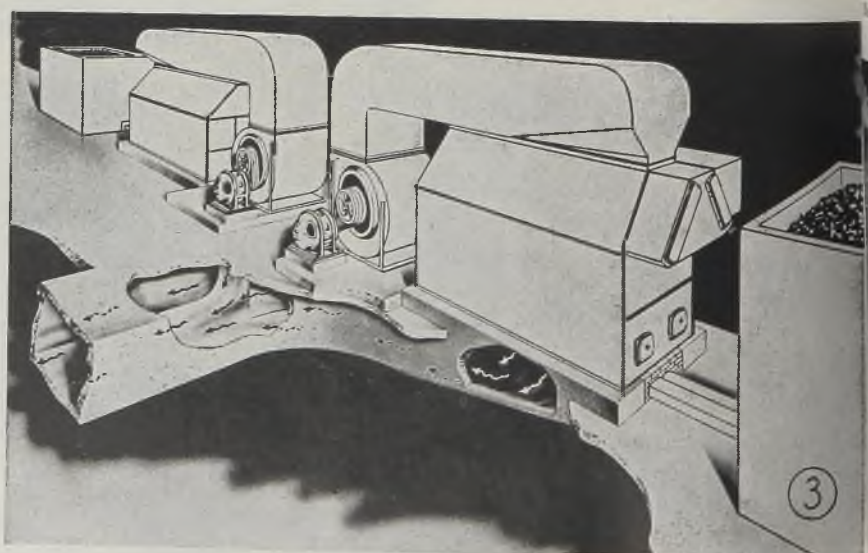
HEALTHFUL breathing conditions increasingly are becoming a basic requirement in the industrial field. In the heavier industries more than usual interest is being shown in the effective elimination of dust, obnoxious gases, acid fumes, and unpleasant odors by providing suitable ventilation. The plant engineer studying this problem is faced with the fact that every cubic foot of air vented has to be replaced with one cubic foot of fresh air. In summer this presents no problem, but in the winter this cubic foot of fresh air usually will be too cold for comfort. The temperature of this air may be zero or below. Bringing such air into the building in quantities will set up uncomfortable working conditions. This air must be heated or tempered first, and special provision made for its introduction. Its temperature must be raised to at least room temperature. Amount of heat required will depend, of course, on the quantity of air handled and the temperature rise.

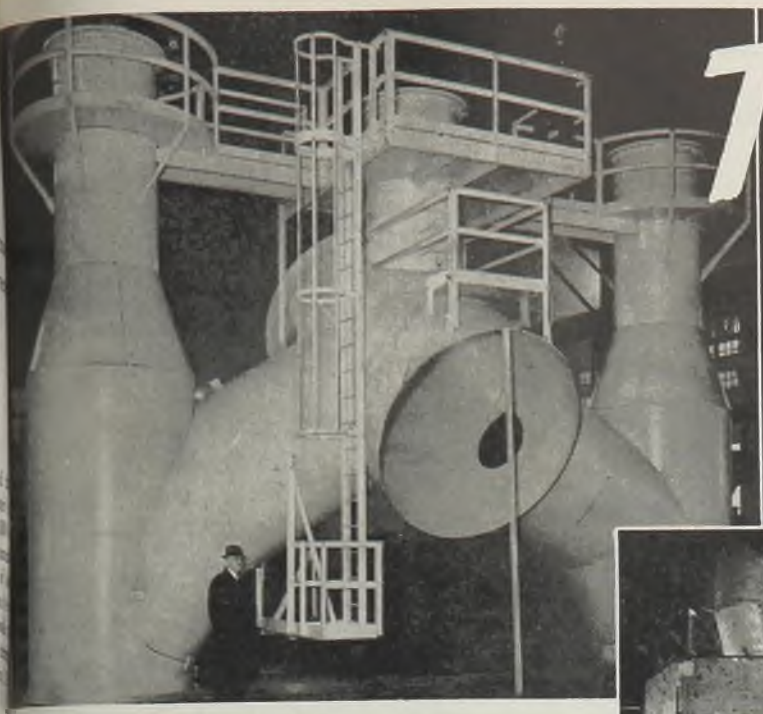
Heat required to raise the temperature of makeup air from 0 to 70 degrees Fahr. totals about 7,500,000 B.t.u.'s per hour, when such air is brought in at the rate of 100,000 cubic feet per minute. This rate of ventilation is quite common and for that matter is greatly exceeded in many cases. In terms of boiler capacity, 100,000 cubic feet per minute requires about 225 boiler horsepower during zero weather conditions.

A multiplicity of air changes per hour often is necessary to attain proper breathing conditions. Thus all of this heat put into the makeup air is in the building only a short time and then thrown away. In terms of a winter's operation, a ventilation rate of 100,000 cubic feet per minute represents an annual expenditure of many thousands of dollars for heat. Under such conditions the aim should be: 1. To reduce if possible, the rate of ventilation without interfering with proper breathing conditions. 2. To use low-cost heat.

Devising ways and means of reducing the ventilation rate is something the plant engineer is best able to do, being acquainted with the local conditions. In many plants this rate is entirely too high and as a result valuable heat is wasted. If such plants can be taken as a criterion an investigation into this should pay dividends. Every cubic foot of air exhausted should be made to count in removing contaminated air. Locating the ventilating equipment as close as possible to the source of contamination and avoiding short circuiting of fresh air to the ventilating equipment will help toward this end.

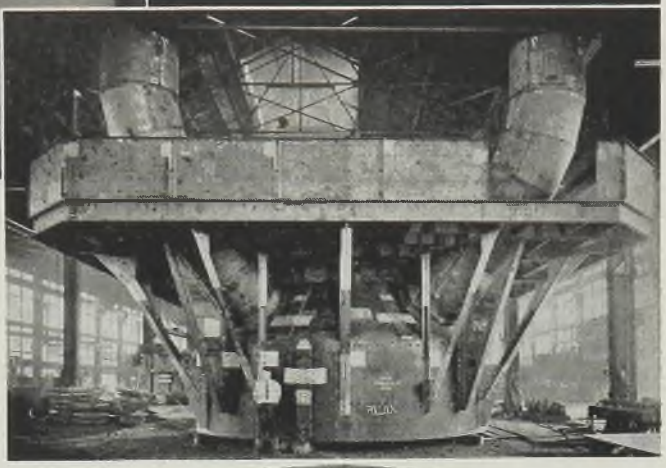
Ventilating equipment should be such that its rated capacity will not be affected materially by variations in outside wind velocities. Obtaining a 25 per cent or more increase in ventilation with an increase in wind velocity, while not objectionable in the summer time, has the objection in the winter time of that much more increase in heat loss. Venting should be under reasonable control. Moreover,





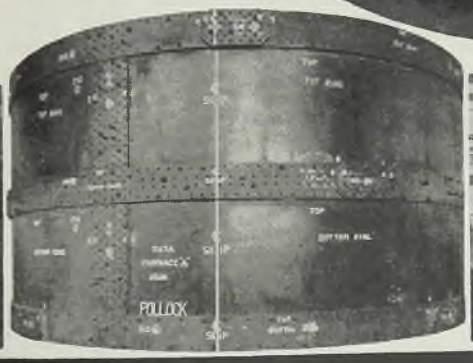
Take a Tip

and take advantage of POLLOCK precision fitting when ordering STEEL PLATE CONSTRUCTION



Customers of THE WILLIAM B. POLLOCK COMPANY have found that accurate and careful shop assembly of fabricated steel plate work, and proper match-marking of field joints for quick and correct erection at the customer's plant, saves untold time and money. Let POLLOCK demonstrate to you how they can take full responsibility when it comes to your steel plate construction requirements and save YOU time and money.

Pictures herein show shop assembly of different kinds of steel plate work in the POLLOCK plant at Youngstown, Ohio.



The WILLIAM B. POLLOCK COMPANY

YOUNGSTOWN, OHIO

STEEL PLATE CONSTRUCTION • ENGINEERS - FABRICATORS - ERECTORS

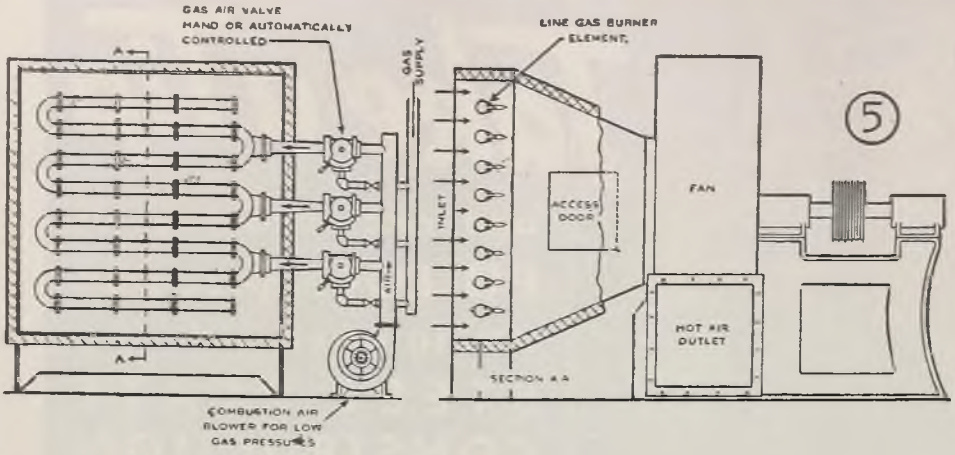
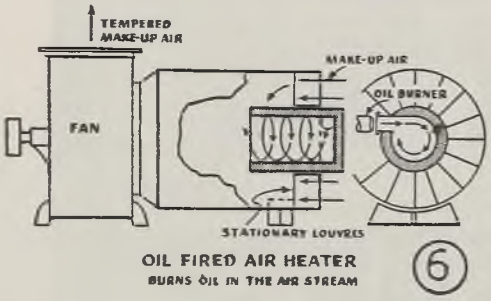
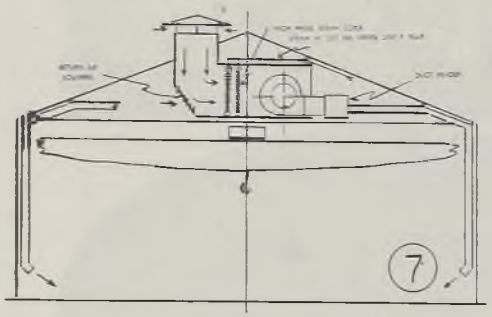


Fig. 5—Heater integral with blower type fan. Gas is burned in air stream.

Fig. 6—Oil fired air heater which burns fuel in the air stream.

Fig. 7—Central steam system located in roof truss, with air discharged into duct distributing system





low cost heat implies low initial and operating costs. Fortunately the choice of equipment is wider than formerly with greater opportunities of obtaining lower costs. The war years have seen for example, a considerable increase in the use of direct-fired equipment for space heating, (by "direct-fired" is meant that air receives its heat direct from the fuel). Such equipment now is being used for tempering makeup air with very excellent results. It is fired with either oil, gas, or coal. Since conditions require a constant outlet temperature with a varying inlet temperature, modulating control of the burning of the fuel is necessary. Considerable and satisfactory progress has been made along these lines. Direct-fired equipment can handle air of almost any initial temperature without danger of freezing as it will be apparent there is nothing about it to freeze.

Figs. 1 and 2 show the adaptation of a conventional industrial type of direct fired unit heater to the tempering of makeup air. This heater is fired with either oil or gas. It will be noted the products of combustion do not mix with the air stream. Combustion takes place in a gas and air tight chamber and the waste gases are discharged to the outside. The units are built to deliver up to 20,000 cubic feet of tempered air per minute.

Coal fired heaters using stokers can deliver up to 100,000 cubic feet per minute of tempered air. Fig. 3 shows a battery of two such units delivering approximately 200,000 cubic feet of air per minute. Such units also are adapted for oil and gas firing.

Lower Costs—All Heat Used

The art even has been extended to the burning of fuel, (gas or oil) directly in the air stream, all resulting in still lower initial and operating costs, and using all of the heat in the fuel. One installation of this kind tempers air at the rate of 568,000 cubic feet per minute and has a total heating capacity of 32,000,000 B.t.u.'s per hour. The building is devoted to welding operations in which a multiplicity of air changes are necessary to assure the proper working conditions. The load is handled by two tempering stations, and tempered air is delivered through floor outlets. Fig. 3 shows diagrammatically one of these stations. An accurate premixture of natural gas and air is burned, using a special type of line burner placed directly in the air stream. The modulation control provided functions up to a 2 degrees Fahr. difference between inside and outside temperatures. In other words, if the inside temperature is 70 degrees, the control will function up to 68 degrees outside temperature and then the gas is shut off. The tempered air is handled by axial flow fans. Each station handles 184,000 cubic feet per minute. The ratio of air to waste gases is about 50 to 1, resulting in a high degree of dilution. The final content of CO_2 is small and well within safe limits. There is no indication of CO. No odor is noticeable. Fig. 5 shows a heater of this type integral with blower type fan.

Light oil also is being burned in the air stream successfully. However, the products of combustion mix with the air stream only after complete combustion has taken place in a refractory lined furnace. Every effort is made to assure complete combustion before the waste ga mix with the cold air stream. The t of furnace used is shown in Fig. 6. T gential firing, as shown, provides necessary time element and turbuler Here again the ratio of air to waste ga is quite high, resulting in a high deg of dilution. No odor is noticeable.

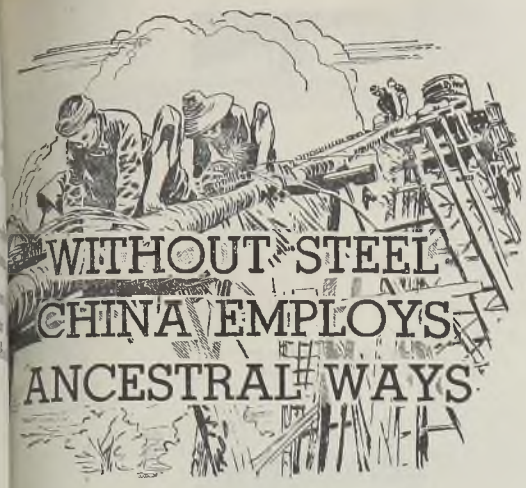
Conditions in the field will dictate kind of tempering system to use. If ste is available, a steam system normally the answer. If not, and new steam g erating equipment is involved, lower c may be found with direct-fired equ ment.

Steam systems may take the form o multiplicity of steam unit heaters c tributed around the building with ea unit connected to the outside air a each provided with individual modul ing control, or it may be a central syst involving one or more steam coil a fan combinations discharging into a d distributing system.

One of the latest installations of t latter is being made in a steel plant buil ing in which steam at full line pressu of 225 pounds per square inch and 5 degrees Fahr. total temperature is used the steam coils. The coils are made v of straight steel pipe set vertically a welded into pipe headers. The pipe finned heavily and is good for 800-pou pressure. The building has two tempe ing stations, each handling 120,000 cub feet of air per minute and good for a output of 12,000,000 B.t.u.'s per hour. cross section of this installation is show in Fig. 7. As will be noted, these tempe ing stations are located in the roof tru and discharged into a duct system wit downcomers bringing the fresh tem pered air to the breathing zone.

The basic advantage of using high pre sure steam centers is the ability to us smaller piping, provided provision made for cooling the condensate an avoiding losses due to flashed steam. Th cooling effect can be obtained readil by inserting additional coil in the a stream. Furthermore, high temperatu steam means less steam coil surface fo generation of heat.

This article is reproduced with the specia permission of *The Foundry*.



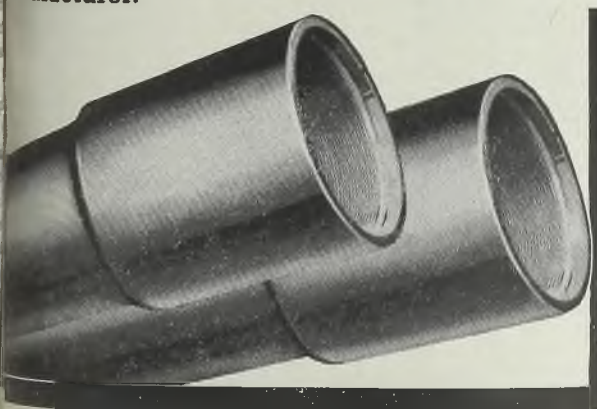
WITHOUT STEEL CHINA EMPLOYS ANCESTRAL WAYS

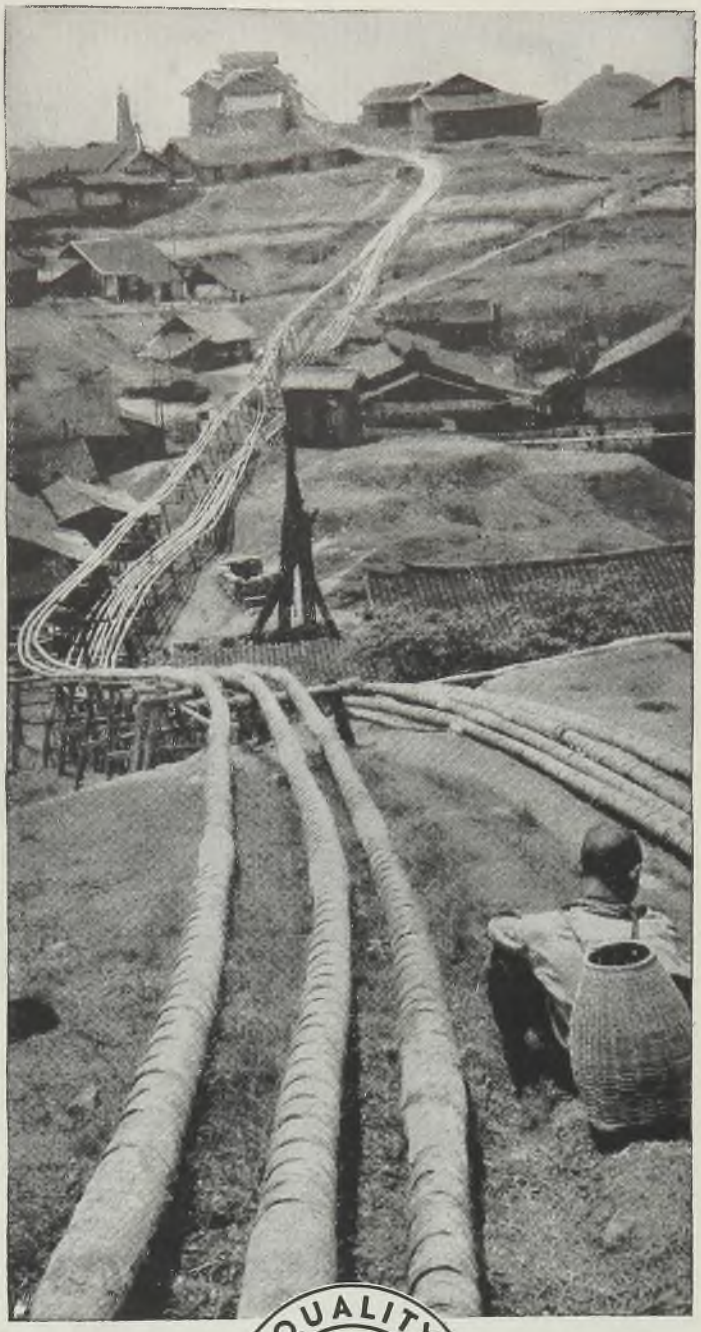
THIS picture might have been ...ken centuries ago. It shows a bamboo ...eline, carrying brine from 2,600 year ...d salt mines to a refinery in the heart of ...dern China. Here in Tse Liu Ching, ...chwan province, steel pipe is not avail...le, and the Generalissimo's engineers ...ust use primitive bamboo pipe as a war...me substitute.

Of course the bamboo pipe splits, is ...ten by insects, deteriorates with age and ...n. Every day coolies must repair it, by ...apping the lines with bamboo strips. ...ere are countless sizes of bamboo pipe, ...l different (and none of them big enough). And the technique of making permanent water-tight joints is unknown.

But this bamboo pipe points to what we *in America* seldom realize..the importance of steel. Low-cost durable steel pipe, for example, is a priceless ingredient of our civilization. Without it we could not have ...r pure water supplies, or our sanitary ...ystems. Our railroads, factories, oil fields ...d power plants could not exist without ...odern steel pipe.

Steel is America's No. 1 basic industry. ...he whole structure of American life--with ...ll its security, convenience and comfort--depends upon the steel and steel products ...t which Youngstown is a leading ...anufacturer.





QUALITY
TRADE MARK
YOUNGSTOWN
SERVICE

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN, OHIO

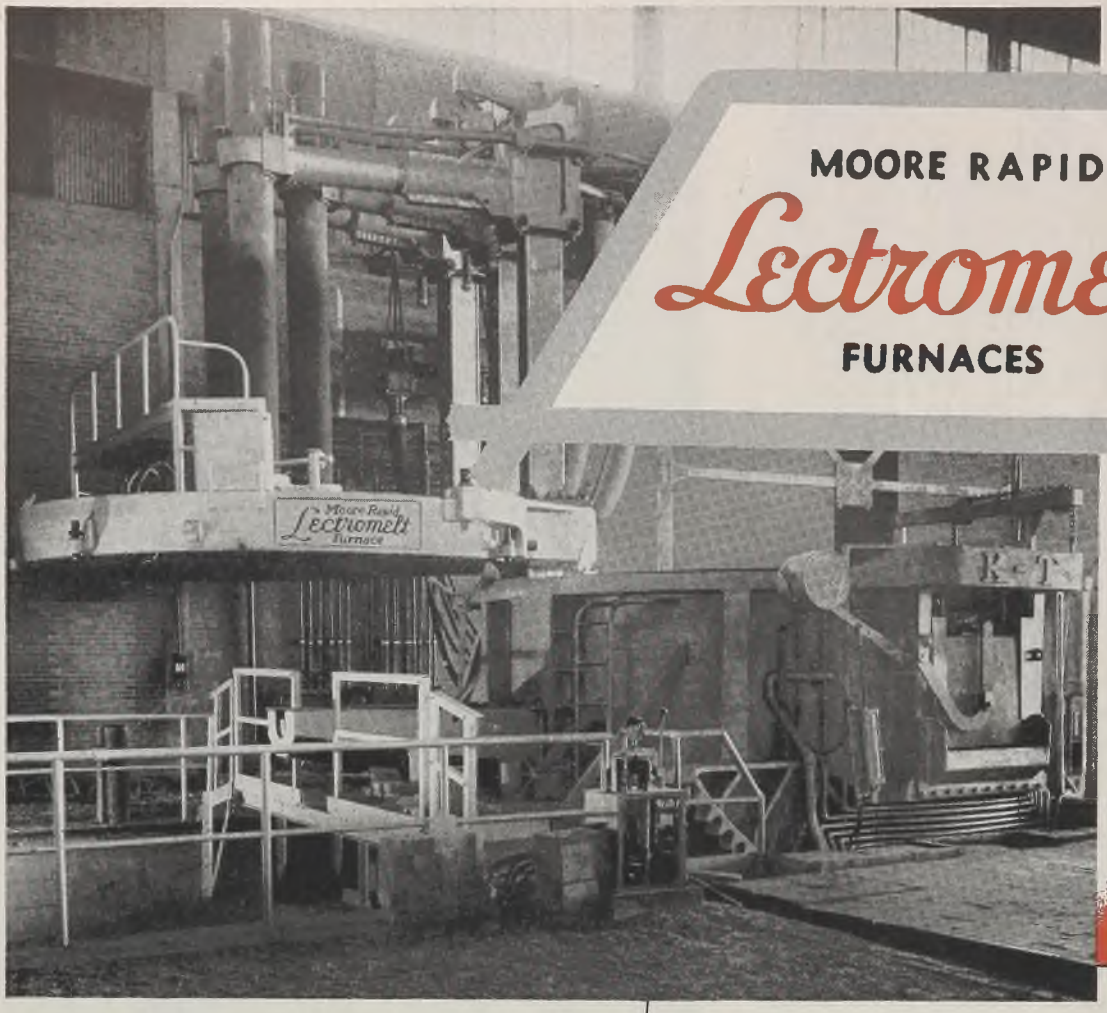
Manufacturers of

CARBON - ALLOY AND YOLOY STEELS

Ask your distributor for Youngstown

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Electrolytic Tin Plate - Coke Tin Plate - Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels.

MOORE RAPID Lectromelt FURNACES



A size "KT" Lectromelt top charge furnace with roof rotated, ready to be charged by a drop bottom charging bucket. This is one of the heavy, steel mill type furnaces.

★Moore Rapid Lectromelt Furnaces are built in a wide range of standard sizes from 100 tons down to 25 pounds capacity. Almost all of the Lectromelt furnaces installed during the past few years have been of the top charge type. The top charge feature offers many advantages, such as greater output due to decreased charging time, lower power and refractory costs, increased production per man hour and many others. Especially large pieces of scrap can be charged readily, and light fluffy scrap can be charged to shell height with a drop bottom bucket. In some of the very large sizes—frequently arranged for installation on an open-hearth platform—a door charge furnace may be used with the charging being handled by an open-hearth charging machine.

The following tables list some pertinent data on the various sizes of Lectromelt Furnaces:

TABLE I. These larger capacity furnaces are of the heavy, steel mill type and are generally used for ingot production.

Lectromelt Size	Nominal Size of Heat	Shell Diameter	Nominal Capacity of Substation
HT	75-100 Tons	20′—0″	15,000 kva
IT	60-75 Tons	19′—0″	15,000 kva
JT	50-60 Tons	18′—0″	12,000-15,000 kva
KT	40-50 Tons	17′—0″	10,000-12,000 kva
LT	30-40 Tons	16′—0″	8,750-10,000 kva
MT	25-30 Tons	15′—0″	7,500 - 9,375 kva
NT	15-20 Tons	12′—4″	7,500 - 9,375 kva
OT	8-12 Tons	11′—0″	6,000 - 7,500 kva

TABLE II. The Lectromelt furnaces listed in this table are generally used in foundry work but many of these smaller furnaces are used in ingot shops for pouring billet size ingots or for tool steel.

Lectromelt Size	Usual Hourly Production Rate*	Usual Size of Heat**	Nominal Size of Substation
OPT	4½ Tons	8-9 Tons	3,000-3,750 kva
PT	3 Tons	5-6 Tons	2,000-2,500 kva
CQT	2 Tons	3½-4 Tons	1,000-2,000 kva
QT	1½ Tons	2½-3 Tons	1,200-1,500 kva
RT	1 Ton	2 Tons	800-1,000 kva
ST	1,000 Pounds	1 Ton	400- 500 kva
TT	500 Pounds	1,000 Pounds	300- 375 kva
UT	250 Pounds	500 Pounds	200- 250 kva

*On acid practice or single slag basic practice.
**The furnaces are so constructed that, when the occasion demands, especially large heats can be poured, considerably in excess of the "usual" heats listed.

TABLE III. The Lectromelt furnaces listed in this table are intended primarily for laboratory and experimental use. These furnaces are for operation from a single phase supply.

Lectromelt Laboratory Sizes	Usual Size of Heat	KVA Rating
V	200-300 Pounds	100
VW	100 Pounds	100
W	50 Pounds	50
X	25 Pounds	37.5

PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 30, PENNSYLVANIA

Wiremakers deal with...

DRAWING AND FINISHING PRACTICES

By JOHN D. KNOX
Steel Plant Editor, STEEL

Use of goggles by workmen handling lifts of bundled wire is strongly recommended. Pickling of alloy steels is improved by addition of rock salt to bath. Wear of pickling hooks at acid line remedied by slight addition of lead to nonferrous mixture. Electrogalvanizing, carbide cold heading dies and carbon steels for wiremaking explained in detail

IMPROVEMENT in the injury rates of rod and wire mills since 1929 has not kept pace with the reductions attained in some of the other major departments, R. H. Ferguson, manager of safety, Republic Steel Corp., Cleveland, told wiremakers attending the annual meeting of the Wire Association, William Penn hotel, Pittsburgh, Oct. 16-19. The decrease in frequency rate during past years has amounted to 41 per cent whereas this rate is down 78 per cent in sheet mills, 62 per cent in open hearth, 60 per cent in general mechanical and 54 per cent in pipe mills. The net reduction in severity has been 38 per cent since 1929 in comparison with decreases of 72 per cent for sheet mills, 81 per cent for open hearth and 55 per cent for blast furnaces.

Successful safety programs have been established on the premises that safety is management's responsibility as well as an operating problem. He stressed the importance of building plants with the safety and well-being of the working personnel in mind, and claimed it is just as simple to construct a plant the right way as to build dangers into a building and operations which a little foresight could have eliminated. To do this job representatives of our engineering departments sit down with the safety man and review the best known practices, check the safety codes, both state and national, and agree on the structure to be recommended. Blueprints are checked for safety and for legal requirements of the jurisdiction in which the plant is located.

Too many times in the safety field all of the educational work is directed towards the man on the job. Leadership for safety must come from management. The program must have the active attention of the top flight officers. Lip service alone is not sufficient. The speaker suggested a safety organization be set up to fit the particular plant. One man should be made responsible for the program. This man should report directly to the plant manager.

He stressed the vital importance of the use of practical safety rules for the plant and recommended that these safety rules should be in the form of safety instructions. Safety rules should be explained so that they are thoroughly understood. Only when this is done can proper enforcement and intelligent application be attained.

The speaker also cited the importance of workmen wearing goggles when placing wire around bundles. He pointed out that last year six accidents were experienced where the bundling wire flew up and hit men in the face. Because the employes wore goggles there was no loss of eyes.

Particular emphasis was placed by the speaker on a thorough and regular plant inspection for safety conditions and poor practices. It is imperative, he said, that such situations be corrected promptly. Routine inspections by the plant safety man in company with the departmental superintendent and foreman have a definite effect on the reaction of personnel. When correcting poor practices, supervisors must be fair and just. It serves little purpose to correct a practice if a bad taste is left in a man's mouth and the reasons for changing a practice are not explained to him in full detail.

In discussing Mr. Ferguson's paper, one wiremaker pointed out that industrial relations will become more pertinent in the future. Large companies have been rather slow to take up the cause of safety; smaller concerns have been more active.

Discussion also brought out some important methods of handling cold-rolled bars. At one mill canvass rubber belts with a ring inserted at each end are em-

ployed for this purpose, handling 1 ton at a time. At an eastern plant, braided rope suspended from a bar at each end is employed for this purpose.

Much has been written and said recently concerning the qualifications of a foreman. The expression, "Give me a man with a head full of common sense and plenty of initiative, and he will make a real foreman," covers the qualifications for one holding this position. This opinion was expressed by J. J. Sanderson, assistant superintendent wire mills, Keystone Steel & Wire Co., Peoria, Ill., in discussing the subject of "Handling Wire Mill Labor Problems." In our mills, he stated, more than 95 per cent of the foremen have been in supervisory capacity for 5 years or more. Every one of them has come up through the ranks within the mill. They understand the workings of the organization, and know they have the backing of their immediate superior, as well as management. They are expected to meet production schedules, and keep the morale of their employes high. Their main headache has been absenteeism. Checking absentee personally by telephone, he emphasized, has done more to straighten out this condition than than waiting for the man concerned to get back to work.

Mr. Sanderson, in alluding to the frequently heard phase of playing "favorites" with workers, drew attention to a system operating successfully in his plant which nullifies such a condition. He explained that two departments have a "bidding system," where each employe in his respective department is given a sheet of paper on which all jobs are itemized. The employes bid on all the jobs, listing their choices in numerical order. These are turned into the department office at a designated time, and are filed according to seniority. Inasmuch as seniority and fitness for the job are the governing factors, the schedule is made with the senior men getting their choices, and so on, until the schedule is completed. No "favorites," he contended, can be played by this bidding system.

"Cleaninghouse Practice"

In speaking on "Cleaninghouse Practice," F. P. Spruance, vice president, American Chemical Paint Co., Ambler, Pa., stated that the removal of scale from wire other than stainless, still is accomplished in sulphuric acid baths varying in strength from 3 to 12 per cent by volume. However, concentrations of from 5 to 7 per cent by volume might represent a fair average for wire pickling. Temperature as well as concentration is utilized in controlling the speed of pickling. The acid activity of a bath of given concentration can be quickly increased or decreased by raising or lowering its temperature, each change of 20° Fahr. will approximately double or halve the activity. Temperature also has its effect on the nature of the pickled surface and while high temperatures, even in relatively strong baths, have little harmful effect on low-carbon steels, high-carbon and alloy steels are better pickled and freer of smut at low temperatures.

Mr. Spruance pointed out that the use of inhibitors ushered in a new pickling era. Full advantage, he pointed out, can be taken of improved inhibitors and their ability to minimize the attack of acid on metal and markedly reduce the absorption of hydrogen with its embrittling action.

Use of strong inhibitors, stable in hot acid baths, has been a factor in reducing the embrittlement of pickled wire to an extent that rapid drying of the limed rods is now accomplished in flash bakers, instead of in the slower tunnel ovens formerly required to expel the occluded hydrogen.

The optimum amount of iron to be tolerated in the bath varies. In general, however, when the bath has dissolved approximately ½-pound of iron per gallon (approximately 6 per cent), it is good practice to discontinue the addition of acid and inhibitor, to raise the temperature of the bath to offset the slowing action of its increasing iron and decreasing acid, and to pickle as long as possible to reduce the acid as low as possible before the bath is discarded. Pickle supervisors often do, and always should, keep a running log for each acid tank.

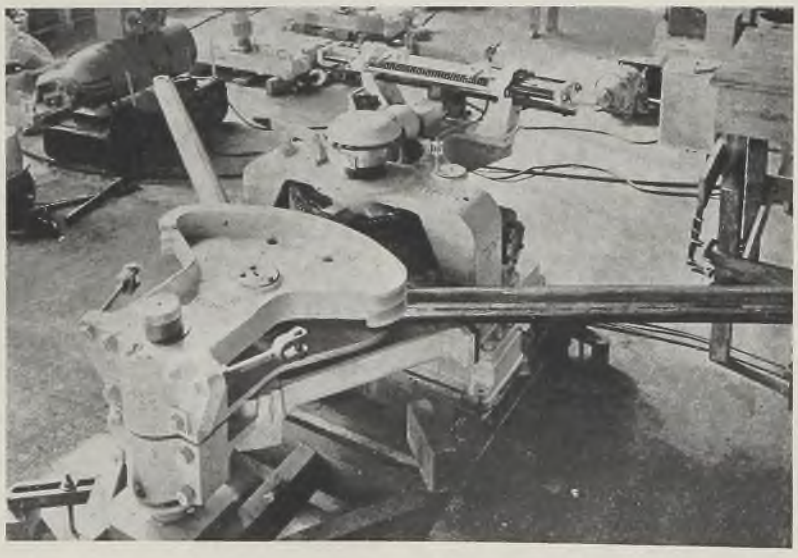
Pickling of alloy steels, he stated, has been markedly improved by a single addition of from 5 to 20 pounds of rock salt to each 100 gallons of the usual sulphuric acid bath. Muriatic acid (20° Be. in the amount of from 1 to 4 per cent by volume would have the same action. Salt is used because it is cheap and usually on hand.

Salt Improves Pickling

Addition of salt to a sulphuric acid bath used to pickle chrome vanadium steel, for instance, markedly improves the pickling. It is even more noteworthy that if, in addition to salt, a strong inhibitor designed for use in such baths is also added, over-pickling is substantially prevented. The metal loss and the acid consumed are minimized and a smooth, fine crystalline surface is obtained.

Mr. Spruance in conclusion announced that a chemical treatment of rods will be developed that may so modify the nature of the scale that further economies and greater pickling speed will be obtained. Encouraging work is being done along this line. Alloy steel forgings now are being treated in the heat treating process with the result that scale is loosened sufficiently to flake off almost completely when the treated forgings cool. More work is required to adapt this process to the treatment of wire rods or to adapt it to the furnaces in which they are treated.

D. D. Buchanan, manager of operations, Union Drawn Steel division, Republic Steel Corp., Massillon, O., in commenting on Mr. Spruance's paper stated that little attention has been given to the cleaning house during past years. If the steel is not cleaned properly, he warned, a wide variation in the coating and trouble with the dies will occur; poor cleaning gives a poor bond. In many plants the pickling room is placed in any old spot; it seldom is painted, floors are in bad condition and there is little incentive for the operators to turn out a quality product. He described a new pickling room installed at Republic's Hamilton, Ont., plant in 1942, with its walls of white and border of battleship gray, and stated that it has not been painted since then. The employes are proud of the installation, he



LST STEERING GEAR: Located below deck in a special compartment above the rudders, this unit is operated by an electric motor remotely controlled by the wheel on the bridge. The wheel may be set for any desired angle and motion of the gear is halted when the desired position is reached. It can be hand operated in case of power failure. A quadrant type, it was built by Baldwin Locomotive Works