Women workers operating centerless grinders in plant of Wyckoff Drawn Steel Co. Page 80

STEEL

The Magazine of Metalworking and Metalproducing

MARCH 20, 1944

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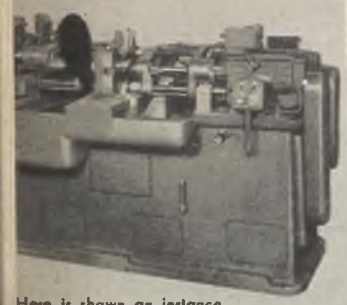
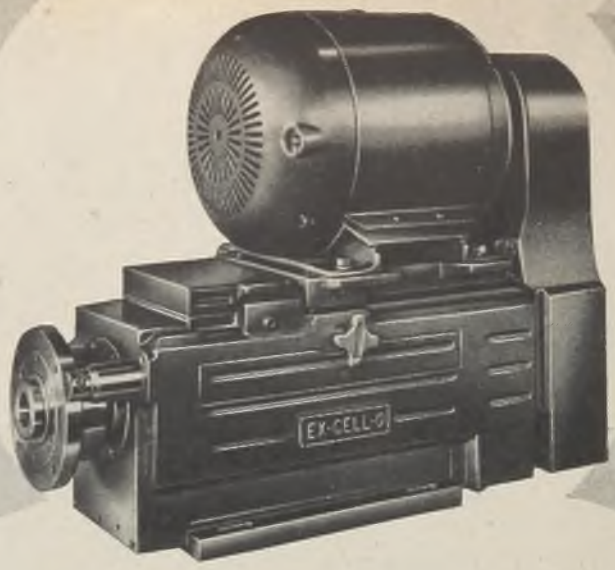
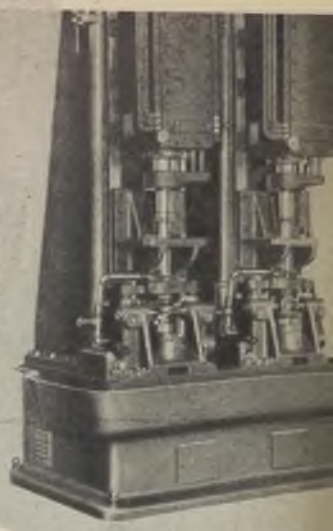


Here is shown an instance where the Ex-Cell-O Small Hydraulic Unit (Style 21) is used on a machine for the accurate drilling of holes in oil pump bodies.





On this Ex-Cell-O double drill press, two Style 25-A Ex-Cell-O Hydraulic Units are mounted on the column in vertical position. This has definite advantages on certain classes of work.

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STEEL
March 20, 1944

Confession Good for Soul

Last Monday Eric Johnston, president of the United States Chamber of Commerce, delivered an address at Boston College which has received widespread favorable comment. The reason for this is that Mr. Johnston, unlike most speakers for business, admitted freely that management has made mistakes.

Mr. Johnston drew a parallel between abuses by management and by labor. He referred to the twenties when "we of management had everything our own way, a friendly administration at Washington, low taxes and a friendly public." Yet with all these advantages, "on the economic side we gave this country a balloon boom that had to burst and on the moral side produced men like Insull, Hopson and Musica, who undermined confidence in business." As a result, "we got the biggest public beating that any group of Americans ever took."

To labor, Johnston said, "From 1933 to 1942 you rode high. You were tops; a friendly administration in Washington; all sorts of favors fed to you daily. . . . What did you do with your power? On the economic side you gave yourselves a labor boom, regardless of the consequences to any other element of the population. On the moral side you produced men like Browne, Bioff and Scalise who gave all labor a black eye." As a result, Johnston warned labor, "the doghouse is now yawning for you."

To management and labor jointly he said, "Go ahead and turn this country into a continuous brawl and the government will chain you both, or work together and stay free."

Some industrialists may complain that the president of the chamber was too sweeping in his admission that management was to blame for the ills of the twenties. If he did err in this respect, he erred in emphasis and not in substance. The important point is that in liberally admitting that management did make mistakes, he is performing a tremendous service for industry.

Consider how important it is at this moment to preserve private enterprise for the postwar period. Millions of voters are asking what management means by "private enterprise." If industry admits no mistakes in the past, then "private enterprise" to the man in the street means managements' 1921-1929 conception of "private enterprise," and he wants no part of it.

Mr. Johnston is trying to tell the public industry has learned from past mistakes and that it is fighting for a private enterprise unencumbered by the fallacies of the twenties.

Confession always is good for the soul.

SCANNING THE FUTURE: Reports from more than 3000 companies in the metalworking industry show that 49.4 per cent of the companies are still turning out the same products they made before the war started, 35.6 per cent are engaged partially on the same products and 15 per cent are not making the same products. Of the 50.6 per cent which shifted partially or wholly to new products during the war, 80.4 per cent intend to return to their old products, 17.3 per cent will return to them partially and 2.3 per cent will not go back to the old lines.

Only 17.2 per cent of the companies are using government-owned plants or equipment. Of these, 62.7 per cent intend to buy the government-owned facilities after the war if opportunity for purchase on reasonable terms is offered. On the contrary, 37.3 per cent do not intend to buy.

(OVER)

These statistics are typical of the pertinent data afforded by STEEL's survey. The results have been compiled in a "special report to industry" which will be presented in four installments, the first of which appears in this issue. The breakdown of information according to size of plant, nature of product and, in some instances, geographical location, will make this report a useful guide to industrialists who are looking ahead to the transition and postwar periods. —p. 67

° ° °

THE FLEET IS READY: If favorable weather holds, navigation on the Great Lakes may be resumed by April 1. Last year the season opened April 19.

This possible head start of nearly three weeks will be welcomed, because the Great Lakes shippers will need all the breaks they can get. True, the carrying capacity of the fleet will be augmented by the full-season operation of 16 new Maritime Commission vessels, but this advantage has a potential offset in a threatened serious shortage of seamen.

Barring extraordinary mishaps, vessel operators believe they can meet the goal of transporting 90,000,000 tons of iron ore to lower ports. They foresee coal shipments of 53,500,000 tons, limestone cargoes aggregating 19,000,000 tons and a grain movement of 525,000,000 bushels. To move this tonnage in a single season is a feat unparalleled in inland waterway transportation, but it probably will be accomplished—quietly and efficiently. —p. 54

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DEPOTS FOR SURPLUS: Athough much thought has been given to the problem of redistributing surplus material in war contractors' plants to other plants where it can be used advantageously, the plans for redistribution thus far employed have not worked as well as could be desired.

One informed commentator believes that part of the difficulty lies in the failure on the part of the planners to place sufficient emphasis upon the physical movement of the surplus materials. Too much attention, he infers, is devoted to "paper work" and general plans and not enough to actual inventorying, storage and shipment.

This constructive critic recommends that central warehouses or depots be established where contractors may send surpluses for subsequent disposal into existing commercial distribution channels. This idea has merit. It would make it unnecessary for government agencies or contractors to become retail distributors. —p. 76

PROCEED WITH CAUTION: Stocks of military goods are mounting rapidly. By midyear, the nation may be so well fortified with stores of munitions that the pressure for some reconversion to civilian goods will be overpowering.

Washington is aware of this situation, but it must proceed cautiously. For one thing, it dare not go too far in liberalizing restrictions until after the results of the impending invasion are known. Secondly, it must take into account the effect of a partial shift to peacetime production upon the internal economy. For instance, will it be fair to permit certain manufacturers in a given field to return to their normal activities while competitors still are required to keep on with their war work?

WPB is alert to the implications of this question. It wants to restrain manufacturers from "jumping the gun." It hopes this restraint can be exercised through the control of materials and manpower. It is not an easy problem. —p. 49

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ELECTRONIC DETECTORS: Adapting electronics to industrial operations is one of the most interesting developments of recent years. There seems to be no limit to the applications of this amazing science.

Typical is the electronic detection of pinholes in tin plate. Until a few years ago the inspection for pinholes and other defects was performed by workmen. It was tedious work, involving strain on eyes and nerves and sometimes necessitating working in short shifts to minimize fatigue. Also it was physically impossible to inspect a sheet satisfactorily if it was traveling at much more than 50 feet per minute.

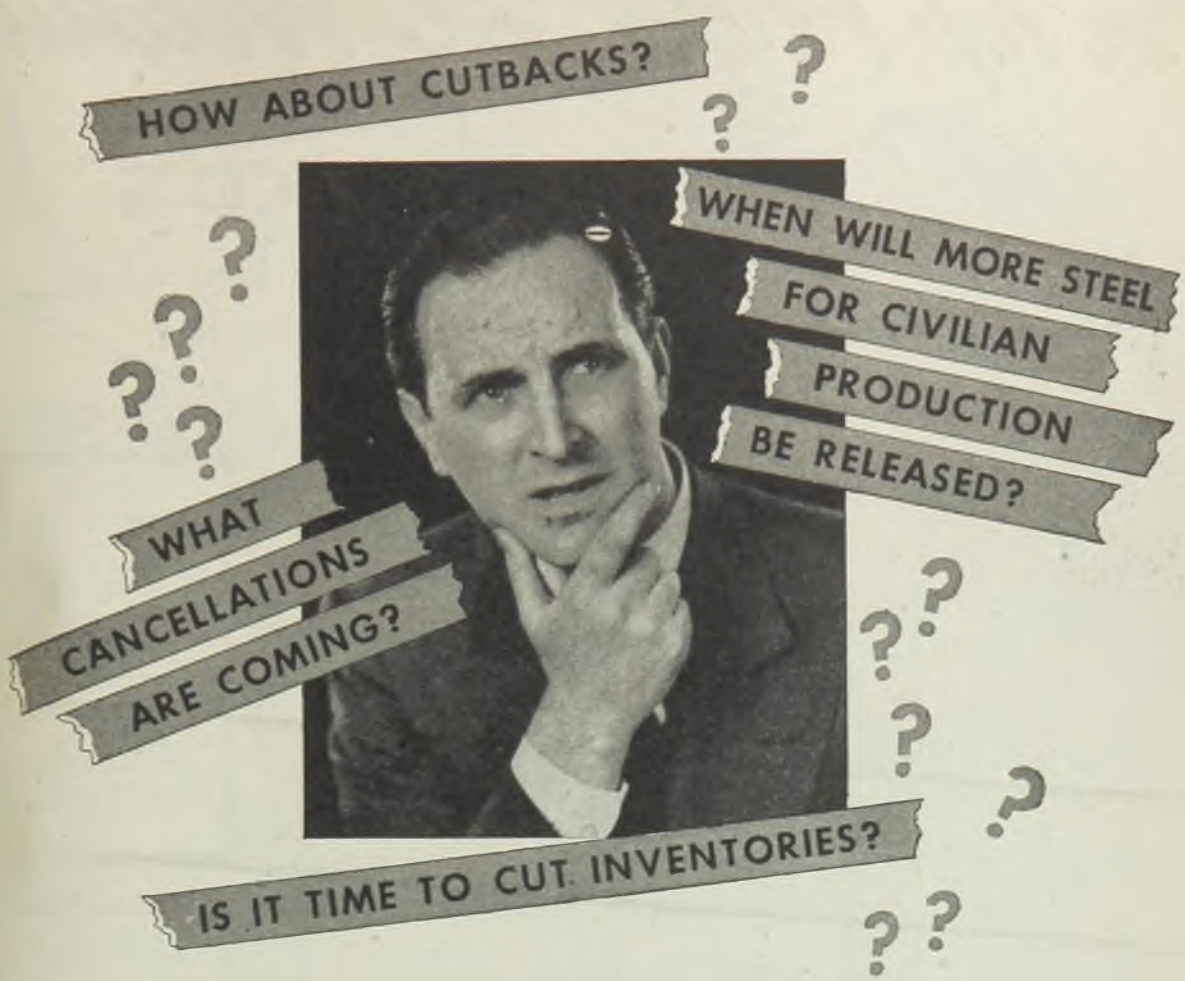
Today it is possible with photoelectric devices not only to detect pinholes as small as 1/100-inch in diameter in strip measuring from 6 to 62 inches wide moving at a speed of 1000 feet per minute, but also to register detection of the defect by signal or by marking the hole and, if desired, to sort out the defective material from the good.

All of this is accomplished by a light source, photoelectric tubes and suitable control equipment. It is prophetic of the extraordinary services we may expect from electronics during the next decade.

—p. 108

E. L. Shaner

EDITOR-IN-CHIEF



Here are the facts . . .

● Many companies in the metal-working industries have recently experienced cutbacks in war contracts and there is some evidence of planning for partial reconversion to commercial production. As a result, a number of manufacturers are already circulating lists of odd steel stocks and excess inventories. More lists will appear as cancellations, design changes and manufacturing trends follow the tide of war.

While there is no real surplus of steel at the present time, there are sound reasons for a conservative buying policy. First, you will help war production by making steel available for those who need it immediately. Second, it is good business to keep your inventory at a practical working level.

Steel overstocks may be dynamite. Cancellation of a contract or a change in design can overnight leave you with an excessive or obsolete steel inventory. There was a time when this conservative inventory policy might not have been sound from a production standpoint. However—most warehouse stocks have been built up so they now can quickly meet any demand.

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"Jumping the Gun" Major Problem

War production officials seek to avoid competitive advantages and disadvantages in permitting earliest possible return to civilian goods manufacture

RECENT pronouncements by War Production Board and other government officials have done little to dispel the uncertainty surrounding reconversion to civilian goods manufacture.

One week, the Truman committee recommends reconversion be started as soon as cutbacks in the war production program frees facilities, materials and manpower. The next week, WPB Chairman Donald M. Nelson warns that large-scale civilian goods output may not be permitted until six or eight months after Germany's collapse.

In addition to the questions of the time when and the extent to which more liberal resumption of peacetime manufacture will be permitted are numerous other perplexing problems. Among the most puzzling is whether, when the reconversion starts, some manufacturers will be permitted to "jump the gun" on their competitors and whether new manufacturers will be permitted to enter the field while the old established companies are tied up with war production.

For example, two companies in the electrical appliance field may have produced 10 per cent and 2 per cent of the total industry's output before the war. Both are engaged in war work. The smaller company's war contracts are canceled, while the larger remains in war production. Will the smaller company, with facilities perhaps expanded during the war, be permitted to manufacture as much as it can, take advantage of a seller's market, and build up its trade name to the detriment of the larger company? Or will it be restricted to a quota based on, say, 1940 output?

A straw in the wind which may indicate WPB's policy is seen in the program for the production of some 2,000,000 flatirons with quotas established for manufacturers based on 1940 output. Applicants for controlled materials will be required to supply detailed information not only on the amounts of such materials that will be required but also to describe the manner in which labor requirements will be met. It is believed this form may be used to prevent manufacturers who were not producers of flatirons in 1940 from entering the field now.

A similar policy apparently will be followed in permitting limited production of machinery used in the manufacture of ice cream, brews, wines and beverages. WPB officials said percentages of permitted production will be based on the tonnage of controlled materials used by the manufacturers in the base period 1939-41. The allocations will be small. Those for brewing machinery and syrup mixing and handling will be 10 per cent of the annual average in the base period. For ice cream machinery and bottling equipment, the allocations will be 25 per cent.

As long as WPB exercises control over materials, it will be possible for that agency to maintain some control over which companies will be permitted to manufacture what products and also the extent of such manufacture. Such control will be dictated primarily by the labor supply situation.

WPB's general policy on this question was outlined by Chairman Nelson in answering a question propounded by Sen. Francis Maloney of Connecticut. Senator Maloney asked: "Is it contemplated that all producers of a particular product will be permitted to resume production at the same time and in amounts approximately equal to their relative peacetime production, or will some particular companies or regions be permitted to resume civilian production before others?"

Mr. Nelson replied: "It would certainly be convenient, as well as fair, to allow all manufacturers in each industry to resume production at the same time, but this is, of course, a physical impossibility, owing to the varying degrees to which companies are engaged in essential war work. It goes without saying that the tremendous impact of war on the economy is bound to produce hardship for some business concerns, as well as for other elements in the society. Obviously the government cannot entirely prevent such hardships, and the controlling factor in laying down policy must be in the interest of the public as a whole, rather than the protection of any one group.

"If without interference with the war

INVASION BOUND: Earmarked for Europe are these stacks of prefabricated barracks and steel material for hut construction at a United States engineering depot in England. Acme photo

PLAN TRANSITION

Formation of an automobile industry advisory committee, composed of the top ranking official in each company that manufactured passenger cars at the time production was halted, was announced last week by WPB. This committee will meet with WPB officials in Washington about the middle of April to explore basic problems which must be dealt with by industry and government as a preliminary to eventual resumption of passenger car production. Its purpose is entirely exploratory and advisory on the part of both industry and government.

effort, we can give a manufacturer in a noncritical manpower area materials and parts to resume production of things the civilian economy needs, I think it is to the public interest that we do so without waiting until another concern in a critical area is permitted to resume production. This policy may seem hard on the manufacturer in the critical area, but it would be at least an equal hardship on the manufacturer in the noncritical area if he were prevented from resuming production, just because a manufacturer in a critical area could not do so.

Requires Careful Scheduling

"Until that happy period when we can resume civilian production on a much broader scale than will be possible so long as direct military production must be maintained in large volume, there will be many shortages of civilian products whose importance to the supporting economy demands their production and scheduling with the same certainty as must be applied to war items."

Senator Maloney also inquired whether it would be practical to require that those companies which first resume production must manufacture some part of their output for sale by the other companies who are kept on war work, so that the latter do not "suffer a fortuitous competitive disadvantage."

The WPB chieftain believed this could be done in certain cases and that in such cases he favored the plan. In some industries, however, he said practical obstacles would be difficult to overcome.

The Connecticut senator also wanted to know whether a policy existed with respect to the treatment of companies who wish to enter production of civilian items which they did not produce before the war. To this, Mr. Nelson answered:

Preserve Competitive Economy

"This question touches the roots of national policy. If the government were to attempt to prevent new competition, there would clearly be grave danger of shackling the country with a regimented economy for a long while to come. Such action would require detailed planning of all production by a government group —a development which I would strenuously oppose. In my judgment, it is all-important to maintain a competitive economy. I do not believe you can have a democracy and at the same time forbid new competition. It has been my objective from the very start to confine detailed economic planning to wartime production of military and civilian essentials. If, with the return of peace, we were to start out with the policy of planning our peacetime economy in detail, as we would have to do in order to prevent new competition, we would do irreparable injury to the free enterprise system in the United States.

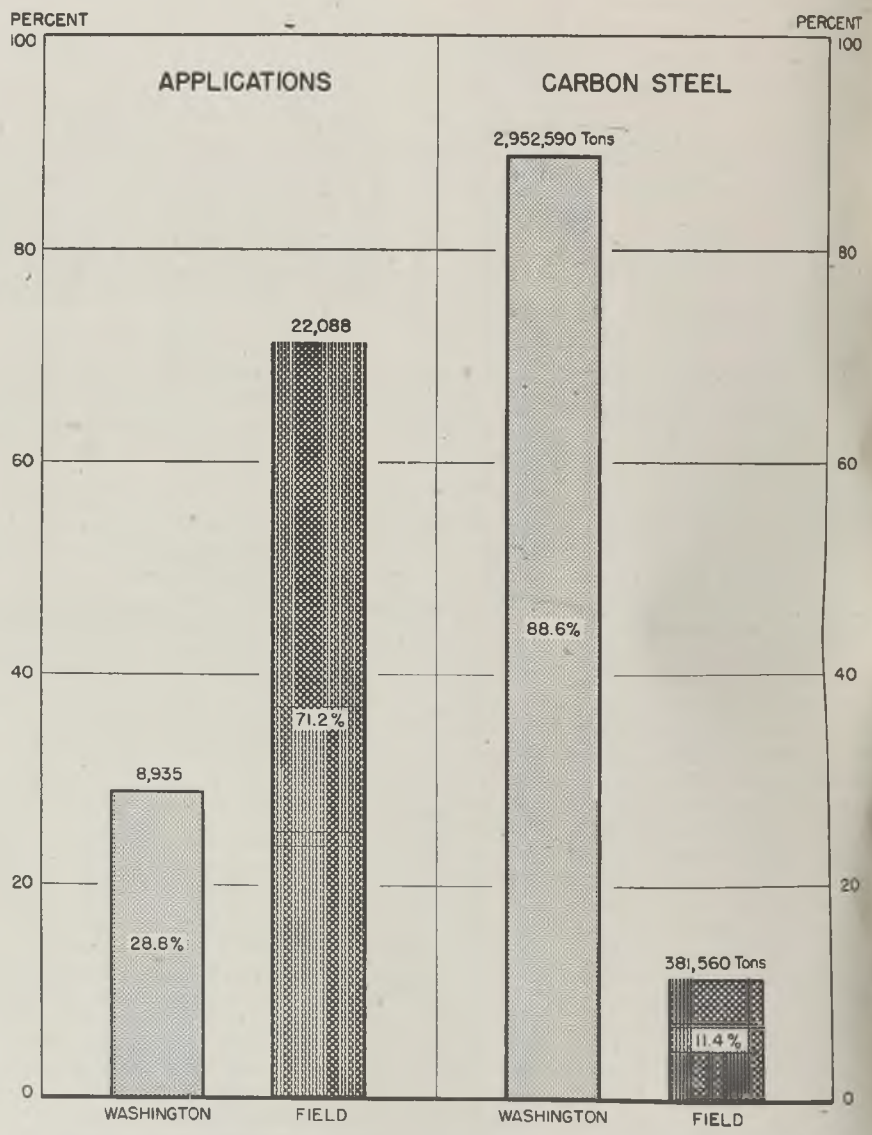
"It is my view that controls should be relaxed whenever they cease to be necessary to war production. However, the need for controls is obviously going to continue for some time. Even in the case of material which is in good supply today, if suddenly the controls were relaxed another shortage would be likely to occur."

Manufacturers who are most worried over the answers to these questions are the prime contractors and those who face major conversion problems. They fear that by the time their war contracts are ended, their normal prewar business will have been seriously infiltrated by smaller companies and by new concerns.

A considerable difference in the length of time that will be required to change back to peacetime production will be required by the various companies. Only about one-tenth of the metalworking companies expect three months or more will be needed (see pages 68-69).

Another factor which may influence reconversion is change in the types of goods required by the military. Perhaps the most recent example of this is the launching of the large steel ammunition container program. These are for the packaging of shells, with two or three exceptions, and cover primarily sizes from 57-millimeter through 105-millimeter. The program requires about 100,000 tons of steel sheets to be fabricated in the container bodies alone and approximately the same amount for the tops, bottoms, baffles and other accessories. The launching of this program is bringing into service much stamping equipment formerly free, and indicates how quickly changing military requirements can affect an industry and serves to illustrate why the armed services are reluctant to agree to widespread reconversion to civilian production.

WPB for months has been reviewing



DECENTRALIZATION: Progress of the War Production Board in decentralizing its activities are illustrated in the above chart. Field offices processed 71.2 per cent of the first quarter CMP4-B application for carbon steel. These, however, represented only 11.4 per cent of the total tonnage allocated. The 28.8 per cent of applications processed in Washington accounted for 88.6 per cent of the tonnage. The national headquarters of WPB still handle most of the applications made on special "L" and "M" forms

its limitation and material orders so that strictly essential civilian supplies can be rounded out. Allotment of steel and some other materials has been increased as needs and conditions warranted. Steel allotments for this quarter totaled 155,000 tons, in sharp contrast to the 35,000 tons allotted in the first quarter of 1943. For the second quarter this year, provision has been made for 210,000 tons.

The items in which production will be increased—and the quality of which will be improved—are mostly minor products. There are no early prospects for the production of heavy durable consumers' goods such as automobiles, washing machines, mechanical refrigerators, vacuum cleaners or radios.

A summary of the program for the smaller items follows:

ICE REFRIGERATORS: First quarter production calls for 269,809, compared to prewar quarterly output of 50,000. For the year, the WPB program calls for 821,000 ice boxes, against 633,000 last year.

ELECTRIC RANGES: Production in 1944 of three-burner and standard electric ranges was first scheduled to be 64,000, but has now been increased to 88,000.

COOKING UTENSILS: Manufacturers of cast-iron cooking ware now are allowed to produce at approximately prewar levels; about 2,774,000 skillets and 335,000 Dutch ovens were produced from July 1, 1940, through June 30, 1941. Only change in enameled ware is the manufacture of 500,000 cold-pack canners before July 1. First aluminum civilian cooking utensils to be manufactured since January, 1942, are 400,000 aluminum pressure canners, which also will contain copper in the indicating gages, safety and relief valves and blowout plugs.

GALVANIZED WARE: Permitted production of pails, buckets, wash tubs and certain other galvanized items will be considerably greater than in 1943. With the allocation of more iron and steel during this quarter for such production, manufacturers are being permitted to use up to 92½ per cent as much iron and steel as they averaged per quarter in the year ended June 30, 1941. The previous permitted rate was 50 per cent.

BABY CARRIAGES: Restrictions on the amount of steel which can go into individual baby carriages, strollers, walkers or pushcarts have been removed, but there is a ceiling on amount of steel allocated for this purpose. It is expected WPB will allocate enough steel to make 800,000 or 900,000 baby carriages averaging 25 pounds of steel, and about 650,000 strollers and pushcarts containing an average of 15 pounds of steel.

SILVER-PLATED FLATWARE: About 25 per cent more will be made than in 1943. Quality will be improved by an undercoating of nickel. The production increase will result from the closing out of some contracts in plants making surgical instruments, cartridge cases, gun mounts, bayonets and jungle knives.

ALARM CLOCKS: Current production is 3,300,000 a year, compared with 10,600,000 before the war. The industry believes production can be increased 15 per cent by substituting steel for fiberboard in the outer case and brass for steel in the works.

AUTOMOBILE BATTERIES: Tentatively, the number to be made for all claimants, military and civilian, is set at 19,300,000, or 5 per cent more than sold in 1943.

BEDSPRINGS: Total permitted to be made this year is about 3,100,000, or 50 per cent of output in the base year ended June 30, 1941. Production of innerspring mattresses for civilians is not permitted nor anticipated by WPB. Steel springs now are permitted in wood upholstered furniture up to 50 per cent of the dollar value used by the manufacturer in 1941.

Present, Past and Pending

■ FOY TO SUCCEED WHITING AS STEEL DIRECTOR

WASHINGTON—J. T. Whiting last week resigned as director of the Steel Division, War Production Board, the resignation, it being understood, becoming effective at the end of this month. He will be succeeded as steel director by Norman W. Foy, who has been deputy director of the division. Mr. Whiting will return to his post as president of the Alan Wood Steel Co. Before going with WPB Mr. Foy was general manager of sales for Republic Steel Corp.

■ SALES TRAINING CONFERENCE ATTRACTS MANY

CLEVELAND—First in a series of dinner-conferences to study the problem of "Selection and Training Postwar Sales Personnel" was attended by 450 northern Ohio sales executives March 13. The conference aims at eliminating the acute shortage of trained sales personnel.

■ MANPOWER TO BE RATIONED AT CHICAGO

CHICAGO—A manpower rationing program to make up existing shortages in war plants throughout this area has been announced. Allocation of needed workmen will be guided by local surveys to establish priority lists for industrial plants suffering critical labor shortages.

■ FEAR DRAFT MAY CURB STEEL PRODUCTION

WASHINGTON—The Steel Industry Advisory Committee, WPB, met here last week with WPB Chairman Nelson and Selective Service Director Hershey to report the loss of key men under the recent Presidential manpower directive may seriously affect steel output. It was stated the loss of men already is affecting production.

■ SOUTH AFRICA SENDS MISSION TO U. S.

JOHANNESBURG, SOUTH AFRICA—A scientific war mission to America, led by Dr. S. D. Haughton, director of geological survey and controller of nonferrous metals, has left Pretoria. Included in the group are experts on metals, chemistry and agriculture.

■ MONSANTO CHEMICAL ENTERS WEST COAST FIELD

ST. LOUIS—Monsanto Chemical Co. has acquired I. F. Laucks Inc., manufacturing chemists of Seattle. Laucks has plants at Seattle, Vancouver, B. C., Los Angeles, Portsmouth, Va., Lockport, N. Y., and Stanbridge, Que.

■ SWEDEN SEEKS POSTWAR AMERICAN TRADE

LOS ANGELES—Sweden will become one of the United States' best customers after the war, according to Rolf von Henderstam, Stockholm industrialist and chairman of a Swedish trade mission visiting this country. Among products Sweden will want are automobiles, trucks, tractors, machine tools, oil, rubber and coal.

Whiting Urges Increase In NE Steel Production

Steel producers have been asked by the War Production Board to increase production of the three-way alloy National Emergency steels. Concern has been expressed by John T. Whiting, director, Steel Division, WPB, over the tendency of alloy steel producers to relax efforts to maintain the NE steel production program.

In a letter to these interests, Mr. Whiting said: "We are seriously concerned by the present apparent feeling of both producers and consumers that, in view of the easier alloy steel situation, the NE steel program can be relaxed."

He pointed out that December NE steel alloy ingot output reached a peak in percentage of alloy ingot production, amounting to 46 per cent of the total. In January this percentage dropped to 40 per cent of the total, wiping out one-quarter of all the gains gradually achieved during the preceding year. It is the division's aim to see that 60 per cent of alloy steel output is made up of NE steels.

Over-Buying of Steel, Metals Is Reflected

Extensive protective covering shown by heavy offerings of excess tonnages in East by aircraft builders and suppliers

NEW YORK

THAT many aircraft builders and suppliers of components to the industry overbought steel, aluminum and other metals, also small tools and fabricated parts, is evident by the heavy tonnages now offered in the East as excess material.

While changes in design, revised programs and other factors make much of this steel excess material, a large part of the accumulation apparently is due to indiscriminate purchases at a time when shortages were feared by most consumers.

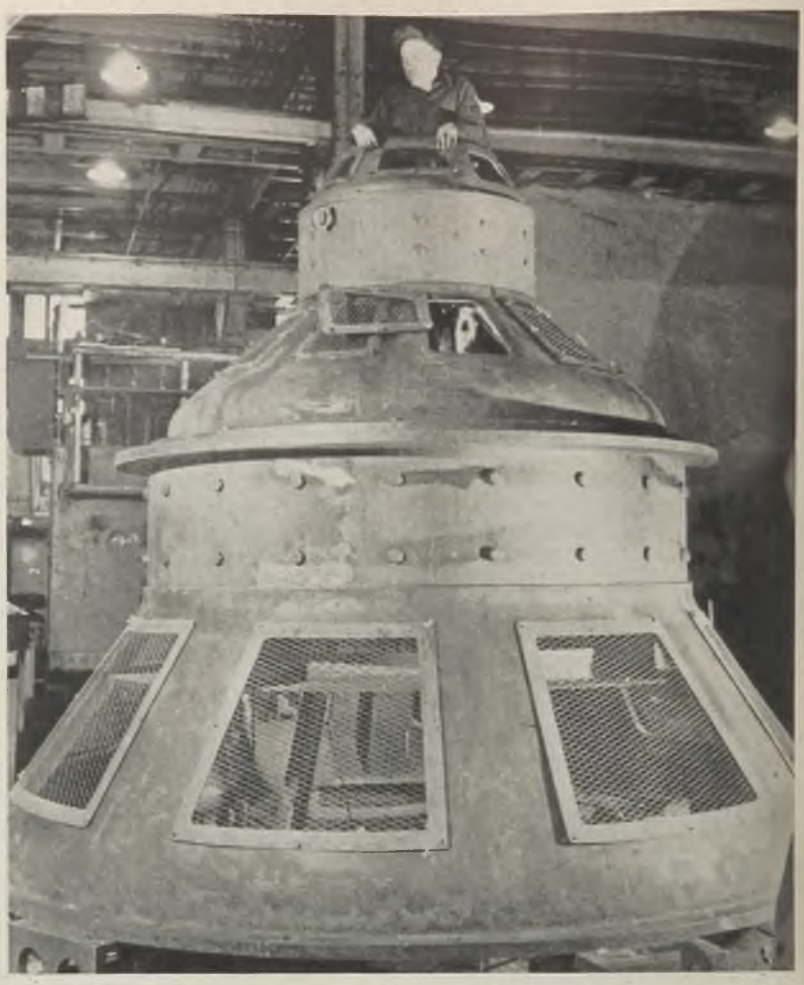
If a certain drill was required, orders were placed for all available; the same was largely true of steel and the volume of alloy bars now offered as excess stock is large, much of it SAE grades. Also, substantial tonnages of carbon bars are offered with strip and even some sheets and plates, currently the tightest products on which deliveries are in the third quarter. Excess lists, some other than aircraft, are also well peppered with nonferrous products, wire, cable and other steel materials, including small tools. Some of this steel and other products was bought before the advent of CMP.

An exhibition aimed to assist in the sale of millions of dollars worth will be held at the Hotel McAlpin, New York, starting March 27 and continuing for two weeks, through April 8, under auspices of the New York Regional offices of the War Production Board. The following aircraft companies will cooperate:

Bell Aircraft Co.; Eclipse Pioneer division, Bendix Aviation Corp.; Eastern Aircraft division, General Motors Corp.; Glenn L. Martin Co.; Republic Aviation Corp.; and Chance-Vought Aircraft division, United Aircraft Corp.

More than 5000 different types of items, covering aluminum, steel, copper, hardware, perishable tools, miscellaneous industrial supplies and materials, and component parts, will be exhibited in the booths and panels to be set up by the aircraft companies.

The exhibit will be an initial step in large-scale effort by government and industry to redistribute large holdings of critical items that heretofore have been held for prospective aircraft needs, before engineering changes and new designing dictated by combat requirements made them no longer needed by the aircraft industry. The exhibit will be composed of displays of samples, many of which represent inventories of huge quantities.



DESTINED FOR BOULDER DAM: This is a twin exciter for an 82,500-kilowatt waterwheel generator which General Electric's Schenectady Works will ship soon to Boulder dam. This will be the sixth generating unit which the company has furnished for Boulder

WPB Revokes Two Holdup Orders

Completion of work on structural mill at Geneva Steel Works and on certain facilities at Republic's South Chicago plant permitted under new rulings

WAR Production Board last week reversed itself on two steel plant construction projects, revoking orders holding up work which was near completion.

On March 13 the board announced that construction of the structural mill of the Geneva Steel Co. at Geneva, Utah, is being permitted to proceed to completion. Work on this plant was ordered stopped on Dec. 7, 1943, the order becoming finally effective on Dec. 24. This order now has been revoked.

The Geneva structural mill has a rated capacity of 200,000 tons annually. The total cost was estimated at $17,250,000, of which the work remaining to be done should come to approximately $1,350,000. It is believed it will take approximately three months to complete the remaining work, War Production Board officials said.

WPB also announced revocation of its recommendation that work be terminated on construction of a 32 inch bar mill at Republic Steel Corp.'s South Chicago works. Completion of such facilities as are needed to produce shell and other carbon steel in this mill will be permitted.

When termination was recommended by the Steel Division, WPB, Jan. 22, the plant was scheduled to produce alloy steel, but current plans call for production of carbon steel. This switch in operation is the basis for last week's revocation of the holdup order.

The plant consists of four batteries of coke ovens, a blast furnace, four open hearths and a 44-inch blooming mill (all

of which are complete), three ore unloading bridges (two complete), nine electric furnaces (seven complete), a 36-inch breakdown mill (nearly complete), and the unfinished 32-inch bar mill.

Two New Divisions Set Up By American Steel & Wire

The American Steel & Wire Co., Cleveland, subsidiary, U. S. Steel Corp., is creating two separate divisions to handle the sale of electrical products and wire rope and constructioin materials. P. T. Coons, formerly head of the electrical, wire rope and construction materials department, which is being discontinued, will assume the responsibilities as manager of the wire rope and construction materials division. T. F. Peterson has been appointed manager of the newly created electrical division. At the same time, B. M. Ashbauchcer has been made assistant manager of the wire rope and construction materials division, while C. H. Eisenhardt has been named to a similar position in the electrical division.

MEETINGS CALENDAR

Great Lakes Regional Advisory Board: Twenty-first annual and fifty-eighth regular meeting, Commodore Perry hotel, Toledo, O., March 22.

American Society of Tool Engineers: Annual meeting at the Bellevue Stratford hotel. Philadelphia, March 26-28.

American Gas Association: War conference on industrial and commercial gas, Hotel Seneca, Rochester, N. Y., March 30-31.

American Ceramic Society Inc.: Annual meeting in Pittsburgh, William Penn hotel, April 2-5.

Society of Automotive Engineers Inc: National aeronautic meeting, Hotel New Yorker, New York, April 5-7.

Electrochemical Society Inc.: Spring convention at the Pfister hotel, Milwaukee, April 13-15.

American Zinc Institute Inc.: Twenty-sixth annual meeting, Jefferson hotel, St. Louis, April 17-18.

American Institute of Mining & Metallurgical Engineers: Twenty-seventh annual conference of the Open-Hearth Steel committee and Blast Furnace and Raw Materials committee, Iron and Steel Division, A.I.M.E., William Penn hotel, Pittsburgh, April 20-21.

American Foundrymen's Association: Third war production foundry congress at Buffalo, April 25-28.

Machine Tool Electrification Forum: Ninth annual meeting, William Penn hotel, Pittsburgh, May 1-2.

Association of Iron and Steel Engineers: Annual spring conference under the auspices of the rolling mill committee, William Penn hotel, Pittsburgh, May 8.

American Steel Warehouse Association Inc.: Thirty-fifth annual meeting at the Drake hotel, Chicago, May 9-10.

American Gas Association: Natural gas spring conference, French Lick Springs hotel, French Lick, Ind., May 11-13.

Society of Automotive Engineers Inc.: National Diesel-fuels and lubricants meeting, Hotel Knickerbocker, Chicago, May 17-18.

American Iron and Steel Institute: Fifty-third general meeting, Waldorf-Astoria hotel,

Carriers Expected To Be Good Steel Customers After the War

Backlogs of rails and accessories total about 3,000,000 tons. Locomotive and freight car deliveries to be increased. Financing of future purchases offers no particular problem as roads have built up substantial reserves

CLEVELAND

RAILROADS should be excellent customers for equipment and supplies for a number of years after the war and, in fact, the partial lifting of restrictions on materials already is being reflected in heavier buying, J. H. Parmelee, director, Bureau of Railway Economics, Association of American Railroads, told members of the American Marketing Association here March 14.

Dr. Parmelee said that already, 1,865,000 tons of steel rails have been allocated to the steel mills for delivery to the railroads this year and that the tonnage may be increased in the next few months. Total 1944 backlog of both rails and accessories, such as frogs, switches, tie plates and spikes, is about 3,000,000 tons, he said. Over the past three years, allocations of rails alone have been only 1,400,000 tons.

Rolling Stock Schedules Boosted

As for rolling stock, Dr. Parmelee pointed out that only about 800 locomotives were delivered to the railroads last year while about 1200 are scheduled for shipment this year. Freight car deliveries last year totaled 29,000 but 50,000 is regarded as a conservative estimate for 1944 and some are inclined to believe that the figure may run as high as 60,000.

The railroads have been required to use substitutes, such as wood for steel and carbon steel for alloy steel, in equipment acquired in the past couple of years but from now on, especially after July 1, Dr. Parmelee expects that better materials will be available. In other words, he said, the railroads will be able to specify the types of materials going into equipment rather than finding it necessary to comply with government edicts.

Most of the roads are getting enough of other types of supplies for maintenance purposes but not in sufficient volume to care for "program" work, such as replacement bridges and structures.

Dr. Parmelee said financing of future purchases would offer no particular problem as railroads have been building up substantial financial reserves.

Dr. Parmelee foresees 1944 as the peak year in volume of freight traffic based upon anticipated industrial production. Taking 1939 as a base of 100, freight traffic in 1943 stood at 217, passenger traffic at 388 and gross revenues at 227. Present prospects are for a further increase of 5 per cent in freight traffic and revenues and 10 to 20 per cent in passenger movement. Freight traffic increased 10 per cent in January and 8 per cent in February. Passenger movement in January rose 25 per cent but a leveling off in passenger as well as freight traffic is expected as the year progresses.

If one enemy is out of the war some time in 1945 and the end of the conflict is more nearly in sight, Dr. Parmelee looks for a rapid decline in war production which will, of course, be reflected in smaller movement of freight. Some conversion will take place in 1945 but not enough to offset a rapid cutback in war orders.

He regards 1946 and 1947 as the years of postwar transition from war to peace in which there will be a more rapid tapering in war orders accompanied by reconversion to peacetime products. The rate of probable conversion cannot be foretold clearly, he said, since some industries can convert more rapidly than others. Volume of freight traffic in 1946 and 1947 in all likelihood will be lower than in 1945 but above the 1939-1941 average.

In discussing earnings, Dr. Parmelee noted that a probable increase of 5 per cent in gross revenues in 1944 compared with 1943 is "no guarantee" that net earnings will increase. In fact, net earnings reached their peak in 1942 and a further decline of $100,000,000 in 1944 as compared with 1943 may be expected although gross will be around $500,000,000 higher.

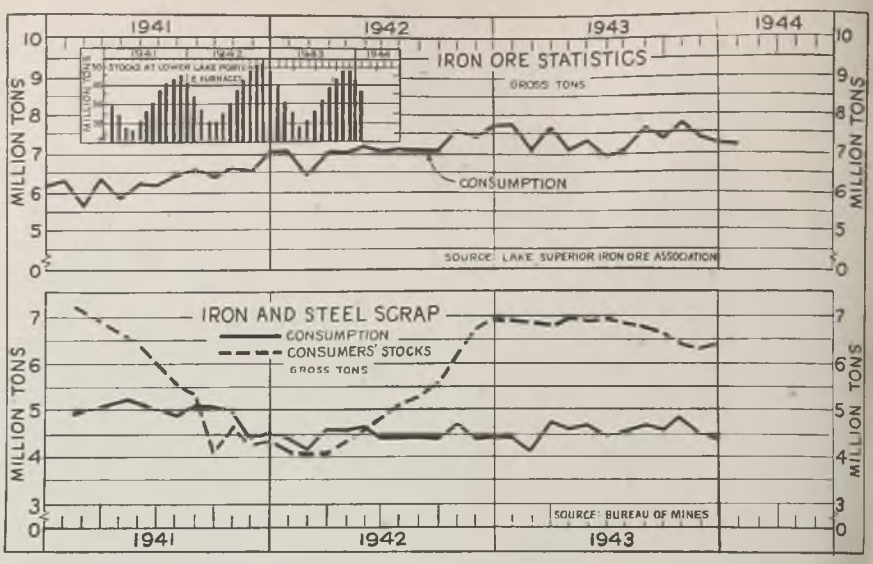
Ayres Says Transportation Is No. 1 Economic Problem

No. 1 problem of America's domestic wartime economy is transportation, Brig. Gen. Leonard P. Ayres, vice president, Cleveland Trust Co., Cleveland, stated last week in the bank's monthly business bulletin.

The railroads, Ayres says, are short of manpower, short of rolling stock, short of materials and short of maintenance. The national supply of passenger automobiles is about 4,000,000 cars smaller than it was two years ago and the rate of decrease is accelerating. Urban and intercity trucking are having a hard time meeting the demands placed upon them; their equipment is wearing out and they are short of repair and replacement parts. They are short of tires and are seriously short of manpower.

Early 1944 Ore Vessel Start Seen

Season may get under way by April 1 with moderate weather prevailing. Labor scarcity chief concern of operators



CLEVELAND

COMPARATIVELY mild weather to date this winter indicates possible opening of navigation on the upper Great Lakes by April 1, in contrast with the April 19 opening last year.

Iron ore shippers feel that the 90 million gross ton goal set for the 1944 season will be reached despite an indicated shortage of seamen, and scheduled increases in the movement of grain, limestone and coal this year. In addition to the probable earlier opening of navigation, capacity of the Great Lakes fleet will be materially augmented this season with the 16 new Maritime Commission ore carriers available for the entire season. Most of these vessels were in service only a brief period last year.

Vessel interests anticipate a movement of about 53.5 million net tons of coal this season, contrasted with 52 million last year. To permit the unrestricted movement of coal until the iron ore traffic reaches its full stride, the Office of Defense Transportation has suspended until May 15 all restrictions on Great Lakes shipments of coal.

Vessel shipment of grain this year may reach 525 million bushels, or 100 million more than in 1943. A number of ore carriers were diverted to the grain trade last season.

At the Duluth harbor there is only three miles of light ice now, against about 30 miles last year. Ice is four to six inches thick in the St. Mary's river just below the Soo canal; last year it was 16 to 24 inches. Only ice problem in prospect is in the Straits of Mackinac. United States coast guard cutters are scheduled to start opening channels for the start of upper lake navigation early this week.

There is little concern over iron ore stocks not being sufficient to sustain present near-capacity steel operations until the opening of navigation.

Ore stocks aggregated 36,059,302 tons Feb. 1, latest figures available, compared with 43,428,641 at the close of the preceding month and 39,742,766 on the comparable date last year. Consumption has averaged about 7.5 million tons monthly, which would indicate that stocks May 1 will exceed 13 million tons even if a drastic change in weather conditions should prevent the bringing down of any ore during April.

Some ore shippers have already placed engineers aboard ore carriers and fitting-out crews are expected aboard several other vessels shortly. However, vessel interests may experience a serious manpower shortage this coming season. Recent survey by the Lake Vessel Committee, an organization of 33 Great Lakes shippers transporting bulk commodities, points out that of their 12,605 officers and seamen about 6800 are subject to immediate induction.

Lake shippers state that although seamen on ocean vessels are automatically exempt from the Selective Service law, those employed on lake vessels receive no corresponding blanket deferment, which means every individual case has to be decided by local draft boards.

Ore Sellers Reluctant To Close Contracts with Costs Uncertain

CLEVELAND

MERCHANT iron ore sellers are in a dilemma regarding the closing of 1944 season ore contracts.

Facing possible increases in wage and other costs, iron ore shippers are reluctant to commit themselves on closing of contracts for the coming season at present ceiling prices.

Prior to the war, vessel operators by this time each year would have closed on their shipping contracts for the season. Frequently in the past the initial contract closed by these merchant ore shippers was with Ford Motor Co. or some other large consumer, which price normally set the ore market for the season.

Under present conditions shippers must sell their ore at the current ceiling price, without any provision for increased costs that would develop if WLB grants the requested wage increase.

Office of Price Administration's iron ore price regulation RMPR 113 states that "no person may, unless authorized by OPA, deliver or agree to deliver at prices to be adjusted upward in accordance with action taken by the OPA after delivery. Such authorization may be given when a request for a change in the applicable maximum price is pending, but only if the authorization is necessary to promote production or distribution and if it will not interfere with the purposes of the Emergency Price Control Act of 1942, as amended."

The workers' wage increase demands of 17 cents an hour, if approved, are expected to be made retroactive to Jan. 4 this year. This wage increase, combined with other demands made by the union such as severance pay, company provision of protective wearing apparel and guarantee of a 40 hour minimum weekly wage, will raise iron ore mining costs in the underground mines between 46 and 60 cents a gross ton. One shipper, with a number of large underground mines, estimates that these demands will raise the overall mining costs about 56 cents a ton.

At the opening of the 1943 navigation season the merchant iron ore shippers, who account for about 20 per cent of the total shipments each year, notified their customers that they would have to absorb the iron ore price increase request then being considered by OPA, and shipped the ore with that understanding. However, under amendment to RMPR-113 such an understanding and shipping arrangement would violate the order.

Proposed Change in Government Contracting Policy Is Opposed

Industry views suggested procedure as likely to nullify any price adjustments permitted by OPA. Most steel contracts at present are based on ceiling prices in effect at time of shipment. Promulgation of order is delayed

PITTSBURGH

OPPOSITION is expressed by steel executives here to proposed issuance of an order affecting steel prices on contracts with government procurement agencies.

The order, which has been prepared after a series of conferences covering many months, would have the effect of nullifying any price adjustments which OPA might permit on steel during the existence of these contracts.

Present steel contracts are almost entirely based on OPA ceiling prices at time of shipment. There are a few contracts with a so-called "escalator" clause which permits adjustment of prices based on changes in primary costs, such as an increase in labor rates. These are relatively insignificant, however, with the bulk of current steel moving on p.i.e. contracts. This means that should OPA make any adjustment in the price of steel, all material shipped after the effective date of the change would automatically carry the new price.

In direct opposition to this policy, the proposed order would require negotiations between the steelmaker and the procurement agency should there be any change in steel prices during the life of the contract. A further provision limits the time for negotiations to 60 days, after which the contract would be voided unless agreement is reached on a new price. This means the contract is not binding on either party if there is a change in the price of steel—virtually no contract, in other words.

The difficulty involved is obvious. Under today's conditions, the heavy pressure for delivery in all types of steel products makes it impossible for a government agency to void a contract with one producer and turn around and place the tonnage elsewhere. For example, Maritime Commission schedules on plate requirements are now six to nine months ahead. If the price of plate should change, it is certain that all plate producers would immediately invoke the higher price, and should the Commission refuse to accept the increase, all plate contracts would be voided in 60 days, and plates for the shipyards would be eliminated.

As a further club, one of the provisions of the Selective Service act of 1940 permits government seizure of plants for virtually any reason whatever if the war effort is impeded through improper operation of that plant. These powers are broad enough to be applied in case of a stalemate on prices. They are now being used as an enforcement measure in connection with renegotiation procedures, although as yet have not been invoked. However, should such a case arise, the government agency involved would then negotiate a new contract with the Army (or Navy, as the case might be) presumably at the original terms.

Order Not Formally Issued

Although the order has been prepared by the Procurement Policy Board, it has not yet been formally issued. Discussions on the subject have been under way for many months, and the board recommended its adoption March 1 by the various governmental procurement agencies. Opposition from the steel industry, and other industries such as lumber and oil whose price policies are now under consideration by OPA, has delayed its adoption.

In the case of the steel industry in particular, the delay is desirable in view of the wage negotiations now under way. Higher wage rates in the industry would almost certainly bring an upward revision in steel prices, and probably similar revisions in wages and prices in other industries as well.

There seems to be considerable doubt at the moment regarding the possible issuance of the order. It would be necessary for all governmental purchasing units to agree on the provisions of the plan, and thus far there has been a notable hesitancy to reach such an agreement. Some procurement officers are of the opinion that the government will obtain through renegotiation any unwarranted profits made through too-high prices, and therefore there is no need for "renegotiation in advance" through the preliminary price adjustments set forth in this plan. Cost to the government would be virtually the same in either case, and any savings which accrued through the proposed method would be at the expense of the manufacturer.

Steel Inquiry Board Is Asked To Exclude Wage Demands at Hearing

EXCLUSION of the United Steelworkers of America's demands for a 17-cent hourly wage increase from consideration at hearings of a War Labor Board panel's hearings on the steel case was asked by John C. Gall, attorney for the Youngstown Sheet & Tube Co.

Since both union and War Labor Board officials had frankly admitted that granting the wage increase would mean the scrapping of the Little Steel wage formula, Mr. Gall declared the demand could not be granted by the War Labor Board unless the stabilization program was modified.

Although the board circumvented the wage formula and the stabilization program in the coal and railroad cases, many believe it lacks the power to grant the steelworkers' wage demands without approval from Congress. The stabilization act of October, 1942, "authorized and directed" the President "to issue a general order stabilizing prices, wages and salaries . . . on the basis of levels which existed on Sept. 15, 1942." This was followed by the President's executive order that the War Labor Board "shall not approve any increase in the wage rates prevailing on Sept. 15, 1942, unless such increase is necessary to correct maladjustments or inequalities, to eliminate substandards of living, to correct gross inequities, or to aid in the effective prosecution of the war."

The board panel has set March 22 as the date for hearing the union's argument for inclusion of the wage demand.

The War Labor Board last week sidestepped a demand by its American Federation of Labor members that it request the President to modify the executive order which made the Little Steel formula the national wage ceiling. The board's action was taken by a vote of 8 to 4. However, it was made clear that it was passing the issue only temporarily and in deference to Congress which now has the entire stabilization question before it in connection with the enactment of legislation to replace the second emergency price control act which expires June 30.

Congressmen Move To Make Little Steel Formula Law

Proposal to write the Little Steel wage formula into law was launched last week by Rep. Albert Gore (Dem., Tenn.) and Rep. A. S. Mike Monroney (Dem., Okla.), who will seek to add the wage restraints to legislation extending the life of the Office of Price Administration.

The move to enact the wage curb into law followed closely the opening of hearings before the War Labor Board panel on demands of the United Steelworkers of America which, if approved, would openly break the formula and crack the stabilization line.

War, Navy Departments Prefer Fixed-Price to Cost-Plus Types

Forrestal and Patterson, however, protest against inflexibility of Ferguson bill requiring mandatory conversion of agreements. Insist some work is best accomplished under fixed-fee contract. Armed services ask freedom in making awards

ROBERT P. PATTERSON

FIRST comprehensive story about the whys and wherefores of Army and Navy contractual arrangements with war producing plants was told to the Murray subcommittee of the Senate Military Affairs Committee when Under Secretaries Robert P. Patterson of the War Department and James V. Forrestal of the Navy Department appeared to give their views on S. J. Res. 80. This is the bill, introduced by Sen. Homer Ferguson (Rep., Mich.), calling for mandatory conversion of cost-plus-fixed-fee to fixed-price contracts, excepting only where there is no knowledge of costs due to absence of experience.

Both of the under secretaries said they are converting as rapidly as possible from cost-plus to fixed-price contracts and thus their policies are in full accord with the objectives of S. J. Res. 80. They protested, however, that the bill is too inflexible. There are many instances, they said, in which it is impossible or undesirable to get away from the cost-plus-fixed-fee system and, in their opinion, the type of contract to be let should continue to be left to the best judgment of the contracting officers.

"Not a single contract is now being awarded by our department on a cost-plus-fixed-fee basis if it is at all possible to get the work done with the necessary speed, quality and economy on a fixed-price basis," stated Mr. Forrestal. "But there are still many instances, other than those in which there is lacking either experience or precedents upon which to base fixed prices, in which it is to the advantage of the war effort to use the cost-plus-fixed-fee contract."

The capital of the leading aircraft companies is entirely disproportionate to the dollar amount of the contracts awarded to them, he said. Battle-dictated changes in aircraft design are frequent and often of a radical nature. Some of the planes still are in an experimental stage. "It is understandable on these grounds why these aircraft producers are reluctant and in some cases unable to undertake to operate on a fixed-price basis. Nevertheless, our efforts to obtain conversions will not be relaxed."

The extent to which the Navy has made progress in converting, said Mr. Forrestal, is indicated by the fact that unliquidated fixed-price contracts on the books as of Dec. 31, 1943, stood at $24,900,000,000 while on the same date the cost-plus-fixed-fee contracts stood at around $5,000,000,000. The Navy issued a directive on March 20, 1943, urging conversion and ever since the conversion program has been gaining in momentum.

It never will be possible, he said, to get away from the cost-plus type of contracting in connection with repairs and conversion work whose costs are not readily ascertainable and where speed, as when repairing battle-damaged ships, planes and other units so as to get them back into the war, is essential. The same is true of work on new types of weapons, also in connection with research and experimental projects.

Mr. Forrestal described the merits of the so-called Type C contract under which thousands of small companies, many employing only three or four men, do work for the Navy. They manufacture a large variety of parts and render such service as rehabilitating the electrical equipment of the U. S. S. CALIFORNIA and the U. S. S. WEST VIRGINIA after their submergence at Pearl Harbor. These small companies not only do a vast amount of work whose costs cannot be estimated in advance, but few are capitalized to work on fixed-price contracts.

Explains Type C Contract

Under the Type C contract, he said, the small operator works on a cost-plus-fixed-fee basis under which he can go to his bank for financial assistance. This is because the bank is assured that the contractor will not take a loss, but rather will obtain a certain though small profit, also that payments will be made by the government as the work progresses.

The Navy, wherever possible, places Type D contracts with small firms; these are fixed-price contracts. However, in the majority of cases the Type C contract is required.

The Navy is having satisfactory results with contracts involving the incentive principle, said Mr. Forrestal; they are so good, he said, that the Army is thinking of following suit.

"In 1941," he said, "the Bureau of Ships began to use a form of cost-plus-fixed-fee contract which provided for a fixed fee of 6 per cent of the estimated cost plus a bonus of 1 per cent for early delivery." That was at a time when the only element that counted was speed. Later, the system was changed to encourage efficiency.

"Subsequently," continued Mr. Forrestal, "the 1 per cent bonus was made to cover both early delivery and savings in cost. In the summer of 1942 the fixed fee was reduced to 4 per cent of the estimated cost with a maximum bonus of 3 per cent for savings in cost and early delivery. Shortly thereafter, the fee was reduced to 3 per cent with a maximum bonus of 4 per cent for savings in cost and early delivery. In June of 1943 the bonus was made applicable solely to savings in cost. At the present time contracts are being negotiated (although none have been executed as yet) on the basis of a 3 per cent fee and a 2 per cent bonus for cost savings."

One reason why there will be more fixed-price contracts as compared with cost-plus-fixed-fee, said Mr. Forrestal is "because the reduction in volume of war materials will make available a greater number of contractors who are willing to operate on a fixed-price basis, thus rendering unnecessary the awarding of contracts to persons and companies who are either unwilling or unable to operate on that basis."

This statement proved surprising to Senator Ferguson; he wondered how it could be that any person or company would refuse to accept a fixed-price contract offered by the government—always provided the fixed price has been fairly based on estimated costs. "Before such a shift can be consummated it is necessary to obtain the consent of the contractor," said Mr. Forrestal.

"In many instances," he explained, contractors who are now operating on a cost-plus-fixed-fee basis, are unwilling, for one reason or another, to shift to the fixed-price form. One example is the Chrysler Corp., which holds large ordnance contracts, and another is Douglas Aircraft Co. In other instances contractors are willing to make the shift, but only at an inordinately high fixed price which the contracting officers of the Navy cannot, in good faith, recommend."

The Navy, he said, does not believe it desirable for one company to operate under both types of contracts at the same time.

"One reason is that there are tremendous accounting difficulties for the company in attempting to operate on both bases. However, the main reason is that in a shipyard, for instance, where both

JAMES V. FORRESTAL

types of contracts are in use, there is a "tendency to shift workmen from the cost-plus-fixed-fee work to the fixed-price work, to the benefit of the contractor and to the detriment of the government. This tendency is by no means always present, but presents a possibility of fraud as well as financial loss."

Judge Patterson said the War Department believes that the fixed-price contract generally is the best instrument for getting efficient production. Acting in this belief, it early in the war authorized contract provisions for fixing a tentative original price and for adjusting this price after part performance had yielded better information as to costs. In January, 1943, it authorized a new form of fixed-price contract providing for periodic adjustment of price and, subject to the discretion of the contracting officer, exempting the contractor from renegotiation. Price adjustments are made with the contractor's efficiency in mind and this system encourages efficiency. Since Sept. 30, 1942, said Judge Patterson, the Army's policy has been that "cost-plus-fixed-fee supply contracts are only to be entered into where absolutely necessary or for experimental or developmental items."

In Judge Patterson's opinion, "if use of the cost-plus-fixed-fee contract were substantially restricted, it would deprive us of necessary sources of war production or would require the making of fixed-price contracts on unsound bases.

"Boeing, Bell, Lockheed and Republic, all of whose business with the Army Air Forces is being negotiated on a fixed-fee basis, have multiplied their output over 100 times since 1938. At present these companies," said Judge Patterson, "taken together, have a total net worth of about 1 per cent of their combined unfilled orders. Faced with these conditions and with the practical difficulties of converting these fixed-fee contracts to a fixed-price contract, we see no reasonable hope of transferring most of this production to a fixed-price basis."

War Production Board Modifies Regulations on Warehouse Steel

WAR Production Board last week modified the rules governing purchases by distributors of most steel products through amending M-21-b-1 and b-2, removing virtually all restrictions from procurement operations of existing warehouses.

The changes apply to distributors only and do not affect deliveries to steel users whether by distributors or producers.

Under the amendment distributors may order any item except steel plates, tubing, hot-rolled sheets and strip from producers or any other sources without other restriction than limit of tonnage previously sold from stock. Distributors also may order without limit from holders of idle or excess inventories, such orders being accorded the status of authorized Controlled Materials Plan orders.

New distributors are permitted to enter the field freely and old distributors may add new lines to stocks. Distributors hitherto not buying from producers now are permitted to buy, but initial stocks of new distributors must be purchased from idle and excess stocks.

In a letter to general steel products distributors and producers, Steel Director Whiting said it seems "unwise to continue indefinitely" a restriction on the possibility of normal industry growth particularly when mill conditions at various times encourage new buyers.

This action by WPB has the effect of opening the door to new warehouses on some products and is effective as of April 1.

POSTWAR PREVIEWS

CIVILIAN GOODS—Will some metalworking companies be permitted to enter civilian goods manufacture when their war contracts are terminated, and thus gain a competitive advantage over others who are kept in war work? This question is bothering both manufacturers and government officials. See page 49.

RAILROADS—Carriers are expected to be excellent customers for steel and equipment for a number of years after the war. See page 53.

OPENING THE AMAZON—United States-built steel tug boats are proving their versatility in moving freight on the Amazon. If this waterway is developed as expected in the postwar period, a sustained market for such river units should be realized. See page 58.

BRAZIL Excess profits tax adopted by South American republic provides novel methods for building postwar reserves for industry. See page 58.

SMALL BUSINESS—Congress must take swift action along lines indicated in Baruch-Hancock report to save thousands of small businesses, according to American Business Congress. See page 61.

WHAT'S AHEAD— A Special Report to Industry, based on a comprehensive survey of metalworking companies by STEEL, presents factual data on the industry's thinking on the primary problems involved in reconversion. See page 67.

STEEL SIMPLIFICATION—Adherence of aircraft steel buyers to standard list of airplane tubing available from mills will ease congestion in rolling schedules caused by orders for 328 different sizes. Since 205 sizes cover 95 per cent of requirements for airframes, full standardization is not only desirable but probable. See page 84.

BUILT-UP DESIGN—Postwar prospects appear favorable for wide application of such units as a built-up design made from tubing and formed, sized and welded plate. This type of fabrication has proved production advantages, not the least of which is lower cost. See page 88.

ELECTROPLATING NOVELTY—Due to excellent physical properties obtained, electrodeposited monel metal coatings are being studied with keen interest. When difficulty resulting from tendency toward deposition of copper instead of nickel is overcome, any one of four monel baths tried may become road to success. See page 94.

Amazing Pentagon

WASHINGTONIANS still blink in amazement when they hear facts and figures about the Army's Pentagon building in nearby Arlington. The 1943 coal bill was $177,342 for 28,750 tons of the black mineral. It cost $1,170,946.80 to keep the building clean; the protection bill was $647,073.46. Maintenance of heating, ventilating, air conditioning and refrigerating facilities cost $337,260.92. Maintenance of the electric system cost $189,918.11, including incandescent lamps. Maintenance of lawns and roads cost $117,899.07. The bill for electric current came to $888,244.44. The entire bill for operation and maintenance of the Pentagon in 1943 came to $3,823,236.86.

Useful Pamphlet

Holders of government contracts should write to headquarters of the Wage-Hour and Public Contracts divisions, 165 West 46th street, New York, or to regional, branch or field offices of these divisions, for copies of a supplement to the pamphlet "Rulings and Interpretations under the Walsh-Healey Public Contracts Act." The rulings in some instances change the coverage of the act.

Versatile As Jeeps

Powerful United States-built steel tug boats, the key units in moving increasing quantities of rubber, oil, minerals, cinchona bark and numerous other products down the Amazon river and its tributaries, are proving to have all the versatility of jeeps in their ability to do the impossible. Equipped with two 100-horsepower diesel engines, they are 50 feet long and 13 feet wide; their draft is less than 36 inches so that they can navigate waist-deep waters. A normal tow comprises a score of 100-ton barges measuring 80 x 20 feet. If current expectations that the Amazon system is to be a busy waterway in the future materialize, there should be a sustained demand for such boats.

Aviation in Spotlight

The House Committee on Interstate and Foreign Commerce shortly will begin a series of hearings on H. R. 3421, introduced last October by Rep. Alfred L. Bulwinkle (Dem., N. C.) to amend the Civil Aeronautics act of 1938. It would prohibit mergers of airlines, or shifts in their ownership or control, excepting by approval of the Civil Aeronautics Commission, and it applies to relationships both between domestic airlines and foreign and domestic airlines. It is intended to insure federal control of postwar air transportation.

Last March the committee held extensive hearings on H. R. 1012 proposing many amendments to the Civil Aeronautics act of 1938, covering such subjects as regulation of ground hazards, training of technicians and mechanics, setting rates for carrying passengers and freight, and many others. Included in the bill is a postwar planning directive to the Civil Aeronautics Board. H. R. 1012 was reported favorably by the committee and is now on the House union calendar but without a rule. Current indications are that H. R. 3421 will be merged into or combined with the committee-approved H. R. 1012.

HOME FRONT BATTLE

United States Department of Labor in April will start a campaign "to prevent a million industrial accidents in 1944." Last year's job injuries cost 56,000,000 man-days of war production. To give incentive to the program certificates will be awarded to (1) establishments which have no lost-time injuries during a specified 3-month period, and (2) those which reduce the accident frequency rate by 40 per cent in this 3-month period as contrasted with the preceding three months.

Small plants can obtain advice free of charge from more than 600 trained safety engineers who donate 20 per cent of their time for this purpose. Information on the campaign and the department's services may be obtained by writing the Division of Labor Standards, United States Department of Labor, Washington 25.

SWPC Services

A booklet describing the services small manufacturers may receive from the Smaller War Plants Corp. has been completed. The SWPC will furnish financial help and technical assistance such as lowering production costs, improving product design, solving problems of service and distribution, obtaining access to patents held by the Alien Property Custodian, which are available on a royalty-free basis, furnishing information about possible new products and inventive ideas to the various government agencies. Copies of the booklet may be obtained from any of the 115 SWPC field offices, or from the Technical Advisory Service, Smaller War Plants Corp., HOLC building, First and Indiana, Washington 25.

Morale Boosters

Industrial Services division, Bureau of Public Relations, War Department, Pentagon building, Washington, has available for showing in war plants four additional motion pictures, including the authentic "Battle of Russia," "Film Communique No. 4," "They Deliver the Goods," and "The Case of the Tremendous Trifle."

Stern Measures Probable

Behind the nation-wide recruitment campaign just launched by the railroads is a rapidly deteriorating manpower situation. During February trains that arrived more than two hours late numbered a little more than 1000, while delayed switching "tricks" were more than 2000. The worst situation is in the West. Whereas the drive aims at recruiting 100,000 new workers, actually considerably more will be needed to fill jobs vacated by induction into the armed forces or by other means. Current aim is to find workers not now working in war industries. On the theory, however, that the entire war effort is based on transportation, stern measures will be taken if necessary to provide the carriers with needed help.

Workers' Nutrition

"Adequate on-the-Job Feeding of Workers" is the title of a new book on industrial nutrition prepared by the OWI in co-operation with the War Food Administration. It is a general treatise covering the entire subject, with numerous case histories of successful in-plant feeding. Copies of the book may be obtained by writing to the Office of Program Coordination, OWI, Washington 25.

No Audible Murmur

The War Department has ruled that it has no authority under the law to pay union dues for war prisoners employed in unionized industries. Recently, when 165 Nazi prisoners were put to work at Seabrook Farms near Bridgeton, N. J., a union official stopped in and wanted to know who was going to pay the union dues for these men. He was informed that "the United States paid no union dues; and nothing further was heard from him."

Insuring Reserve Funds

A new excess profits tax adopted by Brazil is aimed not only at combating inflation but at providing Brazilian industries with reserve funds for postwar expansion. The levies imposed range from 20 to 50 per cent on profits exceeding the equivalent of $5000 in United States money. Taxpaying firms have the option of paying the tax outright, or of lending double the amount of the tax to the Brazilian government. In return for such loans, companies are granted "Equipment Certificates" or "Deposits of Guarantee" at their option. "Equipment Certificates", earning 3 per cent and guaranteed by the government, may be used for the purchase of needed equipment from abroad. Purchases made under these certificates will be granted priorities in shipment. Since the new system becomes effective immediately, it is believed many United States manufacturers will solicit business in Brazil for delivery when possible.

How can machine tools help to prevent this kind of Victory?

Remember the big parade of the breadline— the march of the bonus army — the victorious men selling apples? Many an American hero tasted those bitter fruits of victory, and the war to end war ended nothing.

What kind of victory will this one be? It can be the great one American boys are giving their lives for — but they alone can't make it so. For victory in peace, as in war, must be planned ahead . . . and in peace, *you're* one of the Generals.

If you are a manufacturer, there is a small group of basic machine tool engineers who can help you to plan now for the kind of victory we've told our sons they're fighting for.

One of these engineers is a Bryant man. We urge you to call him today. For his specialized knowledge of internal grinding machinery is important to the manufacture of literally *everything* that will make this country a finer place: this victory a victory that we shall not be ashamed of.

BRYANT CHUCKING GRINDER COMPANY SPRINGFIELD VERMONT, U. S. A.

Probe Reason Proposed Electric Nickel Steel Plant Was Stalled

Gillette committee hears testimony on proposal to make steel direct from nickel-bearing iron ore, deposits of which are located in Cuba and in state of Washington. Samples of metal showed excellent ballistic qualities

THE GILLETTE subcommittee of the Senate Special Committee to Investigate the Effect of the Centralization of Industry is seeking to determine the reason why an electric nickel steel plant proposed by the Cascade Alloy Corp., Canton, O., never was got under way. The Cascade company in 1941 conceived the idea of making nickel steel directly from nickel-bearing iron ore.

"We investigated to see if we could obtain nickel from low-grade ores," Thad F. Baily, Cascade Alloy Corp., told the subcommittee. "Among them were the well-known ores of Cuba known as the Mayari and Moa deposits, containing 36 per cent iron, 0.09 nickel and 2 per cent chromium. There are three deposits containing at least 1,500,000,000 tons, owned mostly by Bethlehem Steel Co., United States Steel Corp. and the Abalo Mining Co. of Cuba.

The company obtained about ten tons of this ore from the Abalo company and melted it in a 1½-ton electric furnace at the plant of the Barium Stainless Steel Co., Canton, producing, according to the subsequent report of Frederick B. Hyder, mining engineer, who is on the iron ore staff of the War Production Board's Steel Division, "an alloy containing 3.11 per cent nickel, 0.48 per cent cobalt, no chromium and 0.03 per cent carbon. This was alloyed with an addition of some chromium and molybdenum and poured into a 440-pound ingot which was rolled into ¼-inch plate by the Jessop Steel Co.

"Part of this plate was heat treated by the Jessop Steel Co. and tested as homogeneous plate. Another sample was face-hardened by the Diebold Safe & Lock Co., and tested on that company's range. Both types of plate showed excellent ballistic qualities."

Mr. Baily tried to interest the War Production Board but was told that the submarine menace was too acute to warrant construction of a plant that would have to depend on Cuba for its raw material. Soon after he learned of a deposit in the state of Washington whose analysis is practically identical with that of the Cuban ore. He contacted the Army-Navy Munitions Board in July of 1942 and the latter asked the Bureau of Mines to drill the property.

"Instead of drilling," said Baily, "the bureau commenced to take large-scale tests from the deposit, which they experimented with at their Salt Lake City station. It was not until June of 1943 that it put in drills and drilled four short holes in such a manner and in such depth as not likely to intercept the main ore vein; the bureau already had determined its location and depth.

"We had asked the War Production Board Sept. 8, 1942, for authorization to build a plant to produce 240,000 tons of 3.25 per cent nickel steel per year, at Leavenworth, Wash., in the district served by the Bonneville power lines. We were told that the proposal could not be considered until the ore deposit had been proved up and until additional tests had been run in large-scale operations."

The Cascade company, Mr. Baily continued, arranged to ship 40 tons of the Washington nickel-iron ore for reduction by the Copperweld Steel Corp. at Warren, O., but it was unable to get authorization or appropriation to conduct such test work.

A record of the experiences encountered by the Leavenworth nickel steel plant proposal, prepared at the direction of John T. Whiting, director of the WPB Steel Division, was placed in the record. This showed that some of the advisors in the division favored the proposal while others doubted the wisdom of going ahead with it. At least some of the opposition to it apparently was based on the belief that the National Emergency Steel program would result so effectively in conserving alloying elements as to remove the critical scarcities before the projected Leavenworth plant could be constructed and placed in operation. At any rate, the proposal never was approved.

"It has been fully demonstrated," Mr. Hyder said, "that nickel steels free from chromium could be produced and chromium steels free from nickel could be made from the slag produced in the reduction of these nickel-iron ores. The Bureau of Mines had made alloys with varying percentages of nickel from 3 to 25 per cent, or higher, and ferrochromium of 45 per cent had been made from the slag. It is proposed to use a shaft-type furnace with an electrically-heated hearth which will require only one-fourth as much power as the conventional ferroalloy electric furnace."

Mr. Hyder said that testimony to the practicability of the process came in the form of a statement by A. A. Chambers, chief metallurgist, Youngstown Sheet & Tube Co., to the Steel Division under date of Aug. 20, 1943, in which he told of successful test experience by his company with a shaft-type furnace.

Murray and Scrugham Criticize WPB Order on Tungsten Contracts

"THE AX has fallen on our tungsten industry," stated Senators James E. Murray (Dem., Mont.) and James G. Scrugham (Dem., Nev.) recently commenting on an order of the War Production Board to the Metals Reserve Co. to cancel domestic "eligible producer" tungsten contracts as of March 31. (See STEEL, March 13, p. 69).

In a joint statement pointing out the probable effect on domestic war mineral production in general, the senators said:

Oppose Contract Cancellation

"There is no possible excuse for cancellation of Metals Reserve contract upon the minimum 30 days' notice permitted under the agreements entered into between the producers and Metals Reserve Co. The War Production Board has been aware of the actual conditions for months. If it be said that the producers knew the terms of the contract they were signing in order to obtain the $6 per unit bonus, it is also true they had no alternative if they were to remain in business.

"Mercury contracts were canceled abruptly as of Feb. 1, after giving the minimum 30 days' notification. It is true that tungsten cancellations have not been handled as drastically as was the case with mercury. Under one option the tungsten producer has the choice of continuing to sell to Metals Reserve at $30 per unit for 60 days and at $24 for a further 60 days, or until June 30, 1944. This gives the producer a little time in which to gut his property of high-grade ores. Thus, tungsten prices will not parachute as rapidly as mercury prices did immediately subsequent to cancellation. Certain other concessions involve more equitable settlements to producers than was indicated in the contracts. Some improvement is being shown in WPB-MRC thinking," the senators said.

"The net result will be, however, that after July 1, 1944, the bottom will drop out of the domestic tungsten market and prices will doubtless fall to the foreign level unless Metals Reserve continues to support the $24 price thereafter. Elimination of the $30 per unit price will close up most of our tungsten mines. If the price falls much below $24, it is likely that the handful of major producers will have to fold up as well.

"The War Production Board has ex-

plained that a similar curtailment program will be followed by the Foreign Economic Administration in the procurement of tungsten from abroad. Nevertheless, imports are expected to continue to greatly exceed domestic production. If the domestic price is permitted to drop below $24 per unit, we will soon again be dependent upon foreign tungsten and a comparatively new American industry, easily capable of taking care of peacetime requirements for many years to come, will be ruined," they concluded in their statement.

Warns Quick Action Needed To Protect Small Business

Declaring that the Baruch-Hancock report on war and postwar adjustments is a "first-class engineering job," the American Business Congress warns that Congress must take swift action along the lines indicated to safeguard existence of thousands of small businesses.

"The greatest danger is that while the Baruch report is being discussed many small businesses may die," according to George J. Seedman, president.

Current demands of small business will be discussed at a dinner symposium sponsored by the American Business Congress at the Waldorf Astoria, New York, March 17, at which Vice President Henry A. Wallace and other leaders in government, industry and labor are scheduled to speak. The organization urges immediate action on the following 6-point program:

1. That small business be represented on the central policy committee, the creation of which is recommended by the report.

2. That the uniform contract-termination clause be made applicable for small business by making it work for subcontractors as well as for prime contractors.

3. That upon the termination of prime contracts the small businesses be burdened by no more than their proportionate share of contract cancellation.

4. That a specific policy of dismissal of severance pay for war workers be worked out now.

5. That Mr. Baruch's insistence upon so-called goods moving through normal channels of trade—a matter of great importance to every wholesaler and retailer in America—be scrupulously followed in the administration of the plan.

6. That time is of paramount importance—the very existence of thousands of small businesses depends upon swift action now along the lines indicated.

Supply Adequate for War Needs

War Production Board official says situation much improved but production quotas must be met to maintain balance. Stocks exceed consumption in manganese, chrome and tungsten

FERROALLOYS have reached a point of balance with stocks and current new supply adequate to meet all present and indicated requirements, according to Frank Hatch, assistant director, Steel Division, War Production Board.

He emphasizes, however, that production quotas must be met to maintain current new supply at required levels.

"The difference in degree of production in no sense lessens the importance of that production or the dependence of the war production program and of the armed forces on that quota," he said.

The accompanying table shows that stocks at the close of last year exceeded current consumption in manganese, chrome and tungsten and were equivalent to about six months' needs of molybdenum and seven months of vanadium.

Manganese was a major supply problem at the beginning of the war program because of the combination of large tonnages and required movement by ocean shipping. Low grade deposits and ore purchasing programs were developed, but fortunately, Mr. Hatch said, it has not been necessary to fall back on some of the supply that was developed as part of this emergency program.

Low grade chrome ore production and ore purchasing programs also were developed, a large part of which has been subsequently discontinued. Production of chrome ores in this country during 1944 will fall well below that for last year due to the grade and undesirability from a use standpoint.

The three-fold increase over the prewar level in requirements of tungsten has been met by almost parallel increases in domestic production and in the new supply obtained from foreign countries. Tungsten, however, has been one of the ferroalloys most directly affected by the changes in the military program and by the decline in alloy steel production from an earlier projected schedule of 1,500,000 tons per month to the current schedule of only about 1,000,000 tons per month.

A sharp increase in vanadium production has not only made it possible to meet expanded war uses and also to build up reserves to protect those requirements but has added new potential reserves to our national resources for possible further emergency utilization.

All essential nickel requirements are being met through increased Canadian production and small importations. Large low grade deposits earlier considered for their possible value as a potential source of supply cannot be justifiably brought into the production arena at the present time in the overall interest of the war effort.

Supply of cobalt has been for many months more than adequate to meet the war requirements, although some domestic production instituted during the early days of threats to ocean shipping has been continued as a part of an insurance program against complete dependency on faraway sources of this metal.

Molybdenum supplies are more than adequate to meet present requirements.

Nonferrous Scrap Shipments Increase During 1943

Total volume of materials handled by nonferrous scrap metal dealers in 1943 differed by less than 1 per cent from the previous year, according to the Bureau of Mines.

Receipts totaled 965,090 short tons, compared with 972,241 tons in 1942, but shipments of scrap to consumers rose to 958,588 tons in 1943 to surpass the 951,027 tons supplied in 1942. Stocks of nonferrous scrap in dealers' yards and warehouses rose from 90,928 tons on Jan. 1, 1942, to 108,166 tons on Dec. 31 of that year and then to 114,505 tons at the end of 1943. Only 6339 tons of scrap were added to stocks during 1943.

Movement of copper and brass scrap from dealers to consumers increased by 2 per cent in 1943 with 496,943 tons shipped, compared with 488,436 tons in 1942. Dealers' stocks dropped 11 per cent to a 38-day supply at the end of 1943.

Lead and tin scrap reflected reduced demand with a drop of 9 per cent in dealers' shipments from 306,192 tons in 1942 to 279,580 tons in 1943. Stocks fell 6 per cent to 35,225 tons on hand at the end of 1943.

Dealers' receipts of aluminum scrap increased 40 per cent from 103,856 tons in 1942 to 145,975 tons in 1943. Shipments increased only 30 per cent to 130,295 tons in 1943.

Movement of zinc and residues in the dealer trade decreased 12 per cent in 1943 but unalloyed nickel and monel scrap shipments showed a 56 per cent improvement during the past year, according to the Bureau of Mines.

Statistical Position of Ferroalloy Minerals

	Stocks Dec. 31, 1943	Ore Production Prewar	Ore Production 1943	Consumption Prewar	Consumption 1943
*Manganese	1,525,000	30,673	175,000	674,583	1,400,000
*Chrome	1,100,000	1,506	100,000	362,873	900,000
†Tungsten	18,683,000	2,803,600	10,274,000	5,047,800	17,151,000
†Molybdenum	29,674,000	23,130,200	58,726,000	23,149,800	53,825,000
†Vanadium	2,433,000‡	633,600	3,497,000	1,519,600	3,672,000

*Figures reported in tons; †figures reported in pounds of recoverable metal or equivalent after deducting refining losses; ‡not including ore.

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

MOTORS: Repair shops may use the AA-3 preference rating assigned them by CMP regulation 9A to obtain fractional horsepower motors from dealers, wholesalers or motor agencies. These suppliers must honor the AA-3 rating from repair shops if the motors in stock are not needed to fill orders bearing better preference ratings.

Only those fractional horsepower motors needed to replace broken down motors may be sold without a rating, and these replaced motors must be taken in exchange to be repaired where practicable and to be resold under similar conditions. Motors for any other purpose may be sold only on orders bearing a preference rating. An old motor cannot be demanded by a dealer, wholesaler or motor agency for a new motor as part of the purchase price on an order bearing the AA-3 rating.

PLUMBING, HEATING, COOKING EQUIPMENT: AA-3 orders for plumbing, heating and cooking equipment placed prior to Jan. 15, 1944, will take precedence over lower rated orders which have been rerated AA-3 in accordance with the provisions of order L-79, as amended Jan. 15.

COPPER SCRAP: Requirement for reporting the generation or accumulation of more than 5000 pounds of copper and copper-base alloy scrap has been eased to require only more than 50,000 pounds. Companies which generate or accumulate less than 50,000 pounds are no longer required to file WPB form 452, although they must continue to comply with the provisions of copper order M-9, requiring the disposal of all scrap in excess of a 30-days' accumulation unless such accumulation aggregates less than 10,000 pounds.

L ORDERS

CONSTRUCTION: On airport construction, the limit allowed without getting WPB permission for any job begun in the same year is placed at $1000 as against the limit of $200 which formerly held. The exception previously given to the installation of plumbing and heating equipment rated on WPB form 2631 (formerly PD-851) has been revoked. WPB permission under order L-41 will be necessary on all plumbing and heating installations where the cost of the construction including the cost of the equipment is in excess of the L-41 cost limits. Applications for this type of construction must be made on WPB form 2896. (L-41)

TRACTORS: General restrictions on the annual quantity or dollar value of repair parts for track-laying tractors that military procurement agencies may acquire have been removed. Provision that limits military agencies to maximum purchases of 40 per cent by dollar volume of all shipments of critically short items made by manufacturers remains in force. (L-53-b)

HEATING EQUIPMENT: In larger housed blower units of standard size unit heaters, it is now permissible to substitute a tube-within-a-tube heat transfer element of no greater heating capacity than that replaced. Manufacture, fabrication or assembly of convectors by any producer is limited to not more than 20 sizes of heat transfer elements in each of the permissible depths. Recessed or semi-recessed cabinets for convectors for use in hospitals for mentally disturbed patients may be produced. Provisions that made it possible to schedule production of extended surface heating equipment under order L-107 have been removed from the order since production of this equipment may be scheduled under order M-293. All appeals now must be forwarded to WPB field offices instead of directly to Washington. (L-107)

REFRIGERATION EQUIPMENT: Specifications for refrigeration condensing units for industrial and commercial refrigeration and air conditioning machinery and equipment have been revoked. Prohibition has been removed on the use of steel in construction of bases for units having motors over 20 horsepower in size. Also removed were standardization restrictions which limited the number of models that each manufacturer could produce. (L-126)

HAND TOOLS: Alloy steel now may be used in the manufacture of hand shovels, spades, scoops and telegraph spoons; forged axes, hatchets, broad axes, adzes, and light hammers; heavy forged hand tools; hand forks, hooks, rakes, hoes, eye hoes, and cultivators. These items are covered by schedules I, II, IV, and V of order L-157. (L-157)

FARM MACHINERY: Through revocation of order L-170-a, use of copper and scrap-grade bronze is now permitted for bushing backings and fuel lines in farm tractors and engine power units. Use of the red metal will be limited in any but fractional parts through the provisions of order M-9-c which will continue to apply to use of copper and bronze in these types of components. (L-170-a)

STEEL PRESSURE PIPE: Specifications for the manufacture of steel pressure pipe have been modified to bring them into conformity with recent changes in basic pressure pipe specifications. These specifications are based on those established by the American Society for Testing Materials. (L-211)

POWER BOILERS: No person now shall produce, fabricate or deliver any power boiler (except boilers for locomotives or marine service or miniature boilers) having a greater metal thickness or quantity of steel than needed to meet the minimum thickness requirements of section 1 (edition 1943) of the American Society of Mechanical Engineers Boiler Construction code, and addenda and interpretations issued prior to Jan. 15, 1944. (L-299)

INDEX OF ORDER REVISIONS

Subject	Designations
Boilers, Power	L-299
Closures	M-9-c
Construction	L-41
Corundum	M-89
Equipment, Heating	L-107
Equipment, Refrigeration	L-126
Machinery, Farm	L-170-a
Pipe, Steel Pressure	L-211
Tools, Hand	L-157
Tractors	L-53-b
Zinc	L-11-b
Price Regulations	
Machines and Parts	No. 136
Storage Vessels	No. 465
Wire and Cable	No. 82

M ORDERS

CLOSURES: Sew-on, machine attached or riveted snap fasteners, buckles, eyelets, staples, rivets and burrs now may be manufactured from copper, if they are for military use and if they are purchased on orders bearing AA-3 preference ratings or better. (M-9-c)

ZINC: Use of zinc is now permitted in the manufacture of coal stokers, domestic electric ranges, dry cell batteries and portable electric lights, electric fans, mechanical pencils, motorized fire apparatus, protective coating or plating of zinc on loose leaf metal parts and units. End product volume and other restrictions on manufacture still remain under controls set up by the many "L" orders under which they are produced. (M-11-b)

CORUNDUM: Deliveries up to 25 pounds per month of finely ground corundum (known as superfine flours) of all sizes are exempted from allocation, provided the consumer does not have an inventory in excess of his average 60-day consumption. (M-89)

PRICE REGULATIONS

WIRE AND CABLE: Sales of services that contribute to the fabrication or insulation of wire, cable and cable accessories now are priced according to provisions of the regulation establishing prices for the finished wire and cable products. Maximum prices for these services must not exceed the net price the supplier had in effect for a similar operation on Oct. 15, 1941, or on the latest date within six months prior to that time. (No. 82)

MACHINES AND PARTS: Metal stampings have been added to the list of articles covered by regulation No. 136. Formerly, three price regulations applied to different types of metal stampings. (No. 136)

STORAGE VESSELS: Provision of regulation No. 465 setting maximum prices for used storage vessels which allows sellers to charge a portion of the original installation cost, when in excess of $100, has been amended to include all vessels listed in that regulation. These vessels include some 2600 sizes and combinations of used pressure vessels and used enclosed atmospheric pressure vessels. (No. 465)

Civilian Tractor Output To Hold at Present Rate

There is little possibility of increasing civilian tractor production in 1944, according to reports given by members of the Tracklaying Tractor Industry Advisory Committee, WPB, at its recent meeting in Washington, although facilities are being prepared to increase production of one model for the Army.

Committee members recommended that military requirements by items be determined over a long period since the production cycle for parts runs from 9 to 12 months. Military needs can be filled only if orders are placed far enough in advance to permit proper production scheduling.

Lack of Components Check Test Equipment Production

Members of the Test Equipment Manufacturers Industry Advisory committee have reported that production has been retarded as much as 35 per cent in some cases as the result of delayed delivery of components, such as resistors, condensers, switches and potentiometers.

New Power Cranes, Shovels Taken by Armed Services

Practically all power cranes and shovels produced in 1944 will be needed by the armed services, the War Production Board announced recently. The

majority of manufacturers are building only a few models and sizes of standard products, and in general they are not able to meet delivery schedules promptly.

Civilian needs are filled for the most part from stocks of used equipment, now totaling about 25,000 items as registered under order L-196. However, not more than 10 per cent of the machines in good condition are idle at the present time, and only part of this percentage is available for sale.

Shovels, cranes, draglines, tractors, and motor graders are the types of equipment most in demand. About 80 per cent of present requirements for used equipment is for these items.

WPB Organizes Two New Industry Advisory Groups

Office of Industry Advisory Committees, War Production Board, announced recently the formation of additional committees which must be consulted prior to the issuance of any limitation or conservation order or amendment, if the change will result in a substantial alteration in operations of the affected industry.

Screw Machine Products Industry Advisory committee has been formed with O. F. Fancey, Building Materials Division, as the government presiding officer. Membership is as follows:

Robert Chestnut, Aluminum Co. of America Inc., Edgewater, N. J.; C. P. Dewey, American Screw Products Co., Indianapolis; J. S. Elsby, Screw Machine Products Co., Milwaukee; W. J. Finn, Chicago Screw Co., Chicago; Paul M. Hershey, Hershey Metal Products Co., Derby, Conn.; N. A. Hewitt, The Couche-Uthe Co., Elyria, O.; Charles H. Hyde, David Bell Co., Buffalo; W. C. Knight, Knight Screw Products Co. Inc., Detroit; Robert Olson, Olson Mfg. Co., Worcester, Mass.; Fred C. Phillips, F. C. Phillips Co., Stoughton, Mass.; Ernest W. Schneider, Hudson Screw Products Co. Inc., Chicago; Earl W. Stewart, Federal Screw Works, Detroit; Jess Robbins, Arpee Products Co., Glendale, Cal., and T. A. Dear, Automatic Screw Machine Co., Los Angeles.

Metal Cutting Hack and Band Saw Industry Advisory committee has been organized with William C. Teare, Tools Division, War Production Board, as the government presiding officer. Members of the committee are:

H. G. Aldridge, Huther Bros., Rochester, N. Y.; Jacob S. Disston, Henry Disston & Sons Co., Philadelphia; R. F. Ellis, E. C. Atkins & Co., Indianapolis; J. H. Flavell, W. O. Barnes Co. Inc., Detroit; William J. Greene, L. S. Starrett Co., Athol, Mass.; Ralph K. Lawrence, Simonds Saw & Steel Co., Fitchburg, Mass.; Donald McQuillan, Spartan Saw Works, Springfield, Mass.; Daniel K. Northrup, Henry G. Thompson & Son Co., New Haven, Conn.; Verne Olson, Contour Saws Inc., Des Plaines, Ill.; Phillip Rogers, Millers Falls Co., Greenfield, Mass.

Output of Large Antifriction Bearings Limited to 10 Plants

Concentration of production of many sizes used in heavy military and industrial equipment is ordered by War Production Board for purpose of achieving greater efficiency and saving in manhours. Other producers must maintain their equipment

AUTHORIZED production of many sizes of antifriction bearings used in heavy military and industrial equipment has been concentrated in the plants of 10 producers, the War Production Board has announced.

This action, for the purpose of achieving greater efficiency and saving in manhours in the production of the larger sizes, was taken through the addition to schedule A of order L-145 of a list of sizes in the heavy series of ball bearings with the names of authorized producers.

The designated producers will manufacture single-row, double-row, and angular contact heavy series ball bearings.

The authorized producers for one or more of the specified additional bearing sizes are Marlin-Rockwell Corp., Jamestown, N. Y.; SKF Industries Inc., Philadelphia; Fafnir Bearing Co., New Britain, Conn.; New Departure division, General Motors Corp., Bristol, Conn.; Hoover Ball & Bearing Co., Ann Arbor, Mich.; Norma-Hoffmann Bearings Corp., Stamford, Conn.; Bearings Co. of America, Lancaster, Pa.; Torrington Co. (Bantam division), South Bend, Ind.; Ahlberg Bearing Co., Chicago; and McGill Mfg. Co., Valparaiso, Ind.

A maker not designated as an authorized producer of bearing sizes listed in the schedule may refer inquiries for these sizes to an authorized producer, or may accept a production contract and place it with an authorized producer. Any factory that might previously have made some of the bearing sizes specified in the schedule, but is not designated as an authorized producer, must keep its equipment for making such bearings and in such condition that it may be utilized within one month of notification, if so ordered by WPB.

Increased Production of Small Motors Required

Production of small electric motors for aircraft use will not be sufficient to meet present programs, according to members of the Fractional Horsepower Motor Industry Advisory Committee, WPB, unless additional manpower and some additional facilities are made available. They also pointed out that while supplies of ball bearings are improving, the quantity available does not meet present requirements.

It was also pointed out that while production of standard alternating current motors for use in civilian products is increasing steadily, the supply available for products just coming onto the market is decreasing since presently programmed production for aircraft and essential civilian requirements utilizes more and more of the existing production facilities.

Appointments-Resignations

S. A. Crabtree, Chicago, has been appointed chief of the Alloy Steel Branch, War Production Board, succeeding L. E. Creighton. Mr. Crabtree will continue as deputy assistant director for production.

Mr. Creighton resigned his WPB post to return to his former position with the Rotary Electric Steel Co., Detroit. He came to WPB as chief of the Aircraft Alloy Steel section on Feb. 17, 1943. On March 3, 1943, he was made chief of the Alloy Steel Branch.

* * *

Clarence M. Smith, New York city, has been appointed consultant to the Traffic Branch of the WPB Office of Civilian Requirements.

* * *

C. F. K. Hague has been appointed by the British Minister of Production as the British member of the Combined Production and Resources Board's Public Utilities committee. He will leave England shortly to take up his new duties in Washington. Sir Henry Self, British deputy member of the CPRB, has been acting as Great Britain's representative on the committee since its creation in December.

The Public Utilities committee was formed to assemble all pertinent facts and recommend to CPRB such action as may be advisable concerning requirements, supplies and production of equipment to re-established or build electric, gas and water services in liberated and conquered areas.

* * *

Carston Tiedeman has been appointed regional director of WPB's Detroit region, succeeding L. W. Welch who has served as acting director since the first of November. Mr. Tiedman was formerly vice president and general credit manager of the Universal Credit Co., Detroit, and is a director of the Hudson Motor Car Co.

Mr. Welch is returning to the Avery Farm Machinery Co., Peoria, Ill., of which he is president and general manager, and will continue to serve the War Production Board on special assignments.

MEN of INDUSTRY

GEORGE A. SLOAN

J. N. YORKE

JAMES COPE

W. R. KOTTSIEPER

George A. Sloan of New York city has been elected a member of the finance committee of United States Steel Corp., Pittsburgh, to fill the vacancy caused by the recent death of William J. Filbert. Mr. Sloan, who has been a director of the corporation since January, 1937, is president of Nutrition Foundation Inc., and is active in New York civic affairs, being president of the Metropolitan Opera Association, and chairman of the Mayor's Business Advisory Committee.

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A. H. Englund, previously executive vice president of Electric Service Mfg. Co., Philadelphia, formerly known as Electric Service Supplies Co., recently was elected president, and **J. R. McFarlin,** electrical engineer, was elected secretary.

—o—

Frank R. Benedict, since 1941 manager of engineering and service in the New England area for Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been appointed manager of the product performance analysis section at the East Pittsburgh plant. As head of this newly-created section Mr. Benedict will work under direction of **M. B. Wyman,** manager of the district engineering and service department.

—o—

H. W. Whitmore, formerly associated with Automatic Products Co., Milwaukee, has joined Kold-Hold Mfg. Co., Lansing, Mich., as chief engineer, succeeding **R. H. Swart.**

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Gerald A. Lux, for the past two years a research associate of the American Electroplaters' Society at the National Bureau of Standards, recently joined the technical staff of Oakite Products Inc., New York, making his headquarters in New York.

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W. Harvey Payne, former president and founder, Hydro-Arc Furnace Corp., La Grange, Ill., has opened an office in the Board of Trade building, 141 West Jackson boulevard, Chicago, to engage in consulting work in electric furnace design, plant layout and operation, as well as to continue as Chicago district representative of Foundry Equipment Co., Cleveland, in sales of core and mold ovens and foundry supplies. Mr. Payne sold the patents and assets of his electric arc melting furnace business to Whiting Corp., Harvey, Ill., last December, and now serves the latter on a consulting basis.

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J. N. Yorke has been elected controller of Superior Steel Corp., Carnegie, Pa. Mr. Yorke joined Superior Steel Corp. in 1941, and was made auditor in 1943.

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James Cope, since 1935 associated with the Washington office of the Automobile Manufacturers Association and also affiliated with the Automotive Council for War Production, has been named assistant to **K. T. Keller,** president of Chrysler Corp., Detroit.

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J. Paul Oliver, for the past two years superintendent of the electrochemical plant of Cardox Corp. at Claremore, Okla., has been appointed administrative technical assistant of the corporation's Research division. **Dr. Lawrence M. Liggett** succeeds Mr. Oliver as plant superintendent in Claremore. **Dr. James A. Taylor** has joined the Research division of Cardox Corp. as chemical engineer.

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Joseph A. O'Malley has been appointed assistant general sales manager, Chrysler division, Chrysler Corp., Detroit. Mr. O'Malley continues as vice president of the Industrial and Marine Engine divisions.

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A. Winkler Prins has been named New York district sales manager for American Machine & Metals Inc., East Moline, Ill. Previously, Mr. Prins had been district manager for Wellman Engineering Co., Cleveland.

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C. M. Wright has been appointed executive vice president, Mt. Vernon Car Mfg. Co., Mt. Vernon, O., succeeding **L. G. Sever,** who is retiring after nearly 50 years in the car building business and 22 years with the Mt. Vernon company. **Walter L. Settlemire** has been elected secretary, succeeding Owen W. Harvey, retiring vice president, secretary-treasurer.

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William R. Kottsieper, who in 1931 helped organize the valve department of American Car & Foundry Co., New York, and who was made assistant manager of valve sales in that year, has been appointed manager of the valve department. Mr. Kottsieper has appointed **W. A. Gormley** as sales manager of valves, and **L. A. Ward** as assistant sales manager. **W. Lyle Richeson** has been appointed assistant vice president of the company. Mr. Richeson has been associated with the company for 19 years, at one time serving as Cleveland district sales manager.

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Ellis L. Spray has been named assistant to the president, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and will be in charge of the Headquarters Manufacturing division.

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Charles W. Sprenger has been appointed district manager in the metropolitan New York district for Carborundum Co., Niagara Falls, N. Y., succeeding the late John Storm. **Joseph C. Steele** has been appointed district sales office manager at New York, succeeding **E. W. Martin,** who has been named regional sales office manager of the company's eastern sales districts.

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Edward R. Wolfert, manager of engineering, and **Alfred L. Atherton,** manager of quality control, Electric Appliance division, Westinghouse Electric & Mfg. Co., East Springfield, Mass., have received the Westinghouse Order of Merit for their contributions to the electrical and mechanical arts and to company progress.

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T. E. Marston has been appointed manager of ring sales, Edgewater Steel Co., Pittsburgh.

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William J. Kelly, manager, Marine Ways division, Pittsburgh Coal Co., Pittsburgh, has been appointed manager of the River Transportation division, to

ALBERT L. CUFF

WALTER S. MacNABB

LEON F. MILLER

HARRY M. HECKATHORN

succeed J. F. Flood, who died in January. **F. Harold Evans** has been named assistant manager in charge of shipping for the company.

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Albert L. Cuff, secretary and treasurer, Blaw-Knox Co., Pittsburgh, has been elected a vice president, **W. S. Bowser,** controller, has been elected a director, and **Frederick Baker,** assistant treasurer, was named treasurer.

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James Thomson, former cost analyst at the Gary works, Carnegie-Illinois Steel Corp., Chicago, has been made assistant supervisor of the Statistics division of the corporation's Finance department, succeeding **Ralph C. Grimm,** who now heads the unit. **James W. Kettle,** who succeeded Mr. Thomson as cost analyst at the Gary works, also has been appointed to succeed him as assistant to supervisor of the Statistics division in Pittsburgh. **Gaston Estep,** former chief cost clerk of the Gary sheet and tin mill, has been made supervisor of the analytical cost bureau of the corporation, with headquarters in Pittsburgh, and **Charles C. MacDonald,** who has been assistant Chicago district supervisor of the Analytical Cost bureau, has been named district supervisor, succeeding Mr. Kettle. **Peter V. Martin,** formerly superintendent of blast furnaces at the Gary Works, has been appointed chief of safety for the corporation.

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George L. Davis, formerly vice president of Diamond Power Specialty Corp., Detroit, has joined Carnegie-Illinois Steel Corp., Pittsburgh, as general staff manager, sales. Prior to his connection with Diamond Power Specialty Corp. Mr. Davis had been affiliated with American Steel & Wire Co., Donora, Pa., Pressed Steel Car Co., McKees Rocks, Pa., and Oliver Iron & Steel Corp., Pittsburgh.

—o—

J. H. Thompson, vice president of the M. A. Hanna Co., Cleveland, has been named director of the newly-created division which has been formed by the consolidation of the lake coal, iron ore, and dock and vessel departments. In the iron ore department, **H. L. Pierce** has been named executive vice president of the various iron ore mining subsidiaries, in charge of mine operations and sales. **G. H. Warner** continues to head the dock and vessel departments, and **E. J. Myers,** the lake coal department.

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Walter S. MacNabb, who took part in the development of Carnegie-Illinois Steel Corp.'s Gary works, Gary, Ind., has been appointed division superintendent of the plant's blast furnaces. Except for a number of years spent in India as superintendent of the blast furnaces of Tata Iron & Steel Co., Jamshedpur, Mr. MacNabb has served continuously with the Gary organization since 1910.

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Leon F. Miller, who for the past 15 years has served in both sales and engineering capacities in the Foundry Machine division of Osborn Mfg. Co., Cleveland, has been appointed sales manager, succeeding **R. F. Lincoln,** who has resigned to enter another field.

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Herman A. Griebenow has been appointed superintendent in charge of factory operations, Union Brass & Metal Mfg. Co., St. Paul.

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Charles Schwarzler, formerly manager of the sales promotion department, Foxboro Co., Foxboro, Mass., has been appointed manager of the export department, succeeding Henry B. Moelter, who died Jan. 20.

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J. F. Joyce has been appointed district sales representative in Cleveland for Pennsylvania Transformer Co., Pittsburgh.

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Dr. Harry R. Ricardo, well known British consulting engineer, research worker and inventor, has been elected president of the Institution of Mechanical Engineers, London.

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Glen David Bagley, leader of the experimental engineering group of the Union Carbide & Carbon Research Corp. Inc., New York, has been awarded the Jacob F. Schoellkopf Medal for 1944 by the Western New York Section, American Chemical Society. Mr. Bagley was cited for his work in the commercialization of very active metals.

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Harry M. Heckathorn, since 1938 vice president in charge of operations of the Youngstown Pressed Steel division plant in Warren, O., for Mullins Mfg. Corp., Salem, O., has been elected vice president in charge of production of the corporation's Salem and Warren plants. The appointment, effective April 15, was made following the resignation of **Howard F. Kulas,** vice president in charge of operations at Salem, who is leaving because of ill health. Prior to joining Mullins Mfg. Corp. in 1938 Mr. Kulas had been vice president in charge of manufacturing and general manager for Midland Steel Products Co., Cleveland.

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Charles R. Morgan, branch manager of International Harvester Co. in St. Louis, has been elected president of the Sales Managers' Bureau of the St. Louis Chamber of Commerce.

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T. W. Korb, counsel for Harnischfeger Corp., Milwaukee, has been elected assistant secretary.

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Neil C. Hurley has been elected chairman of the board, Independent Pneumatic Tool Co., Chicago, and **Neil C. Hurley Jr.** has been elected president of the company. **Edward G. Gustafson,** treasurer, and **John McGuire,** secretary, were elected to the board of directors.

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H. P. Owen, for the past ten years sales engineer, Ingersoll Steel & Disc division, Borg-Warner Corp., Chicago, has become associated with Sterling Tool Products Co., Chicago, as district manager.

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J. O. Wible has been elected president, Union Electric Steel Corp., Pittsburgh. Mr. Wible previously filled the unexpired term of **Earle G. Winner,** who resigned the presidency because of ill health. **Robert C. Good,** formerly metallurgical engineer for Electro Metallur-

R. T. COWAN

Who has been appointed manager of the Detroit office, Bailey Meter Co., Cleveland, noted in STEEL, March 6, p. 107.

ANTON ERHARDT

Who has been named plant superintendent, National Tool Co., Cleveland, as announced in STEEL, March 13, p. 78.

gical Sales Co., New York, has been appointed sales manager for Union Electric Steel Corp.

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George P. Torrence has been elected president of Cleveland Pneumatic Tool Co., Cleveland, and its subsidiary, Cleveland Pneumatic Aerol Inc., and **Daniel C. Green** has been elected board chairman. Prior to his election, Mr. Torrence was vice president and general manager, Rayon Machinery Corp., Cleveland, and before becoming affiliated with Rayon Machinery Corp. in 1936, he was associated with Link Belt Co., Chicago, serving as president from 1932 to 1936. Mr. Green joined Cleveland Pneumatic Tool in March, 1942, as a director and chairman of the board. In June, 1943 he was elected president, to fill the vacancy created by the resignation of **John DeMooy.** Toward the end of this year Mr. Green plans to resume his profession as management, finance, engineering consultant, in Chicago.

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J. F. Woessner, formerly general works auditor in the Pittsburgh district, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed assistant comptroller in charge of staff activities and general duties, and **M. W. Krueger,** previously supervisor of the Pittsburgh district's organization planning department, has been named assistant comptroller in charge of works accounting. **A. B. Cook,** who has been assistant comptroller in charge of general office accounting since 1942, will continue in that capacity.

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Victor H. Gordon, purchasing agent, Grand Home Appliance Co., Cleveland, is leaving his post to enter the armed services. As yet no successor to Mr. Gordon has been named.

OBITUARIES . . .

William Edward Hoblitzelle, 73, president of Smith & Davis Mfg. Co., St. Louis, and formerly associated with Howard Steel Co., Birmingham, Ala., and with Commonwealth Steel Co., Madison, Ill., and a former president of Duquesne Steel Foundry Co., Pittsburgh, died recently in St. Louis.

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Thomas H. Williams, 63, president, E. A. Williams & Son Inc., Jersey City, N. J., died March 9 in that city. Mr. Williams was a grandson of the founder of the company, which is one of the oldest brass foundries in New Jersey.

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Joseph F. Lamb, vice president and a member of the board, Landers, Frary & Clark, New Britain, Conn., died there recently. Mr. Lamb had been associated with the company about 40 years.

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George M. Bowen, 51, who became president of Ross Operating Valve Co., Detroit, following the death in 1939 of the company's founder, C. A. Ross, died March 8 in Orchard Lake, Mich. Mr. Bowen had been active in various community clubs and associations, and was a member of the American Society of Tool Engineers and the American Legion.

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Eugene E. Hinkle, 74, founder and former president of the Hinkle Iron Co., New York, structural steel fabricators, died March 7 in Greens Farms, Conn. Mr. Hinkle had retired in 1925 as president of the company, and subsequently a group of employes organized the Hinkle Steel Construction Co. The Hinkle Iron Co. was dissolved in 1933. Mr. Hinkle had been a former director of Peabody Engineering Corp., New York.

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Howard Stanley Hart, 76, who played a prominent part in the organization of the Hart & Cooley Mfg. Co., Holland, Mich., and of the Fafnir Bearing Co., New Britain, Conn., died March 8 in Martha's Vineyard, Mass. Mr. Hart was chairman of the board of Hart & Cooley Mfg. Co., and had been the first president of Fafnir Bearing Co.

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Richard H. Scott, 75, former general manager, Reo Motors Inc., Lansing, Mich., died March 11 in that city. Mr. Scott, who retired in 1934, had assisted in the organization of many Lansing industries, and was known for his benevolence in his home city.

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Harry I. Ambus, 58, president and owner of the Sandusky Metal Products Co., Sandusky, O., was killed in an automobile accident near Cleveland March 12.

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Edward R. Estberg, 81, chairman of the board of the Waukesha National bank, Waukesha, Wis., and treasurer and a director of the Waukesha Motor Co. and the Hein-Werner Motor Parts Corp., died March 3 in Waukesha.

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Lieut. W. H. Highberger, 37, of the Chemical Warfare Service, United States Army, who formerly was associated with Mathieson Alkali Works Inc., New York, as sales representative in the New York area, has been listed as lost in action. Second Lieutenant Highberger, who was reported missing in action in the European war theatre a year ago, has been posthumously awarded the Order of the Purple Heart "for military merit and for wounds received in action."

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Septimus H. Griffiths, 63, metallurgical engineer, Ohio Steel Foundry Co., Canton, O., died recently in that city.

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George J. Batzer, 60, consulting engineer, the Trundle Engineering Co., Cleveland, died March 13 in Detroit. Mr. Batzer was superintendent for many years of The Foote-Burt Co., Cleveland.

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William P. Deppe, 70, inventor, who was a pioneer in the development of combustion engines, and a former railroad and mining executive, died March 6 in New York. Mr. Deppe founded the Deppe Motors Corp. and served as its president from 1917 to 1933.

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Russell S. Carter, 65, who was assistant manager of the New York office of Ingersoll-Rand Co., New York, at the time of his retirement in 1918, died March 5 in Hewlett, N. Y.

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Ralph [illegible] president and treasurer [illegible] Schutz-O'Neill Co., Minneapolis, died [illegible] March 8.

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Walter C. Sutton, 43, chief engineer of the S. K. Wellman Co., Cleveland, died there March 10. Mr. Sutton was president of the Cleveland Engineering Society at the time of his death and was nationally known as an authority of construction engineering.

What's ahead for the METALWORKING INDUSTRY as it prepares for peace?

SPECIAL REPORT TO INDUSTRY

WAR production is past peak though the flames of battle blaze with rising intensity. With the output curve flattening out after months of uninterrupted upswing, the metalworking industry, realistically, is taking stock of its position as it prepares for a new production era. Can the industry reconvert to peace as quickly and as effectively as it converted to war?

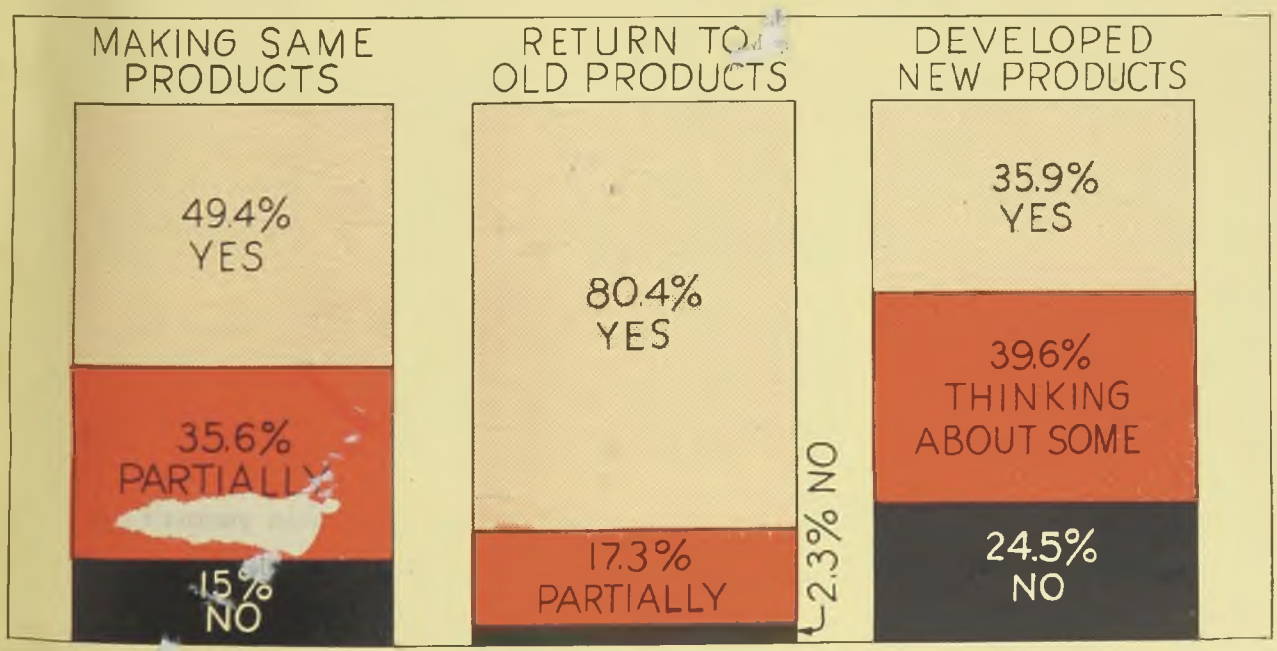
Because metalworking is basic in the national economy it ranks No. 1 position on the industrial reconversion calendar. And how the transition to peace is executed in this field may well establish the design for industry demobilization in general. For within the scope of the industry's varied activities are certain to be met most, if not all, of the complex problems of the transitory period.

The metalworking-metalproducing industry has long been the largest industrial market in this country. This emphasizes its importance as a pillar in the national economy. The latest Census of Manufactures (1939) showed that the 28,215 metalworking establishments employed 3,326,727 salaried employes and wage earners before the war. Next largest classification was Food and Kindred Products with 1,335,157 employes.

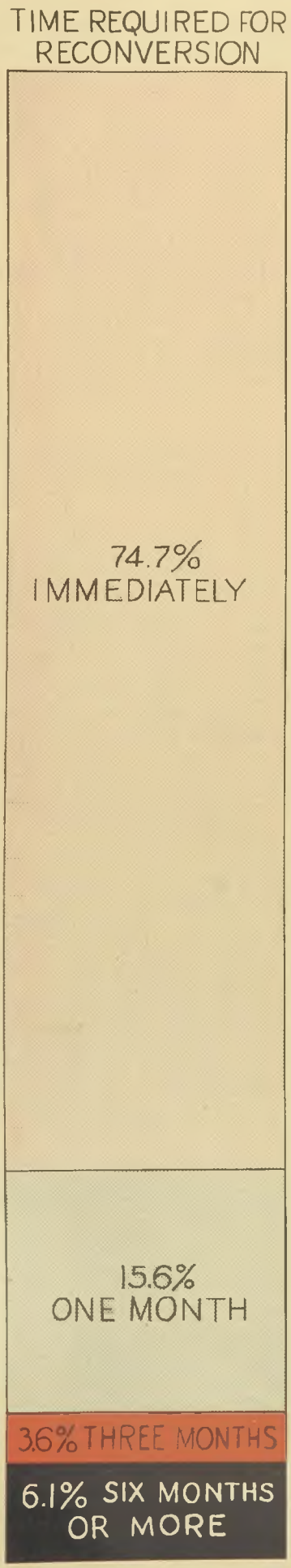
By value of products metalworking ranked first with $19,568,604,000, more than twice the total of the food industry. But of the 28,215 metalworking establishments, only 6600 employed more than fifty, 21,615 fifty or fewer, 17,347 twenty or fewer and 9268 five or fewer. It is significant to note that 39 per cent of the plants accounted for 96 per cent of the industry's total value of products.

Since the outbreak of the war the industry has expanded greatly in physical plant, value of products and volume of employment. While government data for the war years are not available, STEEL's research department has maintained a continuing study of industry trends, and this study indicates a definite movement toward a greater number of large plants and fewer small plants. Whereas in 1939 the industry accounted for 37 per cent of all manufacturing, in 1942 its out-

Industry's Position on Product Manufacture



Bar at left in above graph shows replies, in percentage, to the question: How many plants are still making the same products as before the war? Bar in middle of graph shows answers to the question: Of those plants which have changed wholly or partially, how many intend to go back to their former products after the war? Bar at right shows replies to the question: How many companies have developed new products to manufacture after the war?



put rated 54 per cent, and today there are 9300 plants in the field employing over 50, an increase of 50 per cent over 1939.

What is the thinking in the metalworking industry as it prepares for reconversion? To learn prevailing opinion on important angles of the overall problem, STEEL has conducted a comprehensive survey among top industry executives. Over 3000 replies were received, developing tangible data pertinent to sound policy-making as related to this major economic division.

The survey was cross-sectional, both geographically and by size of plant. Six important questions were considered, as follows:

1. How many plants are still making the same products as before the war; and how many that have changed intend to go back to their former product after the war?

2. How many plants have developed new products for manufacture after the war?

3. How long will it take to reconvert to peacetime production?

4. How many plants expect to maintain their present level of employment and production on peacetime products?

5. How many plants have government-owned capacity or equipment and how many expect to buy it after the war?

6. Will present extensive subcontracting methods continue on peacetime production?

Speed in shifting productive capacity from war to peace, according to the recent Baruch-Hancock report, will provide the most effective attack against the two enemies which threaten in the transition and postwar period—unemployment and inflation. In metalworking, reconversion should be fairly prompt, if for no other reason than the fact only a relatively small percentage of the industry confronts a total reconversion job, that is, will have to reconvert entire physical plant from war to peace production.

In view of the basic nature of metalworking in the war effort, it is not surprising that an unusually high percentage of the plants in the industry are still making their normal prewar products. STEEL's survey shows 49.4 per cent of the plants are still manufacturing the same products as before the war, while 35.6 per cent have changed partially, and only 15 per cent wholly.

Significantly, the larger sized plants, those employing 1000 or more, were more severely affected in the matter of total product change than were the medium or small plants. This is shown in the following table:

STILL MAKING SAME PRODUCT AS BEFORE WAR

All Plants Employing:	YES 49.4%	NO 15.0%	PARTIALLY 35.6%
1000 or more	51.1	20.7	28.2
500 to 1000	44.1	16.8	39.1
250 to 500	43.3	14.9	41.8
100 to 250	44.0	16.8	39.2
50 to 100	49.6	13.8	36.6
25 to 50	53.8	12.4	33.8
under 25	53.2	13.5	33.3

That more large than small plants were diverted wholly to new work is probably explained by the fact the larger manufacturers possibly were more readily adaptable to total conversion. In considering this point, however, it should be borne in mind only 48.9 per cent of the plants employing 1000 or more were wholly or partially forced to change production; 51.1 of such plants did not change at all.

As is to be expected, most plants which were compelled to change to new products plan resumption of prewar production when released from war work. Actually only 2.3 per cent report they do not plan to resume their prewar manufacture, while 17.3 per cent will resume partially, and 80.4 per cent wholly. It is interesting to note that the smallest size plants, those employing under 25, rank highest in percentage of those not returning to prewar product, either partially or wholly, as shown in the accompanying tabulation of returns:

INTEND TO GO BACK TO PREWAR PRODUCT

All Plants Employing:	YES 80.4%	NO 2.3%	PARTIALLY 17.3%
1000 or more	87.0	1.3	11.7
500 to 1000	85.6		14.4
250 to 500	77.9	3.7	18.4
100 to 250	82.5	1.3	16.2
50 to 100	80.9	1.8	17.3
25 to 50	80.0	1.7	18.3
under 25	76.5	4.1	19.4

One reason why the smaller plants rank highest in the list of those not resuming prewar production possibly is that they are engaged on war products which they feel will find peacetime applications.

With regard to new product development for postwar introduction, STEEL's survey indicates 35.9 per cent of plants in the field have developed new products, 39.6 per cent are planning or thinking about such developments and only 24.5 per cent have taken no action in this matter.

New product development appears much higher in the larger than in the smaller plants. Roughly 50 per cent of the plants with 500 or more employes have new products, compared to about 27 per cent of those employing fewer than 50. Detailed breakdown of percentage returns follows:

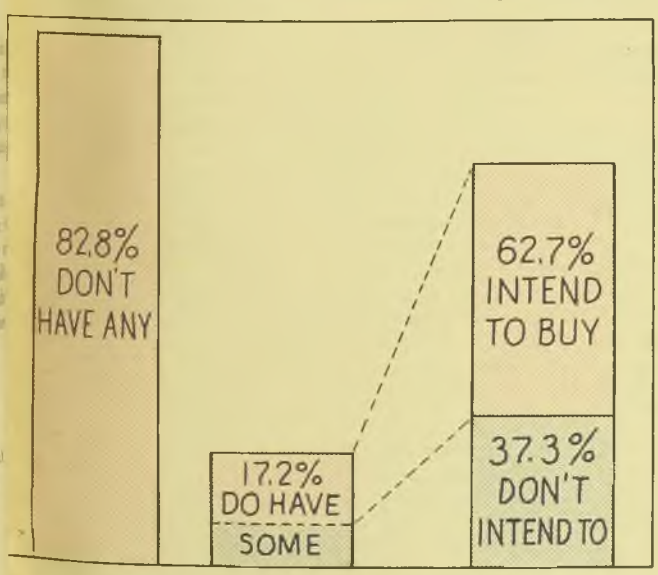
HAVE DEVELOPED NEW POSTWAR PRODUCTS

All Plants Employing:	YES	NO	THINKING ABOUT SOME
	35.9%	24.5%	39.6%
1000 or more	48.8	20.2	31.0
500 to 1000	52.0	9.0	39.0
250 to 500	48.5	7.8	43.7
100 to 250	39.0	18.0	43.0
50 to 100	34.2	26.0	39.8
25 to 50	27.5	32.1	40.4
under 25	26.3	38.4	35.3

STEEL's survey indicates product development within the industry varies considerably. For example, 47 per cent of the electrical equipment manufacturers report they have new products, as compared to 27.5 per cent of the metal furniture group and 28.9 per cent of the machine tool accessories manufacturers.

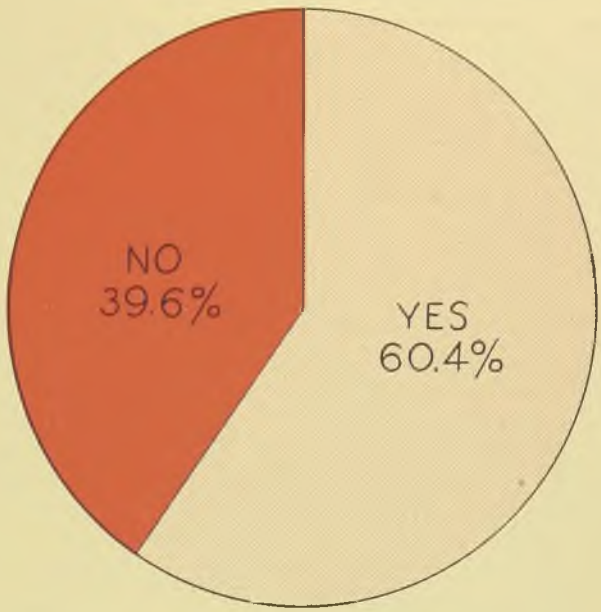
How quickly the industry is readjusted from war to peacetime production depends upon multiple factors. However, assuming necessary equipment and materials are available and that government policy permits, indications are most plants in the metalworking field will reconvert fairly promptly. For example, STEEL's survey shows that 74.7 per cent of the plants expect to effect the transition immediately, 15.6 per cent think it will take a month, 3.6 per cent, three months, and 6.1 per cent six months or more. The reconversion problem, of course, will differ considerably from plant to plant and as regards individual products. Naturally plants that have not been compelled to change production during the war

Government-Owned Capacity



Position and thinking of the metalworking industry on the matter of government-owned capacity and equipment is shown in the graph above.

Employment Expectations



High percentage of the metalworking industry expects to maintain present levels of employment after the war. In above graph are shown the percentage replies, "Yes" or "No", to the question: Do you expect to be able to maintain present level of employment on peacetime products?

will be in position to go ahead immediately on peacetime work, all other factors being equal. Something like 90.5 per cent of these plants expect no time lag at all. On the other hand 59 per cent of the plants that changed products also report they expect to convert immediately, while 25.9 per cent of such plants think it will take a month, 5 per cent three months, and 10.1 per cent, six months or more.

There also is a decided contrast shown between the large and small plants. For instance, 84.2 per cent of the plants employing fewer than 25 expect to go ahead immediately on peacetime work, compared with only 50 per cent of the plants employing over a thousand. Significantly, 38.6 per cent of the plants employing over a thousand think it will take three to six months or more to reconvert.

Thinking on this most important matter is shown in the following table:

LENGTH OF TIME TO CONVERT TO PEACETIME PRODUCTION

All Plants	IMMEDIATELY	ONE MONTH	THREE MONTHS	SIX MOS. OR MORE
Employing:	74.7%	15.6%	3.6%	6.1%
1000 or more	50.0	11.4	19.6	19.0
500 to 1000	58.4	24.8	6.0	10.8
250 to 500	66.9	21.7	2.4	9.0
100 to 250	76.4	14.9	1.8	6.9
50 to 100	76.1	17.2	2.3	4.4
25 to 50	80.1	14.2	2.6	3.1
under 25	84.2	12.2	0.5	3.1

Maintenance of a high level of employment and production in the transition and postwar periods is the goal of government and industry. STEEL's survey shows 60.4 per cent of the metalworking plants expect to be able to maintain their present level of activity, while 39.6 per cent say they will not be able to do so.

For the industry as a whole, the plants that changed products expect to maintain present employment levels to about the same extent as those that did not change. However, there is a wide difference between the large plants and the small plants. Only 27.5 per cent of the plants employing a thousand or more expect to maintain their present level, com-

pared to 71.9 per cent of plants employing fewer than 50.

While there is a difference in the outlook for employment and production by states, it is significant that well over 50 per cent of the plants in the highly industrialized states expect they will be able to maintain present high levels.

By product classifications, naturally, there are greater differences. For example, 83.3 per cent of the agricultural implement manufacturers think they will be able to maintain employment, but only 36.2 per cent of the machine tool manufacturers and 40.9 per cent of the bar product manufacturers.

The following table gives the breakdown of replies on this important question:

EXPECT TO BE ABLE TO MAINTAIN EMPLOYMENT AND PRODUCTION

All Plants Employing:	YES 60.4%	NO 39.6%
1000 or more	27.5	72.5
500 to 1000	42.1	57.9
250 to 500	38.1	61.9
100 to 250	55.6	44.4
50 to 100	62.8	37.2
25 to 50	71.9	28.1
under 25	77.9	22.1

The great expansion of plant capacity in the industry throughout the war has created a problem which will hamper prompt reconversion until it is eliminated through creation of sound government policy affecting disposition of government-owned facilities. However, while considerable government plant exists in the field, the number of companies affected appears relatively small. For example, 82.8 per cent report they do not have any government capacity, and only 17.2 per cent report they have. Of the total government-owned plant or equipment, 87.5 per cent is indicated by the survey to be in sixteen states, with Pennsylvania having 11.5 per cent, Michigan 11.3 per cent and Ohio, 10.6 per cent. More than 40 per cent of the locomotive, car and ship builders indicate they have government-owned capacity or equipment, 41.2 per cent of the automotive, airplane, truck and tractor manufacturers, 17.7 per cent of the machine tool manufacturers, and 14.5 per cent of the materials handling equipment manufacturers.

By size of plants the difference is marked. Only 7 per cent employing fewer than 50 have government-owned capacity or equipment, compared with 40.1 per cent employing between 500 to 1000, and 59.2 per cent employing over one thousand.

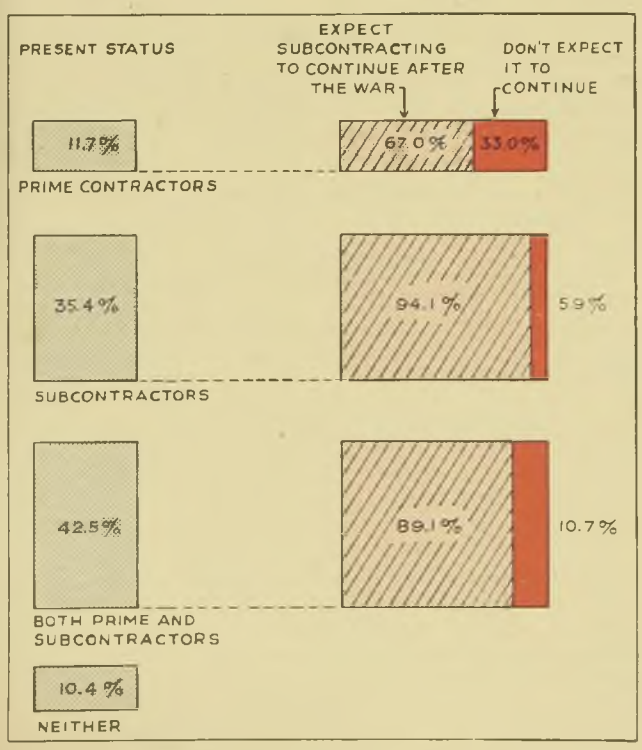
Assuming government-owned plant capacity and equipment are offered for sale at a reasonable price, 62.7 per cent of those companies with such capacity report they intend to buy it, while 37.3 per cent do not so intend

The following table shows the thinking on this question:

DISPOSITION OF GOVERNMENT-OWNED PLANT CAPACITY OR EQUIPMENT

All Plants Employing:	DO NOT HAVE 82.8%	DO HAVE 17.2%	PLAN TO BUY 62.7%	WILL NOT BUY 37.3%
1000 or more	40.8	59.2	69.0	31.0
500 to 1000	59.9	40.1	73.1	26.9
250 to 500	71.1	28.9	77.8	22.2
100 to 250	82.3	17.7	65.2	34.8
50 to 100	88.7	11.3	60.4	39.6
25 to 50	93.5	6.5	29.4	70.6
under 25	92.8	7.2	30.3	69.7

Views on Subcontracting



The war gave tremendous impetus to subcontracting. Steel's survey shows a surprisingly high percentage of both prime and subcontractors expect a continuance of the practice on an appreciable scale after the war

The war gave tremendous impetus to subcontracting. Under pressure of urgent delivery schedules the larger manufacturers found it necessary to farm out considerable work which ordinarily would have been performed in their own shops. Will termination of the war reverse policy in this respect?

STEEL's survey indicates that a surprisingly high percentage of the prime contractors expect subcontracting to continue on an appreciable scale, 67 per cent to be exact. At the same time subcontractors appear confident present procedure will continue, 94.1 per cent in this category looking for a continuance and only 5.9 per cent anticipating radical change. Something like 89.1 per cent of the contractors who do both prime and subcontracting expect present practice to continue.

The facility and effectiveness of reconversion in metalworking unquestionably will tremendously influence the shaping of governmental policy in readjusting the nation to the slower tempo of peace. With remarkable celerity the industry adapted its facilities, old and new, to production for war. Can it backtrack to peace as smoothly and as quickly? Obviously the factors encountered will differ vastly from those met in the transition to war. Not only is physical plant greater, but competitive conditions may be greatly changed, unity of action and purpose may be less evident, government controls may be less stringent, individual initiative may have freer play and may vary in design and application. In a sense, everyone once again may be on his own. In such circumstances it is clear industrial turmoil will be averted only through the development of governmental policy which will permit private industry to chart its course with a minimum of confusion.

STEEL's survey shows that industry thinking on the various reconversion problems, generally speaking, is on the optimistic side. It is clear that despite the complex nature of the overall problem and the uncertainties attendant upon the development of government policy industry's hopes are high for successfully surmounting the difficulties incident to the transition.

STEEL, in forthcoming issues, will take up in greater detail the individual reconversion problems only briefly touched upon in this report.

Expect Postwar Appliance Needs To Increase 78%

Westinghouse survey of 102 distributors covers 13 different appliances. . . . Use average 1940-41 sales as base

AN ANNUAL average of 78 per cent more electrical household appliances will be sold during the first five postwar years than were distributed in either of the peak years of 1940 and 1941, according to estimates made by 102 distributors of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

The survey covered 13 different appliances. Estimated increase expected in the various appliances are: Refrigerators, 48 per cent; ranges, 72; water heaters, 118; washers, 97; ironer, 183; fans, 29; vacuum cleaners, 67; small air conditioners, 138; roasters, 36; irons, 58; small appliances, 66; water coolers, 82, and dishwashers, 818 per cent.

Three general assumptions were made by the distributors in arriving at their estimates. The average sales in 1940 and 1941 were used as a base against which postwar estimates were made. Freedom from government control and freedom from material shortages were assumed. And finally they assumed that factories would have adequate capacity to produce the number of appliances demanded, and at the same time prices, policies and products would be fully competitive.

WARTIME BRAIN: First public exhibit of the Sperry gyrocompass, navigational "brain" of wartime vessels, was held in Detroit recently by the Dodge Division of Chrysler Corp. which so far has built enough of these compasses to equip 3000 merchant ships. Here Commander Robert Velz, inspector of naval materiel at Detroit, Mayor Edward J. Jeffries Jr., and K. T. Keller, Chrysler president, inspect one of the 600-pound compasses in simulated service. Better than 10,000 individual parts, many machined to precision tolerances, make up the unit. Transparent casing of this exhibit piece is not used in the production version

Enters Freight Car Industry As Largest Independent

Entering the freight car manufacturing field and greatly expanding its Process Equipment division, the H. K. Porter Co. Inc., Pittsburgh, has purchased Mt. Vernon Car Mfg. Co. and its subsidiary, J. P. Devine Mfg. Co. Inc., both of Mt. Vernon, O.

Acquisition of Mt. Vernon Car Mfg. Co., representing approximately 10 per cent of the nation's freight car manufacturing capacity, establishes the H. K. Porter Co. as the largest independent in this industry. J. P. Devine Mfg. Co. produces heavy chemical, food and oil refinery equipment.

BRIEFS . . .

Pullman-Standard Car Mfg. Co., Michigan City, Ind., rolled the last of 1200 triple-deck troop sleepers off its assembly line recently.

—o—

Heller Bros. Co., Newark, N. J., now is making and marketing a complete line of hand cut rotary files for use on flexible or stationary shaft filing machines, portable electric and air tools and similar devices. A six page illustrated and descriptive folder is obtainable.

—o—

American Bridge Co., Ambridge, Pa., had less than one-third as many accidents at its shipyard than the national average for shipyards. The yard had a frequency rate of 9.64 lost-time accidents for every 1,000,000 man-hours of work.

—o—

Eighmy Equipment Co., Rockford, Ill., announces the removal of its office to Rochelle, Ill.

—o—

United States Rubber Co., New York, reports that its auxiliary gas tanks are now being used as a container into which medical and food supplies are loaded and dropped to ground forces.

—o—

International Nickel Co. Inc., New York, reports that F. G. Sefing of the development and research division is continuing talks on molding methods for sound castings before various groups.

—o—

C. M. Kemp Mfg. Co., Baltimore, recently appointed the Robert Arnold Sales & Engineering Co., Philadelphia, to represent it in the Philadelphia area.

—o—

Hydraulic Press Mfg. Co., Mt. Gilead, O., has completed one of the largest hydraulic presses ever built for powder metallurgy. The press is designed for briquetting powdered carbides of tungsten, titanium or tantalum for carbide cutting tools, dies and inspection gages.

—o—

Mechanite Research Institute of America Inc., New Rochelle, N. Y., has published a new 8-page booklet entitled, "A Study of Friction, Galling and Seizing."

—o—

Purdue Research Foundation, Lafayette, Ind., announces establishment of a new joint industry-education enterprise at Purdue University for the intensive training of graduate students in exploring the field of heat transfer. The program is made possible by a $75,000 grant.

REPRINTS AVAILABLE

Additional copies of the special report on "What's Ahead for the Metalworking Industry As It Prepares for Peace?" are available to readers on request. Large quantities for additional distribution will be furnished at cost, small quantities free of charge by addressing STEEL, Readers Service Department, Penton Building, Cleveland 13, Ohio.

I PREDICT...

by **Raymond Loewy**

Noted Industrial Designer

After the war you will travel more than you ever have. And one of the developments that will make it possible is the new helicopter air bus. This remarkable aeronautical achievement ushers in a really new mode of transportation that will enable you to make short air trips quickly, inexpensively and in complete comfort. Present bus terminals will be adapted as landing ports and maintenance hangars so you will take off and arrive in central sections of cities and towns. The multi-passenger helicopter air bus, already endorsed by authorities as entirely practical, will bring air travel to millions of persons and thousands of communities that now lack this form of transportation. When you buy War Bonds today remember they will enable you to experience this and many other marvels in tomorrow's world!

* * *

Note: The Weatherhead Company, one of the oldest and most important manufacturers of parts for the aviation industry, is prepared for the day when its four plants will again be contributing to aviation's peacetime needs.

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Plants: Cleveland, Columbia City, Ind., Los Angeles
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Truman committee urges enough freedom for manufacturers to exercise their ingenuity in devising means of utilizing surplus materials. . . Three provisos would prevent wholesale resumption of civilian goods production

IN ADVOCATING the earliest possible resumption of production of civilian goods, the Senate's Truman committee suggests in its third annual report that manufacturers ought to be free to exercise their ingenuity in devising means of utilizing materials surpluses for the production of any items they may choose, to the extent that surpluses of material exist after provision has been made for war items and essential civilian items. The committee adds that any attempt at close control over the production of hundreds or even thousands of items which might be made from surplus materials would do much more harm than good.

Three provisos are set forth as limiting factors covering the resumption of civilian goods manufacture.

1. Basic commodities such as steel and aluminum must be available in the shapes and forms required, and these must not be required for manufacture of war or essential civilian items.

2. Proposed manufacturing operations must not be undertaken in an area which the WMC has classified as having an acute manpower shortage, and

3. The manufacturer must not have been offered a contract or subcontract for a war item, or have been notified by a war procurement agency that a contract would be offered him in the immediate future.

Obviously these restrictions would seriously restrict any wholesale resumption of civilian goods manufacture, certainly would rule out any automobiles. In the first place, it takes a lot more than basic raw materials to produce anything but the very simplest forms of goods. There is talk of permitting washing machine production to be resumed, but many components of such products —bearings to mention only one—will prove serious bottlenecks and likely will preclude any production whatsoever.

Nevertheless, the Truman committee will be supported enthusiastically by most manufacturers in its contentions that (1) we must not prevent the use of surplus commodities and thereby create unemployment, (2) we must not create a new series of unworkable industrial controls that will retard seriously the conversion from war production in the initial and most difficult stages of that conversion, and (3) we must not establish a pattern of regimentation for peacetime production, however good our intentions may be, because such regimentation will have a tendency to become permanent.

The assumption, backed principally by the armed services, that unemployment resulting from the completion of war contracts and the inability to obtain permission to resume civilian production would be desirable because they would tend to force some of the unemployed to migrate to areas of manpower shortages is hardly a tenable position, in the eyes of the Senate committee, for three reasons:

"1. Many women and older men, not employed before the war, would be lost to the labor force, because they would be forced to stop work and would not be willing, or in many cases able, to move to areas where additional manpower was needed for war production.

Would Reduce Quit Rate

"2. Many workers, even in areas of manpower shortage, would quit their present employment because the inability to obtain civilian goods destroys a large part of their incentive to work. This tendency to quit employment in war industries is already one of the most important single factors in the manpower situation. If industry were permitted to employ workers in areas where there are no manpower shortages to make civilian products from surplus materials, the availability of such products for purchase by war workers would tend to reduce the quit rate for war workers in areas of manpower shortage.

"3. We must understand that we are dealing with the entire United States and that the sudden ending of employment in one area does not mean that those who are thereby deprived of a means of livelihood can or will be transferred instantly to an area where employment and shelter will be available to them. The country is too vast, our economy is too complex, and the knowledge by workers of conditions in other areas too fragmentary to support any such expectation."

Imminence of the European invasion throws into sharp relief the committee's forecast that such invasion will be followed by a large number of cutbacks and cancellations in contracts for articles having no direct connection with the invasion but with respect to which procurement officers are now hesitating to take action. Cancellations currently, according to WPB estimates, are running about $1,500,000,000 a month and will continue at this rate through June, against war contract backlogs of something like $55,000,000,000 on Feb. 1.

Each post-invasion cutback or cancellation of an end product will of course affect its many components and the cumulative effect is expected to assume ever-increasing proportions far in excess of existing estimates, just as in the early stages of war production each month saw huge additions by the armed services to previous estimates of requirements.

Figures just compiled by the Board of Commerce show a 90 per cent increase

JACK-OF-ALL-JOBS: More jeep engines now are harnessed to the United Nations' war effort than any other type of motor, regardless of size or weight. The versatile power plant, shown here undergoing final inspection at the Willys-Overland Toledo, O., plant, is not only driving jeeps into battle, but powering radar equipment, floodlights, short-wave radio sets, searchlights, welding apparatus, landing barges, life boats, tractors, pump units and other equipment

in output of Detroit area plants in 1943 over 1942. Total for last year was $9.5 billions, comparing with $3.1 billions in 1937, top peacetime year. To date, the board experts figure manufacturers in the Detroit area have received prime supply contracts for war materials valued at approximately $14 billions which, the civic breast-beaters proclaim, is 75 per cent above the corresponding value for the second-place Los Angeles area, and represents 10 per cent of all contracts awarded in the United States which are assignable to areas. Against this figure of 10 per cent of the contracts, the Detroit area embraces only 2 per cent of the nation's population.

The tremendous load of war contracts has carried ahead almost every conceivable index of industrial activity in Wayne county. Payrolls were up 47.5 per cent in 1943 over 1942; average weekly earnings, up 9.5 per cent to $60.80; postal receipts, up 12 per cent; savings deposits, up 31.5 per cent; bank clearings, up 39 per cent; passengers on the city transportation system, up 29 per cent; electric power, up 21 per cent; gas, up 19 per cent; population, up 5 per cent. On the other hand, marriage licenses, unmoved by the wave of prosperity, slumped 10 per cent.

Warns Against Antagonism

Harvey Campbell, executive vice president of the board, after the first flush of pride over the production achievement of his city, sounds a sour note for the future with the statement—

"Why did men like Rockefeller and Sperry leave Cleveland? Our planners, lawmakers and labor leaders should get the answer to that one, before they continue to irritate Detroit's industrial leaders. Every Chamber of Commerce in America is exerting every influence, from pamphlet to prayer, to induce business to leave Detroit. In lots of towns they'd have bands at the platform to meet men who have been hanged in effigy here by union hoodlums. Let's start being nice to our neighbors. One of them may have a chance to influence a decision that would be costly to Detroit's payroll."

More and more it appears doubtful that Mr. Campbell or any other devoted citizens can do much about restraining the move of industry away from large centers of population. As indicated in this department last week, the trend is to decentralization. Highway planners know it. Automotive manufacturers know it. Suppliers know it. Doubtless even the unions know it.

With an eye in the postwar direction, the UAW-CIO has released a 120-page booklet containing results of a research carried out under its direction on the subject of postwar urban housing. The booklet is worthy of study by anyone interested in the development of housing, for it represents strictly a socialized concept, with the government keeping a finger in everything from disposition of temporary war housing to slum clearance and public ownership and control of both urban and suburban land. Even design control of housing would be exercised by a government agency. To anyone even casually acquainted with the waste and inefficiency of bureaucracy, the UAW-CIO's slant on postwar housing is hopelessly fuddled and inadequate.

Motor companies are in process of strengthening and expanding their Washington representation and contacts, for one reason because they are realizing that governmental controls on production, prices, materials allocation, etc., seem certain to endure beyond the end of the war, and hence it is only good business judgment to have as strong a representation as possible in the nation's capital. Both Studebaker and Chrysler, for example, in recent weeks have made personnel adjustments which on their face could be calculated to reinforce their Washington position.

Chrysler plants are in production on midwing sections for the Curtiss Helldiver carrier-based scout bombers. This ship is somewhat unconventional in design in that instead of being a strongly constructed fuselage with wings, wing tips, motors and controls attached, the midwing sections are basically the principal foundation structure, housing the retractable landing gear, hydraulic controls to lift the landing gear and outer wings, as well as bomb bay doors. There is also space in the midwing section for extra fuel tanks, ammunition, bombs, guns, diving and landing control flaps, fittings for external bombs, and other similar equipment.

All in all, the midwing comprises some 10,000 separate parts assembled into a unit measuring about 20 feet in length and 12 feet in width at the widest point. Chrysler and DeSoto divisions do final assembly work on the wing. Machining of parts is allocated to Plymouth, aluminum forgings to Dodge, stamping to DeSoto and Chrysler Highland Park plants. A total of 464 subcontractors supply parts. First shipment of wings was made five months after receipt of drawings.

A.S.T.M. Committees Hold Sessions at Cincinnati

More than 745 materials engineers and technologists were in attendance at the 148 technical committee meetings of the American Society for Testing Materials held at Cincinnati recently during the 1944 Committee Week. This was almost double attendance at the 1943 sessions.

The following main A.S.T.M. standing committees met: A-1 on Steel; A-3 on Cast Iron; A-5 on Corrosion of Iron and Steel; A-6 on Magnetic Properties; A-7 on Malleable Iron Castings; A-10 on Iron-Chromium, Iron-Chromium-Nickel and Related Alloys; B-3 on Corrosion of Nonferrous Metals and Alloys; B-5 on Copper and Copper Alloys; B-6 on Die-Cast Metals and Alloys; B-7 on Light Metals and Alloys; B-8 on Electrodeposited Metallic Coatings; C-16 on Thermal Insulating Materials; D-1 on Paint, Varnish and Related Products; D-2 on Petroleum Products and Lubricants; D-4 on Road and Paving Materials; D-5 on Coal and Coke; D-9 on Electrical Insulating Materials (Philadelphia, Pa. Feb. 21, 22); D-11 on Rubber Products; D-17 on Naval Stores.

They Say:

"It is my considered opinion that the patent reward given by our laws, enacted under constitutional authority to stimulate genius in research and accomplishment, is in a large measure responsible for the business and industrial development of this country, which has led to the highest standard of living yet produced for the human family in any part of the world."—**Sen. Albert W. Hawkes** (Rep., N. J.).

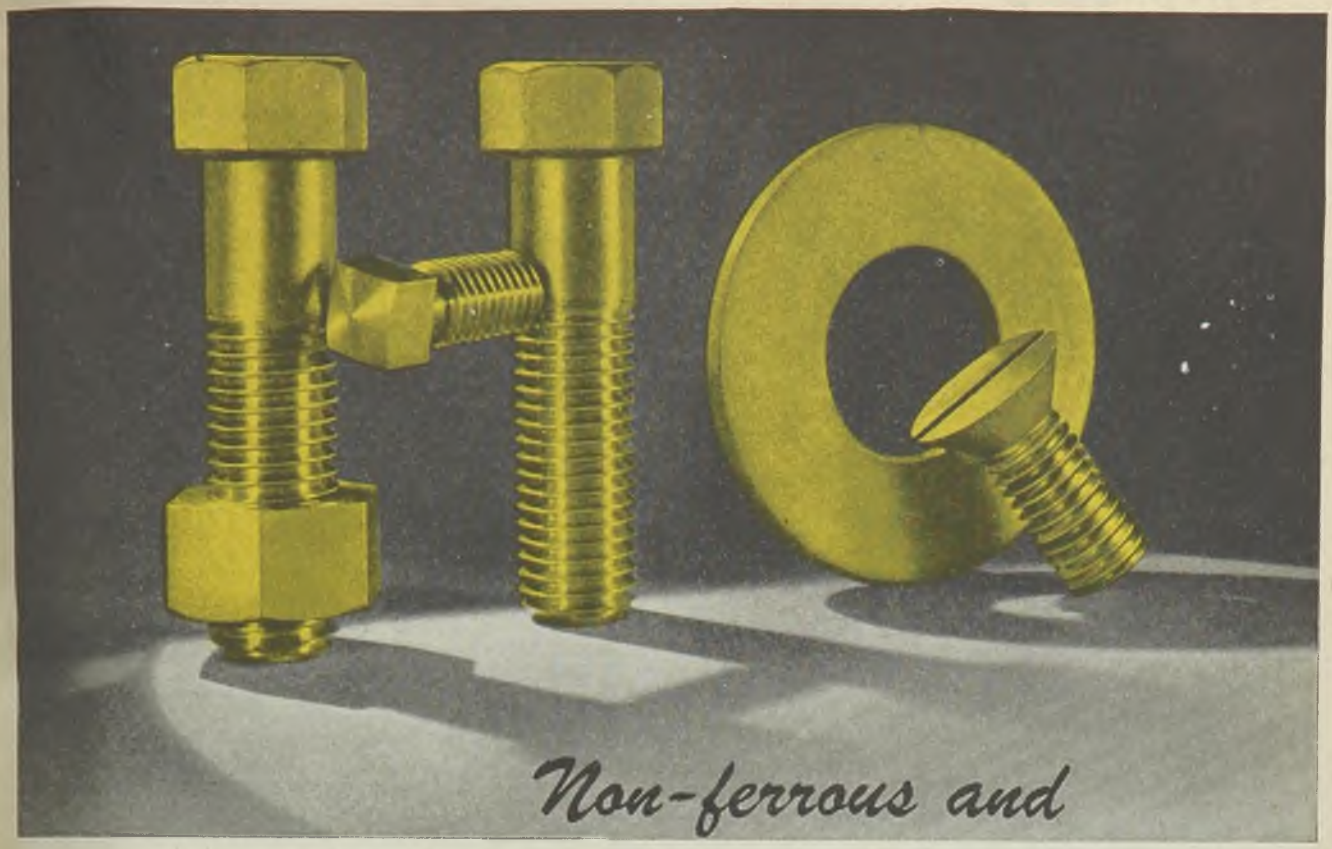
° ° °

"In certain quarters there is prejudice against the word 'planning' that probably springs from apprehension that planning may lead us into a regimented way of life. I feel that just the opposite is the case. Regimentation arises after planning has failed."—**Beardsley Ruml**, chairman, Federal Reserve Bank, New York.

"To me the real essence of reconversion is continuous employment. If we will figure out a way in which idleness will not occur in our labor force, we will have properly reconverted."—**Fred Lazarus Jr.**, chairman, American Retail Federation.

° ° °

"The Committee for Economic Development has no doubts about tangible factors in the program for an expanded economy, but there are two major intangibles which must also be considered—whether businessmen really believe they ought to plan boldly now for postwar days and whether the nation can recover sufficiently from a depression psychosis."—**Paul G. Hoffman**, president, Studebaker Corp. and chairman, National Committee for Economic Development.



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WING TIPS

Program advanced for systematizing and facilitating redistribution of surplus materials in plants of aircraft manufacturers. Plea made for establishment of central disposal depots where contractors may send surpluses

REDISTRIBUTION of surplus materials in plants of aircraft manufacturers by the Aircraft Scheduling Unit, Dayton, O., became "official" in October, 1942. Since that time innumerable conferences have been held; letters, directives and procedures have been written by the bale expounding how the job shall be done and by whom. In all fairness it must be stated all of that was not wasted work. Progress definitely has been made, yet in spite of the fact Col. C. R. Baxter, chief, Redistribution Branch, WPB, and Herschel Wilson, chief, Materials Branch, WPB, have gone on record to the effect ASU has done the outstanding job in redistribution, the fact remains too little material has been moved and that too slowly.

Some straight thinking on the subject of disposal of surplus materials in aircraft manufacturing plants through redistribution to other contractors is contained in the accompanying comment by Lieut. Col. A. E. P. Peterka, chief, Materials Distribution Branch, Resources Control Section, AAF, Wright Field, Dayton, O.

Outlining the extent of the problem and the difficulties of inventorying present supplies, Colonel Peterka makes a plea for the establishment of central warehouses or depots where contractors may send surpluses for subsequent disposal to existing commercial distribution channels on attractive terms.

There are two phases of planning which should be carried on simultaneously:

1. The overall plan involving general broad policy covering all periods from the present through the end of the hostilities in Europe and the termination of the war. Such general overall plans involve Army, including Ordnance, Navy, Bureau of Ships, etc. This type of planning has been getting practically all of the attention.

2. The other phase currently involved has been largely overlooked, and that is the phase involving the actual physical movement of surplus material from a contractor's plant where it is not needed, into productive channels directly or indirectly through remelt or refabrication.

These two phases of the redistribution problem can and must be planned simultaneously. The latter phase, if effectively and swiftly carried out, will make the general phase much more simple. The second phase must be carried out in accordance with established fundamental principles for which there is a background established by industry.

It is obvious, in the redistribution of aircraft materials and supplies, ASU has set itself up to go into the business of selling those commodities in surplus aircraft material stocks. In so doing ASU can follow one of two courses. The first course would be to go in competition with the steel industry and its system of distribution, the hardware industry and its system of distribution, the aluminum industry and its distribution channels, and so on through the entire line of materials and supplies. The other alternative is to go in business with these industries and their established distribution channels as "partners." There can be no doubt in anyone's mind but that the partnership alternative is by far the most effective and desirable.

Inter-Contractor Sales Inefficient

When materials were exceedingly scarce it was feasible for one contractor to sell his surplus material in whole or part to another contractor who needed it badly. The question of price was not important and contractors were willing to do this on a "you scratch my back and I'll scratch yours" basis. To the layman it appears the inter-contractor transaction is the most satisfactory. As a matter of fact it is grossly inefficient.

Assume contractor "A" has a million aircraft bolts in surplus stock. If he could dispose of these million bolts to not more than four or five other contractors, the problem would be comparatively simple, but experience has shown that is not happening today. Contractor "A" lets it be known that he has a million bolts in his surplus stock. He will get an order from some subcontractor for 500 pieces, from someone else for 3000 pieces, another for 69,000 pieces, etc. The contractor is not at all set up to weigh or count and package such quantities or arrange such shipments. His bookkeeping system is not set up to bill and keep track of accounts receivable or prepare the necessary certification; all the foregoing to apply to all conceivable types and kinds of material. It is too difficult to buy and too difficult to sell under such a system.

In assuming the job of "selling" the surplus aircraft material it is axiomatic that before one can sell anything he must directly or indirectly have physical possession of it. Recognizing the need for this initial step, aircraft contractors were requested to report in accordance with directive No. 16 their surplus materials on ASU-41 forms. Unfortunately this has been only partly successful for the following reasons: In too many instances the contractor took the sum of his receipts as shown on his records which was incorrect, subtracted from it the sum of his consumption, which was also incorrect. Obviously, the desired information on ASU-41 forms would have been a true physical inventory.

Perhaps no industry has a poorer knowledge of its true physical inventory than the aircraft industry, yet it would be most unfair to be critical of that situation. Nearly every aircraft contractor, and most of his subcontractors, started from scratch and every conceivable pressure was put on them to produce more and better airplanes faster, and "to hell with keeping records and inventories." The aircraft industry has done an amazingly splendid job in producing good airplanes, but inventory-wise they do not know what they have or where they have it.

When a customer is found for the surplus material the IBM records drawn off the ASU-41s are consulted. If the material is found in the records, its availability is checked then with the holders. The holder is contacted by teletype, telegram,

CARRIERS: Huge Army Air Force gliders travel Texas highways between South Plains Army air field at Lubbock and Sheppard field at Wichita Falls via a recently inaugurated truck transport service. With the glider loaded, the Chevrolet truck-trailer combination has an overall length of 64 feet and a width of 13 feet. Indicating the size of the glider, the truck, if dismantled, could be loaded into the glider and the medium of transportation thus reversed

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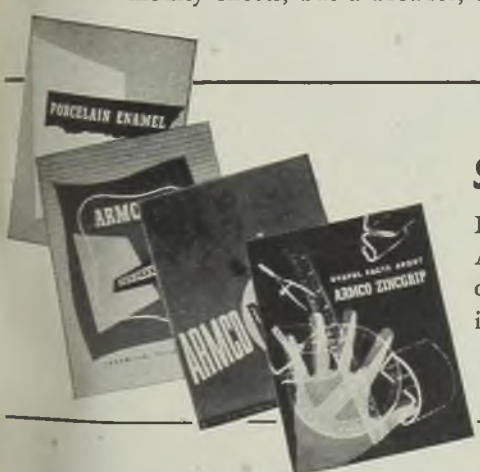
While "the going is tough" now, the Armco Distributor is planning better things for you. After the war he not only will offer you the most complete line of special-purpose and commodity sheets, but a broader, swifter and closer service.



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So whether it's now or after the war, remember that the Armco Distributor wants to serve you to the limit of his ability. Every day brings him nearer the time when he can give you the ALL that he wants to give you—in special steels, application service, deliveries, or all three. The American Rolling Mill Company, 1011 Curtis Street, Middletown, Ohio.

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ARMCO *DISTRIBUTOR SERVICE*

MASS PRODUCTION: Main assembly floor of Republic Aviation Corp.'s plant at Farmingdale, N. Y., gives a good idea of the space required for airplane manufacturing, all the more significant when it is considered the product is a single-place fighter plane, the P-47 Thunderbolt

or telephone and asked if he has the material. If he says "yes," he is asked to "freeze" it while the purchaser is notified and prepares his purchase order. However, in too large a number of cases when the purchase order gets to the holder it is found the material does not exist except on paper, or it may exist but simply cannot be located, or it has deteriorated. It has been suggested contractors be required to maintain a running physical inventory of their surplus stocks and segregate them. This has not been found practicable to date. Managements of the airplane companies have been judged by the number of airplanes they turn out; they still have serious manpower problems, and even if they had the inclination they have not had the time nor the manpower to do the inventorying and segregating which would help simplify the redistribution problem.

Competes with Producing Mills

Getting back to ASU's role of "selling" surplus materials, it must be recognized that it must sell or dispose of materials in competition with the producing mills involved. Price, quality and service being equal, people will still favor the organization with which it is the easiest and most pleasant to do business. Currently it is much more difficult to do business with ASU than with a producing mill or its distributors. For example: Assume a contractor wishes to buy 50 tons of material. If he places the order with a mill, he places one order with one company. If he wishes deliveries spread out over five months in equal amounts, he will get it that way. The company furnishes certifications of quality and backs up its products.

Assume, on the other hand, the contractor attempts to purchase these 50 tons of material from surplus stock. He will get in touch with the local district office or with the Central Register in Dayton and may be told that surplus stock exists and that its availability has been checked. However, it is in five different contractors' plants, each holding 10 tons. So he must make out five purchase orders instead of one. It is then found that two of the holders actually do have the material, the third one actually has but half of it, and the fourth and fifth do not have it at all. So the contractor must then make out a sixth purchase order on a producing mill for 25 tons. By this time he may have lost his position in the mill's production schedule and may not receive the material when required. Furthermore, he may be required to pay a higher price for the 25 tons than he would had he purchased the entire 50 tons from the producing mill. The contractor, for physical or financial reasons, ordered the 50 tons shipped 10 tons per month, but material from surplus stock has to be shipped to him immediately; first, because ASU cannot depend on the holding contractor to keep it until the purchaser requires it; and second, the holding contractor, once he receives a purchase order, is anxious to get material out of his plant.

It all sums up to something like this: That a system of storage reservoirs must be established immediately, to which contractors' surplus inventories may be moved and there inspected, inventoried, and distributed to established commercial distribution channels. These storage reservoirs might well be Air Service Command Depots, or if necessary, storehouses operated on a management-fee basis by experienced commercial warehouse organizations. These reservoirs would make it possible to remove immediately surplus stock from a contractor's plant and then control its flow back into production, either aircraft or other war construction or such civilian production as M and L orders may permit. There is no single method or formula for the distribution or sale of all materials. Over a period of years, each industry has evolved a distribution system peculiar to itself; and to further confound the uninitiated, there are important differences within each industry among the different products within the industry. For example: In what we broadly term "hardware"—bolts, nuts, screws, cotter-pins—are distributed under a different financial set-up than fittings. Unless these facts are thoroughly understood and recognized, difficulties are encountered.

Solution Requires Co-operation

The redistribution problem of surplus aircraft steel will be difficult to solve. We now have 26 official aircraft steel warehouses as a nucleus in solving this problem. The producing mills have expressed their willingness to co-operate. However, there are a great number of producing mills and aircraft steel is but a small part of the overall steel situation. To further complicate the steel problem, much of the aircraft steel in surplus stock is "tailor-made" and in the category of "specials." Arrangements have been made whereby ASU will receive the advice and counsel of the producing steel mills and the 26 official aircraft steel warehouse managements.

The problem of selling or disposing of surplus materials for production should not be divorced from disposal of scrap for remelting or refabricating. There is no strict line of demarkation. Material that can be disposed of for production today, later as conditions change, may be disposed of as scrap only. It requires the same talent and knowledge to distribute material and redistribute it for production or scrap. It is urged therefore:

1. That surplus material from contractors' plants be removed to storage reservoirs.

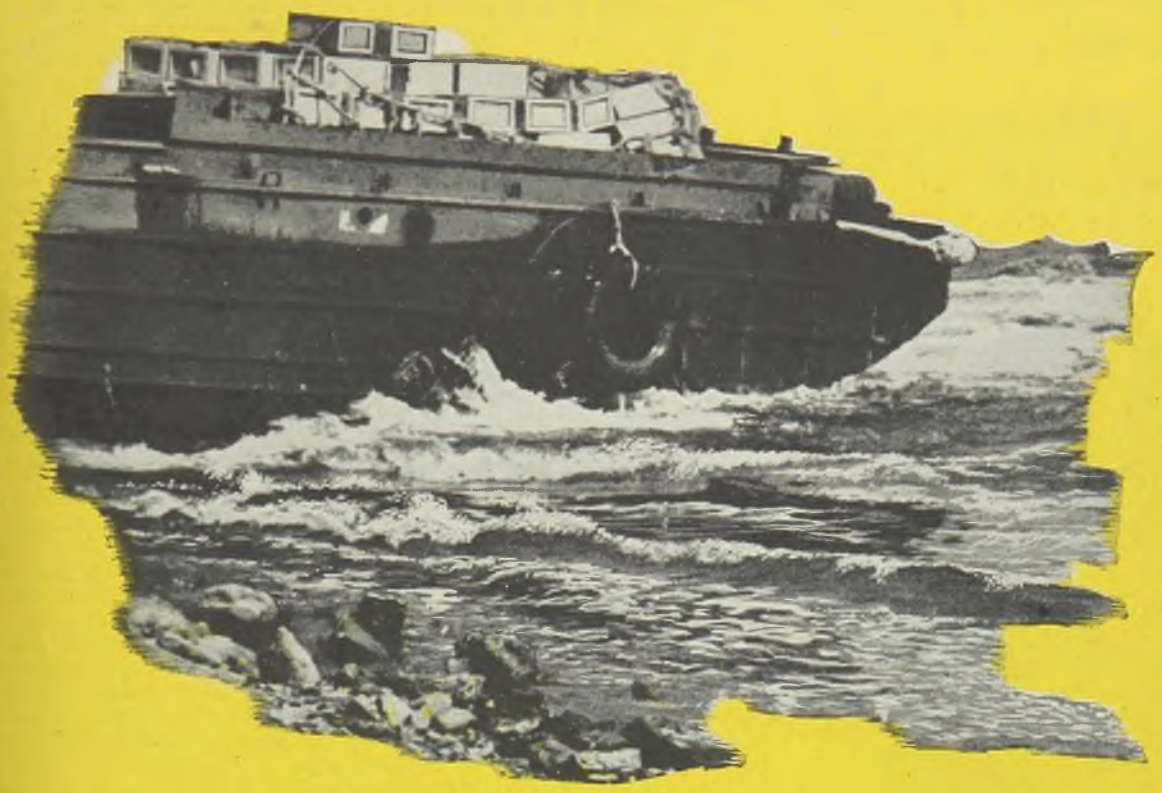
2. That it be made available to Air Service Command and Aviation Supply Office.

3. That all usable material be diverted to existing commercial distribution channels on attractive terms.

4. That the material declared undistributable be turned back into remelt or refabrication into such forms as are currently usable.

5. That authority and latitude be given to the Materials Distribution Branch to carry out the distribution as outlined, in that lowest echelon of overall distribution plans, taking full recognition of the fact no complete air-tight procedure can be written out with conditions changing as rapidly as they are; that mistakes will be made but, if the same mistakes are not repeated, the objective will be attained that the support, assistance and confidence of "top-side" may be depended on

"Turning Points" to Victory



BEACHHEAD BRAWL-BUGGY

The very essence of sea-borne invasion is the amphibious troop carrier that literally wades into the enemy and "slugs it out" in typical American fashion. Engineering magic enables this versatile vehicle to drive itself from ship to shore, secure a four-wheeled foothold and deepen the beachhead for safe debarkation of more men, munitions and supplies. It is often the turning point of invasion success – and its own "turning points" are ball bearings.

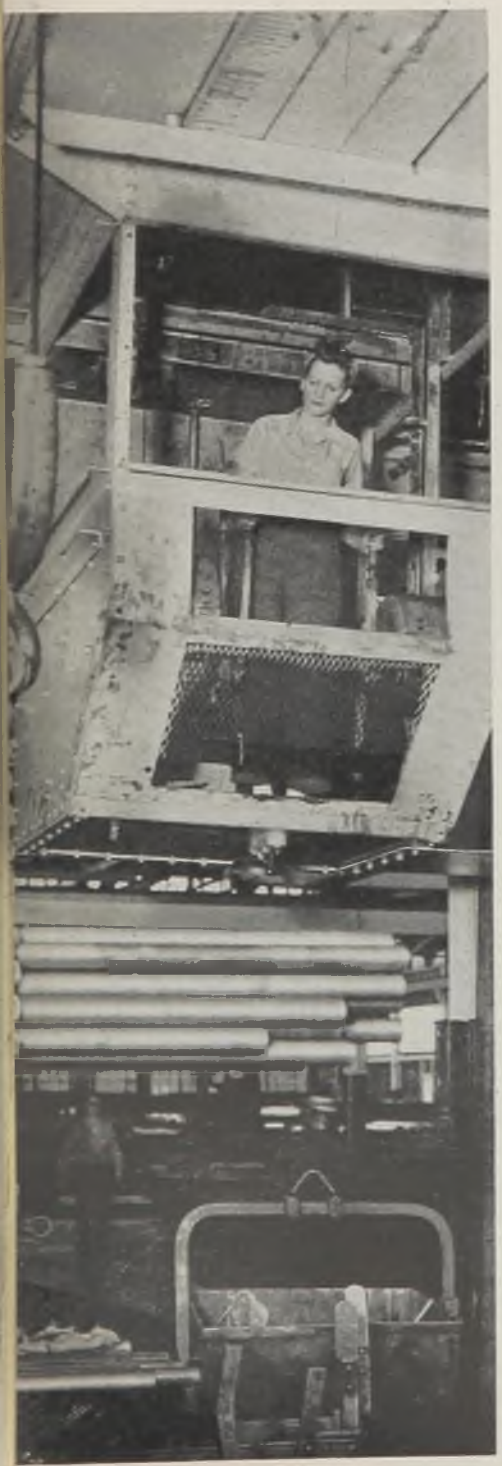
Amphibious vehicles have hazards other than bombs and bullets. Mechanically, they must resist the corrosion of sea water, the abrasion of sand, and the whole range of global war's temperatures from Arctic to Equator. To meet these conditions, Fafnir Ball Bearings are engineered to resist trouble while they deliver smooth, dependable performance in vital parts of practically every type of war machine.

They will be just as carefully engineered to serve in untold numbers of applications and deliver friction-free performance in coming peacetime products. The Fafnir Bearing Company, New Britain, Connecticut.

FAFNIR BALL BEARINGS

Speed Production at Wyckoff Draw

Twenty-five per cent of expanded force constituted by women trained since war started. One hundred and fifty-three jobs in cold-drawn steel plant can be filled by female workers. Forethought in planning and training regarded as key to success of the program



By MARY CURRAN
War Manpower Commission

HOW the Wyckoff Drawn Steel Co., Ambridge, Pa., is meeting its replacement problem by utilizing women workers is a story of interest to every employer in the metalworking industry. Today, Wyckoff employs a larger percentage of women workers than does any other cold-drawn steel mill, according to Vice President J. G. Schaefer. Women constitute more than 25 per cent of the total expanded force. Wyckoff officials attribute their production achievement throughout the replacement and expansion period to their plan for the utilization and training of women and other draft exempt workers.

In the fall of 1942, it became apparent there were not sufficient men in the Pittsburgh area to satisfy the requirements of the armed forces and the expanding war production establishments up and down the Ohio valley. The production force at Wyckoff, as in other cold-drawn steel mills, always has been exclusively male. When consideration was first given to the possibility of employing women to handle some of the jobs, company officials recognized a need for special consideration of the problem and some advisory assistance on it. They had no experience in employing women in mill jobs, nor had their foremen and other male workers experience in training and working with women.

Recalling service provided the company earlier on apprentice training, in-plant training technicians from the Pittsburgh office of the Apprentice-Training Service were requested to survey the jobs in the plant and advise on those in which women could be employed, and the training time needed to bring them to job proficiency. A representative of the Women's Division of the Pennsylvania State Department of Labor and Industry assisted in the survey, providing helpful information on safety and health standards and state regulations in connection with the employment of women workers.

Form Six-Member Committee

Most the jobs to be surveyed were in the line of progression along which the men moved as vacancies occurred, according to the existing bargaining agreement. Therefore, before making the survey, the training technicians of the Apprentice-Training Service discussed in detail the reason and necessity for such a study with the residence ordnance inspector, and the district representative and local president of the United Steelworkers, the bargaining agency for the plant. To work out a solution to the problem of placing women in the jobs listed as a result of the survey, a committee of six members was formed with

One of the first jobs to be filled by women at Wyckoff Drawn Steel Co. was that of crane operator. At left is shown a woman operator with a load of steel bars. Below, a team inspects gun barrels. At right below, women workers are operating centerless grinders

Steel Co.

the vice president, personnel director, and plant superintendent representing the company, and the president, secretary, and a member of the shop committee representing the union. This committee, agreeing upon the necessity for employing women in the mill, recommended three supplementary provisions to the regular bargaining agreement to make this possible. The provisions are as follows:

A. The agreed-upon schedules of pay currently in effect shall apply to women as to men; as shall the 1942 agreement, except as herein modified.

B. When a man is displaced from a job by a woman he shall be paid for the work to which he has been displaced at the rate of the work from which he is displaced excepting if the rate of the new job is higher, then he shall be paid the higher of the two rates.

Permit Circumvention of Jobs

C. A woman shall be permitted to circumvent such jobs in line of progression which she is physically unable to do in order to progress to job she is able to do; and a man shall be permitted to circumvent women's jobs in the same manner.

This supplement was agreed upon by the company and the union. Company officials state that the joint committee, originally formed to consider the problem of introducing women to the mill, has continued to advise on utilization and training, removing many difficulties and smoothing the way for successful operation of the plan.

Further preparation was made for receiving women workers in the plant by setting aside sufficient space for individual lockers and complete washroom facilities, including showers. Adjoining these facilities, a first-aid room was equipped and a full-time attendant employed. This compact arrangement has made it easy for the women to get immediate first-aid treatment when injured in the plant.

Thus, the procedure for introducing women workers was fully worked out before any women were hired. Planning ahead has paid dividends in avoiding controversies and eliminating misunderstandings in regard to the employment of women. Company officials credit the rather remarkable success in operating this agreement to the co-operation of Wyckoff men and their recognition of their patriotic duty in doing all they can to keep production moving by aiding the women workers.

Women Operate Cranes

One of the first jobs to be moved from the line of progression for the duration of the war was that of crane operator. This is one of the high-wage classification jobs but one which could be satisfactorily performed by women. The cranes in this mill can be operated without much physical exertion and are easily entered by an attached ladder. The first women placed in these jobs were carefully selected.

Each crane operator trainee works with an experienced operator for 30 days before being allowed to operate alone. The women have worked out splendidly in this job and now all of the main mill cranes on all three shifts are operated by women. Although the women selected for crane operation are usually between the ages of 21 and 35, final selection is on personal qualities. One of the best operators is over 40.

The original survey made in the fall of 1942 by the Apprentice-Training Service technician listed 153 jobs on three shifts as those in which women could be employed. This has proven a remarkably accurate estimate as there are now 150 women on the three shifts in the jobs listed.

Job classifications in which women are employed are: Time checker; assistant chemist; chemistry laboratory helper; emery testing machine operator; miscellaneous tester; chemistry laboratory clerk; lathe hands-test pieces; machine shop-drill press hands and grinders; crane operators; power hack saw for test pieces; centerless grinders; power hack saw, production work; punch press, straightening (keep one man per shift); inspectors; checkers; magnetic tester; turning machines; shape straighteners, improve handling methods; receiving clerk; crane, pointing department; pointing machines; wiring shapes for pickling; turning test pieces, die room and machine shop; surface grinders; mill office clerks; mill office weighman; medart straightener, small; shears; and as stockers.

Responsibility for worker training is under the direction of a full-time training supervisor. In carrying out this assignment, he works in close co-operation with the plant superintendent. An induction conference is first held with all new employes by the personnel director, who then introduces them to the training supervisor. The training supervisor then turns the workers over to the care of the proper job instructor to receive training in job proficiency on production work. The average training time varies according to job from one week to one month. Foremen and job instructor have had the benefit of job instructor training and job methods training offered by the Training-Within-Industry Service of the War Manpower Commission. Supervisory training is given to foremen and supervisors through advanced courses at Pennsylvania State College.

Precision Important Factor

Fifteen women have been trained as magnetic testers, a job in which precision is an important factor. The company reports that they are performing very successfully on this job. Most of the work is done without lifting as the bars are rolled from one position to another. Although the bars are greasy and dirty the women accept this as part of the job, using the protective hand cream provided by the company. As aptitudes are observed women are trained for the more exacting jobs. It is now planned to select one of the girls showing aptitude on machine work and possessing the necessary physical qualities for the job for up-grading training to draw bench operator.

One of the women selected from the plant production force is now being trained as an assistant chemist in the laboratory. The laboratory technician under whom she is being trained says she is doing excellent work. In this laboratory, where samples are analyzed and tested, 120 tests a day are often required.

Forethought in planning the utilization and training of women workers has been the keynote to the successful manner in which Wyckoff is meeting its war production responsibilities. As Mr. Schaefer remarked, "If we hadn't put women in, we wouldn't now be breaking records on production."

THE BUSINESS TREND

Push Production of Critical Components

DESPITE added pressure for production of most needed military equipment—such as selected types of planes and ships—the general pace of industrial output continues to follow the leveling off pattern noted in recent weeks. Strenuous efforts are still being exerted, however, to overcome critical shortages in a number of components such as antifriction bearings and fractional horsepower motors, but in most instances surpluses in many items continue to pile up all the way from raw materials to finished armaments.

Military authorities state requirements call for a 16 per cent gain in war production this year over 1943, and a rate of about 4 per cent above that recorded in the final 1943 quarter.

CIVILIAN GOODS—Production on a large scale may not be permitted until six to eight months after Germany's collapse, WPB Chairman Donald M. Nelson states. He favors government control over industry during the reconversion period, but strenuously opposes "any attempt to put the postwar economy in a totalitarian straitjacket". It would be against the national interest for any concern to "begin jockeying for competitive postwar position", Mr. Nelson said, and added that WPB will resist all efforts to "beat the gun".

Expanding steelworks order backlogs in such key items as plates, sheets and certain bar sizes, a reversal of the downward trend noted toward the close of last year, would appear to dampen any immediate prospect of a general switch to civilian goods output even if the military were in accord.

FINISHED STEEL—February finished steel shipments reported by the United States Steel Corp. reached a new record tonnage for that month of 1,755,772 net tons, while the total shipments for the first two months this year aggregated 3,486,559 tons, also a new record. On a daily average basis February shipments, with the extra working day this year, were slightly under like 1943 month's daily shipments.

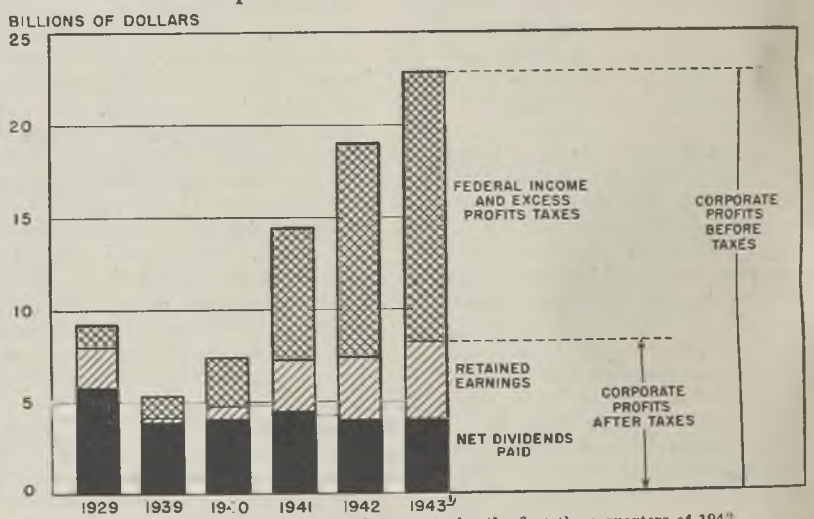
Plate production declined about 51,000 tons during February to 1,122,219, due to the shorter month, but primarily because of the extra working day this February, output was above the 1,072,001 tons produced in the like 1943 month.

EMPLOYMENT—For the first time, the American Iron and Steel Institute's report on employment in the steel industry represents the average number of employes at work throughout the month, in contrast to previous reports which showed the total number of employes carried on the payrolls regardless whether they had worked one day or the full month. In recent months when the turnover of employes has been high, the total number of employes has not constituted an entirely satisfactory index.

Average work week of wage earners continued to lengthen during January, amounting to 45.7 hours, against 43.2 in December and 39.8 in January last year. Trend in average earnings per hour also continued upward during January, amounting to 116.5 cents per hour, compared with 116.1 in December and 110.7 cents in the corresponding 1943 month.

PROFITS—Corporate profits before taxes turned sharply upward for years 1941 through 1943, the United States Department of Commerce states. Retained earnings after taxes recorded moderate gains during this period, while dividend payments were somewhat reduced.

Corporate Profits Before and After Taxes



[1] Estimates are based upon corporate profits reports for the first three quarters of 1943.

Source: U. S. Department of Commerce.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	98.5	97.5	100.0	99
Electric Power Distributed (million kilowatt hours)	4,426	4,465	4,533	3,945
Bituminous Coal Production (daily av.—1000 tons)	2,000	2,155	2,127	2,058
Petroleum Production (daily av.—1000 bbls.)	4,381	4,413	4,399	3,877
Construction Volume (ENR—unit $1,000,000)	$44.6	$39.4	$23.2	$90.4
Automobile and Truck Output (Ward's—number units)	17,605	17,655	17,595	17,560

*Dates on request.

TRADE				
Freight Carloadings (unit—1000 cars)	787†	788	795	749
Business Failures (Dun & Bradstreet, number)	17	24	22	91
Money in Circulation (in millions of dollars)‡	$20,963	$20,823	$20,586	$16,205
Department Store Sales (change from like week a year ago)‡	−11%	−9%	+8%	+26%

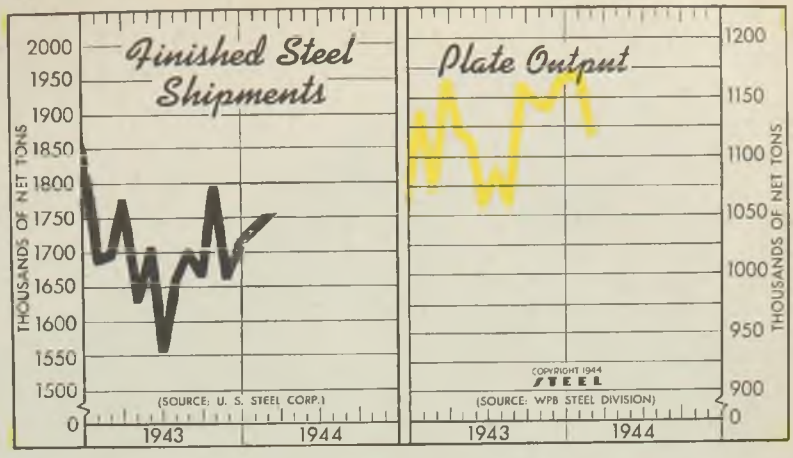
†Preliminary. ‡Federal Reserve Board.

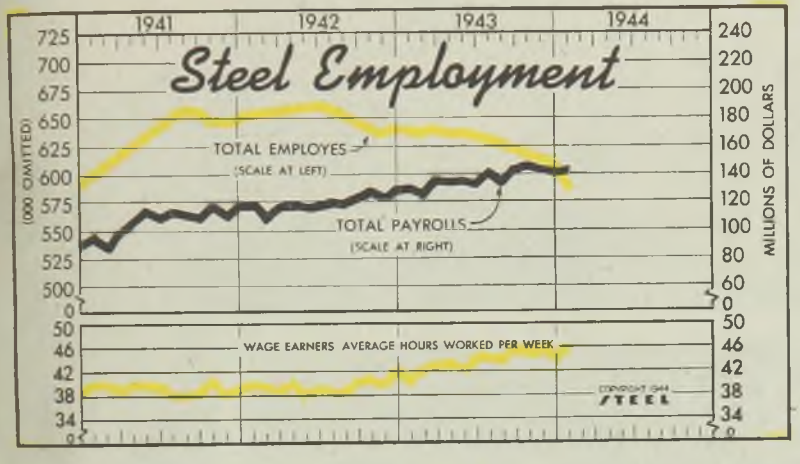
Steel Shipments†—Plate Production‡

(Net tons; 000 omitted)

	—Shipments—		Plate Output	
	1944	1943	1944	1943
Jan.	1,781	1,686	1,173	1,135
Feb.	1,756	1,692	1,122	1,072
Mar.	.....	1,772	.....	1,168
Apr.	.....	1,631	.....	1,122
May	.....	1,707	.....	1,115
June	.....	1,553	.....	1,056
July	.....	1,661	.....	1,090
Aug.	.....	1,705	.....	1,061
Sept.	.....	1,665	.....	1,106
Oct.	.....	1,795	.....	1,147
Nov.	.....	1,661	.....	1,142
Dec.	.....	1,720	.....	1,169
Total	.....	20,245	.....	13,382

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





Steel Employment

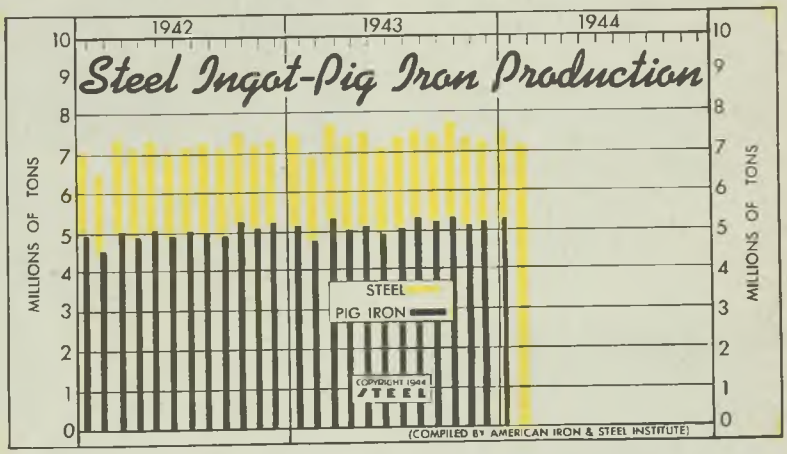
	—Employes— (000 omitted)			—Total Payrolls— (Unit—$1,000,000)		
	1944	1943	1942	1944	1943	1942
Jan.	583†	637	651	$141.8	$129.7	$118.8
Feb.	...	635	651	.....	122.8	108.5
March	...	637	653	.....	136.8	117.0
April	...	634	654	.....	133.3	118.5
May	...	632	656	.....	137.4	117.4
June	...	631	659	.....	136.2	118.0
July	...	627	655	.....	142.8	120.7
Aug.	...	625	647	.....	139.9	118.7
Sept.	...	620	641	.....	143.8	124.8
Oct.	...	615	635	.....	144.9	126.6
Nov.	...	611	632	.....	141.5	122.8
Dec.	...	605	633	.....	140.2	129.3

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

Iron, Steel Production

(Net tons—000 omitted)

	Steel Ingots		—Pig Iron—	
	1944	1943	1944	1943
Jan.	7,595	7,424	5,276	5,194
Feb.	7,188	6,826	.....	4,766
Mar.	.....	7,670	.....	5,314
Apr.	.....	7,374	.....	5,035
May	.....	7,545	.....	5,173
June	.....	7,027	.....	4,836
July	.....	7,376	.....	5,023
Aug.	.....	7,562	.....	5,316
Sept.	.....	7,489	.....	5,226
Oct.	.....	7,786	.....	5,324
Nov.	.....	7,374	.....	5.096
Dec.	.....	7,266	.....	5,213
Total	.....	88,873	.....	61,777



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,095	$9,173	$9,636	$7,414
Federal Gross Debt (billions)	$187.4	$187.4	$182.1	$120.4
Bond Volume, NYSE (millions)	$54.0	$61.1	$87.7	$100.3
Stocks Sales, NYSE (thousands)	6,413	4,047	3,512	7,826
Loans and Investments (millions)†	$53,290	$53,267	$52,177	$41,470
United States Government Obligations Held (millions)†	$38,898	$38,755	$37,930	$28,657

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	250.3	248.6	249.0	247.2
Industrial Raw Materials (Bureau of Labor index)‡	113.2	113.2	112.4	111.2
Manufactured Products (Bureau of Labor index)‡	100.6	100.6	100.5	100.6

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

STANDARDIZATION

By JOHN W. OFFUTT and DAVID T. MARVEL
National Tube Co., Subsidiary
United States Steel Corp.
Pittsburgh

Fig. 1 (Above)—This pile of round, oval, streamlined, square and rectangular aircraft tubing in a plant of the National Tube Co. provides some conception of the many varieties required

Fig. 2 (Below) — A white-hot seamless tube is shown here emerging from a piercing mill in a National Tube Co. plant

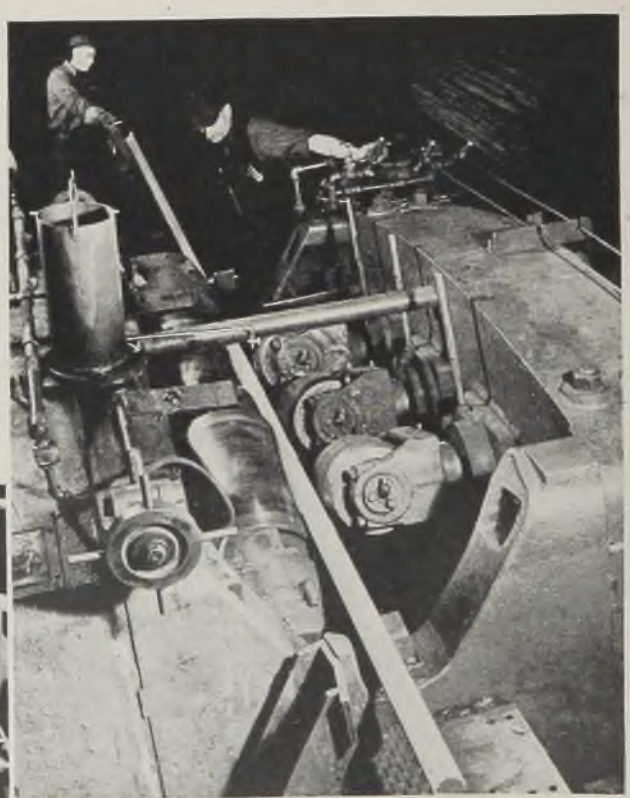


Fig. 3 (Above)—A modern rotary straightener is shown removing any irregularities which may be present in this light gage tubing for aircraft use

Fig. 4 (Right)—This aircraft tubing is being pickled to remove scale and oxides and, after dipping in a lubricant, will be ready for further forming operations in cold drawing equipment

f AIRCRAFT TUBING PROPOSED

Two hundred and five sizes will cover 95 per cent of sizes required for airframes, the authors point out, although 328 sizes are ordered. Standardization of other aircraft types now regarded as desirable

THE CASUAL observer admiring the sleek lines of a modern airplane little realizes the number of parts hidden under the smooth surfaces of the body and wings. If the "skin" could be removed one would be amazed at the intricate skeleton framework beneath with its thousands of precision parts made from seamless tubes, practically all of which are alloy steel.

The use of seamless tubing in aircraft construction is the outgrowth of another application of this versatile product where strength-weight ratio has been a dominant factor. Light gage steel tubing had its first major application in the bicycle frame, and for over a period of 50 years no better type of construction has been developed, for no other structural section will withstand the combined stresses of tension, compression, bending, and torsion, as well as the round tubular section.

These factors filled the rigid requirements in the construction of vital parts of the modern plane and the unprecedented demand for aircraft has called for hundreds of millions of feet of seamless tubing, taxing the capacity of all existing tube plants and now being supplemented by new seamless tube mill capacity.

The airplane designer must hold the dead weight of the plane to the irreducible minimum, calculate the stresses of each member accurately and then select materials and part sizes that will safely withstand these stresses. Fortunately for all concerned, grades of material for steel tubing were, or have been standardized, and practically all structural tubing is being specified in plain carbon (SAE-1025) and chrome (SAE X-4130), of which the latter is used in practically all but light trainer type planes. Due to the difficulty in securing ample supplies of X-4130 steel, chrome-nickel-molybdenum (NE-8630) steel is now being used as an alternate material in increasing quantities.

Standardization Has Been Difficult

Unfortunately, however, standardization of sizes of tubing due to design requirements has been very difficult and both consumers and suppliers must share the responsibility for this situation. The designer, who must get the last pound of strength and save the last ounce of weight in his structure, naturally wants a wide choice of sizes and gages of tubing to reach these goals, and no criticism of his requirements in the development period of airplane construction is implied here. He found tubing manufacturers were willing to furnish almost any size and gage specified, as they were sympathetic to his problems, and at that time the small quantities of tubing required did not involve serious production problems. While aircraft tubing is a special grade of cold drawn mechanical tubing, made to more exacting specifications than regular mechanical tubing, yet, practically all producing equipment and tools used in the whole range covered in the regular mechanical tubing field were available for its manufacture. Producers of cold drawn mechanical tubing were, therefore, readily equipped to make all sizes and gages between 1/16 and 10¾ inches outside diameter, with walls from 0.004 to 1⅝ inches thick, and a weight table listing of sizes that were obtainable within these ranges included over 4300 items.

In the early development of airplanes only the smaller diameter and lighter wall tubing entered into the construction of the small planes then built, and only such items were shown on lists of sizes available in the aircraft grades. These early published lists included about 240 items, ranging from 3/16 to 5 inches outside diameter by 0.022 to 0.375-inch wall thickness.

Nearly 800 Sizes Demanded in '42

Army - Navy Aeronautical Design Standard, approved June, 1940, listed but 146 items, 3/16 to 4¾ inches outside diameter by 0.022 to 0.188-inch wall. In 1942, the steel tubing industry was asked to make about 600 round sizes of X-4130, and over 200 round sizes of 1025 grade tubing, a considerable increase.

However, a detailed study made in that year showed that four leading manufacturers of aircraft tubing received orders for 328 sizes of airframe tubing in the first ten months of 1942. Over thirty-three million feet of airframe tubing was involved, of which about 95 per cent was covered by a list of 205 sizes. This list is submitted herewith as a standard which might be adhered to without hardship for either design or production. It was compiled from orders received over a period of years and therefore represents the aircraft industry's choice of sizes of tubing required to meet the major portion of all design requirements.

While it is not possible for the aircraft manufacturer to adhere strictly to this list, and tube manufacturers are prepared to make additional sizes not listed, it is hoped that sincere effort will be made to conform to the list as nearly as possible. From the manufacturer's standpont, the advantage would be twofold, namely, increased production and reduced cost, both of which would be passed along to the consumer in the form of better deliveries and lower prices.

If orders for other than standard sizes were for substantial quantities the mill problems would not be so complicated, but unfortunately they are almost without exception for small quantities requiring more detailed attention than the large

(*Please turn to Page* 113)

Hamilton Standard Hydromatic propeller with feathering mechanism and covering dome of aluminum as used on the Vought "Corsair", one of the Navy's newest shipboard fighters

Deep-Drawing Domes

For Aircraft Propeller Mechanisms

By L. E. BROWNE
Associate Editor, STEEL

DEEP DRAWING the higher carbon and alloy steels as well as aluminum alloys to closer tolerances, frequently to plus or minus 0.001-inch, is a progressive development given impetus by war production and contributing much to the art of cold forming metal. In the aluminum alloy field, Worcester Pressed Steel Co., Worcester, Mass., is deep drawing and forming a series of domes for the housing of the mechanism of the Hamilton Standard Hydromatic quick-feathering aircraft propeller of 61S aluminum alloy.

The deep-drawn dome was redesigned from a forging of 17S aluminum. By thinning the wall and stamping, the Worcester engineers save up to 16 pounds per dome in some sizes and since more than three and one half million pounds of aluminum alloy sheets and disks have been fabricated, the saving in metal is considerable. All the draw operations are performed cold.

As the original forging was of 17S, this material was tried first for deep drawing but in forming many surface defects appeared; this alloy could not stand the repeated severe reworking. Finally 61SO was accepted, the O being the temper designation, and a total reduction in diameter of 57 per cent is attained. This alloy contains 0.25 per cent copper, 0.6 per cent silicon, 1.00 per cent magnesium, 0.25 per cent chromium and the remainder aluminum.

This alloy content is among the smallest of any heat treatable aluminum. Heat treatment brings ultimate tensile strength to 42,000 pounds per square inch, comparable with mild steel, and yield strength is high, 35,000 pounds minimum. Elongation is 2 inches of 10 per cent minimum, indicating a high degree of formability to eliminate heat treatment distortion. The Worcester shop is heat treating this alloy from a brinell hardness of 30 in SO condition to 90 after aging, using Lindberg furnaces, a water quench and Gehnrich ovens for aging.

Three sizes are produced, large, small and intermediate. The intermediate size is considered standard and fabricating details here given cover that size. Including inspection there are 23 operations in fabricating the thin wall dome, 12 press, four annealing and heat treatments, the remainder a series of wash and miscellaneous. Material is a 19 ¼-inch diameter disk, 0.500 to 0.540-inch in thickness, weighing 15.3 pounds. The dome has a hemispherical bottom and is 13 inches deep and 9 9/16 inches outside diameter.

Two double-action drawing operations, involving diameter reductions of 43 per cent and 16 per cent respectively with no intermediate anneal, produce a cup of even wall thickness. Successive draws reduce the thickness of the side wall by "ironing".

The first double action operation makes use of a draw die 12 inches inside diameter, with a 2-inch draw radius. The punch is slightly less than 11 inches in diameter with a rounded end contour formed by blending a 16-inch radius with center on the axis to meet a 4-inch radius tangent to the side of the punch. Moderate blank holding pressure is used.

The second double-action tools consist of a die 10.2 inches in diameter with a 2 11/16-inch draw radius. The seat for the cup is 12.062 inches in diameter and blends into the draw radius with a 2 9/32-inch reverse curve. The punch is 9.15 inches in diameter with a hemispherical end.

After washing and annealing the side wall is "ironed" out to 0.333-inch thickness for most of its length by drawing part way through the next set of tools and ejecting the dome out of the top of the die. This leaves a band of sidewall metal at the open end about 17/32-inch thick. The next operation irons this heavy metal, leaving it uniform and smooth.

Selection of Lubricants Important

Subsequent operations reduce the wall thickness of the previously ironed sidewall from 0.333 to 0.245-inch, pierce a hole in the top center and trim off the excess metal at the open end.

A depression is then formed in the top center by means of a hot press operation using a temperature of 650 degrees Fahr. Two subsequent cold forming operations bring this depressed portion to the proper contour and finished size of 1¾-inch diameter by 1 1/16-inch deep with a minimum amount of thinning of the material.

This tests the formability of any metal, but the 61S alloy stands up without fracturing. The small hole is punched before forming to remove strains and drift material from the periphery, maintaining a metal thickness on the sides of the boss of 0.250-inch although inside radius at the boss is but ⅛-inch thick.

As in all deep drawing, selection of lubricants is important and contributes much to the ultimate result in close tolerances and surface finish. The first

two draws on this dome are heavy draw jobs, considerable pressure producing appreciable heat, but the gage of the metal is not reduced and there is no increase in the surface area covered by the lubricant. Tallow has given good results. After wash and anneal at 650 degrees Fahr. for 2 hours, the third press operation is much more severe, reducing the side wall in thickness.

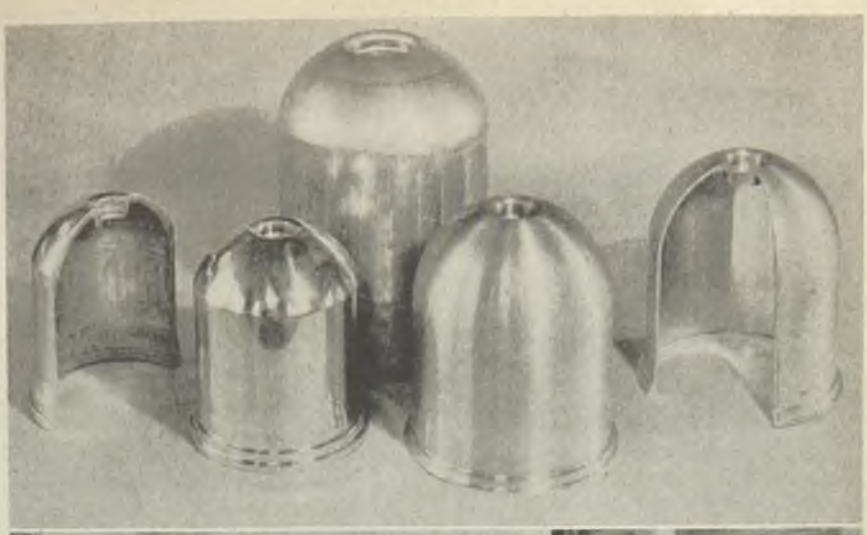
Previous to this draw, the dome is 10.200-inch outside diameter by 11½-inch long; afterwards the length is 13 inches. Increase in length is a result of the reduction in the wall thickness at the next section; pressure at the working lip of the die where the ironing takes place is high, considerable heat is developed and the metal area is increased. To withstand this combination of high pressure, stretching and heat, the lubricating film must be tough with an affinity for aluminum in such marked deformation. A lubricant of high viscosity even at elevated temperatures is required, one with great adhesive power. Tallow used in earlier draws becomes fluid at this heat and will not meet requirements. Yet spreading power to permit coating of the entire surface is a requisite; these requirements in general are opposed to each other.

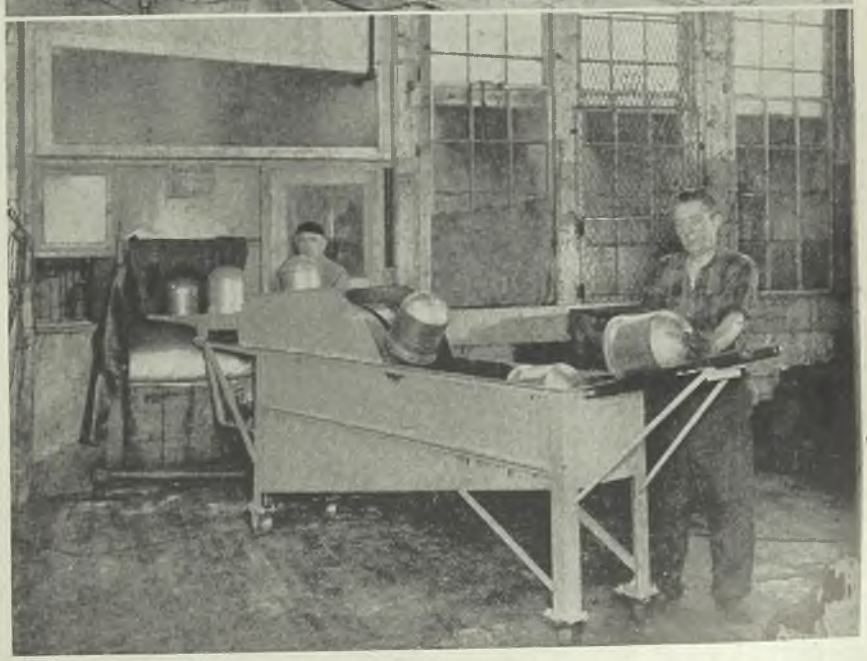
Special Lubricating Mix Used

To meet this exacting operation, after considerable experimentation, a lubricating mix consisting of equal parts of Stuart's Superkool and Quaker No. 2 stainless punching base, thinned with sufficient Topaz B paraffin base oil to permit ready application in production, was adopted. Excellent results have been found with this mixture, producing a smooth planished surface on the side wall and giving long die service. Dies, punches and hold downs kept well polished are material aids in reducing friction, a primary factor in any lubricating problem.

In this severe drawing and ironing operation, chromium plated die rings are helpful in reducing lubricating difficulties and prolonging die life. Despite all precautions some breakdown in lubricating film is likely and while this may be local in extent and duration, frictional drag on sliding metal surfaces occurs;

(*Please turn to Page* 131)





(*Top right*)—*Finished aluminum domes in three sizes with cut-out specimens to show inside boss in the hemispherical end*

(*Center right*)—*One of the heavier press operations among the* 12 *required, a* 1500-*ton strike made on Watson-Stillman hydraulic unit*

(*Bottom right*) — *Revolving the domes in a kerosene bath to help remove the special lubricants used in drawing before feeding them into the special washing machine at left in the rear*

Ingenious use of tubing with formed, sized and welded plate has many production advantages, reduces cost more than 20 per cent. This type of design with its wide range of application is believed to have considerable postwar significance

Built-up

By G. W. BIRDSALL
Associate Editor, STEEL

REDESIGNED ROLLER diagrammed in Fig. 1 is significant because of the important reduction in amount of machining required. This roller is used on an application where it must withstand the full impact of heavy vehicles striking trees, ditch walls and other obstacles. Thus it not only must possess considerable structural strength but must be extremely tough to avoid breakage. The very nature of its use requires that it "give" somewhat in striking an obstacle in order to absorb some of the shock of impact. This means that no attempt is made to design or produce a perfectly rigid roller but rather one that will withstand much accumulated abuse.

As originally made and put into production, this roller had a forged or cast piece inserted in each end of the wrapper tube or outer shell. These end pieces required considerable machining in order to assure a good tight fit in the casing and to provide the bearing seats required. Due to the tremendous volume needed, some method was sought to relieve overloaded forging, casting and machining facilities. At the same time, any cost reduction possibilities were to be carefully examined.

Of several different designs that were suggested, that offered by Harry Kranz, president, and Homer Meuller, vice president, Cleveland Welding Co., Cleveland, appeared to present the most advantages. As can be seen in Fig. 1, the one-piece end sections have been replaced by a built-up assembly of two flanged plates and a hub into which is pressed a forged and heat-treated bearing shell.

Mr. Kranz points out principal advantages thus obtained are ease and simplicity of manufacture, high production rates, simple fabrication, elimination of practically all machining, use of non-critical rolled steel plates and tubing, employment of stamping and forming facilities not otherwise engaged in war work and so readily available for quantity production. He reports the cumulative effect of these many production advantages is more than a 20 per cent reduction in the total cost of the roller.

As will be seen by examining Fig. 1, the built-up design is extremely simple. The outer shell is a piece of lap welded pipe made from SAE-1010 steel. It is about 12 inches in diameter and some 32 inches long.

Central section of the shell is reinforced by two internal rings placed about 10 inches in from each end. These central rings are made from sections of SAE-1010 hot-rolled steel bar stock, ¼ x 1½ inches in cross section, which have been rolled on edge to form a ring and the ends then electric butt welded on an automatic flash welder.

At each end of the roller, two flange plates are positioned about 3 inches apart and with flanges facing as shown in Fig. 1. These flange plates are blanked and formed from SAE-1010 hot-rolled steel plate 3/16-inch thick. They securely position the hub which is a 3½-inch length of SAE-1020 seamless steel tubing, 2½-inch inside diameter and 3¼-inch outside diameter. After the roller has been fabricated, an SAE-1020 bearing bushing, with a hot formed outer flange (Fig. 1) is pressed into the hub. Bushing is 3½ inches long, with ¼-inch wall.

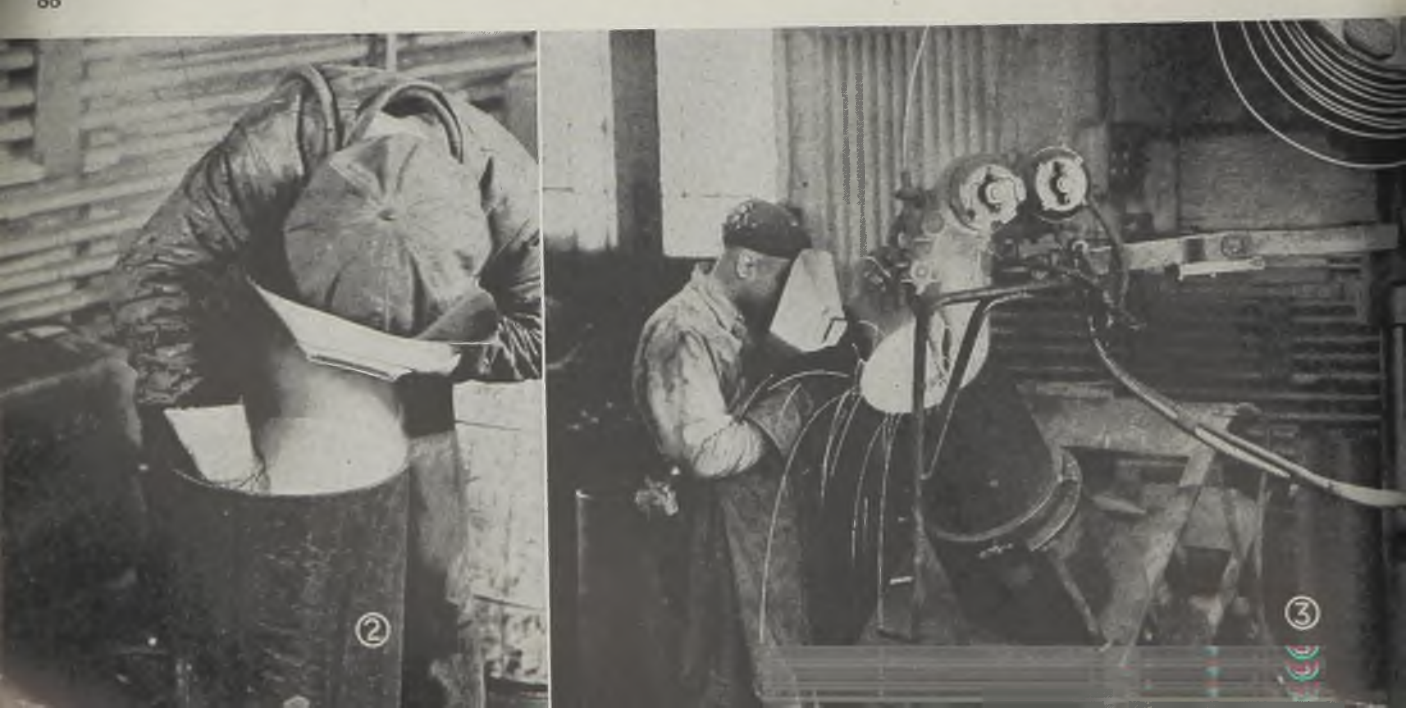
The only machining involved in the entire job is a reaming operation on the inside diameter of the hub into which the bearing bushing is pressed.

Tolerances: The bushing is the only part of the complete roller assembly that is machined. The internal diameter of the hub is held between 2.499 and 2.497 inches to assure proper press fit between it and the bushing whose outside diameter is held at 2.500 to 2.502 inches. The interference (excess of bushing diameter) of about 0.003-inch assures a tight press fit when the parts are assembled.

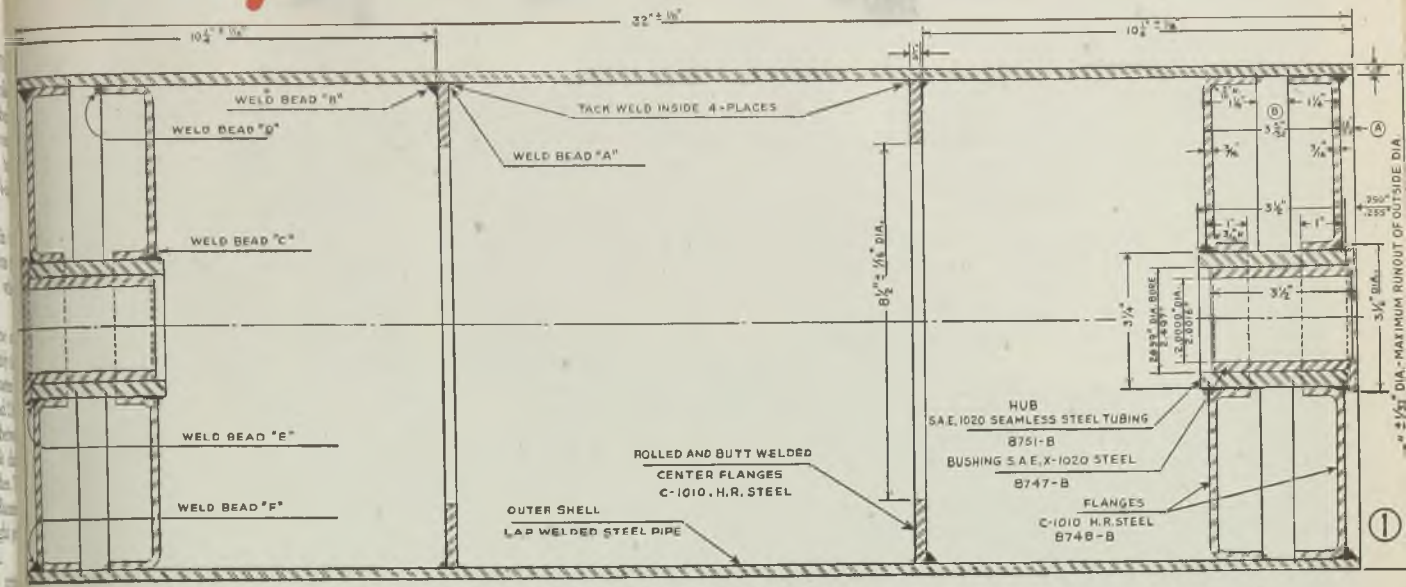
Other tolerances are not so critical. The 12-inch outside diameter of the shell is held within plus or minus 1/32-inch with maximum runout not exceeding ⅛-inch. The central reinforcing rings have a nominal outside diameter which allows just sufficient clearance for an easy insertion inside the shell. Some clearance is necessary, for a tight fit might prevent positioning of the ring in a plane at right angles to the axis of the shell when making the assembly.

The inner flange plate on each end is pressed over the hub section. The other parts of the roller are assembled by hammering lightly, a tolerance of minus 0.010-inch plus zero being allowed.

Production Operations: The outer shell is machine cut from lap welded steel pipe at the mill which ships in fin-



Design Cuts Costs 20%



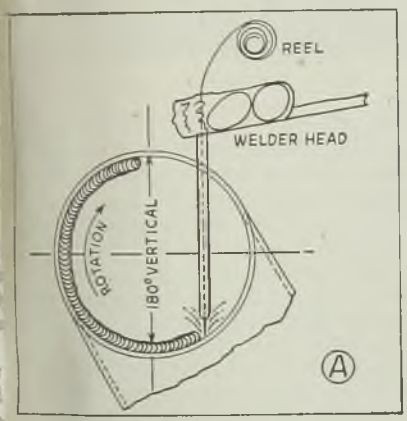


Fig. 1—Cross section of built-up roller. Sequence of welds is indicated here as well as some of principal dimensions and tolerances

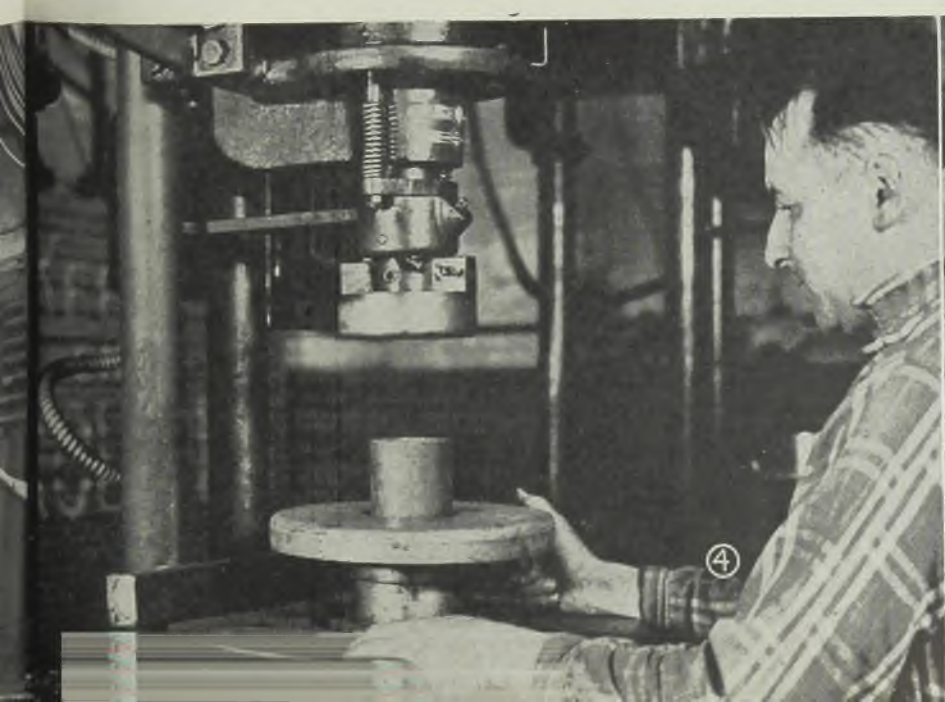
Fig. 2—First step in fabricating the roller is to tack weld the central reinforcing rings. Shell is placed over fixture resting on floor. Ring supported on fixture then is positioned correctly for welding

Fig. 3—Most all the welding is done on automatic setups like the one shown here. Bead "B", Fig. 1, is being deposited here. Note special fixture holding work at correct angle as indicated in Diagram A and rotating shell by self-contained drive in base

Fig. 4—Subassembly is made by pressing hub into inner flange plate on this 3-post worm gear drive press. Fixture assures assembly of flange plate at right angles to axis of hub. Photos by Birdsall

Fig. 5—Hub-and-inner-flange subassembly is driven down into position, using a mandrel in center to assure positive alignment. Operator at left is holding gage to indicate when correct position has been reached

Diagram A—Section at circumferential weld "B", Fig. 1. Machine setup for automatically depositing this weld bead is shown in Fig. 3



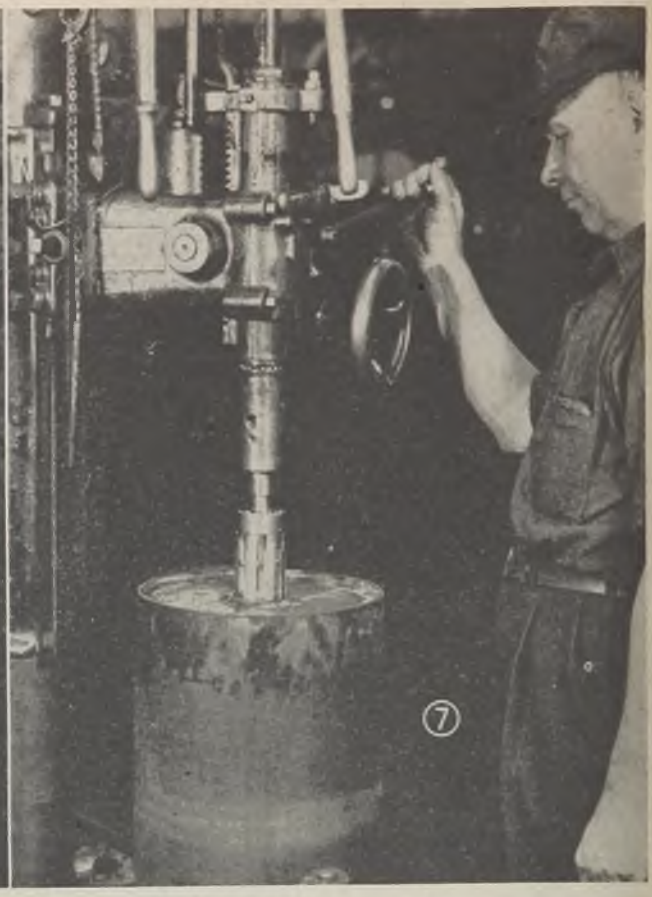


Fig. 6—Tack welding hub-and-inner-flange assembly in position to assure continued alignment during subsequent automatic finish welding

Fig. 7—Reaming shaft hole is only machining operation performed on built-up roller

ished pieces ready for assembly. A tolerance of plus or minus ⅛-inch is allowed on the nominal length of 32 inches.

First step in assembly at Cleveland Welding is shown in Fig. 2. Here a welding operator has placed an outer shell over a fixture that rests on the floor. Then he inserts the first central reinforcing ring and places it on the fixture which then supports the ring the correct distance (about 10 inches) from the end of the shell and in a plane at right angles to axis of shell. Next the operator makes tack welds at four places around the circumference, see Fig. 1, by running a 1-inch length of bead at those points.

With first ring tacked in place, operator reverses the shell end for end to allow positioning and tacking of the second central reinforcing in a similar manner. This tack welding is done with a 200-ampere direct-current arc welding set, using a 5/32-inch shielded general-purpose electrode and about 180 amperes of current. Since these tack welds are not relied upon for strength but are merely used for positioning for subsequent automatic welding on the opposite side of the ring, this welding is not critical.

These two central rings are now finish welded by depositing weld bead "B", Fig. 1. This is a continuous bead around the entire circumference of the ring on the side opposite the tacks at "A". This welding is done using an automatic welding head on a fixture in a setup designed by Cleveland Welding Co. engineers.

Quick Setup: As shown in Fig. 3, the automatic head is mounted on a floor stand which also carries the welding wire on a large reel at extreme upper right. The arm supporting the automatic head is hinged near the center, allowing the head to be pivoted up away from the work while removing a completed piece and inserting the next one to be welded. A weight counterbalances the head so it can be moved easily and yet remain fixed in any position. Two arms with hand grips can be seen extending down in front of the head. These make it easy for the operator to move the head and position it accurately inside the shell.

The work holding fixture contains a motor and speed reducer in the base for revolving the shell which is held accurately in a fixture by quick acting clamps. The entire base is tilted so the weld metal can be deposited in the most efficient position. This is not at the extreme bottom of the circumference but somewhat back of that point. Thus as the work revolves, the molten metal is held back by the weld. Diagram A shows how correct angle of welding is obtained with the welding wire coming vertically downward from the automatic welding head.

Welding wire used at this point is 3/16-inch in diameter, with 350 amperes of direct current being employed. The positioner revolves the work at a rate to complete the entire circumferential weld bead "B" in about 180 seconds arc time. Automatic controls with start and stop buttons are on a floor pedestal just back of the operator in Fig. 3.

Automatic Head: A unique automatic system is employed in feeding welding wire from the overhead reel into the arc. The welding wire is notched slightly so it meshes with a geared feed roll, assuring positive feed as the roll is turned. Feed roll is driven by a differential gear connected to two electric motors which run in opposite directions. Thus when both motors run at same speed, resultant speed at feed roll is zero.

"Up" motion of welding rod is produced by a constant-speed motor. "Down" motion is produced by a variable-speed motor whose armature is connected across the direct current arc so its speed varies with arc voltage.

This system keeps arc length constant because if arc length increases, voltage across the arc rises and "down" motor speed increases, causing the electrode feed roll to move the wire downward. Thus speed of feed closely follows arc length which can be set at any point over a wide range by adjusting a variable resistance in the "down" motor circuit. Automatic operation at arc speeds up to 90 feet per hour is obtainable with this system.

Parts Sized: The flange plates are made from SAE-1010 hot-rolled steel

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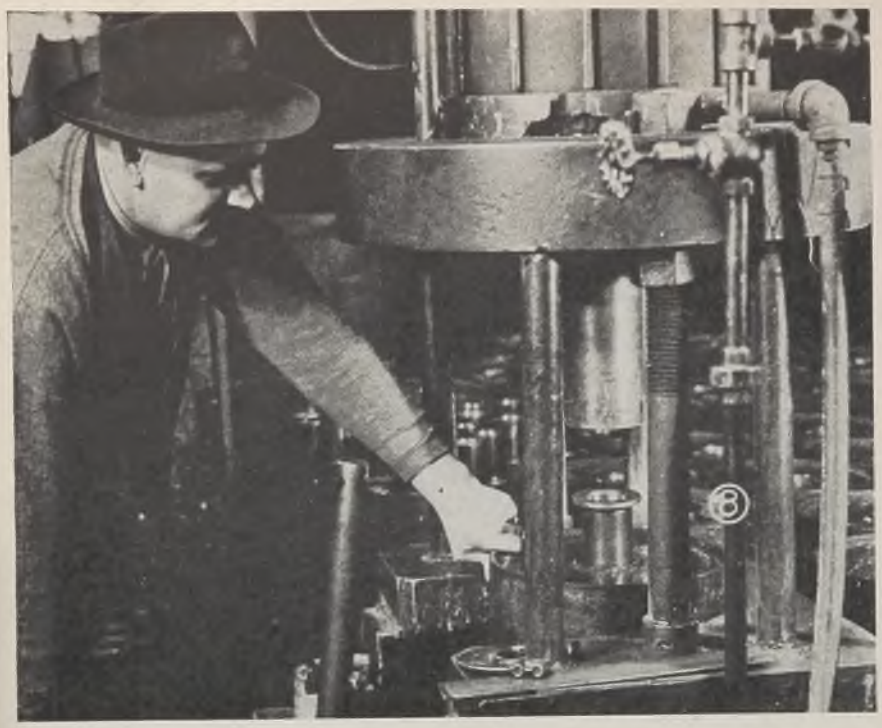

Fig. 8—Roller is completed by pressing bearing housing in hub using pneumatic press as shown

3/16-inch thick, using presses up to 500 tons capacity. After stock has been blanked out, the flange at outer edge is turned over and flange at inner edge made by draw necking. The work is sized at the same time to hold the outer diameter of 11½ inches within the tolerances of plus 0.000 and minus 0.010-inch. Inner diameter of finished piece is successfully maintained within the limits of 3.248 and 3.255 inches.

In cold working the metal, the thickness of the outer flange is increased about 1/64-inch so that finished flange may be reduced about 1/32-inch to 5/32-Similarly the edge of the inner flange may be reduced about 1/32-inch to 5/32-inch instead of 3/16.

Result of being able to hold such close tolerances on these flange plates is that the parts go together with little difficulty when making the assembly as described below.

Subassembly: Before starting the main assembly, a subassembly is built up by pressing the hub into the inner flange plate as shown in Fig. 4. The 3-post press used here is a worm gear drive type with a 9-inch stroke and 12-inch maximum opening. Maximum capacity is given as 8-tons. The fixture employed is so designed that the flange plate is assembled at right angles to the axis of the hub.

Next this hub-and-inner-flange assembly is welded in an automatic arc welding setup similar to that shown in Fig. 3, depositing the weld bead "C" in the corner provided by allowing the hub to extend about 3/16-inch past the face of the flange. The automatic welding head employed here makes this weld with 5/32-inch electrode at 250 amperes in 60 seconds, arc time.

Now the hub-and-inner-flange assembly is mounted into the end of the outer shell. To secure alignment, a mandrel is put through a hub-and-flange assembly at each end of the outer shell. This mandrel is kept in place during all subsequent welding to assure positive alignment. Fig. 5 illustrates how the operators drive the hub-and-flange assembly down into the end of the shell with a mandrel in place to align the parts. Workman at left is holding a gage in his left hand which he uses to indicate when the assembly has been positioned at point desired.

After aligning, next operation is to tack weld at four points by hand as shown in Fig. 6. Operator employs ⅛-inch coated rod, using about 180 amperes from a 300-ampere direct-current welding set. That is followed by making a continuous bead with an automatic head in a setup similar to that shown in Fig. 3. Weld bead "D" is now deposited using 5/32-inch welding wire and about 250 amperes. Arc time is 250 seconds.

Most Welding Automatic: After a hub-and-inner-flange assembly have been positioned and welded in each end of the shell, the outer flange plate is positioned and weld bead "E" deposited by another automatic arc welder similar to the one in Fig. 3. Using ⅛-inch electrode wire, a current of 150 amperes is employed to complete this weld in 62 seconds, arc time.

This is followed by depositing final weld bead "F" also done on an automatic arc welding setup similar to the others. This is the heaviest weld of all, about 400 amperes being used with 7/32-inch electrode wire to make this weld in 225 seconds, arc time.

Single Machining Operation: The only machining performed on the completed roller assembly thus produced is a reaming operation to accurately size the shaft hole to receive the bearing housing. This job is done on the converted vertical drill shown in Fig. 7, using a built-up reamer with eight detachable and adjustable cutter blades of hardened tool steel. Metal removed in making this cut is only about 0.006-inch on the diameter, just enough to assure a good finished surface of correct diameter for the press fit. Inside diameter before reaming is 2.496/2.491 inches.

Base of this machine has a fixture to hold the roller so as to provide accurate alignment in the reaming operation. Reamer rotates at 30 revolutions per minute and is fed down into hole by hand at about 3 inches per minute. Entire operation only consumes some 2 minutes.

Bearing housing is now pressed into the hub as shown in Fig. 8. Compressed air is used to operate a 12-inch diameter piston to produce a maximum force of about 3500 pounds which is sufficient to seat the bearing housing properly in position in the hub.

Shot Blasting: Next a protective plug is placed in each shaft opening and the completed roller cleaned in a shot blast machine to remove all welding slag from the external welds. This cleans up the metal in preparation for a spray coat of primer put on to protect the surface of the roller during shipment and prior to application of finish paint coats.

Vibration Study Reprinted

An 8-page reprint of a technical paper entitled "The Vibration Characteristics of 'Free-Free' Circularly Curved Bars" is being offered by Cooper-Bessemer Corp., Mount Vernon, O. Reporting the outcome of an extensive study, the paper is considered a valuable contribution to engineering in connection with the behavior and design of piston rings.

Taken from a recent issue of the publication "Journal of Applied Physics", the material was prepared and written under the direction of W. A. Pliskin and J. E. Edwards of Ohio University and F. P. Bundy, Harvard University, collaborating with engineering officials of the Cooper-Bessemer Corp. whose interest in the preparation of the data also included the furnishing of accurately machined ring specimens used in various tests upon which the paper was based.

The discussion deals with the experiments conducted to determine certain vibration characteristics, the results of which furnish data that make it possible to calculate with reasonable accuracy the frequency of vibration, parallel or transverse, of any incomplete, free-free, circularly curved bar of uniform cross section where its mechanical constants are known.

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Novelties in ELECTROPLATING

How about plating colors, depositing alloys and the like? Some investigations in those directions are recognized and described

A BRILLIANT, multicolored electroplate has been obtained from molybdate solutions. Because of the brilliance of the colors and their normally banded arrangement, the process has been named "rainbow plating." The plating solution is simple, consisting of 20 grams per liter ammonium molybdate, with the addition of 1 gram per liter sodium cyanide, to secure a slight gain in brightness of the colors. The bath temperature should be 65 to 70 degrees Cent. for the best effect. A satisfactory current density is 0.4-ampere per square decimeter. Cathodes should be highly polished, and may consist of copper, brass, nickel, or an electroplate of these over other metals.

The source of these brilliant colors appears to be the same as the colors of the soap-bubble, i.e., the reflection of light from two parallel surfaces only half a wave length of light apart. Where the two reflecting surfaces are only half a wave length of red apart, the intensity of that color is strengthened, because the crests of the red waves reflected from the two surfaces coincide; where the distance between surfaces is less, the blue light will be similarly strengthened, and so for other colors.

The colors in rainbow plating may be made to take the form of an arch, as in nature's rainbow, or they can be distributed irregularly, all by controlling the spacing and position of the anode. The anode consists of a platinum or nickel wire (any other metal insoluble in the electrolyte will serve), which protrudes an inch from the glass tube which insulates it from the plating solution all except the protruding end. This is coiled closely to confine the entrance of current to a small area, and make possible the control of color and its distribution. For a rainbow form the sheet cathode is placed against one side of the beaker containing the electrolyte, and the anode held against the wall of the beaker 1 to 2 inches away from a vertical edge of the cathode. This position causes a thinner deposit on distant than on near points of the cathode, hence a variation in color. Plating should be stopped as soon as the desired colors develop, usually in 60 to 80 seconds. As soon as removed from the bath, the cathode should be rinsed, wiped dry without scratching, then polished with a tuft of absorbent cotton to brighten the colors.

As might be expected, any over-plating dims the colors, and heavy plating causes their complete disappearance. Addition to the plating solution of ammonium carbonate as a "conducting salt" widens the bands of color and enlarges the figure which they form. The largest plating so far produced is a foot square. Lacquering dims the colors.

Monel Plating: Because of its excellent physical properties, electroplating with monel should make a good substitute for nickel plating—when and if accomplished. From a solution containing the sulfates or chlorides of both nickel and copper there is a natural tendency for the deposition of copper instead of nickel. In order to plate out an alloy such as Monel, this tendency must be overcome.

The first step in preparing a monel plating solution was the making of "monel carbonate." For each liter of solution desired, 60 grams $NiSO_4.6H_2O$ and 3 grams $CuSO_4$ - 5 H_2O were dissolved, precipitated by sodium carbonate, and washed free from soluble salts. The "monel carbonate" was dissolved in several different solvents and tested for plating with Monel. It was found that in alkaline solutions the tendency for deposition of copper instead of nickel was lowered sufficiently to make monel plating possible. Tartrates, citrates and cyanides prevent the precipitation of copper and nickel by alkalies, so either 50 grams per liter sodium citrate or tartrate is added before making alkaline. Or a sufficient excess of acid was used in dissolving the carbonate to form the desired amount of citrate or tartrate when the solution is made alkaline.

After the solution has been made alkaline by sodium carbonate, and heated to 65 or 70 degrees Cent., it is ready for use. Plating solutions may be made directly from the sulfates of nickel and copper, but these solutions seemed less satisfactory in operation than when the sulfates are first converted to carbonates before making the plating solution. When the acetates of nickel and copper are used instead of the sulfates, there is no need of converting these to carbonates before adding to the plating bath. Ammonium carbonate or ammonia may be used for rendering the bath alkaline instead of sodium carbonate, but if the latter is used, excess ammonia must be removed by application of a vacuum to the hot solution. Of the many solutions tried the following are typical:

No. 1. *The Carbonate Citrate Bath for the Deposition of Monel Alloy*: This consists of 50 grams per liter nickel carbonate, 25 grams per liter Monel carbonate, moist, 50 grams per liter citric acid made alkaline by sodium carbonate, and 2 grams per liter sodium cyanide. Current density, 0.5-ampere per square decimeter at 70 degrees Cent.

No. 2. *The Carbonate-Citrate Bath, alkaline by ammonium carbonate,* instead of sodium carbonate, otherwise the same as No. 1. The carbonates of nickel and Monel were still moist, although subjected to suction on the filter on which they were collected after precipitation and washing.

No. 3. *The Sulfate-Citrate Bath*: This contained 50 grams per liter nickel sulfate, 3 grams per liter copper sulfate, 50 grams per liter citric acid, made alkaline by sodium carbonate, and 1.5 grams per liter sodium cyanide added.

No. 4. *The Acetate Citrate Bath*: This contained 40 grams per liter nickel acetate, 3 grams per liter copper acetate, 40 grams per liter citric acid, made alkaline by sodium carbonate. 1.5 grams per liter sodium cyanide was added as a brightener of the deposit.

The performance of these baths is shown in Table I.

An increase in the copper content of the deposit with rise in temperature is seen in No. 1 and 3 (Table I). Stirring of the solution and motion of the cathode while plating has a similar effect. An increase in current density raises the nickel content of the deposit.

Tartaric acid and tartrates may be substituted for citric acid and citrates. A

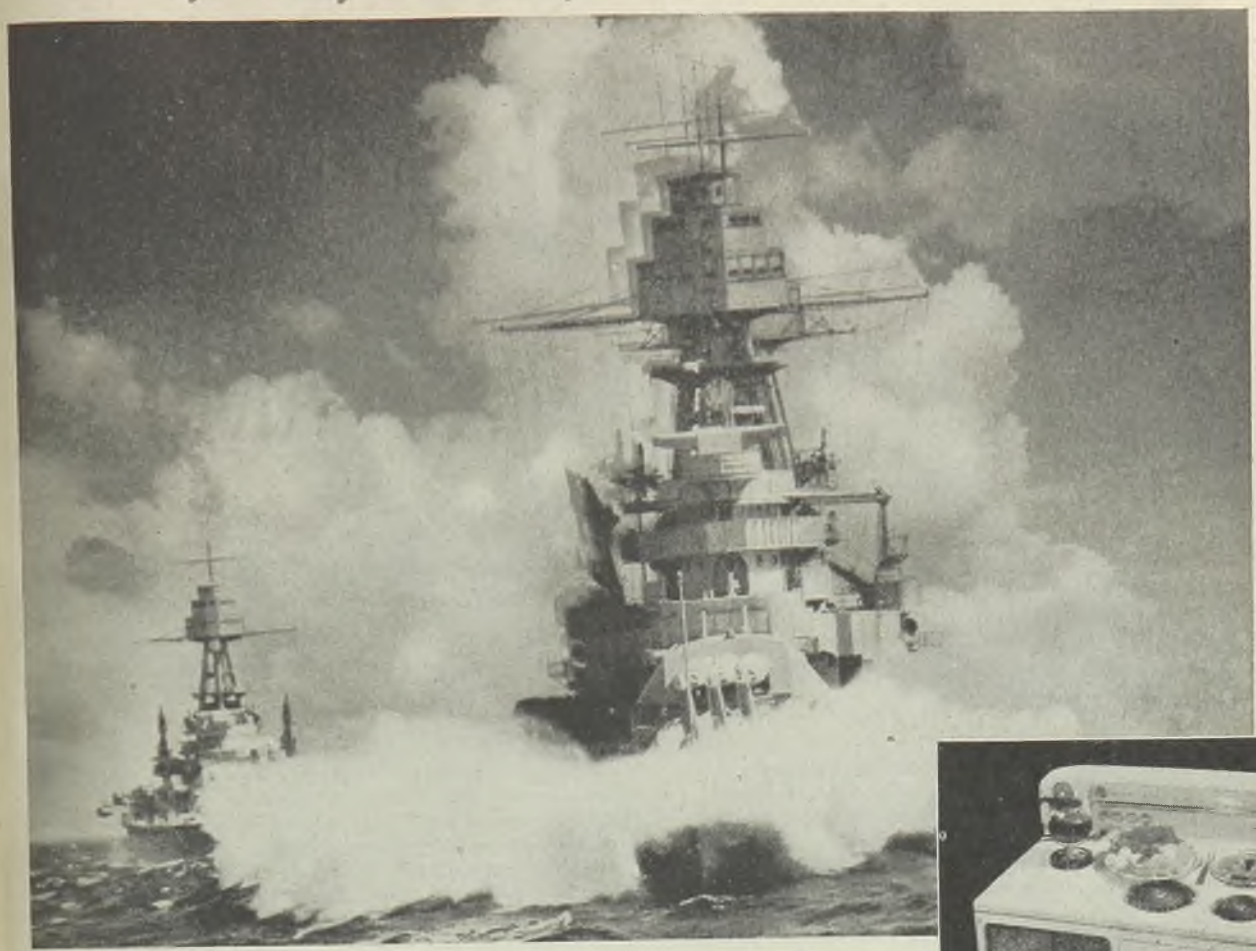
(*Please turn to Page* 128)

TABLE I—CODEPOSITION OF NICKEL AND COPPER AS "MONEL"

Bath No.	Ni in deposit	Cu in deposit	Grams/amp.-hr.	Amp./dm.	Temp.	Result
1	67.7%	32.3%	0.71 g.	0.53	67°C	Fine Monel plate
1	60.3	39.7	0.952	0.53	80	Fine Monel plate
2	65.4	34.6		2.67	80	White, metallic
3	76.3	23.7	1.21	0.53	36	
3	48.4	51.6	1.12	0.53	70	
4	86.3	13.7	0.87	0.43	62	Bright Monel

From a report by Oliver P. Watts to the Electrochemical Society.

Making strong the things that make America strong



Holding a Ship's Shape... Shaping a Stove's Course

That Ship . . . defying a rough-and-tumble fighting ocean . . . needs stiff-willed stamina in the bolts and nuts that secure its ribs.

That stove . . . built on a fast-moving production schedule . . . needs bolts and nuts that are quick on the get-away and take tightening without fumbling or jamming.

For fastening strength that will resist whatever beating a ship or steam-shovel or stone-crusher can give . . . for accurate mating that hurries a product along an assembly line: fasten with RB&W bolts and nuts.

RB&W developments in cold-forming and cold-punching have set new standards in holding power, accuracy and appearance for all kinds of fastening devices.

The dependability you would expect from the accumulated experience of 99 years and the results of hundreds of thousands of dollars' worth of research work . . . is wrapped up with every shipment of RB&W products. Little wonder that so much of the best-known farm machinery, transportation equipment, electrical appliances, construction equipment and furniture is put together faster and held together better by RB&W fasteners.

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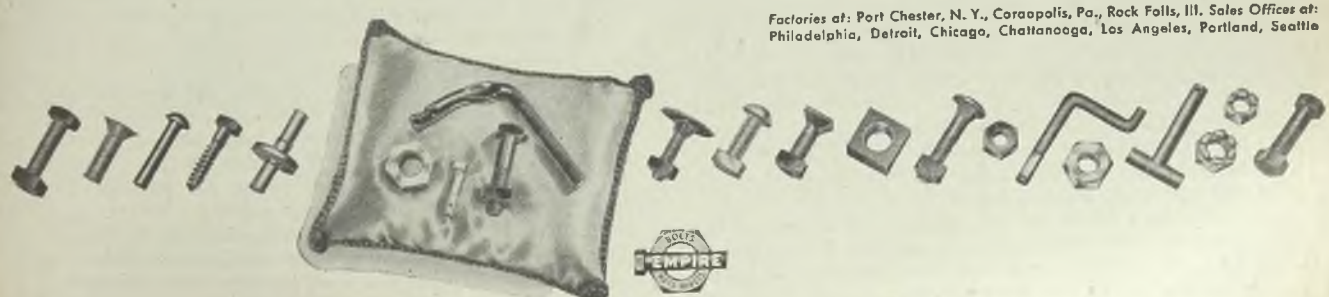
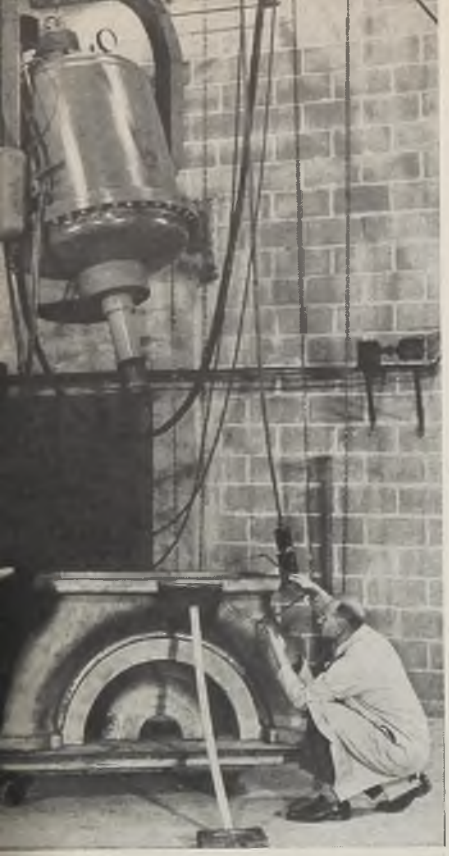
Factories at: Port Chester, N. Y., Coraopolis, Pa., Rock Falls, Ill. *Sales Offices at:* Philadelphia, Detroit, Chicago, Chattanooga, Los Angeles, Portland, Seattle



AND ALLIED FASTENING DEVICES SINCE 1845



Herbert Mermagen, radiographer for university laboratory, applies calipers to determine section thickness of a 2600-pound turbine casting positioned for radiographic examination

CO-OPERATIVE X-RAY RESEARCH

. . . . program uses "all-seeing" eye of million-volt unit to eliminate defective castings before machining and call attention to flaws preventable by changes in casting design or procedure

MILLION-VOLT X-ray unit at the University of Rochester, set up in collaboration with eight Rochester, N. Y., industrial concerns which share its facilities, represents a project unique in American industry. It makes available at low cost a direct and practical service previously lacking for industry of the area. It is not only an important aid in the war efforts of neighborhood firms but holds forth great possibilities for peacetime research in engineering, metallurgy, chemistry and physics.

The eight concerns which originally co-operated in having the General Electric Co. industrial X-ray unit installed were Symington-Gould Corp., Eastman Kodak Co., Delco Appliance Division of General Motors Corp., Consolidated Machine Tool Corp., Rochester Gas & Electric Corp., Pfaudler Co., Rochester Brewing Co. and Rochester Products Division of General Motors Corp. Since the unit began operating in January, 1943, the number of firms sharing its facilities has grown to 20.

Scientific staff is headed by Dr. Stafford L. Warren, head of the Department of Radiography at the university. Allan E. Kappelman, director of co-ordinated research and Radiographer Herbert Mermagen are the other officials.

All of the radiographic work is done in a narrow two-story brick structure, 110 feet long. The X-ray laboratory itself is 36 feet long, 24 feet wide and 22 feet high. Providing effective protection for personnel, the walls vary in thickness from 18 to 36 inches. There are two traveling cranes, one of which supports the X-ray tube on a pantograph device, while the other handles steel castings, many weighing more than 6500 pounds. Castings to be radiographed are delivered through a vestibuled opening in one side of the building. The manually operated crane moves the castings into position. On the X-ray bridge crane are push button control stations which govern the vertical movement of the head and also the rotation of the X-ray unit about its trunnion axis.

Materials submitted for examination so far include heavy tank armor, turbine parts and castings, gun mounts, magneto housings, generator commutators, oil refraction tube weldments, boiler headers, munitions and complex finished assemblies. However, most of the work at the university has dealt with castings.

When the million-volt unit is used to inspect "raw" castings, two things are accomplished:

1. Defective castings can be eliminated before expensive machining and other labor is expended on them. Life testing of the finished product can likewise be eliminated since each individual casting is thus pronounced free of flaws, fissures, holes, etc., which could cause its failure under stress.

2. Data are accumulated which indicate where the common flaws occur, and the casting procedure then can be changed to avoid such defects.

This latter step was established after one particular job at the university where a cast door for a piece of Army equipment was brought in for preliminary tests. In making the door, only one inlet for the molten metal was used. X-ray examination showed shrinkage and fissure around the gate. The process was changed immediately so that the metal was poured into two or more gates. This brought about a marked decrease in defects, and doors X-rayed subsequently revealed none of the previous flaws.

One of the laboratory's first jobs called for radiography of completely machined finished assemblies. X-ray showed the assembly was faulty in a vital zone, with the result that the company concerned had to discard for scrap, at 25 cents per unit, a product on which had been spent $25 to $27 for machining. Technicians found that 80 per cent of the company's 1200 units were defective. Had it been possible for the firm to resort to X-ray examination before machining, this loss, which did not involve a government contract, would not have occurred.

The university's unit is one of over 50 now being used in war industries. The instrument can inspect in 16 minutes pieces of metal whose inspection by other methods requires 60 hours. A number of the Navy Yards are using the powerful device for high-speed radiographic inspection of heavy sections. X-rays reveal such faults as blow holes, tears, shrinkage cavities, inclusions and cracks—faults which could not be detected by the keenest eyes and which could not be tolerated in turbine castings or ordnance equipment.

9 Items to Check When Ordering Wire Rope

(Note: Every day, several orders are received which require correspondence and delay because of insufficient information.

Listed below are items which can be used as a wire rope specification check list. Because wire rope is a controlled material, CMP allocation or symbol, also certification, must be included before orders can be entered.)

WIRE ROPE CHECK LIST

Item	*Example*
1. Length	120 Feet
2. Diameter	¾ Inch
3. Number of Strands	6
4. Number of Wires per Strand	19
5. Lay	Right Lang Lay
6. Core	IWRC
7. Kind of Fabrication	PREformed
8. Grade	(Improved Plow Steel) Monarch Whyte Strand
9. Use	Make, Model of Equipment

(Plus . . . CMP allocation or symbol, also certification.)

Here are all these items for this order.

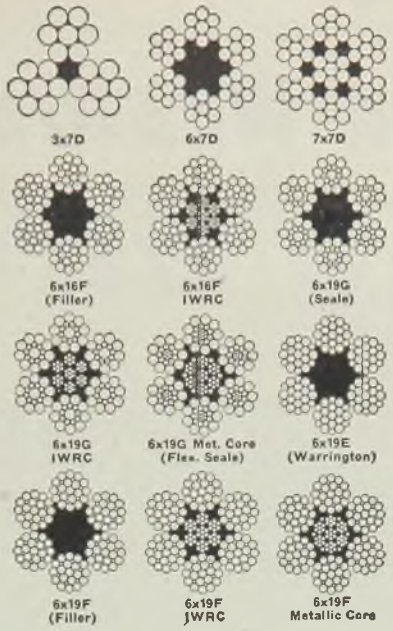
120 feet ¾-inch 6 x 19 Right Lang Lay with IWRC PREformed Monarch Whyte Strand Wire Rope, to be used for hoist line on Model 45 Lorain Skimmer.

Note: For more complete detailed information on how to specify wire rope, refer to Macwhyte G-15 Wire Rope Catalog, pages 89 to 101.

The above check list is normal and complete as to the specifying of wire rope in peacetime, but it is more important than ever in wartime when it is so difficult to get wire rope.

STATE USE FOR ROPE—IT HELPS

Always include the type of service for which the rope is wanted. Then if an error is made in listing the proper construction, or if our experience has shown a different construction gives better service for this purpose, we may be able to help you obtain a better rope. In some cases such information today, makes possible your getting a wire rope to meet your needs when the rope you specify is not available but a similar one is available that might do an even better job for you at no additional cost.



These are but a few wire rope constructions taken from our G-15 Wire Rope Catalog to indicate the vast number of types and constructions of wire rope that are made. As wire rope manufacturers, we are in a position to help wire rope users obtain the correct rope for their specific needs.

HOW TO MAKE SURE OF CORRECT ROPE FOR YOUR EQUIPMENT

There are hundreds of different sizes, grades, and constructions of wire rope. For many years we have cooperated with wire rope users to get the correct ropes for all kinds of equipment. We have watched these ropes give outstanding service on equipment like yours.

The benefit of that experience may help make your wire ropes last longer, or may help you in specifying what we believe is the finest wire rope you can buy — the *correct* rope for *your* equipment: Monarch Whyte Strand PREformed.

Monarch Whyte Strand PREformed has recorded outstanding service records because:

It's made from selected steels.

It's PREformed to reduce internal stresses and to fight rope fatigue.

It's internally lubricated to protect wires and strands against corrosion and friction.

MACWHYTE
PREformed
WIRE ROPE
***Plus* Internal Lubrication**
Selected Steels
Tested—Proved
The correct rope for your equipment

NO. 706

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WIRE ROPE MANUFACTURERS

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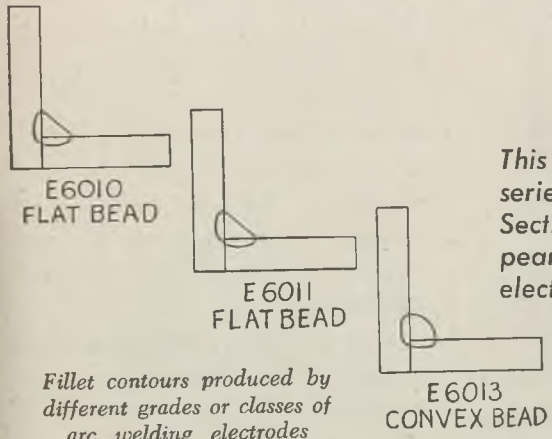
MONARCH WHYTE STRAND Wire Rope
MACWHYTE Special Traction Elevator Rope
MACWHYTE Braided Wire Rope Slings
MACWHYTE Aircraft Cables and Tie-Rods
MACWHYTE Stainless Steel Wire Rope
MACWHYTE Monel Metal Wire Rope

METALLIC ARC WELDING ELECTRODES



Fillet contours produced by different grades or classes of arc welding electrodes

This discussion of class E6011 electrodes is the third in a series on arc welding electrodes and their characteristics. Section I on the AWS-ASTM classification system appeared March 6, 1944, p. 116. Section II on class E6010 electrodes was on p. 98, March 13 issue

By HAROLD LAWRENCE
Metallurgist and Welding Engineer

A REVIEW of the class E6011 electrodes (see STEEL, March 6, 1944, p. 116, for a description of the AWS-ASTM classification system that includes the E6011 type) is somewhat handicapped by sales optimism. Many distributors of metallic arc welding electrodes try to cover as many types as possible. This situation is understandable as no salesman enjoys sending a prospective customer to a competitor except as a last resort. But for someone attempting to understand the place of each electrode type in some logical pattern, the tendency of manufacturers to make products suitable for two or three grades renders the whole matter confusing.

Basically the E6011 electrode is a first cousin of the E6010 electrode. The former works well with alternating current while the latter is restricted to direct current, reverse polarity. (E6010 electrodes were analyzed in STEEL, March 13, 1944, p. 98) Otherwise either grade, when used with the right current and polarity, can do precisely the same work as the other.

Where does disorder enter this picture? Right here. An electrode that could be used with direct current or with alternating current to do exactly the kind of welding for which the E6010 electrode has achieved a well deserved popularity would be a distinct possibility. If the article on E6010 electrodes is compared with this one, it may be noted that one manufacturer has done this very thing. But several manufacturers report a combined grade E6011-grade E6013 electrode. This situation may be something of a paradox.

The AWS-ASTM classification system gives different ductility requirements for these two classes; that is, E6011 electrodes must produce weld metal with a minimum elongation of only 17 per cent the nonstress-relieved condition, whereas the E6013 electrodes need meet a minimum elongation of but 17 per cent in the same state. Of course an electrode that meets a specification demand of 22 per cent, also satisfies 17 per cent. Perhaps it is this situation that has led some electrode makers to report an E6011-E6013 electrode.

However the difference is intended to cover more than physical properties. As is shown in Fig. 1, fillet contours are a function of electrode classification type. Since the E6013 electrode is "colder" than the E6011, the fillet bead is decidedly convex instead of flat. Since the E6013 electrode is "colder" than the E6011, its deposit contains more porosity. But that's enough data to suggest that the E6013 electrode is intended to be different from the E6011. As will be shown in a later article, the E6013 electrode will perform some functions that are outside the capabilities of the E6011 variety.

Please remember that some regard this as a controversial subject, which would suggest that the reader may wish to make some tests in his own plant. Before leaving this idea, some discussion of electrode design may prove helpful. Electrodes are designed by men who have rather definite notions of what they desire in the final product. They consider several dozen attributes among which are ease of handling, quality of bead, chemistry, slag, spatter, appearance, soundness, penetration, etc. So it is not surprising that the electrode that emerges from the laboratory is definitely a compromise. Because several raw materials have been balanced with methods of manufacture, the product of one producer is bound to be different from that of another.

Likewise a compromise between E6011 and E6013 classes possessing the physical properties of the former can be brought about. Yet welding is something like playing a violin. The right notes can be played by many players. But the feeling of the music, that certain quality that electrifies an audience, is reserved for a few musical geniuses. So it is with electrodes. Good welds may be made with any number of electrodes but the best and cheapest welds will result when a perfect matching of electrode grade and welded joint has been brought about. In this day when every industrialist is thinking of trimming costs for the days of free competition that are ahead, there is a premium on sensible selection of electrode classes.

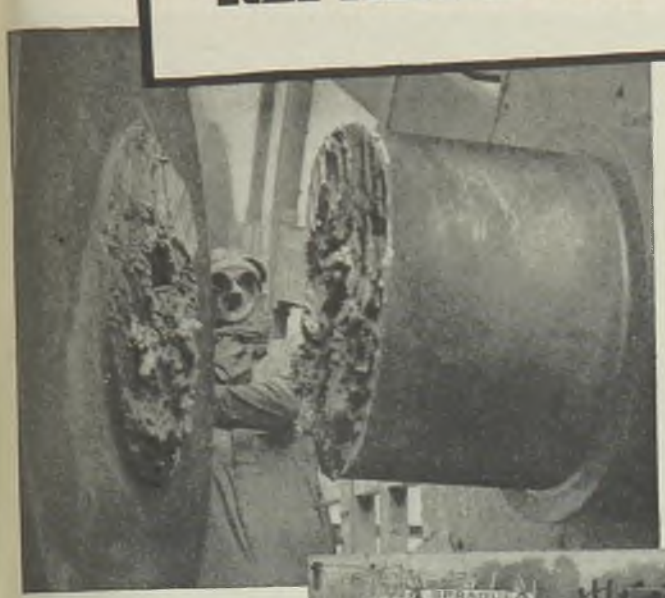
Whereas there were 23 producers of E6010 electrodes, Table I lists but 12 makers of the E6011 class. When you recall that E6010 electrodes have been in the market for many years before the development of the E6011 type (first announced in 1942), the disparity between the two lists is understandable. Following the practice begun in the preceding article, complete data is given for producers and the brand name of the product in Table I.

Very likely the sale of E6011 electrodes does not exceed 5 per cent of the total electrode production. Still in the

40-TON STEEL SHAFT

for World's Largest Stern-Wheel Towboat

REPAIRED BY *Thermit Welding*



(Above) *One of the breaks on the 31" diameter shaft of the stern wheeler steamer, "Sprague."*

(Right) *The huge paddle wheel was set up on a barge preparatory to welding the shaft.*

(Above) *The finished Thermit weld, showing the Thermit collar, and heating gates and risers before removal by oxy-acetylene cutting.*

WHEN a 40-ton 31" diameter paddle wheel shaft broke in two places on the Steamer "Sprague," world's largest stern-wheel towboat, it presented quite a problem. Replacement was almost impossible because of the steel shortage and the time required. Therefore it was decided to repair the shaft by Thermit welding, the only practical method because of the size of the unit.

The work involved the usual steps in the Thermit welding process: (1) the broken ends of the shaft were flame-cut and lined up in position; (2) a wax pattern was made in the space the weld metal would occupy; (3) a mold box was constructed around the wax pattern; (4) the shaft ends were preheated; (5) the Thermit mixture was placed in a crucible over the mold box, ignited, the molten weld metal pouring into the gap and fusing with the parent metal in a strong, durable weld; (6) the pouring gates and risers were removed from the finished weld by oxy-acetylene cutting.

Thermit welding is often the only feasible method of repairing large, heavy parts. As the weld metal is deposited all at one time and only one shrinkage is involved, stress relieving is not necessary. Machining is seldom required except for removal of excess metal.

The Thermit process is also used for fabrication work where the great strength and durability of the welds and the ease of handling several small castings rather than one large one are decided advantages.

Write for the 30-page illustrated booklet which describes the process in detail.

METAL & THERMIT CORPORATION

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A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist. Mention desired height and length of jib when ordering.

★ Above view shows a one-man Jib Crane in action loading castings onto the rack of a heat-treating oven at a large ordnance steel plant.

Here, as in hundreds of other point-of-operation jobs in any steel plant, these Chicago Tramrail Jib Cranes are able to take over loads ranging from 1/2 to 3 tons, thereby releasing the overhead crane for its usually more productive heavy duty handling.

Operating with a full 360° circle swing, these "little giants" of power will speed up your production, conserve your manpower, reduce wear and tear on more costly equipment. Send for circular today describing pillar, mast and swinging bracket jib cranes.

Write—ask us to submit specific recommendations. No Obligation.

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scant two years since its inception, many applications have been discovered where no other type works quite as well. Coincidental with the development of this distinct electrode class has been the expansion of the use of a-c (alternating current) welding.

Although a-c welding was used during the first World War, it fell into disuse because of the need for high open-circuit voltages and because of the lack of suitable electrodes. About 1936 a-c welding began a comeback which continued at an accelerated rate during this war and which promises to continue after the war.

Undoubtedly the main reason for the popularity of alternating-current welding is found in the greatly lessened effect of magnetic disturbances found with direct-current welding. These interferences, usually called "magnetic or arc blow", interfere with the deposition of sound weld metal. At times magnetic blow assumes proportions that almost prevent the making of any weld at all. With experience a welder learns to outwit this devilish condition but not without using up much more energy than would be devoted to making the same weld were no magnetic blow there. Similarly the use of alternating current has enabled the beginners to turn a much needed hand to production welding without the weld cut-outs that excessive blow would have necessitated.

E6011 electrodes are heavily coated, 10 to 15 per cent of the electrode weight is coating, designed to lay quality weld metal in the flat, vertical, horizontal and overhead positions. They, like the E6010 class, are commonly known as all-position electrodes. For the highest quality work that is done in the vertical and overhead positions with alternating current, E6011 electrodes are the right choice. Deposited metal is sound enough to pass X-ray examination.

A digging arc characterizes E6011 electrodes and leads to good penetration in fillet welds. Single V-butt welds need this penetration too. Also tack welding provides a good outlet for a digging arc and good physical properties. Gapped seams where penetration is of utmost importance are best welded with the E6011 electrode because this application is frequently troubled with magnetic blow.

More Slag—Less Gas

Slag characteristics of E6011 electrodes are like those of E6010 with some exceptions. The slag possesses both a low melting point and a low density. Such physical attributes allow the complex manipulation associated with some vertical and overhead welding operations. Although the volume of slag would be considered as low, there is more slag present than would be encountered with the E6010 group.

Arc shielding is largely accomplished by the gases driven out of the coating as the electrode is consumed. The function of this gas shielding is quite similar to that discussed for E6010 electrodes. However, there is more slag with the E6011 group and conversely less gas. Although this type is definitely in the gas shielded category, it leans more to the mineral coated composition than does the direct current, reverse polarity, cellulosic electrode of class E6010.

Primary coating constituents are cellulose, asbestos, titanium dioxide, ferromanganese and an alkaline arc stabilizer. Cellulose furnishes the gas so essential to a gas shielded electrode and is responsible for the carbon monoxide, hydrogen, water vapor and carbon monoxide found in the protecting atmosphere.

The asbestos provides a slag with the aid of the titanium dioxide which also serves to stabilize the arc. As usual the ferromanganese acts as a deoxidant and may help to make the slag more friable. All of these materials were found in the E6010 coatings but now a new material is added.

Alternating-current electrodes must overcome a hurdle that is not encountered in direct-current welding. For the alternations of the current with both voltage and amperage fading away to zero many times a second place an extra value on arc stability. In the E6011 electrode all of the peculiar conditions associated with high quality welding in all positions must be satisfied while providing *an extra measure of arc stability.* Alkaline compounds of sodium and potassium, more often the latter, furnish a means of attaining good arc performance with alternating current.

Fundamentally, though, the E6011 electrode behaves quite like the E6010. Its performance with alternating current is acceptable for the end use intended. No other electrode will behave on alternating current to show qualitites found in the E6011 group. But the arc action leaves a great deal to be desired.

Standardize on E6010

As might be suspected these electrodes may be used with direct current as well as with alternating current. Nor is it too strange to discover that reverse polarity arc performance is more satisfactory than that with straight polarity. Moreover, either type of current and either polarity will lead to equally satisfactory physical properties. But E6011 electrodes are not recommended for direct-current welding. *Better standardize on the E6010 for direct current and pocket the difference as the latter are cheaper.*

E6011 electrodes produce a weld metal that falls into a low carbon pattern. Values reported by the different manufacturers have been gathered together and are summarized in Table II. Once again an examination of the ranges shown leads to the conclusion that the spread for manganese and silicon is greater than can be explained by the physical properties. Manganese ought to run from 0.25 to 0.60 and silicon ought to be at least 0.10 if strengths are to be above the minimum requirement.

Physical properties are reported in Table III with all of the values having been gleaned from manufacturers' catalogs. Some ductility values were listed

(*Please turn to Page* 134)

TABLE I—MANUFACTURERS AND TRADE NAMES OF AWS-ASTM E6011 ELECTRODES
(Primary color—none; secondary color—blue)

Air Reduction Sales Co. 60 E. 42nd Street New York 17, N. Y.	Airco 230
Allied Weld-Craft, Inc. 401 W. South Street Indianapolis, Ind.	77 77W
Electric Arc, Inc. 152-162 Jelliff Ave. Newark, N. J.	Universal
General Electric Co. Schenectady, N. Y.	W-26
Hollup Corp. 4700 W. 19th Street Chicago	Sureweld F
Marquette Mfg. Co., Inc. 401-419 Johnson Street, N. E. Minneapolis, Minn.	Type 151 Type 25 ADS
Metal & Thermit Corp. 120 Broadway New York 5, N. Y.	Type A
Reid-Avery Co. Dundalk, Md.	Raco 11
A. O. Smith Corp. Milwaukee	SW-15
Standard Steel & Wire Co. Bolivar, Pa.	Greyhound Type RC
Westinghouse Electric & Mfg. Co. East Pittsburgh, Pa.	Flexarc ACP
Wilson Welder & Metals Co. 60 E. 42nd Street New York 17, N. Y.	No. 530

TABLE II—DEPOSIT ANALYSES PRODUCED BY E6011 ELECTRODES

	Carbon	Manganese	Phosphorus	Sulphur	Silicon	Molybdenum	Nickel	Copper
Min., %	0.07	0.21	...	...	0.05	...	...	...
Max., %	0.12	0.60	0.04	0.04	0.25	0.025	0.025	0.12

TABLE III—PHYSICAL PROPERTIES OF DEPOSITS MADE WITH E6011 ELECTRODES

Property	Stress-Relieved	Not Stress-Relieved
Yield Point, psi	47,56,000	52-61,000
Ultimate Strength, psi	60-68,000	62-71,000
Elongation, % in 2 in.	27-33	22-27

TABLE IV—CURRENT AND VOLTAGE RANGES FOR E6011 ELECTRODE APPLICATIONS

Size of Electrode, Inch	Recommended Amperes	Recommended Volts
5/32	25- 85	17-29
1/8	85-135	21-29
5/32	115-185	22-26
3/16	150-235	24-26
7/32	165-280	25-27
1/4	225-315	26-28

Fig. 1—Several small gears made from NE-8640, formerly made from SAE-4140 and 6145

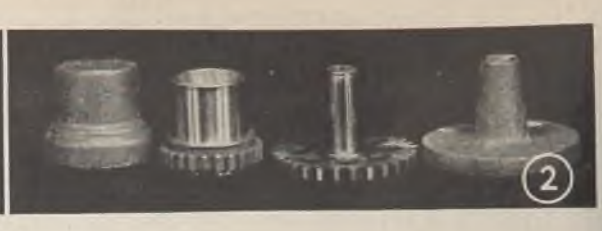

Fig. 2—Cam drive crankshaft gear and oil pump drive gear made from NE-8640

NE steels found well adapted to oil-hardening

By T. M. SNYDER
Chief Metallurgist
Continental Motors Corp.
Muskegon, Mich.

ADAPTABILITY of NE steels to oil hardening is very satisfactory, we have found, especially the higher carbon steels which in our experience heat treat to a more uniform hardness than the usual SAE steels. The possible reason for this high uniformity may be the constant alloy content.

SAE steels may have certain percentages of an alloy present which do not show in the specification. For example, the SAE-6100 series contains chromium and vanadium and may or may not have nickel and molybdenum present. Small amounts of residual alloys make a wide variation in total alloy content. This same situation may also occur in the manufacture of SAE-3140 and SAE-4140 steels.

We have found it necessary to use a higher quenching temperature on all oil-hardening NE steels than we have used on SAE steels.

Fig. 1 shows several small gears made from NE-8640, formerly made from SAE-4140 and 6145. These NE-8640 parts were oil quenched from 1550 degrees Fahr. The finished hardness at which these gears are used cover the ranges of 30 to 33 and 46 to 51 rockwell C.

Fig. 2 shows a cam drive crankshaft gear and an oil pump drive gear. The two outside pieces are the as-forged parts and the center pieces are finished gears. Note the large amount of stock removed in machining. This avoids bad surface decarburizations and imperfections caused by forging. NE-8640 material was used, quenched from 1550 degrees Fahr.

Fig. 3 shows the tensile strengths of six commonly used grades of oil-hardening steel, drawn to a hardness of 300 brinell. We have found the tensile strengths are fairly close at this hardness. Possibly, S A E-6145 and SAE-4340 will average 10,000 pounds per square inch above the others.

Of these six grades of steel at 300 brinell hardness, the reduction of area of SAE-4340 is the highest (Fig. 4), while that of NE-9440 is the lowest.

From actual experience at our plant, we have found SAE-4340 steel to have a greater elongation than any of the other steels shown in Fig. 6. The elongation of SAE-3140 and NE-8640 are nearly identical as indicated in Fig. 5.

Fig. 6 reveals the hardenability curves of the six commonly used steels. It is

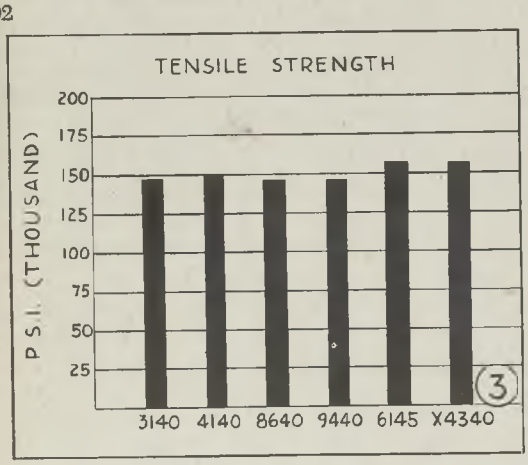

Fig. 3 — Tensile strength of six commonly used grades of oil-hardening steel

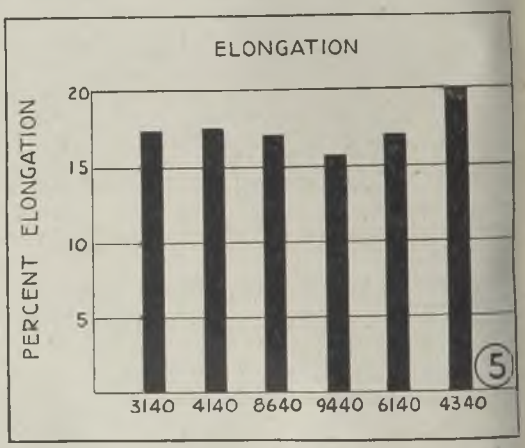

Fig. 4 — Reduction of area compared for the same six grades

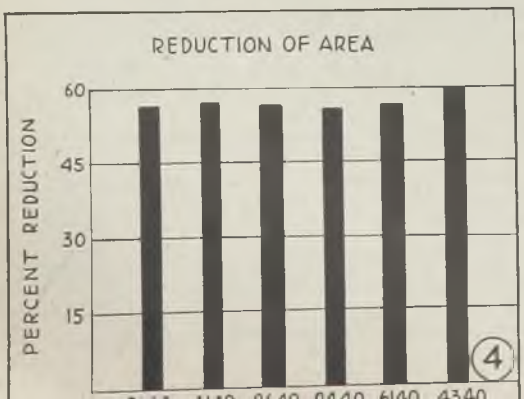

Fig. 5—Elongation comparison, same steels as Figs. 3 and 4

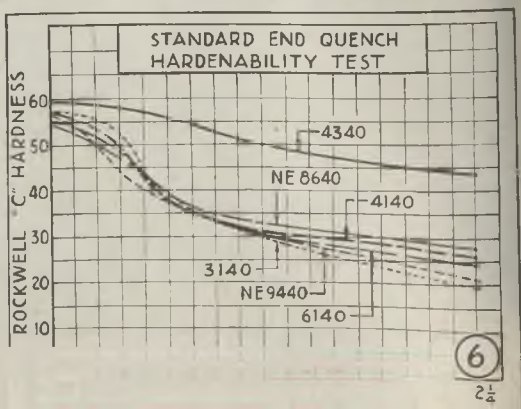

Fig. 6—Hardenability compared. Steels include SAE-4340, 4140, 3140, 6140 and NE-8640, 9440

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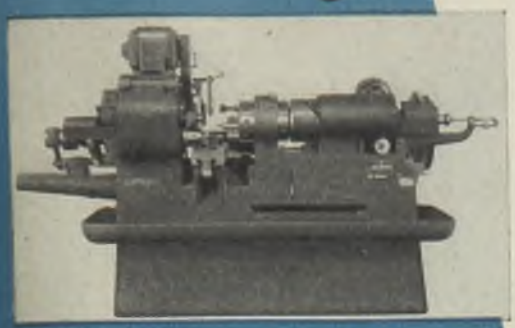
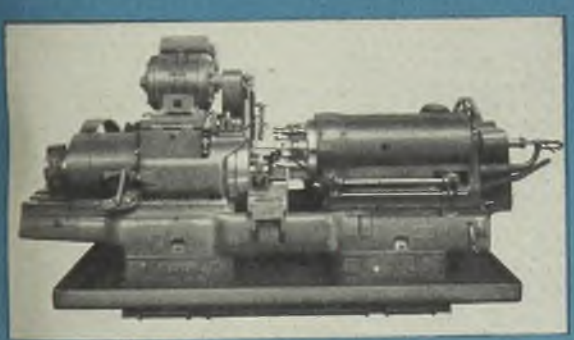


Nine variations of Model A Clevelands handle all metals, round, hex or square, in sizes from 9/16" to 2½" in overlapping capacities.

Four Model B Clevelands have work ranges from 9/16" to 2½" diameters and up to 18" lengths.



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Please write direct to the Cleveland Automatic Machine Company main office, 2269 Ashland Road, Cleveland 3, Ohio.

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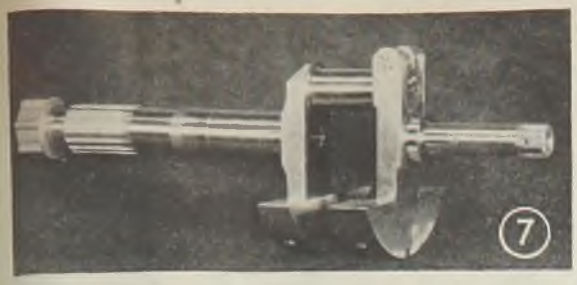

Fig. 7 — Crankshaft made of NE-8949 steel

Fig. 8—Microstructure of SAE-3140 stud, at 250 diameters

Fig. 9—Microstructure of NE-9440 stud, at 250 diameters

Fig. 10 — Microstructure of NE-8640 stud, at 250 diameters

Fig. 11 — Microstructure of NE-8949 crankshaft in Fig. 7

significant that at a distance of 1 inch from the quenched end, five of the steels have practically the same hardness. However, at a distance of 2¼ inches from the end, which is only representative of large sections, the hardness of NE-8640 is the highest of the five. Our experience has shown that NE-9440 has about the same hardenability curve as SAE-3140. The entire hardenability curve of SAE-4340 is much higher than the five other closely grouped curves.

Fig. 8 illustrates the microstructure of an SAE-3140 stud at 250 diameters. Quenching temperature was 1500 degrees Fahr., hardness 300 brinell. Note the fine sorbitic structure.

Stud in Fig. 9 was made from NE-9440 steel. Note that the microstructure appears slightly coarser than that of SAE-3140 stud, as shown in Fig. 8. However, the structure is well broken up and the physical properties are practically the same with the exception of a lower elongation.

Microstructure of an NE-8640 stud evidences a slight amount of banding. We have found banding to be more pronounced in the NE steels than in some of the familiar SAE types, such as SAE-3140 or 4140. It is evident that this structure is not as well refined as is desired. We have found this to be the case on many NE oil quenched parts. Micrograph taken at 250 diameters.

The crankshaft in Fig. 7 is made from NE-8949 steel which is the proposed substitute for SAE-4340. The microstructure illustrated in Fig. 11 is very good. Physical properties obtained from this steel are as good or possibly better than those of SAE-4340. The NE-8949 analysis was: Carbon 0.45 to 0.52 per cent, manganese 1.00 to 1.30 per cent, chromium and nickel 0.40 to 0.60 per cent, molybdenum 0.30 to 0.40 per cent. Our experience with this steel, as with all NE steels, is that the hardenability is somewhat greater than the steels which they are designed to replace.

Summary: We have had no complaints from the shop on the machining of NE oil-hardening steels. Our experience, to date, has been that they machine very similar to the SAE alloy steels. It should again be emphasized that the use of a higher quenching temperature for NE steels is necessary, due to the slowness of these steels in passing through the critical range and going into complete solution. The drawing temperature must also be slightly higher to develop the same hardness as that of corresponding SAE steels.

The hardenability and the uniformity with which NE steels can be heat treated are of great benefit in actual application of them.

A slight rise in magnaflux rejections has been noted, mostly due to small inclusions in the steel, the harmful effect of which is questionable on fatigue life. However, we feel certain that such rejections will become fewer as the steel mills become more familiar with making these steels.

The assistance of Richard Fox, now with our armed forces, in preparing this material is acknowledged and also that of Donn Hylland in making photographs and micrographs.

Dictionary of Spanish-English for Engineers

Engineer's Dictionary, by Louis A. Robb; fabrikoid, 423 pages, 5½ x 8 inches; published by John Wiley & Sons Inc., New York, for $6.

This is a two-way dictionary, English into Spanish and vice versa, for use of the engineering profession. The material has been collected over a period of more than 25 years, starting as a small collection of words to aid in translation for a firm with which the author was associated. The first edition contained about 5000 terms and was in such demand the present volume was compiled.

It now covers the entire field of civil engineering, in the office as well as the shop. It also includes many mechanical and electrical terms and some in geology, chemistry and other sciences. Spanish America uses different terms from those of Spain and there is variation among the several countries of South America. Where there is a difference this book indicates where each is used. Numerous engineers in South American countries aided in the compilation and the work is well authenticated.

—o—

For individually marking aircraft replacement parts, Avery Adhesives, 451 East Third street, Los Angeles 13, have developed a Kum-Kleen label for this application. According to the company, tests have shown that they firmly adhere to the part even under extreme heat, cold and humidity. They are mounted on a translucent tape so that they may be run through a machine for printing on code numbers. They are applied without moistening and, after they have served their purpose, can be peeled off quickly and easily without scraping or tearing or in any way harming the surface of the part.

Glass Jewels Replace Sapphires for Instruments

An essential part of our airplane program, millions of electrical instruments awaited a substitute for tiny sapphire jewels which were formerly supplied from factories of Switzerland. According to Westinghouse engineers, American ingenuity has found a way to make these vital instrument jewels of glass. At first they were made slowly, by hand, one at a time, many of which were imperfect. Production was about 1200 a day.

Now they are turned out by automatic machines at the rate of 3500 per day with one girl tending two machines and almost no poor jewels. This glass-jewel development has not only solved a serious problem but has produced a better product. For many types of instruments engineers now prefer the glass jewels.

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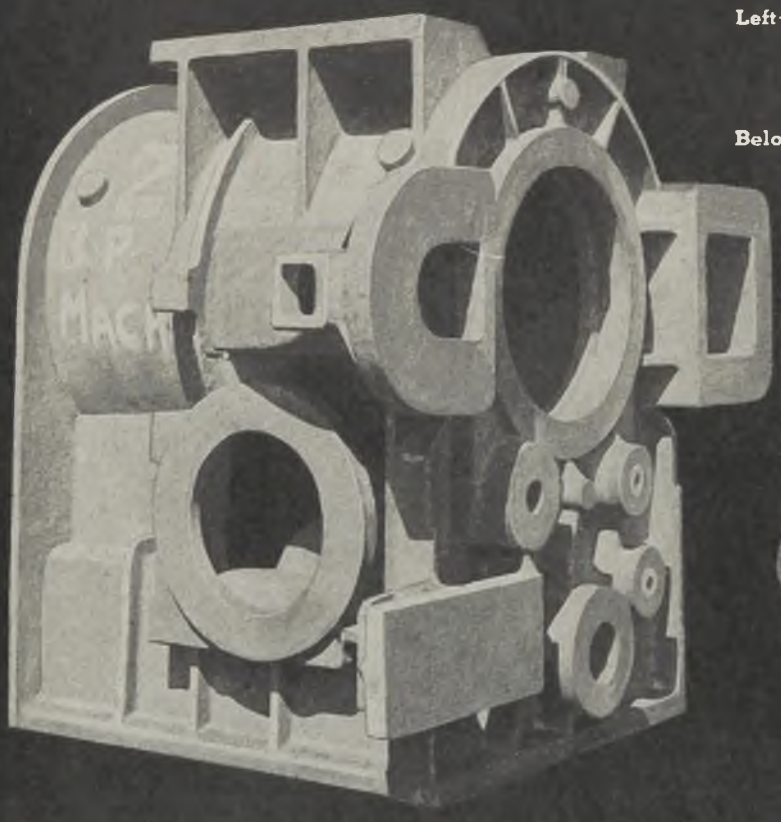
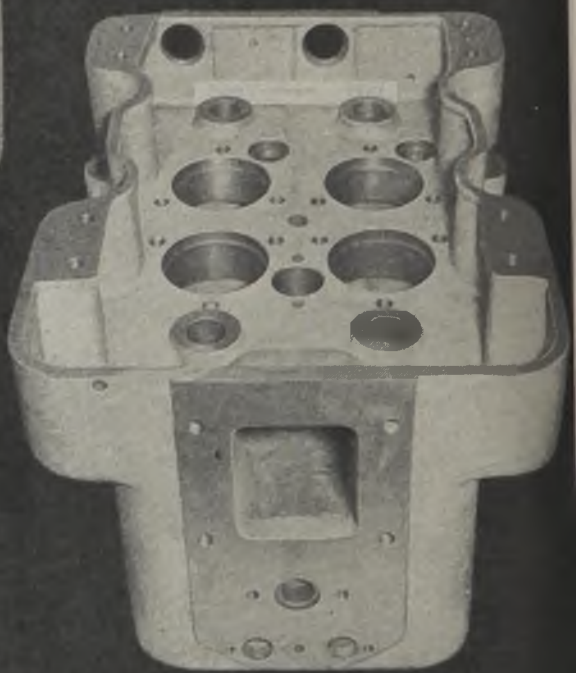


Left—Low pressure steam cylinder for Liberty Ship engines. Since 1941 we have produced over 2100 large steam cylinder castings for fourteen different engine builders.

Below—A four-valve cylinder head for our Type GSB supercharged Diesel engine.



A 7′ 8″ crankshaft for one of our six-cylinder Diesels. The finished shaft weighed 940 pounds. The rough casting weighed 1043 pounds compared to a weight of 4500 pounds for the billet from which the shaft was formally forged.

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Casting Jobs

THIS appeal is directed to no more than 50 to 60 busy machinery and equipment manufacturers — probably located in the Central and Middle Atlantic states.

These are the companies in our territory who have a few troublesome casting jobs that they haven't yet been able to lick. To them we offer the use of the facilities of our modern Meehanite foundries at Grove City and Mount Vernon, for the production of "impossible" and extra difficult structural castings of repetitive types, up to 60,000 pounds in size.

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1. A metallurgically-trained Engineering staff, skillful in the design of high duty iron castings — so well executed that they replace forgings and steel castings and weldments at substantial money savings.
2. Ample, well-trained manpower of long experience, who work to high quality standards, with very low scrappage of even the most intricate designs.
3. Two foundries with completely modern equipment for producing castings, small, medium or extra large, on a mass production basis.
4. The use of Meehanite, an iron of remarkably high strength, ideally suitable for thin-wall construction and complicated designs.

If you need extra foundry capacity right now — or if you are using forgings or weldments which well-designed castings could replace — or if you are faced with other unsolved foundry problems, we want to talk to you. Write, wire or 'phone us, and our Foundry Sales Manager will call to present a plan for a mutually-profitable working arrangement with you.

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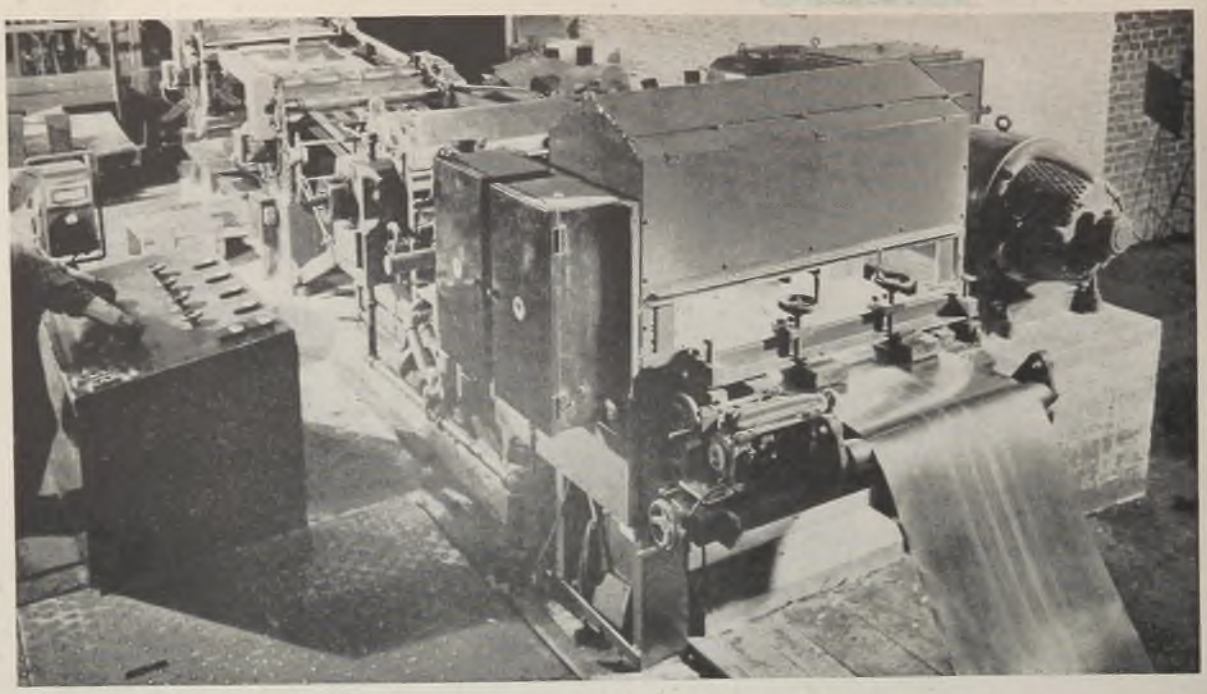


Pinhole detector installation (foreground) on shearing line of strip mill

Electronic Detection of Pinholes

Device is capable of locating holes 1/100-inch diameter in steel strip traveling at 1000 feet a minute. All off-grade stock, such as heavy and light-gage sheets and those with minute holes, is routed into separate piles. Strip from 6 to 62 inches wide may be inspected and assorted

By HAROLD J. HAGUE
Electronic Engineer
Westinghouse Electric & Mfg. Co.
East Pittsburgh, Pa.

PINHOLES in tin plate destined for the canning industry cannot be tolerated. Obviously, large holes permit the contents to leak out while small holes admit air to spoil the product. Thus, such defects must be detected and must be eliminated before the finished cans reach the shipping room.

Until a few years ago the inspection of sheet steel for pinholes, the diameter of which are in the order of 1/64-inch, was performed entirely by workmen. Brilliant lights on the under side of the sheet enabled them to inspect it for holes; if holes were detected, the sheet was removed by hand from the conveyor. This inspection method was tedious for the workmen. Often it was necessary to employ a number of inspectors, working in short shifts, to do a satisfactory job. In addition, this old method limited the speed of the mill to approximately 50 feet per minute.

Today photoelectric devices (pinhole detectors) perform this inspection job on strip from 6 to 62 inches wide as it leaves the last stand of the cold mill. Not only does the pinhole detector perform the job unerringly but it increases the speed of the strip to 1000 feet per minute. Though designed for detecting holes 1/64-inch or larger, practice has demonstrated that holes as small as 1/100-inch will operate the device at the aforementioned strip speed.

Pinhole detectors embrace a light source, a phototube housing and a control device. Presence of a hole is indicated by a signal light or a signal bell. The pinhole detectors also can be arranged to operate a classifier for sorting the defective sheet.

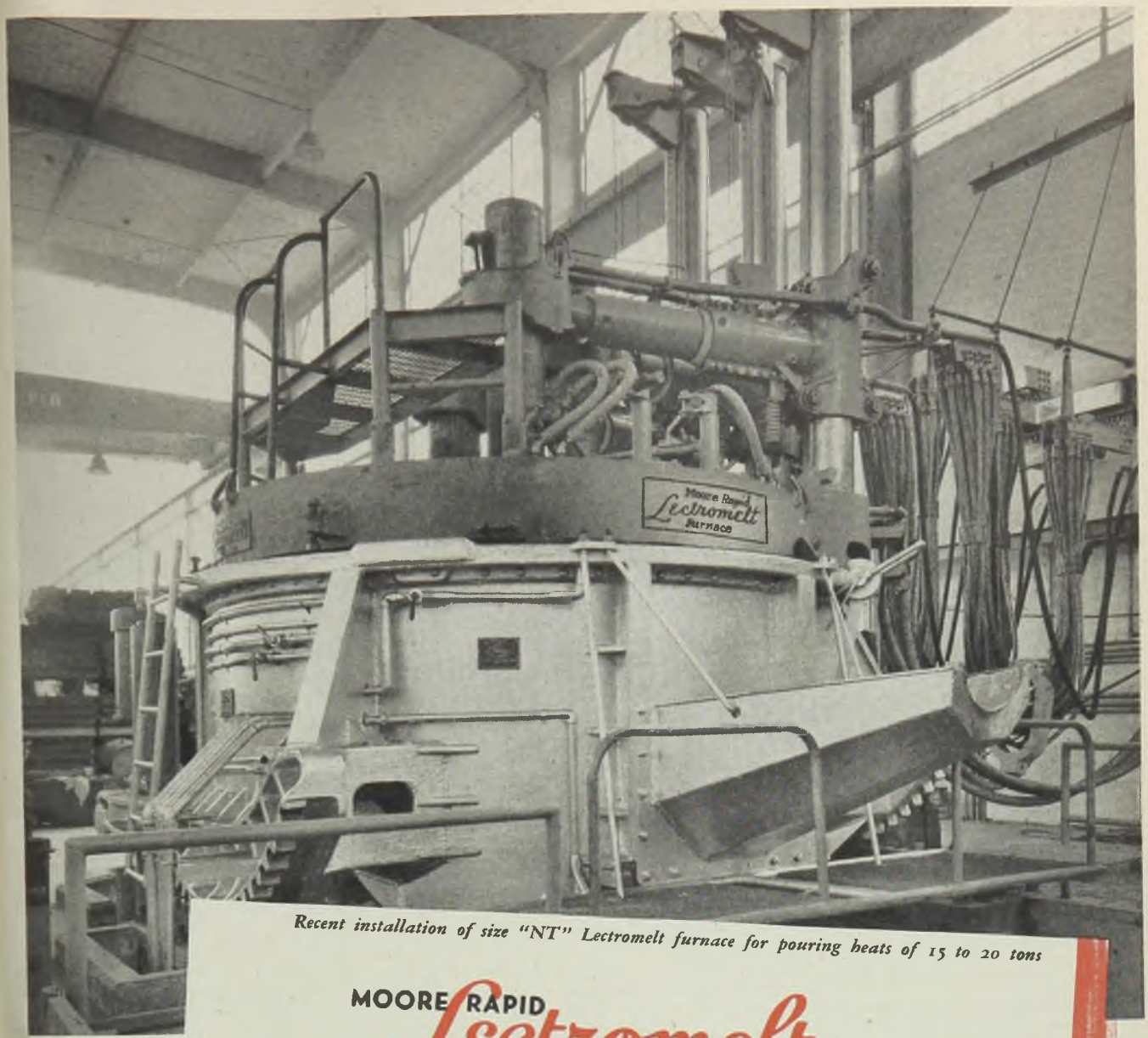
Operation. In the usual setup, the light source is mounted above the strip to provide intense illumination over the full width of the strip. This is done by low-voltage exciter lamps, wired in series-parallel. Neon lamps are connected in parallel across each lamp. Thus, in the event an exciter lamp burns out, the corresponding neon lamp will indicate the defective lamp by flowing. In addition, current relays are connected in series with each of three banks of exciter lamps; when a lamp fails the relay drops out to activate an alarm.

Exciter lamps are operated at reduced voltage, furnished by a separately-mounted transformer, in order to provide a lamp life of several thousand hours. In this manner, lamp burnouts interfere with operation infrequently.

The light source is cooled by twin blowers which are equipped with air filters and which are mounted on the light source housing. The blowers may be connected to run continuously or may be automatically disconnected from the power line at the time the line is shut down and the lights go out.

Phototubes are mounted on an assembly frame under the sheet and are easily accessible for inspection and test. It is only necessary to remove the hinged sideplate from the dust-tight phototube housing. The top cover of the phototube housing contains a lens for each phototube. In this manner, light from the pinhole is focused on the nearest phototube. The phototube housing usually is mounted directly on the mill structure so that the distance from the sheet to the top of the housing is approximately ½-inch. Within the housing, phototube anodes are connected in parallel by a shielded cable. Cathodes, connected in parallel, are grounded to the housing.

Control Equipment. This consists of a thyratron lockin panel, an amplifier and a voltage regulator. The voltage regulator maintains constant voltage across the



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Lectromelt furnaces are extensively used for the quality melting of plain carbon steels, alloy steels, and gray and malleable irons. Lectromelts of the top charge type are available in standard sizes ranging from 100 tons down to 250 pounds capacity. Write for additional information.

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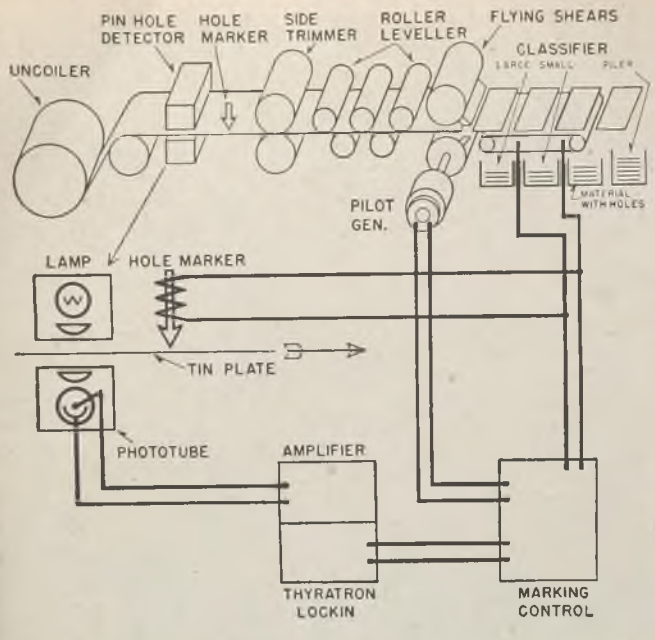

Schematic diagram of connections for pinhole detector. Device inspects strip from 6 to 62 inches wide while in transit through cold mill at 1000 feet per minute

amplifier. It is arranged so that connections can be varied in order to obtain the correct output voltage for the stable operation of the amplifier and thyratron panel.

The amplifier is suspended under the phototube housing by springs to isolate the device from mechanical vibration. The small current impulse, created by light shining through a hole in the strip, passes through the phototube and is magnified by the amplifier. The first stage of the amplifier is nonmicrophonic. Thus vibration is less apt to cause reduced sensitivity. Safety tolerances (greatly above average) insure reliable industrial service. A small potentiometer, mounted on the amplifier, varies the sensitivity of the device.

Serves As Lockin Relay

The impulse output of the amplifier is passed on to the thyratron lockin panel by suitable cables and is impressed upon a thyratron tube. This tube functions as an instantaneous lockin relay and it detects impulses lasting approximately 0.005-second, when the strip is traveling at a speed of 1000 feet per minute. The lockin tube operates a small relay whose contacts are connected to a signal light, a signal bell or a classifier. The lockin tube is reset by a thyratron time-delay relay, mounted on the thyratron panel. A small potentiometer permits adjustment of the time-delay relay for intervals ranging from 0.05 to 1.5 seconds.

Indicator. Three methods are used for removing sheets containing holes after detection: (1) Visual indication, (2) marking of strip for later removal, and (3) the automatic operation of a classifier which is located immediately following the flying shear.

Visual indication (stopping the mill) is not often used since it slows down production, even though time out is short. However, when strip is sold in coils it may be necessary to remove a hole section at the time. For copper coils and similar cases, the relay can be arranged to operate a signal light or bell or may automatically stop the mill itself. After the hole has been detected and removed, the control is reset manually or automatically (by the thyratron time delay) as desired.

Many mills employ classifiers to sort out light and heavy sheets as they come from the shear. Often it is satisfactory to use a 2-pocket classifier. Such a setup routes all off-gage sheets (light or heavy) into one pocket and sheets having holes into another pocket. Then again, those with holes may be routed into pockets containing light or heavy sheets. However, if it is desired to prevent resorting of rejected sheets, a 3-pocket classifier is necessary.

When the pinhole detector is used to operate a classifier, some form of "memory" device is required to determine the proper segregation of sheets when they are passing through the classifier. This device is actuated as soon as the hole appears at the phototube housing and remains active until the hole reaches the classifier, which is some distance from the phototube housing. The hole detector is immediately reset as soon as the memory device is actuated, thus being ready for another detection even though the previous hole has not yet been rejected.

Reset by Contactor

The lockin thyratron circuit can be reset by a contact on the classifier. Another setup utilizes the reset thyratron time-delay relay. The method used depends upon the design of the classifier. The initiating action for operating the classifier may originate in the marking device (when used) rather than in the thyratron lockin panel.

Marking Device. When a hole appears in the strip its location can be marked by a stylus. A marking device having a separately-mounted pilot-generator is employed in conjuction with a marking solenoid. This arrangement usually is desirable when a classifier is not used; the method provides a permanent visible indication of the pinhole position. After marking, the defective sheet is removed at a suitable inspection station, either after it has been sheared or following the plating process.

A small pilot generator designed so that voltage output is properly proportional to speed is geared to the mill to indicate speed which the marking device translates into a time control of the stylus solenoid. The latter is energized in inverse proportion to the pilot generator voltage, i.e., in inverse proportion to strip speed. Thus, the length of mark on the strip remains approximately constant (within a range of 10 to 20 inches) as set by the control potentiometer. If only a fixed time-delay relay was employed to control the length of mark, the mark would vary from 10 to 100 inches during threading or slow operation. When the marking device is used, it resets the lockin thyratron at the proper time. Therefore, the thyratron time-delay relay reset is not used.

While the equipment described is designed primarily for pinhole detection in metal strip, it is equally well adapted for hole detection in paper, rubber, leather, and fabrics.

Cooling-System Treatise

Restudy of cooling-system maintenance methods in the light of war emergency conditions—discontinuance of motor vehicle production for civilian use, shortage of replacements parts and labor and increasing demand on existing vehicles—is recommended by the Maintenance Methods Co-ordinating Committee of Transportation and Maintenance Activity, Society of Automotive Engineers Inc. This group stresses the importance at this time of preventive cooling-system maintenance and suggests the most effective means of cleaning, flushing and preventing rust or freezing of radiators in a comprehensive summary published recently by the Government Printing Office, Washington, D. C. and circulated by Automotive Engine Rebuilders Association of Indianapolis, Ind.

Hand Cleanser

A clean, convenient, effective and sanitary way of removing oil and grease from the hands and arms is said to be satisfactorily accomplished by a product called Flix, developed by Waverly Petroleum Products Co., Philadelphia and Refiners Lubricating Co., New York.

It is a hand-sized semiquilted pad containing an effective absorbent substance that quickly removes all types of oils from the skin, leaving it clean and dry. Some advantages claimed for it by the manufacturers are: It helps prevent skin diseases; it is economical, speeding up cleanups and saving soap; it is safe, will not burn and has no loose ends to catch in machinery; it is sanitary, and it is useful in removing oil from machine parts preparatory to painting.

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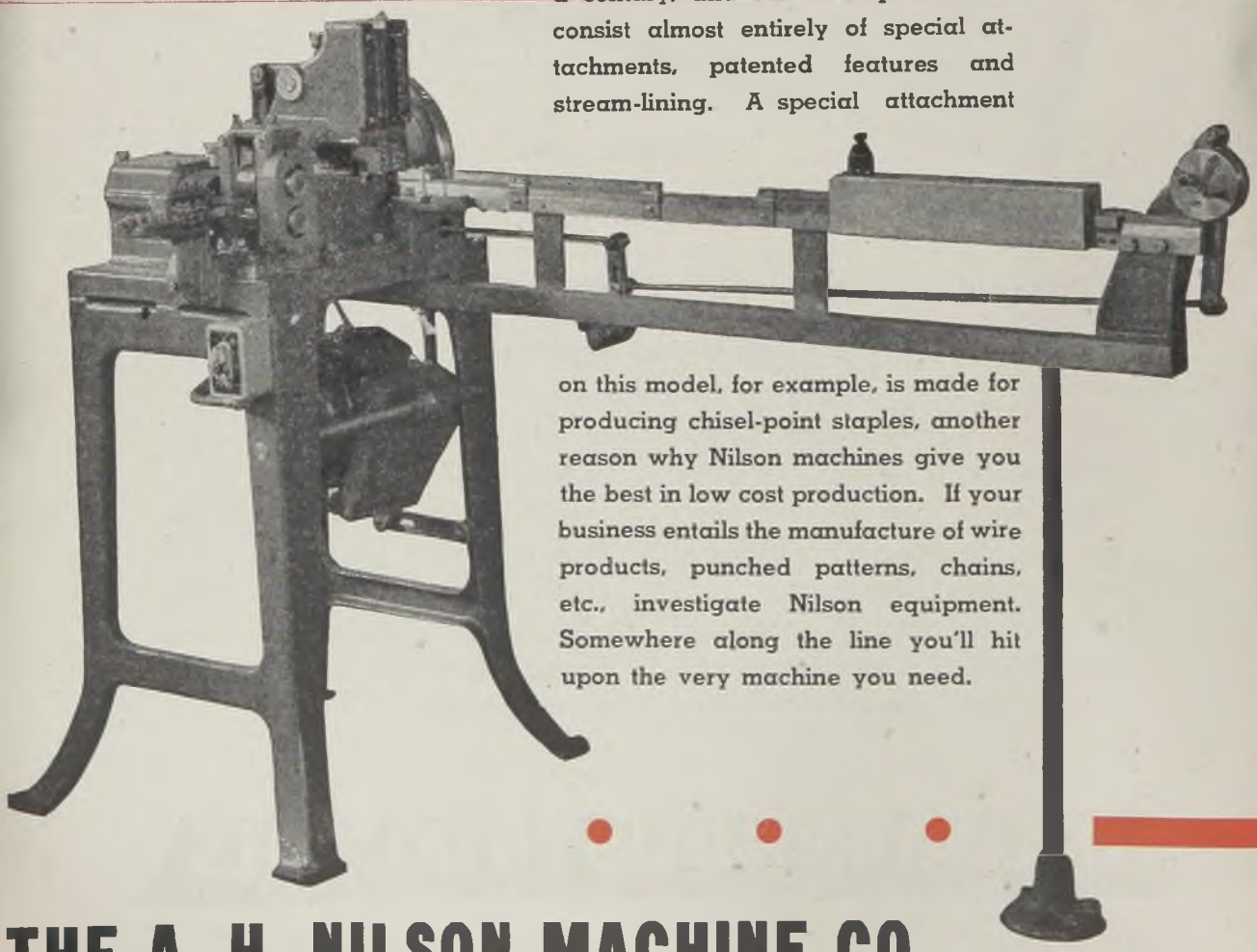
This plunger type, No. 2 model, insures greater speed without impairment of accuracy. Nilson has been designing and building special machines for half a century, and current improvements consist almost entirely of special attachments, patented features and stream-lining. A special attachment



on this model, for example, is made for producing chisel-point staples, another reason why Nilson machines give you the best in low cost production. If your business entails the manufacture of wire products, punched patterns, chains, etc., investigate Nilson equipment. Somewhere along the line you'll hit upon the very machine you need.

THE A. H. NILSON MACHINE CO. BRIDGEPORT, CONN.

Stellite and Steel Finish Machined Simultaneously with Same Tools

A SPECIAL steel aircraft engine valve with Stellite applied to the outside diameter of the head and seat is being machined simultaneously on a mass production basis by Thompson Aircraft Products Co., Euclid, O., with the same cutting tools and speeds. Good results are reported from this combined operation, both as to production and quality of surface finish, as well as tool life, considering the difficulties involved. The method, setup for which is shown here, is as follows:

Part is machined on Sundstrand automatic stub lathe having a front and rear tool slide. The front slide carries a Carboloy turning tool, while forming tool of the same material is mounted on rear tool slide ready for finishing cut which is to follow.

Valve is held on the stem end by means of a collet in the work spindle and supported at the head end by the tailstock center. Operator pulls in the tailstock with handle which also locks it. Lever movement also actuates switch mounted on the tailstock, the latter starts spindle and feed of the two slides. Thus, operator's duties are minimized—he merely loads and unloads. Feed is automatic and machine stops when cycle is completed.

Cut across both steel and Stellite surfaces is made at the same speed, 80 feet per minute. The instant tool clears the work, rear slide moves up and forming tool comes in for the finishing plunge-cut.

Aircraft Tubing

(*Concluded from Page* 85)

orders for standard sizes. When 95 per cent of all orders are for standard sizes, it is readily seen that many consumers' orders can be grouped, thus permitting long mill runs on individual sizes, and creating a liquid stock reservoir that can be tapped in emergencies.

Further, and of equal or greater importance, standardization of sizes permits actual stocking of finished tubing in both mill stocks and distributors' warehouses when conditions of supply and demand permit.

Warehouse stocks would be more useful because the number of sizes in any one warehouse would be tremendously reduced, and if the whole industry standardized on fewer sizes the warehouse stocks would become more interchangeable from one section of the country to another, instead of being localized to serve a few nearby consumers. Furthermore, inactive and dead stocks would be reduced to a minimum. The same conditions would obtain in consumers' stocks, with a reduction of inventory and stock control problems. Identification of various sizes in the fabrication lines would also be simplified, thereby minimizing costly mistakes by inexperienced workers. The purchasing departments, too, would have their work lightened and expedited through any reduction of items, particularly since all orders must clear through the Aircraft Scheduling Unit of the War Production Board, Wright Field, Dayton, O.

Jigs and fixtures, as well as fittings, would be reduced in proportion to number of items. Aside from simplification of fabrication problems in manufacturing plants, greater advantages would be gained in widely scattered service and repair depots where parts must be available at all times to service many different types of planes.

This discussion does not include tubing used in landing gear, engine parts, propeller blades, pressure lines, etc., although standardization of sizes of tubing for such applications is equally important and desirable.

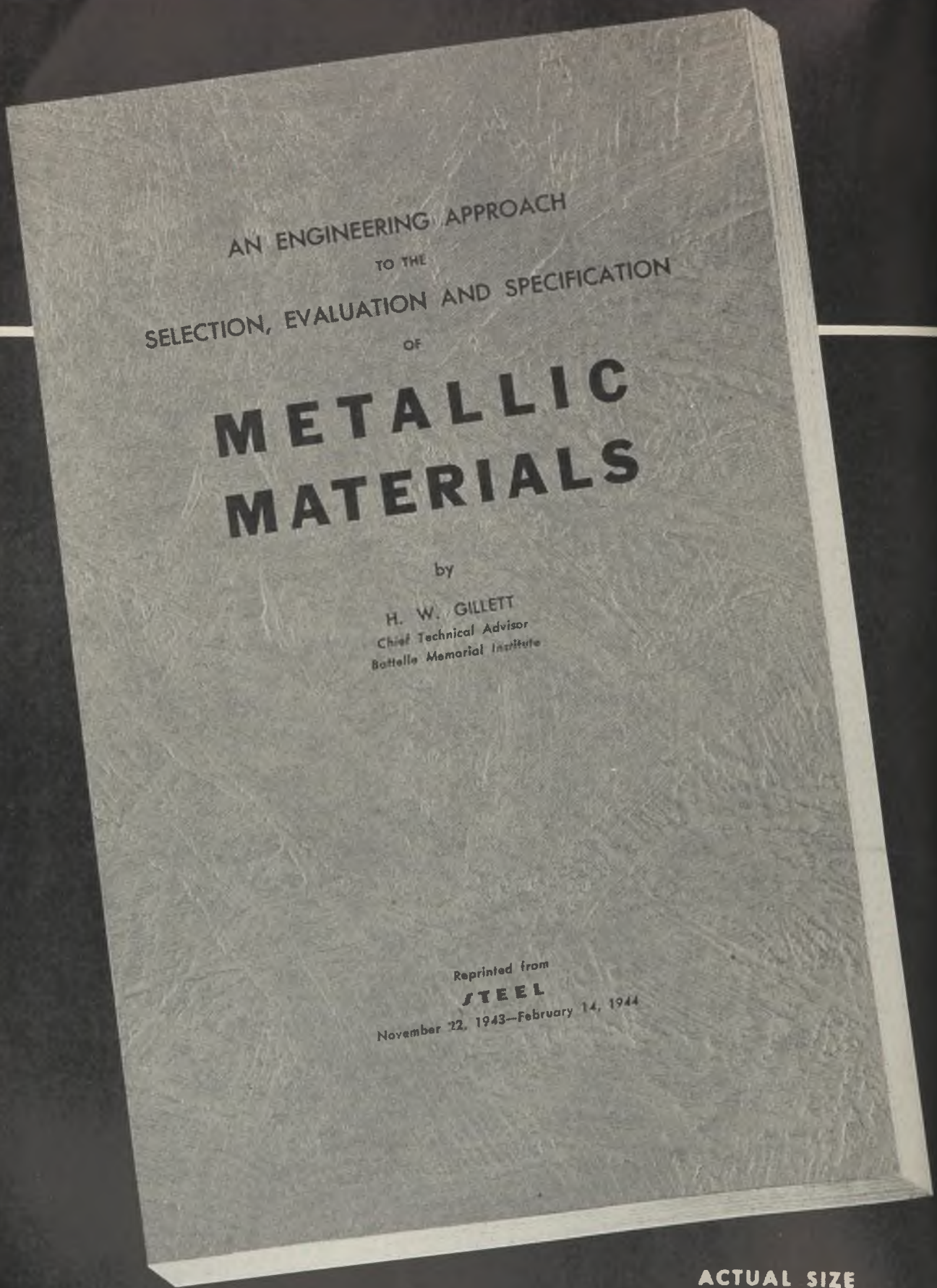
In adopting and recommending standardization of the sizes referred to in this article, the fact that actual requirements of special sizes will still be available should always be kept in mind, and where quantities are sufficiently large there is no objection on the part of the manufacturer to accept orders for such items.

No radical or revolutionary recommendations are being advanced. A reference to the records of the American Standards Association will reveal hundreds of industries that have put standardization of their products into effect, the results of which always have been to the mutual benefit of the producer and consumer.

In conclusion, it should be stated that the airframe manufacturers have wholeheartedly endorsed the above recommendations and through this recognized standardization body, the National Aircraft Standards Committee, are continuing to explore the possibility of further standardization of sizes with the objective in mind of reducing the number of sizes to a minimum consistent with sound aircraft engineering practices.

PROPOSED LIST OF STANDARD SIZES FOR AIRCRAFT TUBING

Wall Thickness Inches	OUTSIDE DIAMETER IN INCHES—205 ITEMS																						
	1/8	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 3/8	1 1/2	1 5/8	1 3/4	1 7/8	2	2 1/4	2 1/2	2 3/4	3
0.022	22	22	22	22				28	28	28	28	28											
.028	28	28	28	28	28	28		28	28	28	28	35	35	35	35		35	35	35				
.035	35	35	35	35	35	35	35	35	35	35	35	49	49	49	49	49	49	49	49				
.049	49	49	49	49	49	49	49	49	49	49	49	58	58	58	58	58	58	58	58	58			58
.058		58	58	58	58	58		58	58	58	58	58	65	65	65	65	65	65	65	65	65	65	65
.065		65	65	65	65	65	65	65	65	65	65	65	83	83	83	83	83	83	83	83	83	83	83
.083				83	83	83		83	83	83	83	83	95	95	95	95	95	95	95	95	95	95	95
.095			95	95	95	95	95	95	95	95	95	95	120	120	120	120	120	120	120	120	120	120	120
.120						120	120	120	120	120	120	120	156	156	156	156	156	156	156	156	156	156	156
.156								156	156	156	156	156	188	188	188	188	188	188	188	188	188	188	188
.188								188	188	188	188	188	250		250		250	250	250	250	250	250	250
.250									250		250	250	313				313		313	313			313
.313													375	375							375	375	
.375																						500	
.500																							



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An Engineering Approach to the Selection, Evaluation and Specification of

METALLIC MATERIALS

CONTENTS:

HERE is an outstanding contribution to available literature in the field of metallurgy. This report, prepared for the War Metallurgy Committee, provides both the engineer and the metallurgist with the basis for a better understanding of each other's problems and proficiencies. Such well-known men in the field of metallurgy as Zay Jeffries, P. D. Merica, John Johnston, R. F. Mehl, J. H. Critchett, G. F. Jenks, V. N. Krivobok, J. B. Macauley, J. L. Gregg, S. Epstein, Val Cronstedt, F. R. Shanley, and members of the Battelle Memorial Institute staff actively collaborated with Doctor Gillett in drafting and revising the report. It should be in the hands of all engineers and production men responsible for the selection or specification of engineering materials.

It was published exclusively in the magazine STEEL over a period of 12 weeks and has created a tremendous amount of interest throughout the metalworking industries. Abstracts also appeared in *Machine Design* and *The Foundry*.

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Speed Lathe

Especially designed for deburring, lapping, polishing or finishing small metal or plastic parts such as are handled in spring type collets, a new model general-purpose speed lathe is announced by Schauer Machine Co., Cincinnati. Fully streamlined, the machine is cooled by forced ventilation with positive air

filter to remove dust and abrasive particles which are injurious to motor and machine.

A new, fully enclosed type switch eliminates danger of switch breakdown under adverse operating conditions. The control lever is fitted with a palm-fit ball handle.

Piloting Fixture

The surface-roughness measurement of piston rings is aided by introduction of a new piloting fixture by Physicists Research Co., Dept. 16, 343 South Main street, Ann Arbor, Mich. The side surfaces of all types of rings, including keystone rings, may be measured with the type R fixture which works in conjunction with any Profilometer.

The ring may be measured in three ways: By tracing circumferentially; by tracing radially at one place on the ring; and by a combination of both at the same time. Operation is entirely automatic with switches provided for selection of the type stroke desired. An auto-

matic shutoff is provided to stop rotation of the ring as the gap approaches point where damage might occur.

The fixture is intended for production checking of piston rings. The tracer is advanced and retracted automatically for measuring each ring. Rings are easily inserted and removed. Very little adjustment is needed to handle rings varying from 2 to 10 inches inside diameter. The same is true with keystone rings. Piloting fixture weighs 95 pounds and measures 10 x 22 x 7½ inches. It operates from 115-volt 60-cycle power lines.

Wire Rope Clamp

A wire rope clamp forged and master coined to fit the rope, made of high tensile strength steel is announced by National Production Co., 4561 St. Jean avenue, Detroit 13. The clamp is made in two halves. The inside of each half is made to fit the rope; the large grooves pocket the large spiral strands; the small grooves pocket each small wire that makes up the strands. The large grooves hold the rope from endwise slippage and the small grooves prevent the rope from spiral winding out of the clamp. Every strand and surface wire contacts the full length inner surface of the clamp. The two halves are gripped tightly on the rope with strong alloy steel nuts.

Some of the features of this clamp

are: Economy in cost; it can be applied by anyone—in a single operation—either in the field or shop; no special tools are required; it automatically exerts a uniform grip; and its streamline shape eliminates fouling.

Scraper Blades

Carboloy tipped scraper blades now are available in three widths to fit the company's standard line of hand scrapers, it is announced by Anderson Bros. Mfg. Co., 1907 Kishwaukee street, Rockford, Ill. All that is necessary is to remove the high-speed steel blade and slip in the new blade. Under test, these blades lasted from 8 to 10 times longer than ordinary blades.

Reversing Controller

A significant feature of the new M-79 simplified 4-speed reversing controller for electric and gas-electric trucks, manufactured by Elwell-Parker Electric Co., Cleveland, is the improved economy in current consumption. The major portion of the possible waste of current when motor current is restricted by introducing resistance on first, second and third speeds, is prevented by the M-79 controller which uses resistance on the first speed only. Addi-

tional power saving is attributed to the manipulation of the motor fields, connecting them in series on first and second speeds which produces greater torque with less current consumption. The welded housing of the new controller is dust tight and meets all specifications for flash-proofing. The controller is installed on all company electric and gas-electric low and high lift trucks in capacities up to 10,000 pounds.

Potentiometer

A redesigned Pyromaster self-balancing potentiometer is announced by Bristol Co., Waterbury 91, Conn. The new model 431 instrument has a universal wall or flush mounting case considerably deeper than previous model 440M. It also has an internal hinged panel on which are mounted pen and indicator drive mechanism; in the case of electric controllers, the control contacts or proportioning slide wire; or in the case of air control, the complete new convertible-type air-operated control mechanism. The deep case and inner panel make it possible to service or replace any part or portion of the instrument without disturbing any other part. Also, in the case of electric type controllers, it is possible to include the control re-

lays in the instrument thus eliminating considerable external wiring.

A heavy duty pen-drive motor gives more torque for operating control contacts and other similar functions, espe-

(All claims are those of the manufacturer of the equipment being described.)

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the new 50 H. P

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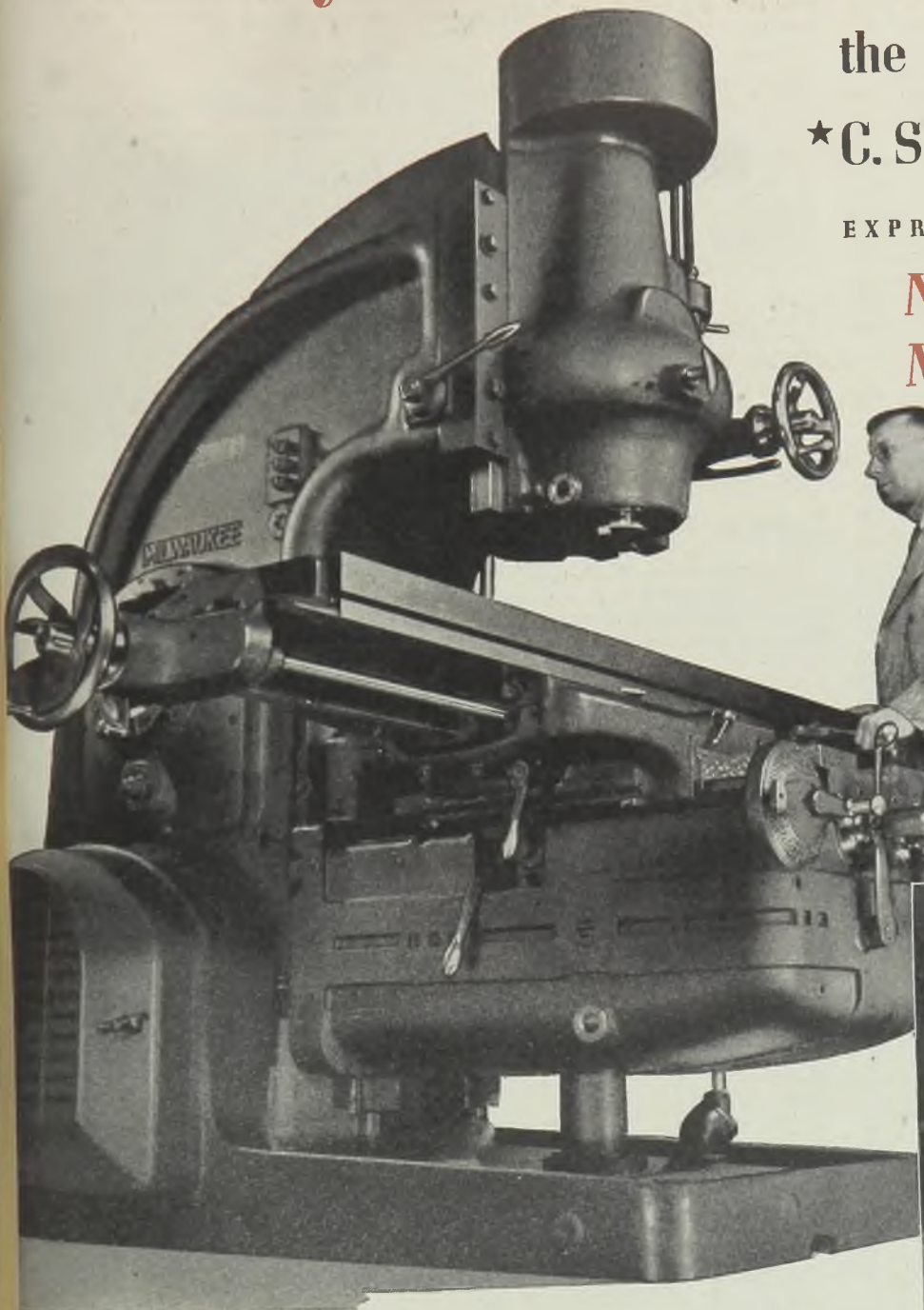
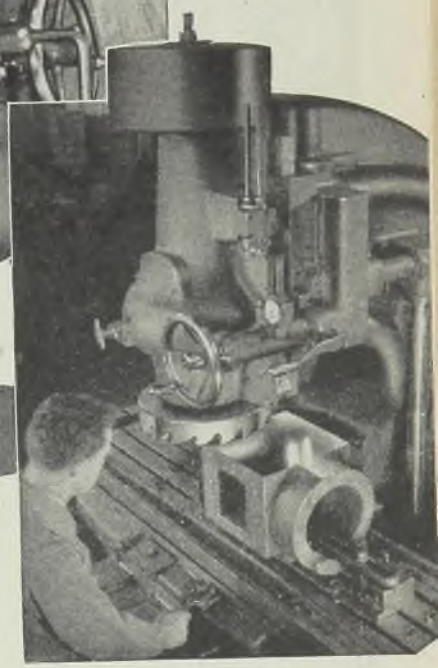
Negative Angle MILLING!





If you've been looking for a milling machine that's big and rugged, with plenty of POWER — a machine that can take it — the 50 H.P. — C.S.M. was made-to-order for you.

This machine was designed and specially engineered to do *Carbide Steel Milling, but because it's an all-purpose machine, it will handle your regular milling jobs to perfection.

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For the past year this machine has been handling all of the "Negative Angle" milling jobs in our own plants. If you have a Negative Angle milling problem, we believe this is the machine you need.

NOTE: Our Research Department will gladly help you with problems concerning Negative Angle milling. We invite your inquiries. Write Department C.S.M., Kearney & Trecker Corporation, Milwaukee 14, Wisconsin.

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C.S.M. FEATURES

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- ★ Feeds — ¼" to 60"
- ★ Electric spindle brake
- ★ Available in both Horizontal an Vertical models

Milwaukee Machine Tools

cially under conditions of poor line-voltage regulation. The indicating scale on the indicating-recording model has been changed to a horizontal wide band. Also the standard cell type of manual standardizing circuit now replaces the voltmeter type formerly supplied. The stepping relays and the slide wire in the potentiometer circuit have been enclosed in a dust-proof bakelite housing and a heavier power supply has been provided. This Pyromaster uses the same basic principle as previous models, providing a self-balancing round-chart recording potentiometer which has no continuously moving mechanical elements, is unaffected by vibration and needs no lubrication.

Potential Transformers

A new family of potential transformers, 25 to 138 kilovolts—midgets compared with their predecessors—are announced by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. An example is the 69-kilovolt unit which is only two-thirds as tall as former model, requires less than one-third the ground

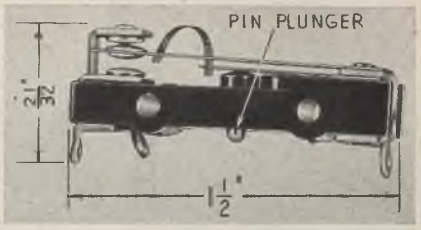
space, occupies one-fifth the volume, uses one-eighth as much oil and weighs two-fifths as much as previous potential transformers.

Use of Hipersil steel and a new type of bushing were important factors in achieving these reductions. Close coordination of insulation structure, coupled with design features which permit liberal substitution of nonmetallic materials for structural and supporting members, are no less important factors.

Midget Switch

A new midget switch built on the rolling spring principle is being made to the maximum dimension of 1½ inches. It is 9/16-inch wide, 7/16-inch thick and weighs less than 1 ounce. All component parts are noncorrosive. The switch is designed for actuation from either the top or the bottom and is adapted to electronic control devices, machine tools, aircraft and electrical appliances.

Both the snap-action spring itself and the center blade are made of beryllium, while the base is of bakelite. Under factory tests the switch has shown no failure after 95 million operations. When



built into relays, smaller coils may be used as only 4 to 6-ounce operating pressure is required. Furnished in single pole, normally open, normally closed and double throw with both pretravel and overtravel provided, the switches are manufactured by Acro Electric Co., 1323 Superior avenue, Cleveland 14.

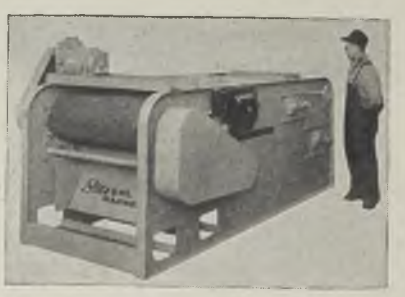
Carbide Tipped Tools

Jessop Steel Co., Washington, Pa., announces the addition of carbide tipped tools to their line of cutting tools. These tools, marketed under the name of Malta, are manufactured in 10 different styles and may be had with any one of three grades of carbide tips. A wide range of sizes will be stocked.

Magnetic Separator

Designed to operate on the principle of the Ball-Norton underfeed lift method, a new type M magnetic separator has been built by Stearns Magnetic Mfg. Co., Milwaukee. The separator is partially enclosed in a welded steel housing and is furnished in various sizes and belt widths.

A unique patented magnetic field is mounted above the lower surface of the separating belt in this type magnetic separator. In operation the mixed material is distributed in an even layer by an automatic feeder to the belt which carries the ore or other material into the magnetic field where the magnetic

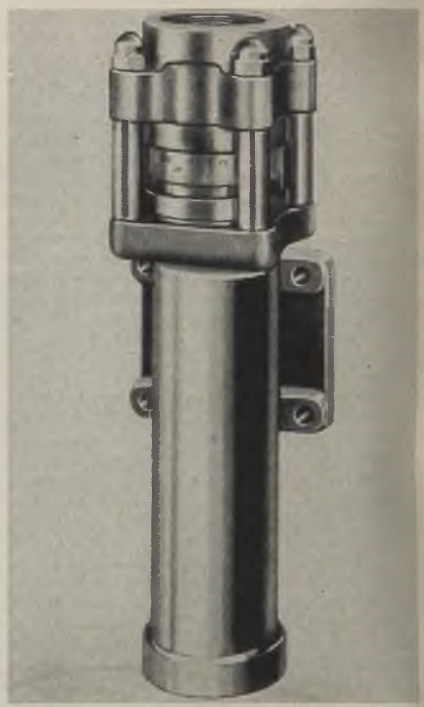


portion is lifted by the power of the magnet to the surface of the separating belt.

The alternating polarity characteristic of the magnetic field subjects the magnetically attracted portion of the material to a violent zigzag rolling movement to release the entrained nonmagnetic particles which drop back on the feeder belt and move along to final delivery. The separating belt runs faster than the feeder belt, thus the magnetic material spreads out over a greater area.

Flow Gage

A new precision Flogage which continuously indicates the rate of fluid-flow is announced by Hydraulic Machinery Inc., 12825 Ford road, Dearborn, Mich. The design of this device permits actuation of the indicating dial by the kinetic energy of the fluid flowing through the gage. Its mechanism consists of an indicating dial constructed as an impeller, the rotary movement of which is resisted by a precision torsion bar. The Hy-Mac



Flogage is insensitive to changes in fluid viscosity, fluid temperature or fluid pressure. It is accurate to within a fraction of 1 per cent and can be constructed to withstand any internal pressure without affecting its accuracy. An adjustment is provided to permit measurement of the flow rate for fluids of different specific gravities. It is adaptable to any capacity and the design allows extremely low weight and overall dimensions in ratio to gallons per minute flow capacity. There are no restrictions or orifices. Provision is made for fittings which facilitate installation. The unit illustrated has a capacity of 60 gallons per minute and is 3 7/16 x 13 15/16 inches overall.

Air Line Filter

Outstanding features of the new compressed air line filters added to the line of Filters Inc., P. O. Box 471, Glendale, Calif., are: Greater flexibility through the addition of two more outlets—making a total of six in the manifold; and a new self-dumping trap which automatically empties the water. Permitting the use of a larger number of filter lines

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—for quick delivery
—of lasting efficiency

One entire plant devoted to hot-coiling—conveyorized for volume manufacture—with control laboratory an active part of production—quenching tanks of swimming pool size—skyscraper-like shot blasters for clean, lustrous finish and added life to springs. A letter will place Muehlhausen engineers at your service—to save you time, cost and effort in obtaining the *right* spring. New, illustrated booklet on hot-coiling springs now available. Muehlhausen Spring Corporation, *Division of Standard Steel Spring Company*, 921 Michigan Avenue, Logansport, Indiana.

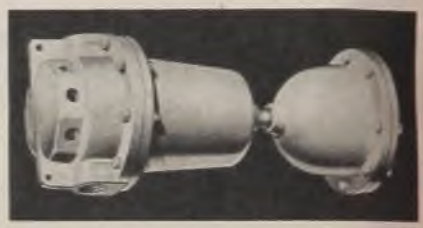
To improve product performance, use

MUEHLHAUSEN Designed SPRINGS

Hydraulic Load Tester

for serving air tool operations at a single point, the new CCA filters augment the company's 2 and 3-way filters. The outlets are ⅜-inch to accommodate snap-on hose connections.

The self-dumping water trap automatically disposes of water filtered out of the lines. The closed float guarantees



positive opening and closing of the discharge valve. Interior parts are heavily plated to reduce rusting to a minimum. The trap is serviced easily. It is standard equipment of all CCA filters having 1-inch or larger pipe connections.

The new filter prevents dust, rust, scale, oil and water from entering valuable air tools, prolonging life and increasing the efficiency of pneumatic equipment.

Magnetic Comparator

For controlling the quality of ferrous parts of the same size and shape, a new magnetic comparator is announced by Special Products Division, General Electric Co., Schenectady, N. Y. When the part to be tested is placed in a coil which has been balanced electrically against a standard part, this comparator detects any difference in the two parts which changes the magnetic flux linking the coils surrounding them. The difference is shown as unbalance on the

comparator's indicating instrument which reads within passing limits when the tested part is acceptable.

It is designed particularly for fabricators of iron or steel parts who desire a nondestructive test to make certain that each part has the required properties within the limits of a standard part.

The comparator consists of a variable-voltage transformer, a sensitivity control rheostat, coarse and fine balance control rheostats and required capacitors which are all mounted in a portable steel case. The zero-center indicating instrument, control knobs and the necessary switches are conveniently located on the front of the panel. Test fixtures furnished with the magnetic comparator are two air-core coils. Where surface

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MECHANICAL SPRINGS

by A. M. Wahl

. . . eminent authority on springs and well-known for his development of the "WAHL CORRECTION FACTOR." He speaks from a wealth of practical experience obtained through his association with the Westinghouse Electric and Manufacturing Company

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BASED on original research and on practical applications, "Mechanical Springs" also includes results of investigations carried out under the direction of the American Society of Mechanical Engineers and the War Engineering Board Spring Committee of the Society of Automotive Engineers.

Fundamental principles and recent developments are presented so that springs can be designed to perform more satisfactorily than if "rule of thumb" methods were employed—saving both time and materials. Being important components of modern machines and devices, springs should be designed with care, especially if fatigue or repeated loading is involved. The information covered puts design on a rational basis. Convenient charts and tables aid quick selection. A glance at the contents will convince you of the comprehensive scope of this book.

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conditions permit and the parts are too large for suitable coils, two gage heads can be furnished for contact measurements. These fixtures are interchangeable and are equipped with flexible leads and connectors. Coils are available in a variety of sizes.

To operate the instrument, two parts of the same size and shape selected from a group of acceptable parts are placed within the coils where they are held in the same relative positions by wooden jigs. The jigs are designed by the user to fit the parts. Then, by adjusting the sensitivity control and the coarse and fine balance controls, the comparator's circuit is balanced to give a zero reading on the indicator instrument. One of the acceptable parts is replaced by the part to be tested. Instantly the direct current provided by the full-wave rectification, which is essentially the difference in current between the coils, indicates on the instrument a variation between the magnetic flux of the acceptable part and that of the part being tested.

Lamp and Guard

A new lamp and guard, type 44-A, has been developed by Hoffman Co., 41 North Penn street, York, Pa. It is especially useful for fine piecework around airplanes. The type illustrated measures 14 inches from tip end of the hook to the end of the handle. The light globe and socket measure 5½ inches and any length of cord desired is available.

The light globe is aluminum finished with one side plain and clear for concentration of light. However, the reverse

side, or portion finished, gives sufficient light to serve secondary purposes. The globe is 40 watts, 110 volts. It affords 90 per cent or better efficiency as its design provides protection without detracting from light efficiency.

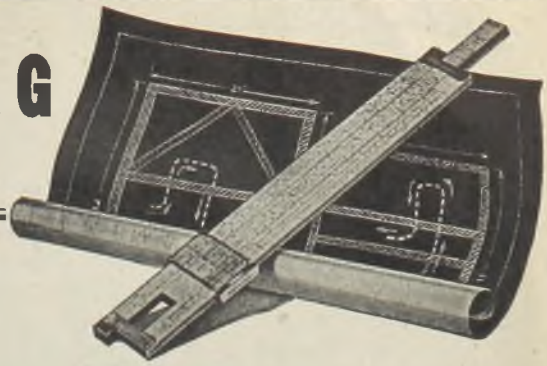
The handle makes it convenient to hold in any special desired position for particular work, and its big hook enables the worker to hook the light almost any place where it is handy.

The armored lamp guards are of regular company design using the cantilever principle to withstand hard shocks and usage. They are made of flat die-cut sheet steel, formed and shaped into a guard of 6¼-inch circumference permitting straight light in out-of-the-way places.

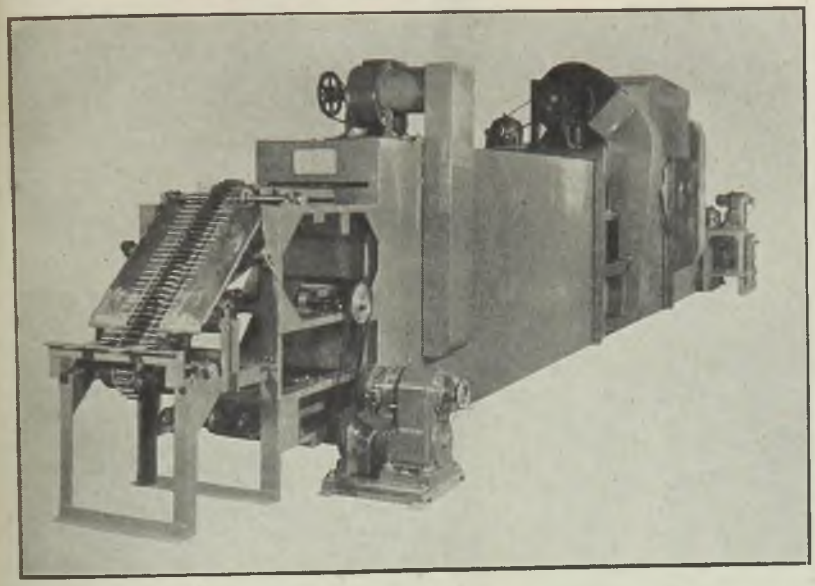
—o—

A Detroit plant producing supercharger gears increased cutting speeds to 220 feet per minute by adopting cemented carbide cutting tools. Previously the gears were machined at a cutting speed of 55 feet per minute.

OVEN ENGINEERING NEWS



Continuous Drying Oven For Welding Electrodes



Completely automatic and requiring only casual human supervision, this machine loads, dries, bakes, cools and presents for inspection 600 welding rods per minute.

Three different atmospheric zones are used to dry coatings properly. An automatic loader picks the rods up from a stripping machine, and a system of conveyers and transfer elevators carries them through the processes of moisture conditioning, drying, baking and cooling, to final inspection and weighing.

Single Heating Unit

A single fuel-fired or electric air heater, equipped with automatic controls, produces the various temperatures. Wide variations of drying and baking times, with each zone completely independent of any other zone, allow the unit to be operated on most types of coatings.

Likewise, wide temperature limits may be obtained between zones. Temperature uniformity in each zone assures uniform coating dryness.

No Jamming

Transfer conveyers are foolproof and lower rods from zone to zone without jamming or bending. Automatic control of all temperature and burner operations completely relieves the system of attendants. The entire unit is 65 feet long and only 5 feet wide, conserving floor space.

Other Industrial Oven processing systems in many different industries are equally ingenious. Why not examine the operations in *your* plant to see if they can be speeded up?

Standard Box Ovens For Simpler Heating Jobs

For simpler heating applications which do not require elaborate handling, conveying or heating equipment, box-type ovens can often be used to advantage. The Industrial Oven Engineering Company designs and manufactures a complete line of such ovens.

Each box oven is, of course, custom built, assuring maximum efficiency for each user's needs, but standardized designs mean higher construction speed. These units are furnished for any type of commercial fuel.

This 900° oven for heat treating aluminum forgings has a built-in, high-pressure air heater for positive and rapid circulation through a relatively dense work load. The smaller sizes are shipped assembled, requiring no post-delivery assembly except attachment of accessories.

Free Engineering Book

In addition to numerous blueprints and descriptions of unusual oven and conveyer systems, this book contains such engineering data as the density, weight and volume of gases, the specific heat and density of various materials, volume and weight of air and various fan law problems. Write for your copy of "Blueprint for Industry".

(This is No. 9 of a series. Reprints of previous advertisements will be sent free upon request.)

THE INDUSTRIAL *Oven Engineering* **COMPANY**

11621 Detroit Avenue **Cleveland, Ohio**

American Brake Starts Foundry At Mahwah, N. J.

THE American Brake Shoe Co. has opened a new experimental foundry at Mahwah, N. J. It will not be operated on a miniature basis as in the case of most pilot units, but as a full-sized foundry capable of handling castings up to 2000 pounds. However, only experimental work will be done.

While this plant had been planned as the next step in the company's program of metallurgical research, the priority situation on construction materials had postponed erection. Then it was learned that the U. S. Army Air Forces, Wright Field, Dayton, O., were concerned with the procurement of forgings for aircraft and were considering the possibility of substituting centrifugal and static castings.

Since such castings required considerable piloting before they could be ready for production, Wright Field engineers approached Brake Shoe and subsequently arranged for the Army Air Forces to sponsor a priority application. Construction was authorized by the War Production Board and a Correlation Research Project was assigned by the War Metallurgy Committee of the National Research Council.

An idle plant at Kansas City, Kans., was purchased and re-erected, adjoining the company's metallurgical laboratory. It consists of two sections, one being the experimental foundry proper, with floor area 82 x 196 feet. The other section is devoted to offices on its upper floor and to tool room, boiler room, and storage space below.

Latest type of equipment has been installed and its immediate work will be devoted to: (1) Development of pilot centrifugal and static castings practices for the aircraft industry; (2) experimental work that may be assigned by the War Metallurgy Committee; (3) research projects that have a bearing on the war for the eight operating divisions of the American Brake Shoe Co. and (4) after the war the principal activity will be the experimental and research work, including investigation of new processes or products.

New Carbide Tool Line Announced

New England Carbide Tool Co. Inc., Cambridge 39, Mass., has announced a new line of standard carbide tipped cutting tools in six shank and tip styles. Tips are finish ground on diamond wheels so that all exposed surfaces have a mirror finish. The tools have a black rust-proof finish and are supplied with either of two grades of carbide, one for cutting all materials except steel and the other for steel.

LOCALIZED ANNEALING COST REDUCED 50%

with a G-E Electronic Heater

The thumbscrews are so positioned on the conveyor belt by the operator that only the tip is heated. Only a ten-second treatment is required.

JUST the 1/8-inch tip of these small thumbscrews—part of a hose-clamp assembly for airplanes, tanks, and other war equipment—must be annealed. The rest of the screw must remain hardened right out to the end of the threads.

By conventional heating methods it was difficult to confine the heat properly—and cost was excessive.

Now, with a single G-E electronic heater, the Wittek Manufacturing Company, Chicago, Ill., (a leading manufacturer of aviation hose clamps) anneals *100,000 thumbscrews a day—at one-half the former cost—and with absolute uniformity of results!*

A simple conveyor belt automatically positions the thumbscrews so that *only the tip* passes through the coil of the heater. Thus, the heat is concentrated on this one small section, and the rest of the screw is not affected.

That is a typical example of precision heat-treating being done today by inductive heating with G-E electronic heaters. With this versatile process you can heat practically any metal. You can anneal, harden, braze, or solder in a very short time and with great accuracy—the heated zone can be controlled to within a small fraction of an inch. It will pay you to investigate the many ways G-E electronic heaters can improve both your present and your future operations. Simply contact the nearest G-E office, or write to General Electric Company, Schenectady 5, New York.

NO. 5 IN A SERIES OF CASE STUDIES *on the accomplishments of G-E electronic heaters, a new and powerful tool that is speeding American war production. Like most new tools, it can easily be misapplied. The recommendations of G-E Industrial Heating Specialists are based on the experience gained with more than 200 installations of electronic heaters, plus a quarter century of experience in the development, manufacture, and application of electric heating equipment of all types.*

GENERAL ELECTRIC

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ELECTRONIC HEATERS

Every week 192,000, G-E employees purchase more than a million dollars' worth of War Bonds.

NEW PRODUCTS

Fluoboric Acid—Suggested for use in the control of acidity in fluoborate electroplating baths, preparation of various metallic fluoborates, pickling agent and preparation of catalysts for esterification, polymerization and condensation reactions, Pennsalt FA 42 is a 42 per cent solution containing a slight excess of boric acid for stabilization. Pennsylvania Salt Mfg. Co., 1000 Widener building, Philadelphia 7,. ST 25.

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Insulation Tester—For production-line testing of faulty insulation and winding dissymmetries in motors, generators, coils and transformers. Consists of a repeating-type, surge-voltage generator; a cathode-ray oscilloscope mounted at eye level height and a synchronously driven switching equipment enclosed in a steel cabinet designed for bench mounting. General Electric Co., Schenectady, N. Y. ST 23

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Low Temperature Welding Alloys—Developed to offer all advantages of silver solders as well as greater strength, firmer bonds and greater hardness. Available in wire, strip, sheet, rod and fine powder form. Eutectic Welding Alloys Co., 40 Worth street, New York. ST30.

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Alkali Cleaner—No. 1919 developed to clean brass cartridge casings as well as steel, tin and stainless steel. Low sodium oxide content makes it harmless to skin and clothing. Nielco Laboratories; 19720 Florence road, Detroit 19. ST 33.

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Thermosetting Cast Resin—Advanced use of a casting resin, Toolite, for structural parts of radial drills is reported at Consolidated Vultee Aircraft Corp., San Diego, Calif. Adhere, Inc., 1220 Maple, Los Angeles 15. ST34.

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Tensile Tester—Gives an accurate and complete check of tensile strength of spot welds on thin sheet metal. Breaking load in pounds pull is read directly from a dial without computation. Streeter-Amet Co., 4138 North Ravenswood avenue, Chicago 13. ST32.

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Spatter Proof Welding Liquid—Method for spraying No-spat on steel structures before and after welding, this liquid cuts cleaning costs and time, prevents rust and leaves cleaner and smoother surface to receive the priming coat of paint. ST31.

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Gas Analyser—Provides simultaneous analysis and continuous graphic record

of the amounts of oxygen, carbon dioxide, carbon monoxide and hydrogen in a sample of combustion products on a 10-inch strip chart, and the four different registrations (one for each gas) are shown by different colors and numbers on the chart. Cambridge Instrument Co. Inc., 3732 Grand Central Terminal, New York. ST29.

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Pickle Bath Toners—For use in pickling baths either with or without Rodine to improve the finish of pickled metals, to improve the pickling of work that is slightly oily and to reduce dragout of pickling solution. Available in either liquid or powder form. American Chemical Paint Co., Ambler, Pa. ST37.

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Adjustable Pressure Relief Valve—Particularly adapted for high pressure systems in aircraft hydraulics where smooth operation and longer life at maximum flow are necessary. Available in three sizes. American Screw Products, 7000 Avalon boulevard, Los Angeles, ST39.

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Blackout Paint Stripper—Formulated primarily for blackout paints of both asphaltic and non-asphaltic types and applicable to windows, street light globes and other vertical surfaces as it is of heavy body and clings without runs on any surface. Turco Products Inc., 6135 South Central avenue, Los Angeles, ST40.

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Portable Lifting Table—Simplifies and speeds handling of dies to and from machines, storage shelves, etc. and may be adjusted to heights ranging from 24 to 40 inches by a crank-up mechanism. Available in two sizes, one with a capacity of 3000 pounds and the other with 2000 pounds. Barrett-Cravens Co., 3240 West Thirtieth street, Chicago. ST41

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Storage Battery—Special 6-volt charge retaining unit is designed to replace 6-volt dry batteries in many applications requiring low current at sustained voltage over long periods of time. May be recharged 15 or more times but provides service of one 6-volt dry battery on single charge. Willard Storage Battery Co., Cleveland. ST47.

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Low Temperature Flux — Simplifies soldering and tinning operations, speeds up production and saves time. Has slightly lower melting temperature than soft silver solder on initial heats and once activated will work on temperatures slightly higher than that of 60-40 solder. Metallizing Co. of America, 1330 West Congress street, Chicago. ST46.

Electroplating

(*Continued from Page* 94)

cyanide bath may be made by dissolving 50 grams per liter nickel sulfate and 3 grams per liter copper sulfate, and adding a solution of sodium cyanide until the precipitate which first forms is nearly but not completely dissolved. Free cyanide must be avoided. Ammonium citrate or tartrate is then added to dissolve the remainder of the precipitate and to promote anode corrosion.

A rise in temperature or in copper concentration of the bath requires a higher current density to secure a white plate. Although it is not necessary to exclude sulfates and chlorides from the bath, the writer considers it better to do so. Addition of ammonium chloride to a good monel bath did not spoil it, but free cyanide cut current efficiency to the vanishing point. Like other electroplate with which the writer is acquainted, monel plate lacks the strength and ductility of the rolled sheet metal.

Plating with Chromium Alloys: The 50 per cent ferro-chromium alloy used to add the chromium to chromium-bearing steels keeps its brilliant luster as well as does chromium metal itself. High-chromium alloys of other metals ought also to maintain their initial brightness. This indicates the desirability of electroplating with chromium alloys, if it can be accomplished.

The chromium-plating solution is peculiar in several respects: First, the chromium bath contains an extremely high concentration of metal, but most of this is in a compound from which the metal cannot be directly deposited by the electric current. Second, an extremely high current density is required for any deposition of metal—a current density which would be fatal to the physical qualities of the metal deposited from any other commercial plating solution.

Third, it is believed that metal is deposited only from the small amount of chromium sulfate present, yet if this small amount of sulfate or of sulphuric acid present be much increased in the hope of obtaining a higher efficiency, all deposition of chromium is prevented! This indicates that in adding other metals to the chromium solution in the hope of depositing chromium alloys, sulfates, chlorides, etc., must be avoided. This restriction is evaded by adding the second metal as carbonate or hydroxide.

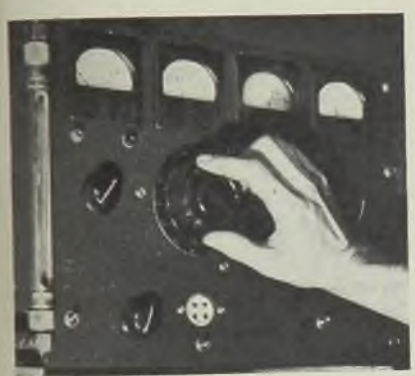
In the first attempt to deposit a chromium alloy, copper was chosen as the alloying metal because of its distinctive color. To a good chromium bath, copper carbonate was added in successive doses, and plating was tried after each addition. No alloy plate was obtained, and deposition of chromium itself was prevented. Similarly, addition of nickel carbonate prevented metal deposition. Since iron is rendered passive by solutions of potassium dichromate and of chromic acid, there still seemed a possibility of plating with a chromium-iron alloy. A solution of ferric sulfate was precipitated by ammonia, and the

washed precipitate dissolved in a good chromium bath. As with copper and nickel, no deposit was obtained by electrolysis. Electroplating with chromium alloys is certainly difficult, and perhaps impossible from water solutions.

Electroplating with chromium alloys would be so valuable that many new attempts to accomplish it will undoubtedly be made. The account of these failures is presented here as an aid to future experimenters, so that they will not waste their time in repeating these experiments, but may concentrate on experiments which have not already proved to be failures.

Dew-Point Indicator

An experimental device developed by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., utilizes electrons to detect dew-point temperature. The electrons furnish a continuous report of their findings to the operator. Oxygen and water vapor are ionized by electron bombardment, whereas constituents of furnace gases are not. The arrangement draws a sample of gas mixture past an electron gun. As long as the gas is free of



impurities, the electron current is constant. However, when oxygen or water vapor are mixed with the gas, some of the electrons are utilized in forming negative ions. This causes a measurable decrease in electron current.

The electron tube used essentially is a diode tube which operates with both ends open. The electron emitter and the plate continually operate in a stream of hot furnace gases. This electronic dew-point indicator removes the difficulty of judging visually determined dew points, and provides a continuous indication of gas quality. At present the new development, a laboratory instrument, is not commercially available. Applications of this indicator will probably be restricted to certain types of furnace gases.

Measure Sound Frequency, Duration To Test Shell

A device which at one time was thought to be the answer to the search for an automatic method of refusing bad coins in coin-operated equipment and of making change for bottled drink vending machines is now being used for acceptance testing of 20-millimeter shell. Known as the Sonotest, the instrument

tests the quality of small objects by means of an analysis of sound waves generated by striking or dropping the objects upon an anvil. Its simplicity suggests wide scope for testing based on vibration of the part. Even minute cracks or defects can be detected by this method.

As described by Capt. E. S. Lombard in the January-February issue of *Army Ordnance*, the device relies for efficacy upon its faculty of distinguishing and measuring first, the frequency of the sound wave; second, amplitude of the sound wave; and third, duration of the sound.

In operation, base frequency of the 20-millimeter shell is first produced by dropping the shell upon an anvil. The frequency thus produced is picked up by a microphone and amplitude of the sound then is automatically stepped up to a fixed value by means of a "limiter". The frequency next is multiplied by a harmonic generator. Frequencies falling within the band width are passed on to the time-delay network, and others are rejected. Duration of the sound then is measured in the time-delay network, and, if the duration is greater than a certain fixed minimum time, a light is illuminated on the front panel of the instrument.

Following the above routine, the shell is bounced upon its side and goes through an identical process of limiting, frequency multiplication, and duration measurement. If the shell has had the necessary qualities to pass through the last test, a second light is illuminated on the front panel. When both lights are illuminated, and only then, a large green or master indicator light flashes to indicate a good shell. The small indicating lamps permit analysis of defects by showing whether frequency or duration is incorrect.

Zinc Plating Solution

A special alkaline solution with which is used S-B addition agent for producing satin-bright deposits—the degree of luster depending on the choice of operating conditions—has been developed by Hanson-Van Winkle-Munning Co., Matawan, N. J.

In unagitated solutions the cathode current density range is from 10 to 45 amperes per square foot. Maximum brightness is obtained with the solution temperature maintained at 70 to 75 degrees Fahr. The deposits are somewhat lustrous as they are taken from the plating bath. A satin-bright to full-bright finish is produced by dipping the work momentarily in a ½ per cent nitric acid solution.

The addition agent used in the S-B solution has an extremely long life. Additions are not required until the solution has operated from 1 to 3 months, the frequency depending upon the amount of drag-out. Zinc-aluminum anodes are recommended in the S-B solution.

The S-B deposits can be heat relieved, blackened, given phosphate coatings or

any of the chromate film treatments. They also can be soldered without difficulty. The deposits are unalloyed zinc, giving excellent protective value. The lustrous, silvery coating can be subjected to forming, bending or drawing operations without rupturing or lifting, according to the company.

Deep-Drawing Domes

(*Continued from page* 87)

chromium plate is helpful in minimizing this drag.

Hardened steel tools also reduce lubricating difficulties, and chromium plating not only gives a hard smooth surface, but introduces a new metal with a "greasy" characteristic. Chromium, favorable to free sliding contact, encourages a sliding action and minimizes galling and seizing even under severe conditions.

Removal of lubricant after drawing operations is also important. With intermediate annealing between drawing operations, it is necessary to thoroughly clean the metal before each anneal. If not, a hard abrasive deposit may be baked on the dome, aggravating frictional conditions during subsequent drawing. There are numerous commercial cleaners for aluminum alloys, but most have limited value for removing coatings of tallow or heavy drawing compounds, especially if the time elapsed between drawing and cleaning is sufficient to allow the lubricant to harden. These factors are all present in the fabrication of this propeller dome. Thorough cleaning is not a simple procedure. The very qualities desired for drawing operations complicate cleaning; high film strength and tenacious adherence to the metal make for difficulty.

Strong Caustic Cleaners Avoided

When tallow and heavier drawing compounds are used, a preliminary immersion in a penetrating bath (kerosene, benzine or one of the naphthas) is usually necessary. If the compound is very adherent, the part is actually wiped or scrubbed in this preliminary bath. For lighter coatings of lubricant, mechanical washing machines with high-pressure sprays suffice, operating the solution at 180 degrees Fahr. or more, followed by an equally hot high-pressure rinse. In this case most of the cleaning action is due to force and temperature of high pressure sprays, and a mild cleaning solution is used. To avoid water stains, the aluminum part passes immediately to the drying chamber. Strong caustic cleaners are not used for this grade of aluminum is readily attacked by strong alkalies, creating rough surfaces and increasing friction in subsequent drawing operations.

After one of the most severe press operations, the "strike" on a 1500-ton hydraulic Watson-Stillman press for 8 seconds in which the heavy compound previously described is used, the dome is taken from the press and given a quick wiping by hand in a kerosene bath before being placed on the conveyor to the

washing machine. Kerosene breaks down the coating and so aids effective cleaning by the hot high-pressure sprays. A clean bright aluminum surface is thus obtained for each drawing operation.

New Method for Making Offset Type Tools

Thompson Aircraft Products Co., Euclid, O., has developed an ingenious method for making offset type Carboloy cemented carbide tools.

In making the ordinary offset tool, the usual practice is to make the tool in two pieces—the tip and the shank. To make the offset it is necessary to mill off the side of the steel shank. However, such tools are now brazed by Thompson Aircraft Products Co. from three separate pieces—a head, a shank and the cemented carbide tip. Both head and shank are of cast Meehanite for all types ¾-inch or larger. Used standard tool shanks are also salvaged for this purpose when practical.

The head is cast in such a shape that it is ready to receive the tip. This eliminates milling to produce the offset saving both machine hours and material and also reduces the amount of machining necessary to provide a recess in the shank for the insertion of the carbide tip. The tip can be placed on either the right or left side of the head. Thus the same heads can be used for either right or left-hand offsets.

To braze the various sections of shank, the cemented carbide cutting tip, silver solder brazing alloy, etc., the parts are assembled and clamped in a vise. The brazing operation is then performed using a torch. Brazing of carbide tips is not at all difficult and requires only the provision of the simple brazing equipment available in most shops.

Wheels of 57 Alundum Offered for General Use

Announcement is made by Norton Co., Worcester, Mass., that grinding wheels made of their 57 Alundum abrasive are now available for general use. This abrasive is an improved aluminum oxide product which has proved to be a success in wheels for cylindrical grinding, centerless grinding, internal grinding and snagging (slow speed). The 57 Alundum abrasive is more friable than regular Alundum abrasive, hence these wheels have a fast, cool cutting action as they tend to keep themselves sharp but they also have the ability to hold shape and require few dressings. They have been successful especially in crankshaft grinding where the ability of the wheel corner to stand up is very important.

Production facilities at the time of introduction were limited so that it was necessary to confine the use of these grinding wheels to those critical war jobs where their special characteristics were most beneficial. Production capacity

now has been increased so that 57 Alundum grinding wheels are available in the patented Norton BE vitrified bond as well as in regular vitrified bond in a wide range of grain sizes, grades and structures for all uses.

No Return to Prewar Tin-Lead Solders Seen

The behavior of a solder joint of about 95 per cent lead, 2 per cent silver and 3 per cent tin in side seams of sanitary cans is reported as so satisfactory that it is unlikely that a return would be made to 70 per cent lead—30 per cent tin, even if tin were in unlimited supply.

This indicates that others who approach the problem of conserving tin in solder with the same will to succeed and the same intelligent adjustment of technique evidenced by the makers of sanitary cans may likewise find a complete and satisfactory solution.

The lead-silver solder thus bids fair to be not a "substitute", to be abandoned after the emergency, but a replacement for much lead-tin solder—from a report by the War Metallurgy Committee.

Colds Combated in Comic-Type Booklet

Common colds cause more absenteeism in war industry than all other causes combined, and this kind of absenteeism can be reduced by following simple health rules. These are the conclusions reached in a new comic type booklet "Common Sense About the Common Cold", issued by the Morale Building and Absentee Reduction Service, 52 Vanderbilt avenue, New York 17.

In this folder a popular picture technique is employed to point out the warning symptoms of colds and to give advice approved by an eminent medical authority for the treatment of colds.

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Insulating pinion gears from shafting by means of applying a bushing of rubber directly between gear and shaft to stop transmission of noise, shock, vibration and impact is a development announced by Bushings Inc., 3442 West Eleven Mile road, Berkley, Mich. Rubber or synthetic material can be inserted without the usual inner and outer metal sleeves, saving considerable cost, the company states. Special tooling is not required and two customary machining operations, milling keyways or flats, are eliminated. Process can be employed in virtually any equipment employing gear drives.

No special preparation of shafting or gear is required. After the material is in position, it provides a mechanical bond with the bore of the gear and the surface of the shafting of sufficient strength to transmit the required torque.

Arc Welding Electrodes

(*Continued from page* 101)

at figures below the minimum value specified for E6011 electrode and the minimum figure is shown in Table III as it was suspected that this is the value to be expected.

Ranges for current and voltage to be used with each diameter of electrode are given in Table IV. Here it may be noted that the spread is nowhere near as great as was listed for E6010 electrodes. This state of affairs is no accident. One notable requirement of E6011 electrodes is that they be used within a narrow range of current. Overheating leads to inferior physical properties. Similarly strange mechanical properties will be found when insufficient current is selected.

This point might be kept in mind should any difficulty be encountered in passing physical tests imposed by welding codes. In fact while it is a good idea to follow manufacturers suggested values with all electrodes, it is almost mandatory that you do so with E6011 electrodes.

Because the E6011 electrodes are rather new, not all of the possible approvals have been secured. A smaller list than was shown for E6010 electrodes is the result, although it is to be expected that E6011 electrodes will eventually qualify everywhere that E6010 have been accepted. At any rate the following codes and specifications have been met:

—American Bureau of Shipping, Hull Class 1 and Boiler Class 1.
—API-ASME Code for Unfired Pressure Vessels, Paragraph W-520.
—ASME Code for Unfired Pressure Vessels, Paragraphs U68, U69 and U70.
—Bureau of Ships Specification 46E3 (INT), Grade III, Class 1.

Although E6011 electrodes were developed with the specific needs of the shipbuilding industry in mind, the shipyards have not turned to this group in all cases. The explanation will be found in the current generating conditions in the various yards. While some of the newer yards are well equipped for alternating-current welding, most of the older yards are set up for direct-current welding.

Along the ways, especially, the older yards are accustomed to providing constant-potential generator outlets. A hundred or more welders take their current from resistance boxes along the feeders from a centrally located constant-potential generator of 1500 amperes minimum capacity. Since all of the welders are seldom welding at the same time, this is a most economical way of getting welding current. Besides these large generators have a high power factor which is often helpful in off-setting a less favorable power condition from other power driven machinery about the yard.

One drawback to the constant-potential generator is the restriction of one polarity. All of the welders must use