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STEEL

The Magazine of Metalworking and Metalproducing

AUGUST 7, 1944

Volume 115—Number 6

NEWS

TECHNICAL

FEATURES

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UNION CHAINS

STEEL
August 7, 1944

Are We Daniel Boones?

On Sunday, July 16, the University of Chicago "Round Table" treated its radio audience to a discussion by British economists broadcast from London. Geoffrey Crowther, editor of "The Economist", former investment banker in New York and a man who commands respect on both sides of the Atlantic, spoke as follows:

"Americans should realize that we in England are frightened of an American depression. We are more frightened of an American depression than of one of our own because after this war America is going to be the most powerful country economically. A depression of the 1929 scale in America will absolutely ruin our British prospects for prosperity and stability at home. We want to be assured that you in America are going to solve the problem of full employment."

Harold J. Laski, professor of political science, University of London, declared "a depression of the 1929 scale or anything like it in the United States would be a world calamity. The thing that disturbs me is that the philosophy of the American business man seems to me exactly the same as that which led the United States into the great depression of 1929."

Joseph Barnes, foreign editor of the "New York Herald-Tribune" retorted that American business men have learned a great deal since 1929. "Britain will make a great mistake," he warned, "if it thinks that we in America are Daniel Boones, each man with a musket and an undying belief in completely free enterprise."

Are American business men Daniel Boones?

With a few exceptions, they are not. All but a small minority have abandoned the idea that a lone-wolf business can prosper while all others languish. In our recent call for expressions as to the ideal conditions under which to conduct a business successfully, not one industrialist who replied asked for complete freedom. All recognized the need for industry group, national and international teamwork in maintaining prosperity. There were no notes of lone-wolfism or isolationism.

Consider the activities of the Committee for Economic Development and of other groups striving to find answers to economic problems. Keep in mind the scores of proposals for equitable tax programs.

These are movements initiated voluntarily by industrial, business and professional men. They indicate an attitude quite different from that which prevailed in 1929. American business men have not solved the problem of full employment, but they are working harder at it than any other group.

BLAZING THE TRAIL: "Must" reading for all holders of government contracts who sooner or later will be confronted with the intricate problem of contract termination is the story of the experience of the International Harvester Co.

The War Department on March 17, 1943, notified the Harvester company that its contract to produce tanks at its Bettendorf, Iowa, works was to be canceled. Inasmuch as this was the first major termination of contract experience in World War II, the entire procedure was attended by a considerable amount of pioneering. Apparently the principals performed a good job of trail blazing.

On July 27, 1944, officials of the Chicago Ordnance District announced that a final settlement in the Harvester case had been effected. It called for a payment of $25,300,000, about 12 per cent of the $217,000,000 specified in the original contract. The settlement involved not only extensive negotiation with the primary contractor, but also

(OVER)

detailed understandings with 438 "first-layer" and hundreds of other subcontractors.

Fortunately a complete transcript of the details of the long-drawn out procedure has been recorded. It should prove to be a valuable guide to other companies which will be facing contract terminations. —p. 58

* * *

THERE IS A LIMIT: In the present tendency in many quarters to provide a financial cushion to ease the shock of misfortune for employes are questions of policy which should not be decided solely by politicians or pressure groups.

The CIO is asking automobile manufacturers for a 12-day sick leave bonus per year for each hourly-rated employe who is a union member. The Senate is debating a proposal to pay $35 per week to war workers during the time they are idle because of shifts in industry from wartime to peacetime work. There are other demands and proposals of similar purpose.

In some of these cases the objectives are commendable. The intent is to compel all employers to be as considerate as the better employers have been on their own initiative.

The danger is that the benefits may be made so attractive as to encourage indolence and absenteeism. Experts who know something about employment should have a hand in these decisions. —p. 73

* * *

JOINING LIGHT ALLOYS: Before the war a number of light alloys, particularly aluminum alloys, were winning acceptance as structural metals. The use of some of these alloys in aircraft and other implements of war has brought about a tremendous increase not only in facilities for producing them in quantities, sizes, shapes and specifications for diversified applications but also in experience as to the best methods of fabricating them.

If industry is to employ these metals effectively, its designers and engineers must become familiar with numerous factors which bear upon the proper assembly of light alloy members. The common methods of joining metals—riveting, welding, brazing and soldering—and a new method of promise—resin-bonding—can be employed in assembling light alloy parts, but not indiscriminately. Prewar and wartime experience has developed accepted practices which should prove invaluable in the postwar period. —p. 84

OUTSIDE LOOKING IN: In digging into the much-publicized need of manpower in foundries and forge shops engaged in making parts for heavy trucks, one is confronted with a confusing array of inhibitions arising from the red tape of government. There are scores—perhaps hundreds—of able, sincere persons in government agencies who at one time or another have tried to do things that would have prevented the present bottleneck. They failed, not because of individual incompetence or neglect, but because the things they wanted to do could not be done without tramping on the toes of the prerogatives of other agencies.

A study of this situation shows that too many conditions have to be met before a go-ahead signal can be given. WMC is stymied by SS, WPB by WLB, Army Ordnance by OPA, and vice versa, and all may be stymied by pressure from unions. It is a complicated mess of inter-agency relations. Foundrymen and forge shop operators, the men directly charged with production, can do little more than look on helplessly from outside. —p. 53

* * *

SEEK BETTER BALANCE: With an eye to the future, Los Angeles manufacturers are studying the relation of some of the production and consumption statistics for the 11 western states with those for the entire nation.

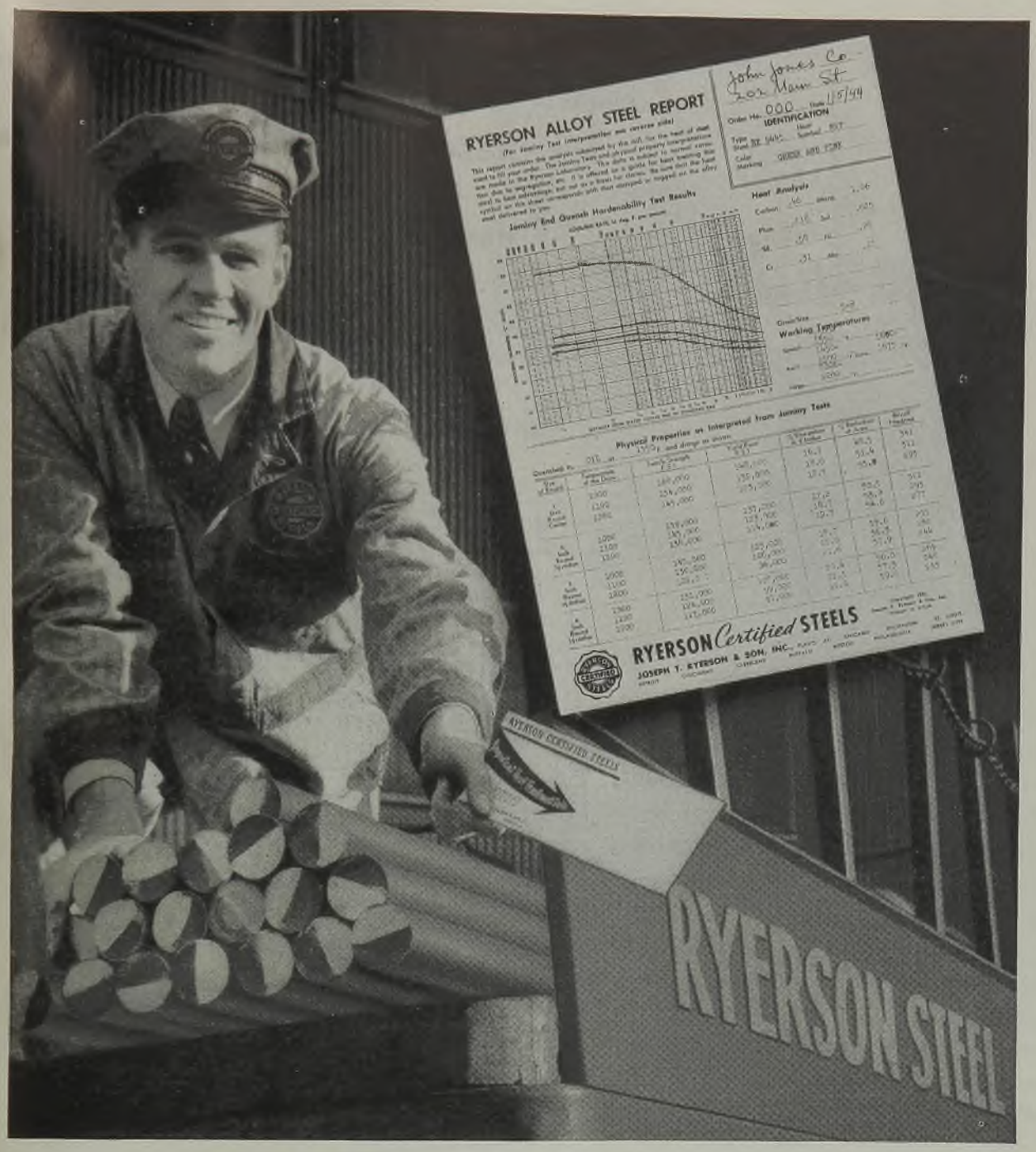
They find, for instance, that whereas in 1939, only 1.3 per cent of the national output of agricultural machinery was manufactured in these 11 western states, the farmers in this area spent 14.5 per cent of all the money spent in the nation that year for farm machinery. The Los Angeles authorities have similar figures for food processing machinery, canning equipment, gasoline dispensing equipment, etc., all indicating that the area is under-industrialized in relation to its consuming capacity.

These progressve leaders disclaim any desire or expectation of creating a completely self-sufficient economy. They realize that parity between consumption and production in a limited area is not feasible. They do seek a better balance between the two.

This approach, which recognizes economic factors, is infinitely more sensible than the political subsidies sought by some proponents of industrial decentralization. —p. 56

E. L. Shaner

EDITOR-IN-CHIEF



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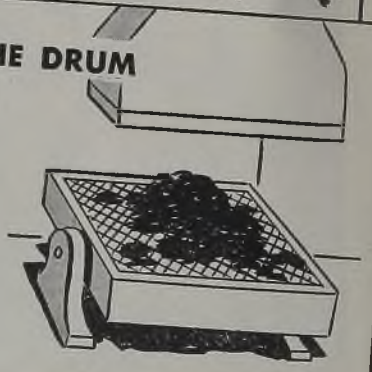

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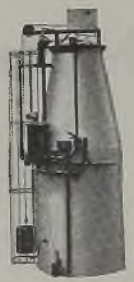

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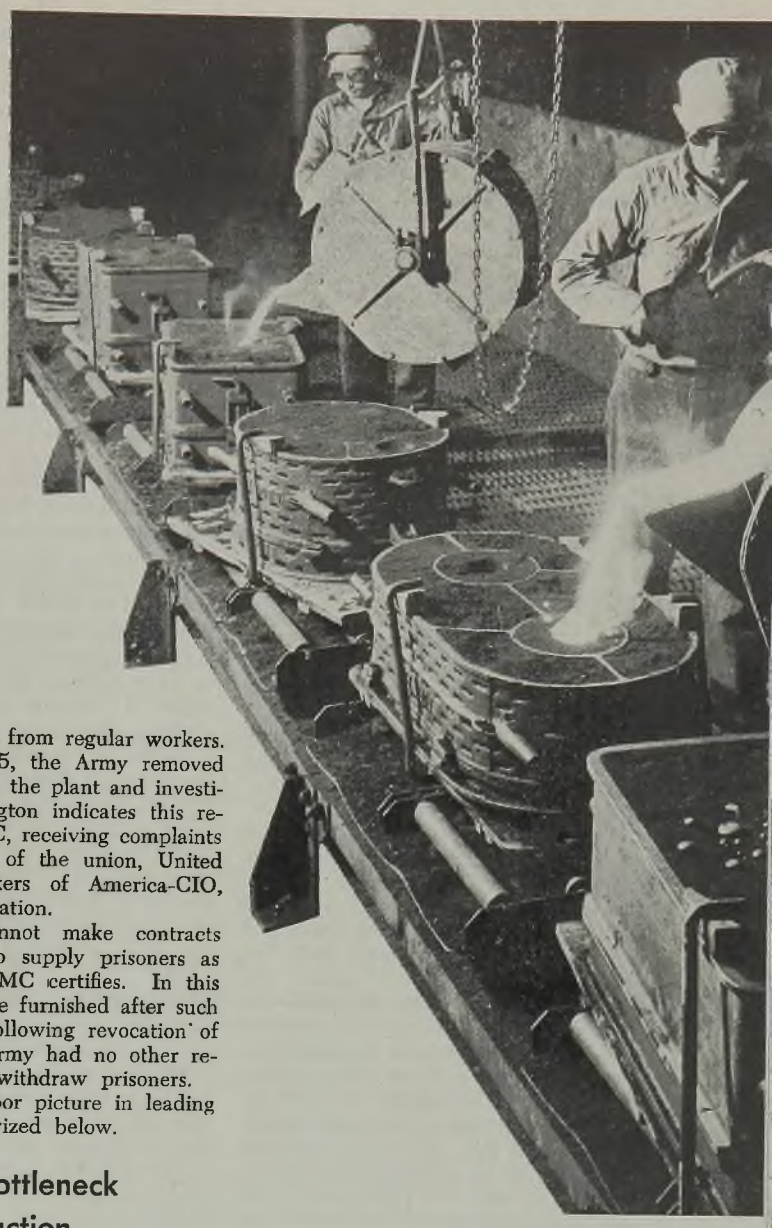
War Agencies Accountable For Shortage



Woke up too late to importance of castings in munitions program. Coddling of labor unions thwarting use of war prisoners to correct problem. July heavy truck output 40 per cent behind schedule

WHETHER the production of heavy military trucks is being retarded to the extent stated by government officials because of inability to obtain an adequate supply of gray iron and malleable castings is a moot question, but the fact remains that most foundries have a manpower problem that so far has defied solution.

For this situation, foundrymen place the primary responsibility on the government war agencies. These agencies, they charge, woke up too late to the importance of castings in the war program. Foundries were not given adequate consideration by the War Manpower Commission in labor recruitment; the Office of Price Administration has been reluctant to afford price relief; the base wages, often offered as a reason for the casting shops' labor shortage, are frozen by the War Labor Board; the Army apparently was slow to realize the size of the truck program required; Selective Service granted too few deferments in this critical industry.

Coddling of labor unions also has contributed to the shortage, and even now, with commanders on all fronts reporting damaging deficiencies in heavy trucks and other military items, foundries are prevented from hiring prisoners of war—simply because the unions object.

On July 24 sixteen German prisoners of war were sent to the Wilmington, Del., plant of Eastern Malleable Iron Co. from Ft. DePont. WMC had certified to the Army they were needed to do high priority work for which no labor was available locally. The Eastern Malleable plant force had been reduced from 800 to 500 workers and the plant had a backlog of 40 weeks' work, composed of high priority castings, notably for heavy military trucks.

Prisoners were young husky men and went to work enthusiastically and there was no complaint from regular workers. Next day, July 25, the Army removed the prisoners from the plant and investigation in Washington indicates this resulted when WMC, receiving complaints from top officers of the union, United Automobile Workers of America-CIO, revoked its certification.

The Army cannot make contracts with employers to supply prisoners as workers unless WMC certifies. In this case prisoners were furnished after such certification but following revocation of certification the Army had no other recourse except to withdraw prisoners.

The foundry labor picture in leading districts is summarized below.

Manpower Bottleneck To Full Production

NEW YORK

Foundries generally are suffering from a serious shortage of manpower and production is being held down by this shortage. If foundries could obtain more men, they could undoubtedly increase their production of war work, trade leaders declare.

Many foundrymen believe government agencies are primarily responsible for the present critical situation in their industry. Early in the war government agencies did not realize the great importance of the foundry industry to the war effort. This was particularly noticeable in the case of gray iron foundries, which predominate in this area. As a result, foundrymen declare, these agencies gave several other industries priority in occupational deferment and also in providing them with new workers.

"These agencies," one foundry leader declared, "woke up too late to the fact that gray iron foundries were a most important factor in the war effort, and they are now frantically trying to find ways to remedy the situation and are also trying to place the blame on the foundry industry, whereas the blame properly should be placed on the agencies who brought these conditions about."

Although the critical situation in the foundry industry has been discussed vigorously by various government agencies both in private and in public in recent months and these agencies have publicly stated they were trying to do all in their power to relieve the situation, there still does not seem to be the proper co-operation among all the various agencies, local and national.

For example, take the case of the new priority referral plan which was put into effect nationally July 1, 1944. Under this plan all industries receive a certain priority rating and also are given an employment ceiling and are not allowed to employ men when their number of employed reaches this ceiling. In view of the agitation about the shortage of la-

bor in the foundry industry, it would have been expected, foundrymen declare, that the WMC would have given the foundries a high priority rating and a high ceiling. Instead of this, most foundries were given a comparatively low priority rating and a ceiling, which in most cases, compared exactly with the number of men they were employing at the time.

The accusation that some foundries are doing a lot of civilian work which is interfering with war work is totally untrue as applied to the New York-Northern New Jersey metropolitan district, foundrymen assert.

Truck Lag 75% Due to Castings Shortage

WASHINGTON

At least 75 per cent of the blame for deficiency in heavy truck production is placed on insufficient supply of gray iron and malleable castings, according to those in charge of this program. July production of heavy trucks, defined by the Army as those capable of carrying four tons or more, was 40 per cent under schedule, and production of light heavies, capable of carrying two and one-half tons was approximately on schedule.

An impending shortage of gray iron and malleable castings was foreseen last September when a long range program was inaugurated. Two large new malleable foundries were authorized and plans were laid for bringing back into production a number of captive idle foundries mainly in the automobile industry. Steps were taken to increase man-hour output through mechanization and some twenty to thirty million dollars of labor saving equipment has been installed in gray iron and malleable foundries since last fall. Steps also were taken to convert a number of aluminum foundries to gray iron production. This long range program did not work out as well as hoped, with foundry labor shortages the principal reason. Resumption at idle captive foundries was hampered by lack of workers, also labor shortages prevented full utilization of new malleable foundries and of aluminum foundries converted to gray iron. In addition, foundry mechanization failed to produce expected results in many cases because of dissatisfaction over wage rates based on expected production rates after mechanization.

Several months ago the government agencies concerned joined in a short-range program aimed at relieving the foundry situation which had become much worse than anticipated last fall. Critical foundries were given top priorities on manpower referrals by USES, WMC undertook to spotlight the problem with publicity, and WPB issued directives under which critical foundries were to get out maximum production of most essential castings.

The foundry labor shortage is now estimated as 20,000 to 30,000 but it is admitted this may be beyond the mark.

Early in June the attack on the foundry labor problem was accelerated under orders of Director of Economic Stabilization. War Labor Board inaugurated a policy of expediting settlements of foundry wage disputes and OPA prepared to take quick action to permit foundries to charge higher prices when necessitated by higher wage costs. These adjustments were made in individual instances rather than on an industry-wide basis.

High-Pay War Plant Competition Blamed

BIRMINGHAM

Birmingham foundries lay most of the trouble in labor to competition from high-pay war industries, particularly such as Bechtel McCone Modification plant here. A. E. Thomas, president of Thomas Foundries Inc., said the labor shortage is general in most industries and not more so in foundries than elsewhere. "Most of these charges," Mr. Thomas said, "are a line of propaganda attributable to ignorance on the part of government agencies. If the foundries were let alone to paddle their own canoes they could work out their own salvation. We want to make it plain that, generally speaking, the production shortage is not due to a lack of foundry capacity but to special types of castings which the foundries, in most instances, were not allowed to convert to."

C. E. Hagler, vice president, Continental Gin Co., declared the trouble there lays specifically in inability to find molders. "We have the floor space and the material," Mr. Hagler said.

Col. Karl Landgrebe, vice president, Goslin-Birmingham Mfg. Co., declared his company had had no trouble outside of getting chippers.

Price, Wage Restrictions Prevent Higher Output

BUFFALO

While local foundries readily admit that military production schedules are not being met, they absolve themselves of all blame, attributing the lag to lack of manpower and OPA price restrictions.

Foundry officials generally told the same story. Reinhold D. Loesch, president of the Western New York chapter of the American Foundrymen's Association, and president of the Lake Erie Foundry Co., agreed to act as official spokesman.

"There isn't a foundry in the area that hasn't got more work than it can handle," Mr. Loesch declared.

"Our chief problem is lack of manpower. We just can't get men. Some of the small operators, holding top urgency subcontracts, aren't even on the labor priority list. Foundries in the area are working 95 to 100 per cent on war work. There are instances, where easier indications appear, and a civilan order is placed, but a foundry doesn't take

Cartoons Appearing Below and on the Following Pag

Terminations of war contracts occur as above because obsolescence is a normal pattern for weapons and equipment in a modern, fluid war. We must change our weapons and equipment to keep a step ahead of the enemy. The contractor, therefore, must be able to produce with one hand and settle terminated contracts with the other. Work on the old contract is halted and new work begins

such an order unless the WPB approves it."

Cleveland Picture Slightly Improved

CLEVELAND

Foundries here report that they have been able to increase their employment recently, although they are handicapped in accelerating the hiring pace due to the rather full employment of labor in this district. There is still a shortage of both skilled and unskilled workers.

Practically all foundries are operating fully on urgent work, although they are unable to determine in all instances whether the castings are going directly into a product required by the armed services. Until some system is evolved by which they can know at all times which of their high priority orders, a majority of which are in the AA-1 bracket, are most urgently needed, they will be unable to concentrate solely on turning the most critical castings.

Chicago Shops Need 10-30% More Workers

CHICAGO

Foundries in Chicago — for some months rated a critical labor shortage area—appear to be undermanned from 10 to 30 per cent. Production, it is estimated, could be boosted 25 per cent with full complements of workers. Result is, of course, that castings manufacturers are running behind schedule and are turning down business regularly.

Chief shortages are in journeymen molders and coremakers, the lack of common labor not being so acute.

Training of new skilled workers currently is stymied by the refusal of unions to let down the bar in rules. Majority of foundries would profit by a more foresighted union leadership, but as matters stand, their hands are tied.

Present, Past and Pending

■ REPUBLIC STARTS OPERATION OF CHICAGO COKE OVENS

CHICAGO—Republic Steel Corp. charged the first coal into its battery of 75 coke ovens here last week. Present schedule calls for putting the blast on its 1200-ton blast furnace Aug. 8 and for tapping the first iron Aug. 10. Original plans were to start coke ovens June 19 and the blast furnace June 23, but inability to obtain operating crews necessitated the delay.

■ FARM MACHINERY OUTPUT REACHES NEW HIGH IN JUNE

WASHINGTON—Production of farm machinery during June increased to $65,677,371, an increase of $4,530,357 over May and a new high for the year, War Production Board reported last week. Output for the year ended June 30 was 11.3 per cent behind the WPB program; exclusive of repair parts, it was 7.9 per cent behind schedule.

■ MONTHLY AIRCRAFT PRODUCTION SCHEDULE CUT SLIGHTLY

WASHINGTON—Aircraft production totaled 8000 planes in July, not including 151 which could not be tallied because of a change in acceptance procedure. This compared with an original schedule of 8499 planes for the month. Total for the first seven months was 59,961 planes.

■ NEW POWERFUL AIRCRAFT ENGINE PROGRAM INAUGURATED

BUFFALO—Plants of the Crevrolet Division, General Motors Corp., have started production of the new 2100-horsepower 18-cylinder Pratt & Whitney aircraft engine.

■ PORTER FIRM PURCHASES FORT PITT STEEL CASTING CO.

PITTSBURGH—H. K. Porter Co. Inc. of Pittsburgh has purchased the Fort Pitt Steel Casting Co., McKeesport, Pa., manufacturers of pressure and alloy steel castings.

■ BEAUMONT, WPB OFFICIAL, ACCEPTS GLOBE IRON POST

JACKSON, O.—G. A. Beaumont has resigned as chief of the Construction section, Steel Division, War Production Board, to accept a position here with the Globe Iron Co. He will be succeeded in Washington by T. E. Steele, assistant chief of the Construction section.

■ WMC TERMINATES MANNING TABLE PLAN

WASHINGTON—War Manpower Commission's manning table plan has been terminated due to recent changes in selective service regulations. Replacement schedules also are permitted to expire, due to draft emphasis on the youngest eligible registrants.

■ JUNE MUNITIONS OUTPUT 3 PER CENT BELOW SCHEDULE

WASHINGTON—Total munitions output in June dropped 1 per cent in dollar value under May and was 3 per cent below schedule. Peak production of combat and motor vehicles, ammunition, communications equipment, guns and fire control equipment, and ships has been scheduled 9 to 34 per cent above current levels.

Depict Steps in Settling Terminated War Contracts

An important executive of the company is appointed to handle the termination job. With the help of a booklet titled, "Contractors' Guide", and the aid of assistants trained in the government's termination schools, the executive does the job. Inventories are held down and when termination comes government equipment is segregated. Identification of equipment now saves time later on

Los Angeles Manufacturers Eye Farm, Food Machinery Fields

Production in prewar year lagged behind purchases. Industrialists believe expanded manufacture of these items will utilize part of war production facilities, and provide employment for displaced war workers

LOS ANGELES

BEATING the sword into the plowshare holds interesting potentialities in this area in postwar years.

Considerable opportunity exists to expand the production of farm machinery and food processing equipment in Southern California. The manufacture of farm tools and packing house machinery is expected to utilize space and equipment in many factories now turning out war materiel.

Possibility and opportunity for expansion in this field hinges upon the fact that the West is a heavy buyer of this type of equipment in proportion to western production of farm machinery and food processing equipment.

In some comparisons drawn recently from governmental statistics, the industrial department of the Los Angeles Chamber of Commerce discloses production of agricultural machinery in 1939 for the 11 western states was only 1.3 per cent of the national production, whereas in this same year, western farmers spent 14.5 per cent of all the money spent nationally for farm machinery.

Western output of food processing machinery was 5.1 per cent of the national production. Against this, 13.5 per cent of all the food processed and packed in the United States in 1939 came from the 11 western states.

The West processed 38 per cent of the canned fruits and vegetables and 72 per cent of the canned fish in that year. Los Angeles county with an extraordinary diversity of food crops—fruits, vegetables, meats, fish, grains—is dollar for dollar the highest food producing county in the United States.

Production of farming and food processing machinery in Los Angeles is only one of many machinery production opportunities declared to exist. The relationship in the 11 western states between the purchases of all types of machinery and their production shows a lack of balance.

In the matter of equipment used in gasoline service stations, pumps and measuring devices, the West purchased 16.5 per cent of the total national purchases in 1939, while western production of gasoline station equipment was so minor as to have no statistical significance.

Other Fields Offer Opportunities

The machinery fields which offer the greatest opportunities for western manufacture are, in addition to food and farm machinery, construction machinery (except mining and oil), internal combustion engines (except auto and aircraft), industrial cars and trucks, laundry, machine shop products, machine tool accessories, machine tools, mechanical power transmission equipment, metalworking machinery (forming and stamping), office and store machines, refrigerators and air-conditioning equipment, tractors, vending and amusement coin machines.

In these fields of manufacturing as a whole, the production value in the 11 western states in the year 1939 was $59,087,000, 2.5 per cent of the national total. In some of the above listed fields the western production was too small to be of statistical significance. Only in machine shop products of a miscellaneous nature was any considerable volume produced. In this industry, the production was 6.6 per cent of national production and amounted to a value of $23,853,000. Los Angeles share of this was $8,745,000.

Western industrial leaders declare any attempt to build a self-sufficient economy by balancing production against consumption would be unsound economically even if physically possible. What is maintained is that a need exists for a more normal relationship between western production of machinery and western purchases.

On the basis of figures for the 21 largest industrial centers of the nation, prewar Los Angeles was relatively one of the underdeveloped manufacturing areas of the country. In the year 1939 in Los Angeles, manufacturing wage earners accounted for only 4.5 per cent of the population. This was the lowest proportion to be found in any important industrial region in the country. Detroit manufacturing wage earners in 1939 totaled 13.7 per cent of its area population. Average proportion of industrial wage earners in all large manufacturing centers of the nation was 10 per cent.

Urgent need for this area to increase industrial activity is indicated in that at the end of the war 250,000 wage earners in Los Angeles will lose their present jobs. Aircraft plants and shipyards now having 474,000 on their payrolls, if they return to the 1936 production level, would employ only ten thousand.

Polls indicate that more than 80 per cent of these workers desire to stay here; 94 per cent of former residents now in the armed services have indicated a desire to return; and of the service men who have been stationed here, it is expected that 100,000 will remain or return.

In the employment of these workers and present plant equipment, the production of machinery used in the West is expected to be an important factor. It is to the same end that so much attention is now being given to postwar planning.

This step calls for getting contracts ready for termination so they will be in perfect shape. It is wise to discuss problems anticipated with the Army Procurement Office. The moment the contract is settled, subcontractors' contracts must be prepared for termination. Be certain the subcontractors understand everything or else subcontractors in the lower tiers will be completely confused

Future of Area's Steel Industry In New Markets

B. F. Fairless, president, U. S. Steel Corp., outlines problems created by expansion of Pacific's steel industry

SAN FRANCISCO

POSTWAR fortunes of much of the Far West's war-expanded steel producing industry will hinge primarily on the development of new consumptive markets in the Pacific Coast area, B. F. Fairless, president, U. S. Steel Corp., believes.

Mr. Fairless said last week he is hopeful that western steel consumption will be expanded after the war, but refused to commit himself as to probable trends. He indicated, however, that production of light rolled products, such as thin strips for tin plate, offers the best opportunity for steel outlets on the Coast. He also foresees a substantial export of steel.

Mr. Fairless declined to make any predictions as to postwar operation of Geneva Steel Co., the $200 million installation built and operated by Columbia Steel Co. for Defense Plant Corp.

Outlining the problems created by wartime expansion in steel producing facilities, Mr. Fairless pointed out that output of finished steel products in the 11 western states had expanded nearly a third, from 2,400,000 tons in prewar to 3,500,000 tons at present. At the same time, wartime consumption in the western area has increased to 6,700,000 tons. Of this demand some 3,000,000 tons of consumption at present is for steel plates.

Steel will cost more after the war, Mr. Fairless predicted. "Costs are up, taxes are up, wages are higher. Prices of all other things will be higher than before the war. Why not steel?"

POSTWAR PREVIEWS

SOUTHERN CALIFORNIA—Los Angeles manufacturers are studying the potentialities of the postwar production of farming and food processing machinery. See page 56.

WEST'S STEEL INDUSTRY— B. F. Fairless, president, U. S. Steel Corp., declared that the future of the West Coast's war-expanded steel industry hinges on the development of new consumptive markets. See page 57.

CONTRACT TERMINATION— Basic procedures developed in the settlement of a terminated war contract with the International Harvester Co., Chicago, expected to be used in termination of other contracts as victory nears. See page 58.

INTERNATIONAL CARTELS—Nation's businessmen are seeking an answer to what the future policy of the government will be toward international cartels. Government opinion divided on the issue. See page 62.

SURPLUS PROPERTY—Estimates by the War Production Board and Surplus War Property Administration indicate that approximately $15 billion in surplus material and property will be offered for sale in this country after the war. OPA has established an overall policy for price controls of surpluses. See page 65.

BRITISH PLANNING—Minister of Reconstruction of Great Britain presents to Parliament a comprehensive plan designed to assure prosperity after the war. British are placing emphasis on expanding exports. See page 68.

POSTWAR ALUMINUM— Increasing quantities of this versatile light metal already are being made available for applications which are not strictly of a war character. Newly developed alloys and availability in considerable tonnage are going to make aluminum an active contender in the materials market after the war. Improvements in fabricating methods also will prove to be a major factor. See page 84.

ROLL FORMING—For many years, circular items such as kitchen pans and light reflectors have been spun by expert technicians in very much the same manner as potter's clay is molded. But, the age of mechanization has invaded this field and the process involved may be a factor in postwar manufacturing methods. See page 86.

NERVOUS WELDING—A process by which vibration is combined with the metallizing technique appears to have many possibilities in making repairs as well as in production work. The hot metal in effect is crowded into usually inaccessible recesses. See page 92.

Notice of Termination is the stop-work order. All work on the contract must be halted unless a modification of the "cease-work" order is received. Immediate steps must be taken to terminate all subcontracts or purchase orders affected. Contractors of each tier must notify the subcontractors in the tier below them. Notification should identify subcontract, government contract number, and procurement office

Basic Procedures Developed in IH

Harvester company's experience offers guide to other manufacturers who sooner or later will face problem of adjusting canceled or reduced contracts. Complete data on all phases of work will facilitate and accelerate settlements, thus avoiding delay in reconverting to peacetime production

ANNOUNCEMENT by the Chicago Ordnance District on July 27 of final settlement of the first major war contract termination of World War II—International Harvester Co.'s $217,000,000 contract to produce tanks at Bettendorf, Iowa—has attracted wide attention. The settlement amounted to $25,300,000, or less than 12 per cent of the total contract.

In announcing the settlement, Col. John Slezak, chief of the Chicago Ordnance District, pointed out that negotiations with 438 "first layer" subcontractors and hundreds of other subcontractors were involved. "In addition to the large amount of money involved, this International Harvester Co. termination is especially significant in that it has provided an experimental basis around which part of the War Department thinking has flowed and it undoubtedly influenced the framing of the Contract Settlement Act of 1944 which became law on July 21," Colonel Slezak said.

"The War Department informed International Harvester Co. on March 17, 1943 of the termination of its tank contract. Since this was the first large termination of the war, it was necessary to pass through a "trail blazing" period of approximately six months developing procedures and methods of settlement. It is the opinion of the Harvester officials and the Chicago Ordnance District officials that under the existing statute and regulations, and with our internal organizations now fully trained, a similar termination could be completed in from four to six months."

Colonel Slezak paid special tribute to the International Harvester organization for the co-operative manner in which it worked with the War Department. "Assistance of many of its highly trained personnel in helping to untangle many of the difficult and complex problems which confronted all of us as termination pioneers was of great value. The efficient manner in which the company handled this important project has made possible the setting up of standard procedures which will prove of great assistance to industry as a whole as terminations gain in volume."

Pays Tribute to Company

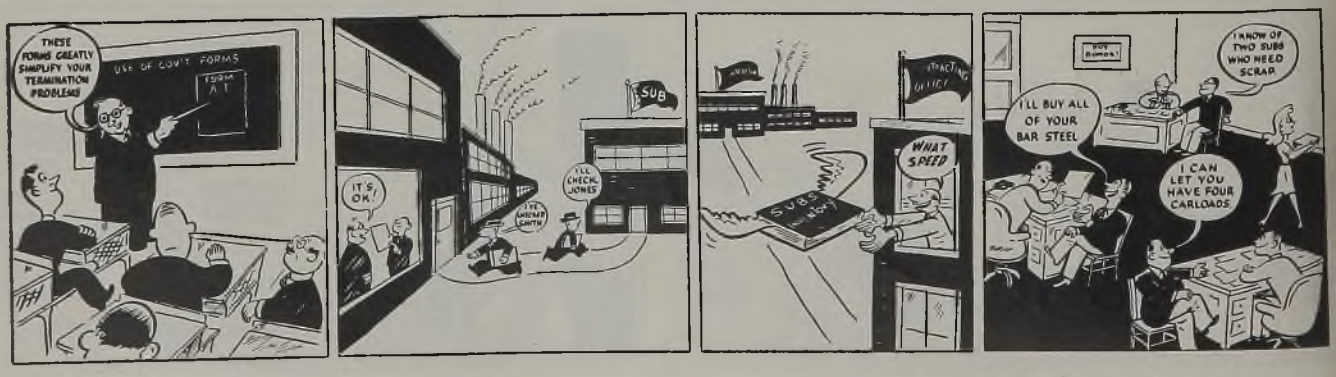
In a letter to Fowler McCormick, president of International Harvester. Maj. Gen. Levin H. Campbell Jr., chief of ordnance, paid special tribute to that organization's assistance in settling this important contract. "The spirit of cooperation, the hard work, the pioneering courage, and the whole-hearted efforts displayed in handling this settlement are indicative of the patriotic zeal of your organization. Indeed, they display the general good sportsmanship which is so characteristic not only of American industry, but of America itself. Thank you very much for your help and leadership," General Campbell said.

Cancellation of the tank program at Bettendorf was announced before the full production rate had been achieved. The program was not abandoned because the tank was inferior, but because only a certain amount of metal was available and the high command had deemed that other types of war equipment were more vitally needed because of the constantly changing conditions of war.

When the program was brought to a close, it affected approximately 1900 workers at Bettendorf alone and some 1400 in other Harvester plants. Soon after tank production ceased, these manufacturing facilities and much of the raw materials and parts were converted to manufacture of an urgently needed artillery prime mover. The plant now employs 1400 workers, who, in addition to building prime movers, are also starting on the re-manufacturing of M-4 medium tanks.

Because the Harvester tank contract cancellation was the first major termination, requiring 16 months to conclude settlement while policies and procedures were developed, and because these latter form the basis for the new Contract Settlement Act of 1944, much interest attaches to this company's experience and plan of operation. Speaking on "War Contract Termination Procedure" before an industry group meeting at California Institute of Technology, Los Angeles, recently, C. E. Jarchow, vice president and comptroller, International Harvester Co., Chicago, outlined with considerable completeness the company's organization and course of action. This detail, set forth in the following extensive excerpts, should prove a valuable guide to manufacturers both large and small who sooner or later will face terminations of contracts.

"Early in 1940, International Harvester indicated its willingness to undertake manufacture of any war product the government wished us to make. Our transition into war work was gradual up to



Prime contractors should train subcontractors in proper use of forms to avoid bottlenecks in termination. An examination of subcontractors' inventories before submitting to contracting officer is a wise procedure. Speed is essential on the inventory phase. Effort should be made to dispose of excess government property. Other contractors who can use this excess property should be contacted

Settlement

the latter part of 1941, but was rapid after Pearl Harbor. The total amount of war orders on our books at the close of our fiscal year Oct. 31, 1941, was $100,000,000; three months later, this jumped to $400,000,000, and a year later to $700,000,000. Our war products have been, first, regular products adapted for military purposes such as motor trucks, crawler tractors, power units, refrigerators, etc.; and, second, special war products such as 57-mm antitank guns, 20-mm airplane cannon, half-track vehicles, tanks, prime movers, airplane cowling assemblies, tracker units for gun directors, aircraft torpedoes, shells, and many other items.

"The largest of these orders was for the tank. In December, 1941, the War Department asked us to consider the manufacture of a new type tank under contracts aggregating $217,000,000. This tank then existed only on paper. It was to be streamlined, fast and quickly maneuverable, designed to carry a 57-mm gun, with a weight of about 20 tons and a size somewhere between the light tanks carrying 37-mm guns and the medium tanks carrying 75-mm guns. The government purchased an existing plant at Bettendorf, Iowa, in which we made alterations, additions, and rehabilitations to prepare it for tank production.

"Design of this tank was fairly well established about the time that Rommel drove the British forces back to the El Alamein line. As a result of that campaign, U. S. military observers concluded that this tank should be redesigned to substitute a 75-mm gun for the 57-mm gun. This necessitated substantial engineering changes so that this tank finally became a 28-ton instead of a 20-ton tank. Thus it became almost as large as the medium M-4 tank and, in many respects, was similar.

"Obviously, these new engineering changes necessitated modifications in material specifications, new machinery and equipment, and resulted in postponement of production. Along about March, 1943, when the tanks were beginning to roll off the assembly line, the U. S. Armored Force decided that tank production in the United States was greater than the Army's requirements. Inasmuch as this tank was the most recent addition to the line and was not required by military strategy to supplement other U. S. tanks already in production and use, the government decided to cancel this contract.

"We received a notice from the government in March, 1943, to stop production and hold up deliveries. The company immediately wired every subcontractor, later confirmed by letter, that production was to stop and deliveries held up, and they in turn were asked to notify their suppliers accordingly. In April the government issued formal notice of termination of the contract. The cancellation affected the Bettendorf tank plant, as well as 11 other plants of the company which were making parts and subassemblies for the tank plant. It also affected 438 subcontractors and many other firms making parts or assemblies for the subcontractors.

"This was the first cancellation of a large war contract made by the Army;

Signing of a final agreement with the War Department by Fowler McCormick, International Harvester Co., Chicago, closes the first major contract termination of World War II, involving $217,000,000. *Col. John Slezak, chief of the Chicago ordnance district, completes the settlement for the War Department as C. E. Jarchow, vice president and comptroller of the company, F. W. Jenks, vice president in charge of merchandising services, Henry P. Isham, chief of the purchasing, termination and renegotiation policy of the Chicago ordnance district, and Lieut. Col. J. W. Karraker, control officer of the district, witness the closing formalities*

Prime contractor meets with contracting officer's group to discuss methods and regulations of termination. Government removes its equipment and surplus materials from the plant as soon as possible. A physical inventory, identified in three categories, raw materials, work-in-process, production equipment, is taken. New uniform forms aid in dividing and listing the inventory

SETTLEMENT DIRECTOR: Robert Henry Hinckley took oath of office at the White House July 28 as director of contract settlement. Left to right: Harold M. Stephens, associate justice of the U. S. Court of Appeals; Mr. Hinckley; John B. Hancock, former chairman of the Joint Contract Termination Board; and James Byrnes, War Mobilization Director. NEA photo

there was no standardized procedure and, in a sense, we were something of a guinea pig. Frankly, we were very much at sea as to what the government would expect us to do in winding up this contract. It was recognized that there was an enormous quantity of materials, work in process, machines, tools, etc., to be disposed of. It was not known at that time whether these were to be transferred to other tank manufacturers, to government arsenals, or sold in the open market. Our first step was to set up a full-time organization at the tank plant, working in close harmony with representatives of the Chicago Ordnance District, to settle the many questions of procedure. It was not until approximately July 1 that a broad fundamental policy was agreed upon by both the parties.

"Representatives of the company, the Chicago Ordnance District and the Ordnance Department at Washington drew up letters of instruction, inventory schedules, and forms for the preparation of costs incurred as a result of the cancellation. The instructions had to do with two main phases: (1) The taking of inventories and obtaining offers or recommendations for disposal of the inventories; and (2) the preparation of cancellation costs. These instructions were sent to the various plants affected by the cancellation and to the subcontractors. The government indicated that it was not interested in the materials on hand (with few exceptions) and, therefore, it was necessary to obtain offers from suppliers and manufacturers so that the various items in the inventory might be disposed of. Much of this was a slow process.

"Practically all of our subcontractors, as well as ourselves, had had no experience with termination of war contracts. As we ran into difficulties, further conferences were necessary with the Ordnance Department with a view of improving the procedure and speeding up the settlements. The experience gained by the co-operative efforts of the Ordnance Department and the company in dealing with all the elements encountered in the tank termination helped to develop numerous policies and procedures which are now being used in other terminations.

"Some time after the tank contract was canceled, it was evident that other terminations, both partial and complete, would be received. It was apparent that the volume of termination work would increase in our company and that supervision by a central office organization would be required.

"Accordingly, an organization was set up as follows: (1) An advisory and co-ordinating committee; (2) a war contract termination department at the general office; and (3) a war contract termination organization at each of the plants.

"The advisory and co-ordinating committee is headed by one of the vice presidents of the company and includes representatives of the accounting and manufacturing departments. Its function is to co-ordinate the termination work, to define general policies, to make decisions on special problems, and to review progress on the various terminations.

"The second group, the war contract termination department, is made up of representatives of the accounting, manufacturing, storekeeping, and legal departments. It issues instructions and follows the progress of the work at each of the manufacturing plants and by subcontractors. It follows inventory schedules submitted to see that disposition is made of all materials as promptly as possible. Whenever necessary, it sends out field representatives to inspect suppliers' inventories and to assist them if

When contract is terminated, War Department sifts out materials needed for other war uses. After inventory list has been submitted to contracting officer, contractor may store government property not needed at own risk and expense for 60 days. Warehousing problem should be solved in advance. After 60 days it's the government's job to remove excess property from your plant

difficulties arise in the making of schedules and disposal of materials. This department also sends out traveling auditors to some of the subcontractors, reviewing their analyses of items included in cancellation claims and asking for supporting schedules and such further information as may be needed to complete the record. Cancellation charges accumulated at the various works are sent to this department for preparation of the overall claim of the Harvester company against the government. Cancellation charges from subcontractors are submitted to this department for review and approval. After claims have been approved by this department they are sent to the Ordnance Department for its approval following which they are promptly paid.

"The third group, the war contract termination organization at each of the plants, is made up of representatives of the storekeeping, accounting, production, and mechanical engineering departments. The size of this working group depends upon the number of terminations at each plant and upon the complexity of the problem. This group handles all termination work at the plant, including segregation and taking of a physical inventory, preparation of schedules, obtaining offers for disposal of materials, accumulation of cancellation charges, etc.

Many Contracts Are Affected

"We have today approximately 70 contracts which have been affected by complete or partial terminations.

"Our present termination procedure is as follows:

"When a notice is received from the government of a partial or complete termination, the plant organization immediately stops all work at the plant and wires all suppliers affected to do likewise. This is later confirmed by a letter to each supplier, with which is enclosed two forms. If the termination will not result in cancellation charges against the Harvester company by the supplier, he returns one of the above forms releasing the company from any liability arising out of that termination.

"If, however, the cancellation has resulted in stoppage of work already under way, or in an accumulation of inventories which must be disposed of, or in any other costs, the supplier returns the other form requesting our general office to send him instructions and schedules so that he may complete all work incidental to the termination. He then receives a set of standard instructions together with schedules for reporting inventories and cancellation costs. The instructions set out the various steps necessary, including the taking of an inventory, obtaining offers and making complete disposition of every item; also the method of summarizing cancellation charges, the accumulation of claims of subcontractors, the use of public accountants, etc.

Separate Inventory Schedules

"Generally speaking, there are eight separate inventory schedules to be submitted, covering raw materials, standard parts, semifinished parts or assemblies, tools, dies, jigs and fixtures, etc. Sample inventory schedules fully filled out are sent with the instructions which serve as a guide.

"In the case of terminations of machine tool contracts, a special letter is sent to the supplier asking him to stop work and enclosing the two forms—one a request for instructions, the other a release. If the subcontractor indicates that a claim will be forthcoming because of the cancellation, he is asked to prepare a schedule showing the stage of completion of the machine tool which has been canceled and the amount of the claim. This is then presented to the government to ascertain whether or not the machine tool should be completed, or the order canceled and the claim accepted.

"Reporting of inventories is done in considerable detail. Inventory schedules are prepared in three stages, the first when the physical inventory has been taken; the second when offers have been received; and the third when all materials have been disposed of. As soon as a physical inventory has been taken, 22 copies of each inventory schedule are prepared showing complete detail with respect to the kind of material, specifications, name of purchaser, quantities on hand, and invoice cost. Eleven copies of each schedule are immediately sent to the Ordnance Department to be distributed to the various ordnance outlets with a view of expediting disposition of materials.

"When offers have been obtained on all items in the inventory, the prices offered and the explanation of the offers are inserted on all of the copies on hand and three of these are sent to the Ordnance Department. When all of the offers in the schedule have been approved and when the materials have been entirely disposed of, the proceeds realized are entered on the remaining copies of the inventory schedules and two of these are sent to the Ordnance Department. In each of these three stages, one copy is sent to the Harvester general office war contract termination department and one copy retained by the supplier, or by the Harvester plant.

"With regard to the disposition of inventories at our own plants, our manual of instructions emphasizes four essentials:

Competent Organization Necessary

"First, that the war contract termination organization at the plant must be made up of competent personnel to carry the job through efficiently and quickly.

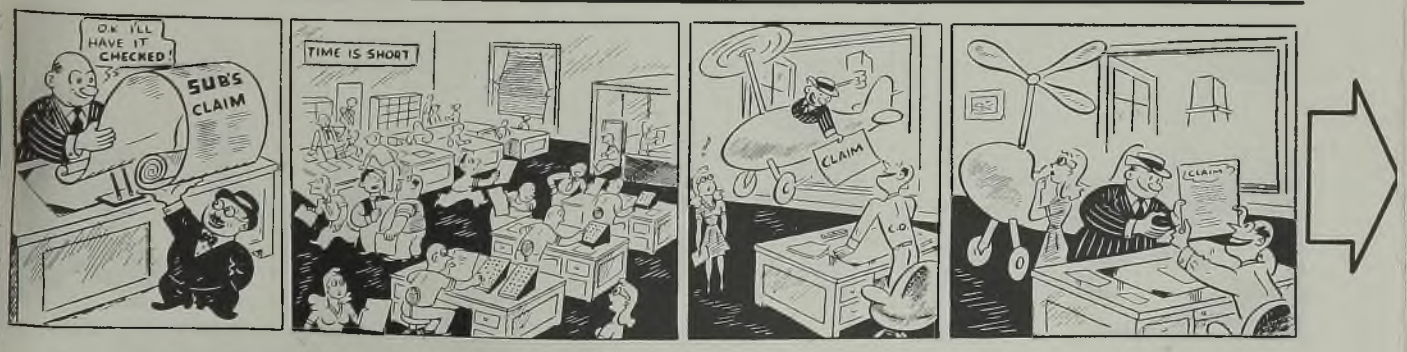
"Second, that the materials involved in a termination must be segregated and moved to another location and a careful physical inventory taken. Any inventory which is to be retained by the plant at its full cost and which consequently will not become a part of the cancellation charges will, of course, not be segregated or included in the inventory schedules.

"Third, that the inventory schedules must be accurately prepared, setting out the various items in complete detail so that they may be readily identified; items of a like character must be grouped together.

"Fourth, that offers must be obtained for the disposal of all materials, etc.

"In making such disposition, we first canvass our own plants to see whether or not any of the items can be used there; we then canvass suppliers from

(*Please turn to Page* 182)



Subcontractors' claims should be checked by prime contractor before being submitted to contracting officer for final approval. Prime contractor must then submit his own claim on the proper government forms. The claims should be complete before handing to contracting officer in order to facilitate the final settlement. Exclusion of unreasonable and unallowable costs will save time

Government Experts Hold Diverse Opinions on International Cartels

Businessmen wonder what future policy will be, but can obtain no reliable information from either state and justice departments. Two recent addresses illustrate sharp differences in opinions

UNITED States government officials usually are at a disadvantage when discussing international problems with representatives of the principal foreign countries. The reason is that whereas the agents from abroad usually know what their countries want, or can get a quick ruling from their superiors, our own representatives all too often do not know what the United States wants.

This situation, in turn, is likely to place difficulties in the path of United States businessmen who are interested in foreign business. In particular, many United States businessmen would like to know the future policy of this country on the subject of international cartels. In the past, many of them have gone ahead and used their best judgment—and had their fingers badly burned. Now, with the postwar era shifting into closer view, they do not want to get into the same trouble again.

However, they have no place in government where they can get sound advice, and they would get no comfort out of trying to gage the prevailing trend of thought about cartels. The government experts are not at all in agreement.

Two recent addresses illustrate the sharp difference in opinion on the subject of cartels that divides the two principal government departments concerned with this problem—the Department of State and the Department of Justice. One of them was made June 30 by Corwin D. Edwards, the State Department's consultant on cartels, before the Consumers Union of Washington. The other was made in New York on July 13 by Wendell Berge, assistant attorney general, before the state-wide meeting of the Affiliated Young Democrats Inc. of New York state.

International trade should be encouraged, the reciprocal trade agreements policy of our government should be promoted, and tariff barriers should be lowered or removed wherever possible, said Mr. Berge. But, he added, "cartels, which are in effect privately-erected tariff barriers, are illegal and must be completely abolished."

Cites Alleged Harmful Effects

"The pattern of cartel operations is fairly well known because of public revelation in the last few years in antitrust suits and congressional investigations," said Mr. Berge. "The public now knows that cartels are devices to restrict trade; that they divide up world territories into non-competing areas; that they divide among their members technical fields of operation; that they often fix prices directly and almost always indirectly; that they suppress technological advances through various systems of control of new scientific developments; that they artificially limit production and thereby reduce employment; that they create a new and false set of loyalties among their members, which often conflict with national loyalty and patriotic duty, and that they subvert and interfere with government foreign policy.

"The American people," he went on, "are well aware of the danger represented by a cartelized economy in which monopoly and power-hungry groups seek to control economic and political life on a basis of privilege. The experience of Germany in recent decades demonstr all too clearly the vicious results union between cartels and paternal government. The keynote of a mo olized economy and a feudalistic poli regime becomes suppression. No petition is permitted. Those who e cise their initiative are considered l leggers, chiselers, and finally become laws. Once competition is elimin there is only a short step to the sup sion of free speech and the right to icize. A society so constituted can dure only by a reign of force, as wit Nazi Germany."

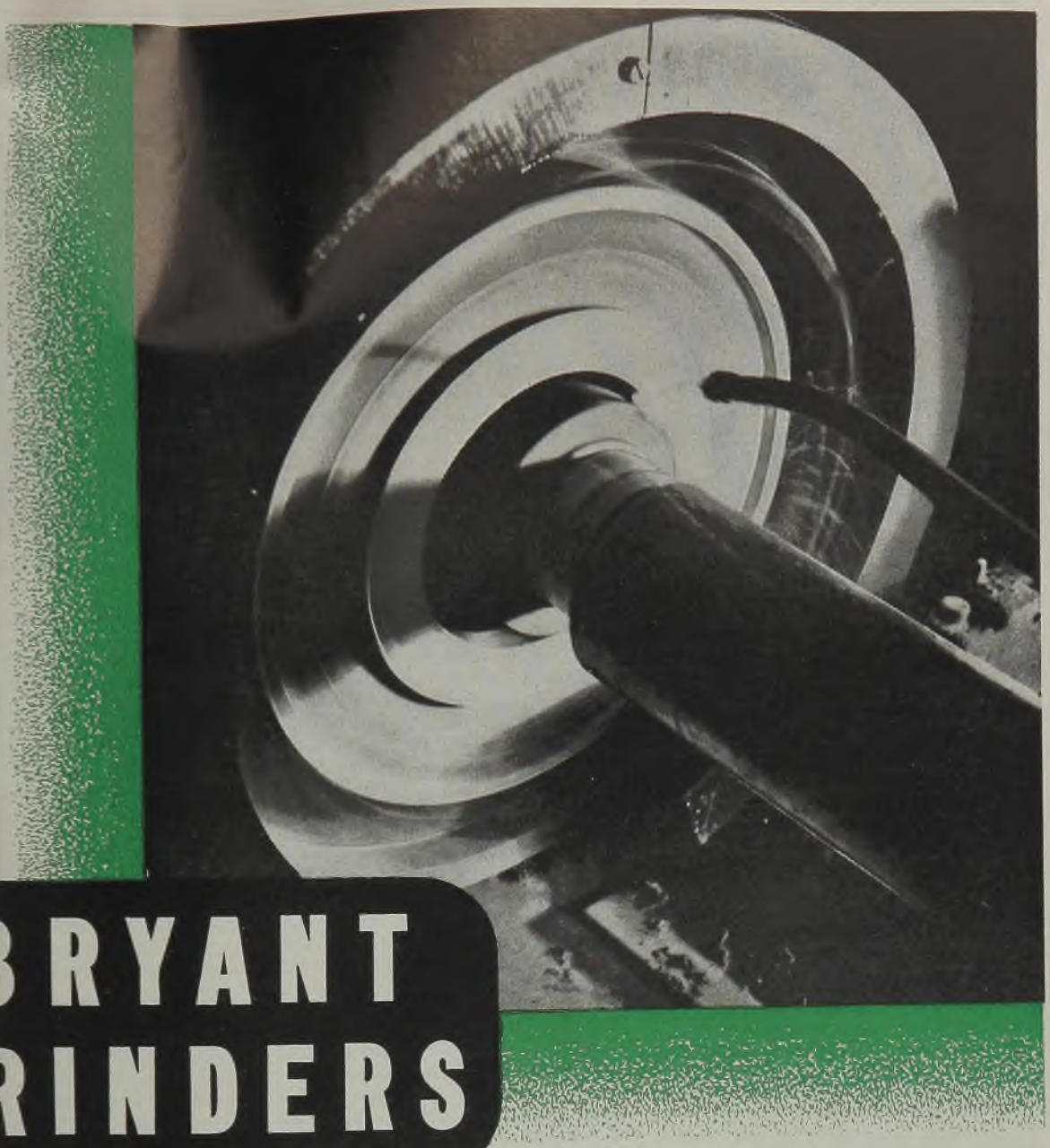
Mr. Berge's address made no r ence to the fact that other countries sides Germany participated in inte tional trade cartels without becon totalitarian. In general, his talk be regarded as a fair expression the Department of Justice's attitude respect to cartels. Mr. Berge's add called on Americans as a people "throw our weight against the conti ance of the cartel system in the post world." He added that "there is s reason to believe that the exposure secret cartel practices is having its ef on the public policy of other count and is promoting common understa ing that certain types of activity sho be outlawed in other countries as w as here."

Mr. Berge also was of the opinion t the existence of cartels would cause harm to American business.

"Irrespective of the extent to whi other governments adopt policies simi to ours," he reasoned, "there would see to be no doubt that American busine can compete successfully with forei cartels even if they continue their prese organization and practices. Cartels, has been noted, result in higher cos higher prices, restricted markets, a shortages of goods. Freed of the shackles, American enterprise should able to expand in world markets a render foreign cartel control ineffecti It is doubtful, indeed, whether any m jor international cartel can effectiv control world markets without the p ticipation and co-operation of the Ame can segments of the industry."

Mr. Berge did not go into explanato

Most terminated contracts are settled by negotiation. Contracting officer has full authority to agree on the amount to be paid. Other recourses, besides negotiation, are available to the contractor. When the claim has been settled, the contractor submits his invoice to the government and receives final payment for the amount settled upon by the contractor and the government's contracting officer



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CORWIN D. EDWARDS

detail when he made his statement to the effect that anticartel sentiment is gaining in other countries.

The State Department's view, as expressed by Mr. Edwards, differs sharply from that expressed by Mr. Berge. Mr. Edwards admitted that cartels have numerous undesirable aspects. They limit production and run counter to efforts to improve standards of living. They hold up prices and discourage competition.

But, as Mr. Edwards realistically pointed out, there are numerous situations in which cartels are likely to appear. These include (a) the desire of powerful business enterprises to exchange inventions; (b) the desire of established industries to cope with threatened loss of markets; (c) the desire of industries to cope with governmental trade barriers; (d) the desire to maintain the exports of highly specialized countries; (e) the desire of independent concerns to do business in cartelized markets.

Following an analysis of the whole cartel problem, Mr. Edwards advanced the conclusion that several important questions of policy toward cartels await decision.

"The first of these," he said, "is whether our future handling of the cartel problem shall depend, as heretofore, exclusively upon our own government machinery and shall carry out a policy which we have determined separately for ourselves, or whether we shall join with other nations in working out a common program of action and in putting it into effect by co-operative means. If the latter alternative were chosen, an attempt to develop principles on which the various nations could agree would be essential, and each country might find it necessary to make some changes in its prewar policy.

"An intermediate course of action is possible in which we and other countries would act together in dealing with parts of the problem about which we agree, but would reserve our freedom to follow different policies in other respects. For example, agreement might be reached to forbid cartels to restrict production, but the different countries might disagree whether or not cartels should be permitted to withhold the research of their members from use by non-members. The latter question would then be dealt with by each country in accord with its own policies.

"Closely related to the question of whether we act alone is the question as to the direction of our future policy, insofar as this policy is not to be regarded as already determined by the Sherman act and the Webb-Pomerene act. Diverse opinions as to future policy toward cartels are being advanced by private groups here and abroad. They include complete abolition of cartels, regulation of the structure and practices of such groups, and active fostering of cartels as the typical method of organizing postwar international commerce.

"In developing our postwar policy, we must decide not only the general direction of our program, but also whether there are to be any exceptions to it, and, if so, in what fields. Among the industries for which claims to exception must be examined are international transportation and communication industries, such as aviation, shipping, cable, and radio, some of which are regulated domestically as public utilities; industries bearing upon military security, such as munitions; industries in which a natural resource may soon be exhausted, such as certain minerals; industries which are limited in size and regulated in order to protect public health and morals, such as the production and sale of narcotics; and certain industries producing agricultural commodities which sometimes suffer from market fluctuations so severe as to cause widespread distress. If it is decided that the special circumstances of any of these industries justify types of restriction which are not generally acceptable, a question will arise whether these restrictions should be established and administered by private agreement or whether, alternatively, intergovernmental agreements should be used."

Must Protect American Exporters

If in the postwar world cartels are permitted to operate abroad in ways which are forbidden in this country, issues will arise about our policy toward the operations of American exporters in foreign cartelized markets and toward the importation of commodities which are controlled by foreign cartels, said Mr. Edwards. In that event, "it will be necessary to determine what steps this government should take to prevent the foreign cartel from destroying the independent American exporter, and what steps we should take to assure the United States an adequate supply of foreign cartelized goods at reasonable prices."

It has been suggested that governments "agree to prohibit such practices as price-fixing, restrictions of output or exports, allocation of markets, and suppression of new inventions; and that each government undertake to enforce this agreement within its own jurisdiction." said Mr. Edwards. "Modifications of national laws and international conventions governing patents have been proposed in order to prevent the use of patents for restrictive purposes and to make new inventions more widely available. Interchange of research which has been sponsored by government has also been suggested. It has been proposed that in those special cases in which control over prices and output would serve a public purpose, international agreements for such control should be made between governments instead of between private business enterprises.

WENDELL BERGE

Would Establish New Agency

"It has been suggested that an international agency be established to help carry out such a program by keeping a record of international private agreements and of the structure and control of international combines and by investigating complaints of restrictive cartel activity in order to recommend corrective measures to the participating governments. Such an agency, it is suggested, might also promote the interchange of new scientific discoveries and industrial ideas and might, from time to time, recommend further steps toward an agreed economic policy among the nations as to trade practices."

Public discussion of the problems raised by cartels, and of the different ways of dealing with them, Mr. Edwards concluded, is necessary in order that a sound national policy may be evolved with public support.

"In this field, as in other aspects of postwar policy," he said, "the only sound course is to begin by obtaining agreement upon broad principles which determine our general direction; then to explore alternative means; and finally to take action where we can agree upon a practical program, while leaving to future experience and discussion the matters which are not yet clear."

Fifteen Billion Dollars Worth To Be Sold in This Country

Reconstruction Finance Corp. making surveys of government-owned industrial plants to determine which can be converted to civilian production when war ends. Larger units studied for adaptability to subdivision

APPROXIMATELY $15 billion in surplus materials and property will be offered for sale in this country at the close of the war, according to estimates by the War Production Board and the Surplus War Property Administration. This estimate does not include food, military construction, plants that the government will maintain in a stand-by condition or convert for other government purposes, or material that will be disposed of in other countries.

Total of surplus material at the end of the war has been variously estimated at up to $100 billion, and the Baruch-Hancock report placed the total at $50 billion, including $15 billion in government-owned plants. Much of the surplus, especially food and material which can be used for the rehabilitation of devastated areas, is expected to be disposed of in foreign countries.

Of the $15 billion of material for which a market will be sought in this country, $6 billion will be in industrial facilities; $1 billion in war housing; $4 billion in Army and Navy equipment; $1 billion in government-owned stockpiles; and $3 billion in manufacturing inventories.

Policies Depend Upon Agreements

Some of the implements of warfare that will be in good condition when the war ends will not be put up for sale. This will be true of some of the plants, considerable ordnance, merchant ships and stockpiles of raw materials. How much will be retained cannot yet be accurately estimated, since postwar policies will depend on international agreement, future legislation, and the size of the peacetime military organization.

WPB estimates of the plant to be held in stand-by condition for future needs run to $5 billion. WPB also figures that approximately $9.6 billion of the government's $15 billion investment in industrial facilities can be put to peacetime use, but that the location, unadaptability and other factors deterring sales will reduce the disposable surplus to $6 billion, of which half will require conversion for peacetime use.

Industrial surveys of all the war plants that may become surplus are being made by the Reconstruction Finance Corp. RFC has informed Will Clayton, surplus property administrator, that:

"We are making cost comparisons both in construction and operation between different plants in given fields and between different products that are competitive or potentially so. . . . We are undertaking studies of individual plants, such as the magnesium plant at Las Vegas, Nev., and the steel plant at Geneva, Utah, to determine postwar possibilities. This includes methods of cutting operating costs (whether through operating economies, process change or further capital expenditures), of developing by-products, of improving products and processes, and of developing uses of new war time products and increased war time capacities. . . .

"With respect to the steel plant at Geneva, we are going into prewar, current and potential demand for steel products in the western area, and are continuing our endeavor to lower transportation costs in order that the plant might be adapted to products that it can market economically."

The larger government-owned plants are being studied with a view to their adaptability to subdivision.

Inventories of munitions manufacturers today are held to about $10 billion because of the controls exercised by WPB. These include raw material, goods in process and finished items. It is estimated that not more than 30 per cent on hand at the end of war will serve a civilian purpose.

OPA Outlines Methods for Price Controls on Sales of Surpluses

BROAD overall methods of price control for sales by the government of all commodities except food and those commodities originally purchased for resale or stockpiling were announced last week by OPA.

These methods, which become effective Sept. 1, or earlier at the option of any government agency, apply to sales of all commodities except food by a contractor whose contract has been terminated, selling for a government agency.

Designed particularly to cover the disposal of vast quantities of material by the government in the reconversion period, the new order seeks to keep prices within stabilization limits.

Authority will be vested in field OPA offices as well as in the national office to establish special ceiling prices on sales where one of the listed methods is not found suitable.

To save needless work on ceiling prices, the order provides that where the government agency has knowledge of market conditions and has good reason to believe that prices obtainable for the commodity to be sold are substantially below existing ceilings, no ceilings need be determined.

The various methods of determining maximum prices fall under five general headings, as follows:

1. Sales of new commodities: Dollar-and-cent ceilings already established in various regulations are made applicable to sales of new commodities, with the type of buyer determining whether the government agency may sell at the manufacturer, wholesaler, or retail level of price ceilings.

Where a heterogeneous group of new commodities held at one place is sold to one purchaser and where the determination of dollar-and-cent maximum prices would be unduly burdensome, the entire group of commodities may be sold at the acquisition or replacement cost. Where this heterogeneous group consists of new and used, or all used, commodities, the maximum price for the entire group may be 75 per cent of the acquisition cost.

War contract termination inventory may be sold at not to exceed dollar-and-cent ceilings or acquisition costs.

2. Sales of used commodities: Maximum prices for used commodities will be determined by use of (1) dollar-and-cent ceilings where they exist; (2) formulas contained in existing price regulations for the same commodities; or (3) formulas proposed by the selling agencies and approved by OPA.

Some Scrap Not Listed

3. Sales of scrap materials: Maximum prices for scrap materials will be the dollar-and-cent ceilings where they exist in other OPA regulation. Scrap not listed in those regulations may be sold without price ceilings.

4. Applications for special maximum prices or exemptions: Where ceilings in dollars-and-cents are not provided, and the alternative methods provided are not utilized, the government agency may apply to OPA for a special price ceiling or an exemption from price control.

5. Sales in reliance upon buyer's certifications: In sales of any commodity, the government may sell at a price not to exceed the maximum price applicable to purchases by the buyer from usual sources of supply, provided that the buyer certifies to the government agency that the price paid does not exceed the applicable maximum price.

Authorizes Placement of Unrated Orders for Specified Equipment

New order under WPB's reconversion program permits companies to place unrated purchase orders for 15 types of capital equipment, including machine tools, manufacturing machinery and similar equipment. Revision of restrictive orders pends

COMPANIES desiring to get ready for postwar civilian goods production may place unrated purchase orders for 15 specific types of capital equipment, including machine tools, manufacturing machinery and similar equipment.

This was announced last week by the War Production Board and constitutes the third of four steps which are being taken to provide for reconversion of industry and to permit such limited civilian goods production now as may be undertaken without interfering with the war effort. The first, effective July 15, released aluminum and magnesium for civilian manufacture; the second, effective July 22, authorized production of postwar experimental models. The fourth, easing restrictions in specified orders, will be effective Aug. 15 and is outlined below, as unofficially reported.

Before an unrated purchase order may be placed for new machinery or equipment, it will be screened by WPB field offices to determine whether existing suitable equipment is available in idle or excess stocks. Priorities regulation No. 24, effective as of July 29, overrides restrictions that have applied to machine tools up to now and permits unrated orders to be placed, accepted and filled if the buyer obtains WPB approval before he places his order and if the producer obtains permission to put into production the items needed to fill the order.

Application for WPB's approval of the placement of unrated orders should be in the form of a letter indicating the type of equipment that the purchase order will cover, including make, size, and approximate price. It should be filed with the nearest WPB field office.

Machinery manufacturers who receive unrated orders placed under the new regulation may obtain permission to fill such orders by filing form WPB-3898 with the nearest WPB field office. This application is for permission to make a specified dollar amount of equipment during a specified period.

If a person wants to place a purchase order for any type of machine tool or equipment, whether or not covered by the order, that will be used eventually to produce a product that may not be manufactured at present under WPB restrictions, he may apply on form WPB-1319 for a preference rating with which to place his purchase if he cannot get assurance of delivery on an unrated order at the time he needs the new equipment.

All rated orders must continue to be filled prior to any unrated order for tools or equipment, as required under priorities regulation No. 1. Furthermore, the new regulation does not permit any construction, which continues to be governed by provisions of order L-41.

Specific types of machine tools, manufacturing machinery and similar equipment for which unrated orders may now be placed are covered by the following WPB orders:

E-1-b, Machine Tools; E-9, Precision Measuring Instruments and Testing Machines; E-11, Foundry Equipment and Metal Melting Furnaces; L-89, Elevators and Escalators; L-123, General Industrial Equipment; L-193, Conveying Machinery and Mechanical Power Transmission Equipment; L-221, Electric Motors and Generators; L-226, Printing Trades Machinery; L-250, Electric Motor Controllers; L-268, Oxy-acetylene Apparatus; L-287, Portable Conveyors; L-298, Resistance Welding Equipment; L-311, Logging, Lumber and Wood Products Machinery and Equipment; L-314, Lubricating Equipment; and L-332, Container Machinery.

Easing of Restrictions Pends

The fourth step in the WPB reconversion program will be the relaxation of restrictions contained in certain "L" and "M" orders, to be made effective Aug. 15. At that time, regional WPB offices will be empowered to authorize civilian production on the basis of local supplies of manpower and materials. Individual manufacturers will have to apply to WPB for approval to start manufacturing the civilian goods, since there will be no automatic lifting or revision of the "L" or "M" orders.

Most of the items judged critically inadequate by WPB's Office of Civilian Requirements are covered in the tentative list of regulations to be relaxed. Relief from restrictions will be granted only with respect to what and how much can be made but not with respect to styles and models where simplification has been ordered or in the amount or weight of any material.

The following are reported as tentatively listed for possible relaxation:

Aluminum and Magnesium — M-1-i, aluminum; M-2-b, magnesium.

Automotive — L-80, outboard motors and supplies; L-180, replacement storage batteries; L-254, internal combustion air-cooled engines; L-270, automotive maintenance equipment; L-331, motorcycles.

Building Materials — L-142, metal doors, metal door frames and metal shutters; L-225, electrical conduits.

Consumers' Durable Goods—L-6, domestic laundry equipment; L-13-a, metal office furniture; L-18-b, vacuum cleaners; L-21-a, automatic phonographs and gaming machines; L-27, vending machines; L-30-a, galvanized ware; L-30-b, enameled ware; L-30-c, cast iron ware; L-30-d (paragraph c), miscellaneous cooking utensils and other articles; L-36, umbrella frames; L-37-a, musical instruments; L-49, beds and bedsprings; L-52, bicycles and parts; L-62, metal household furniture; L-65, electrical appliances; L-67, lawn mowers; L-73, office supplies; L-92, fishing tackle; L-98, domestic sewing machines; L-104, metal hairpins; L-136, church goods; L-140-b, flat and hollow ware; L-176, electric fans; L-227, fountain pens and mechanical pencils; L-227-a, pen nibs; L-227-b, pencils and penholders; L-301, power cycles; L-308, domestic food dehydrators; L-329, staples and staplers.

Copper—M-9-c, M-9-c-1, M-9-c-2, M-9-c-3.

Farm Machinery—L-257.

General Industrial Equipment—L-89, elevators and escalators; L-292, food processing machinery.

Government—L-55, shotguns (those made for law-enforcement agencies).

Lumber and Lumber Products—L-205, house trailers.

Miscellaneous Minerals — M-95, rhodium; M-146, quartz crystals; M-199 (paragraph e), treasury silver; M-302, osmium.

Plumbing and heating — L-75, coal stokers (class B); L-173, domestic space heaters; L-182, commercial cooking and food and plate warming equipment; L-185, water heaters; L-187, cast iron boilers; L-199, plumbing and heating tanks.

Printing and Publishing—L-188, loose-leaf metal parts and units.

Radio and Radar—L-151, domestic watthour meters.

Safety and Technical Equipment—L-238, sun glasses.

Service Equipment—L-29, metal signs; L-54-a, typewriters; L-54-c, office machinery; L-91, commercial laundry equipment; L-190, scales, balances and weights; L-222, floor finishing machines; L-325, motion picture projection equipment.

Steel—M-126 (except stainless steel) iron and steel.

Tin and Lead—M-38, lead.

Zinc—M-11-b, zinc.

Miscellaneous Materials—M-8-a (direction 1 only), cork.

Charges Reconversion Problems Are Neglected

In view of favorable military developments abroad, the government is giving too scant attention to contract termination and reconversion problems, Leo M. Cherne, executive secretary, Research

Institute of America, said in New York recently.

Hostilities may end practically any day in Europe, he said, and there exists an immediate need for more careful planning by the government and, in fact, by business as well. At the recent political conventions in Chicago, Mr. Cherne pointed out, the subjects of contract termination and surplus goods were not mentioned by either party. With reference to reconversion he declared that such efforts have been retarded through slow action by the Office of Price Administration on price levels for such products.

To be overcome are the drawbacks of the presidential campaign, during which "regulation and planning will be underplayed while at the same time rapid deterioration of Germany will demand reconversion programming, quicker, more ruthless administrative agency decision," Mr. Cherne said.

"German disintegration has not been over-emphasized in this country. If anything it is under-emphasized. Early victory over Germany and a shorter subsequent stage of the Japanese war have immediate basic effects on all industrial activity."

Decline in Production of Arsenic in 1945 Predicted

As a result of curtailed production in some arsenic mines, the overall output of arsenic in 1945 will be smaller than that of 1944, a WPB Mining Division official predicted recently.

Insect Wire Screen Cloth Demand To Rise 24 Per Cent

Military and essential civilian requirements for insect wire screen cloth for the fiscal year of 1944-45 will exceed those of the fiscal year of 1943-44 by about 24 per cent, War Production Board officials have told the industry.

Appointments-Resignations

Mason Britton has been appointed assistant administrator, Surplus War Property Administration. He was formerly director of the Machine Tool Division of the agency. His new duties will relate to the general supervision of the disposal of all types of surplus property for which the Reconstruction Finance Corp. is the disposal agency.

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Henry G. Boon has resigned as assistant director, Paper Division, War Production Board.

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Byres H. Gitchell, acting director of the Consumer Goods Price Division, Office of Price Administration, has been appointed director of that division. He will be assisted by Merle D. Vincent, who was recently appointed associate director of the division.

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

STEVEDORES: Stevedores and stevedore companies may use the maintenance, repair and operating supplies symbol and rating to purchase steel wire rope, steel rods, steel nails, steel angles and other steel in controlled material form.

SILVER: Producers of domestic silver goods are still responsible for filing form WPB-3707.

MRO SUPPLIES: A person who has the right to buy controlled materials for maintenance, repair and operating supplies under any regulation of the WPB may use his allotment number and symbol to buy such material to make special tooling for his own use, even if the special tooling will belong to his customer after the completion of the contract.

ENGINES: Purchasers of internal combustion engines now are required to submit to the manufacturer full data as to their contemplated use; the program or project for which the engine or component is required; the government contract number identifying the prime contract placed by the claimant agency for such program or project; and the name of the claimant agency sponsoring the program or project.

INDEX OF ORDER REVISIONS

Subject	Designations
Gas Cylinders	M-233, M-293
Hand Saw Blades, Band Saws	L-216
MRO Supplies	CMP No. 5
NE Steel Products	L-211
Sewing Machine, Vacuum Cleaner, and Laundry Equipment Repair Parts	L-6; L-18-b, c; L-98
Shipping Drums, Steel	L-197
Price Regulations	
Piano Parts	No. 188
Tractors and Mowers	No. 133

ALUMINUM: Users of aluminum and aluminum alloy extruded shapes may accept deliveries of the smallest of the following amounts without violating inventory restrictions in CMP regulation No. 2: A six months' supply of the particular extruded shape; quantity sufficient to complete a contract; or the following quantities in pounds of the particular extruded shape (weight of individual extruded shape per linear foot): Up to ½ pound inclusive per foot, 100; over ½ pound to 1 pound inclusive, 200; over 1 pound to 2 pounds inclusive, 350; over 2 pounds to 4 pounds inclusive, 500; over 4 pounds to 8 pounds inclusive, 750; over 8 pounds per foot, 1000.

CMP REGULATIONS

MRO SUPPLIES: Rating of AA-1 for maintenance, repair and operating supplies has been assigned to aviation concerns engaged exclusively in crop dusting, seeding and spraying, and to the Civil Air Patrol which participates in target towing and similar military projects. The same rating has been assigned to air patrol, survey and fire protection services operated by the Forest Service, Department of Agriculture; to the air services operated by or for police and law-enforcement agencies, and the Bureau of Entomology and Plant Quarantine, Department of Agriculture. AA-2 ratings are to be assigned to air services operated by or for government agencies, except as otherwise rated. (CMP No. 5)

SEWING MACHINE, VACUUM CLEANER, and LAUNDRY EQUIPMENT REPAIR PARTS: Each manufacturer of parts for the repair of domestic laundry equipment, sewing machines, or vacuum cleaners may have in inventory at any one time twice as many of each type of part as he sold during the second preceding quarter. (L-6; L-18-b, c; L-98)

STEEL SHIPPING DRUMS: Schedule B products, which may be packed in new steel drums for domestic shipment, are now allowed under quota restrictions new steel drums for export. Quotas for all new steel drums, based on previous usage, are stated as belonging to the purchaser of the drums whether he does or does not pack the product. All drum quotas now may be established by authorization of the Containers Division, and need not involve a formal appeal. (L-197)

NE STEEL PRODUCTS: Use of copper, subject to approval of the Copper Division, is permitted under National Emergency specifications for production of steel tie plates and spikes. Five-hour cooling control for rails of less than 100 pounds per yard in weight is now permitted. (L-211)

HACK SAW BLADES, BAND SAWS: No producer is allowed to manufacture, sell or deliver any hack saw blade or band saw unless such products are of widths, thicknesses and have the number of teeth described in the appendices of schedules VII and VIII of order L-216. Articles put into production prior to July 29, 1944, and completed prior to Sept. 29 are exempted from provisions of the schedules. Products manufactured for experimental purposes also are exempt, but must be stamped or otherwise permanently marked "test" or "experimental." They may not be sold by the producer, but may be delivered by him in reasonable quantities to users for test purposes only, and must be returned to the producer with a report on results. Each producer must file with the Tools Division, WPB a letter in triplicate giving details on the kinds of saws or blades he intends to manufacture under the schedules. (L-216)

M ORDERS

GAS CYLINDERS: Production and distribution of gas cylinders have been placed under general scheduling order M-293. Order M-233, which previously controlled the product, has been revoked. Gas cylinders will be known as a class X product, and will have their own table, No. 17. (M-293)

PRICE REGULATIONS

TRACTORS and MOWERS: Used garden tractors, tractor mounted and semi-mounted "power take-off" mowers when sold "as is," by dealers, private individuals, or auctioneers, may not sell for more than 85 per cent of the manufacturer's suggested retail price for the article when new if less than one year old, and for not less than 70 per cent of this retail price if more than a year old.

The regulation "establishes a maximum price for any used complete item of farm equipment that has been purchased or acquired by the seller for resale." (No. 133)

PIANO PARTS: Manufacturers of piano parts may deliver their products at existing maximum prices (now set at the individual producer's highest March, 1942, level) under an agreement that any future increase in maximum prices allowed by OPA during 1944 on these sales will be paid to the seller by the purchaser. (No. 188)

White Paper Puts

Comprehensive plan designed to assure prosperity after the war submitted to Parliament by Minister of Reconstruction. Stresses need for co-operation between industry and labor, and urges management to take initiative in increasing overseas markets to provide full employment and production

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Lord Woolton, left, British Minister of Reconstruction, authored the white paper which outlines the island empire's plans for insuring prosperity after the war. The plan calls for greater exports than before the war in many fields, one of which is illustrated by photos below showing locomotive equipment leaving an English port before the war. On opposite page is shown the great English port of Liverpool from whence many of the country's exports are shipped. Photos by British Information Service and NEA

Emphasis on Expanding Exports

UNLIKE the United States, where postwar economic planning has been of epidemic proportions since before Pearl Harbor, but where a lack of centralized, responsible direction has prevented formulation of a complete, co-ordinated blueprint, the British government is sponsoring a comprehensive plan aimed at insuring British prosperity after the war.

It is entitled "Employment Policy" and was drawn up by the Minister of Reconstruction, Lord Woolton, and recently submitted to Parliament. It summarizes the results of months of study undertaken originally by command of His Majesty. It is contained in a 31-page white paper identified as "CMD. 6527," copies of which may be had from His Majesty's Stationery Office, London, at sixpence each.

The plan is of particular interest to American manufacturers in view of the stress it lays on co-operation by labor and industry. "Employment," says the white paper, "cannot be created by act of Parliament or by government action alone. Government policy will be directed to bringing about conditions favorable to the maintenance of a high level of employment, and some legislation will be required to confer powers which are needed for that purpose.

"But the success of the policy outlined in this paper will ultimately depend on the understanding and support of the community as a whole—and especially on the efforts of employers and workers in industry. For without a rising standard of industrial efficiency we cannot achieve a high level of employment combined with a rising standard of living."

Americans generally are agreed that a high level of productivity and employment in the United States after the war will necessitate our engagement in foreign trade on a much broader scale than in the past. Of particular interest, therefore, is the frank avowal in the white paper that the British also expect to take a more intensive part in world trade than ever before. The level of employment and the standard of living which the British can maintain, says the white paper, do not depend only on conditions at home.

"We must continue to import from abroad a large proportion of our foodstuffs and raw materials," it says, "and to a greater extent than ever before we shall have to pay for them by the export of our goods and services. For, as the result of two world wars, we have had to sacrifice by far the greater part of the foreign investments which we built up over many years when we were the leading creditor country of the world. It will not, therefore, be enough to maintain the volume of our prewar exports. We shall have to expand them greatly."

The white paper goes on to indicate the conditions under which the British can hope to increase their export business, also to recount some of the actions they already have taken to promote such conditions.

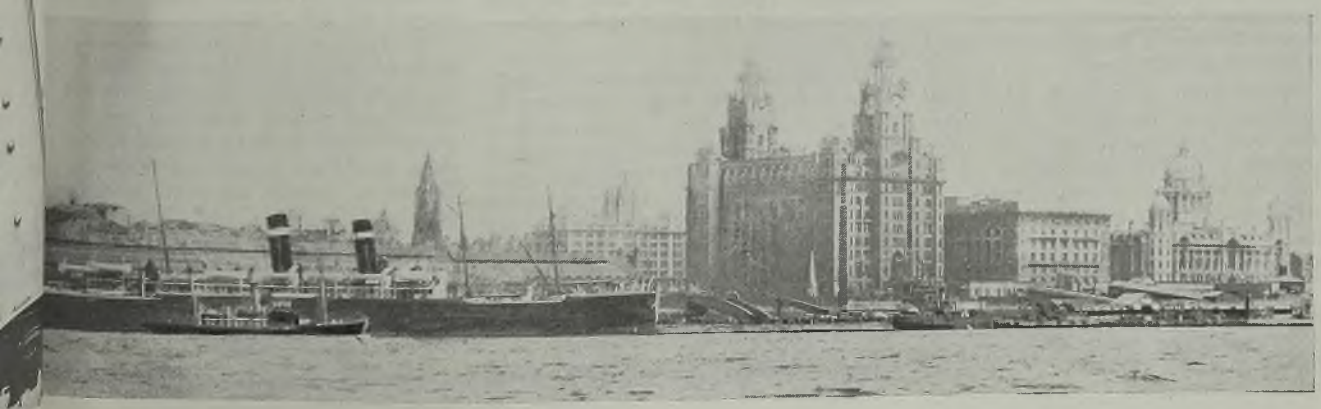
Seek Effective Collaboration

"A country dependent on exports," it says, "needs prosperity in its overseas markets. This cannot be achieved without effective collaboration among the nations. It is therefore an essential part of the government's employment policy to co-operate actively with other nations, in the first place for the re-establishment of general economic stability after the shocks of the war, and next for the progressive expansion of trade.

"The aims of this international co-operation are to promote the beneficial exchange of goods and services between nations, to insure reasonably stable rates of exchange, and to check the swing in world commodity prices which alternately inflate and destroy the incomes of the primary producers of foodstuffs and raw materials. It will also be necessary to arrange that countries which are faced with temporary difficulties in their balance of payments shall be able both to take exceptional measures to regulate their imports and to call on other nations, as good neighbors, to come to their help, so that their difficulties may be eased without recourse to measures which would permanently arrest the flow of international trade.

"The government has already given proof of its intentions. It has signed the Atlantic Charter. It has made a mutual aid agreement with the government of the United States of America, one of the chief aims of which is agreed action 'directed to the expansion, by appropriate international and domestic measures, of production, employment and the exchange and consumption of goods.' It has also declared its acceptance of the comprehensive recommendations made to the governments and authorities of 44 nations by the United Nations Conference on Food and Agriculture held at Hot Springs in 1943, insofar as those recommendations are applicable to conditions in the United Kingdom. One of those recommendations recognizes that 'the promotion of the full employment of human and material resources, based on sound social and economic policies, is the first condition of a general and progressive increase in production and purchasing power. . . . Progress by individual nations toward a higher standard of living contributes to the solution of broader economic problems, but freedom from want cannot be achieved without effective collaboration among nations.'

"The government is considering, with the governments of others of the United Nations, how these general agreements regarding the common ends of international economic policy can best be carried out in practice. For this purpose it is working in close consultation with the governments of the dominions and of India. The early renewal of the eco-



nomic strength of the British Commonwealth of Nations and the economic development of our colonial dependencies are among the substantial contributions we can make to stability in the world's economic order. The government will also collaborate with other governments in considering how effect may be given to the principles and recommendations recently put forward by the International Labor Organization."

At this point the white paper again strikes a note that recurs in it again and again—to the effect that a flourishing export trade after the war will depend far less on government efforts than on the initiative of industry.

"While the government will spare no effort to create conditions favorable to the expansion of British export trade," it says, "it is with industry that the responsibility and initiative must rest for making the most of its opportunities to recover its export markets and to find fresh outlets for its products. In the interest of the whole national economy, our export industries must be resilient and flexible; and in the period immediately after the end of the war their claims for raw materials, labor and factory space freed from war purposes must have a high priority."

Sees Unsettled Economic Conditions

The white paper sees the transitional period as follows:

"After the end of the war with Germany, the war with Japan will have first call on our resources of manpower and materials. There will, however, be some redistribution of manpower which will release labor for urgent civilian work. At this point we shall enter a period of unsettled economic conditions, which is likely to last until some time after the end of the war with Japan. The plans for this transition period must be extremely flexible; for no one can yet know when the war with Germany will come to an end or how long thereafter Japanese resistance will continue."

In this transitional period, the white paper sees a threefold danger: (a) That patches of unemployment may develop where the industrial system fails to adapt itself quickly enough to peacetime production; (b) that demand may outrun supply and create an inflationary rise in prices; (c) that civilian production, when it is resumed, may concentrate on the wrong things from the point of view of national needs.

"Government action," it says, "will be directed to forestall, so far as possible, each of these dangers. The government is making preparations to reduce the resulting unemployment:

"1—By assisting firms to prepare to switch over their capacity to peacetime production as quickly as possible.

"2—By finding out in advance where the skilled labor which will gradually become available for civilian work will be most urgently required.

"3—By arranging, so far as war conditions permit, that labor and raw materials will be forthcoming for urgent civilian work and ensuring that the machinery of allocation devised in wartime will be adaptable to the special conditions likely to obtain after the end of war in Europe.

"4—By arranging, as far as possible, that curtailments of munitions production shall take place in areas where the capacity and labor can be used for civilian products of high priority.

"5—By arranging that the disposal of surplus government stocks shall not prejudice the re-establishment and development of the normal trade channels for producing and distributing goods.

"6—By regulating the disposal of government factories in such a way as to help towards the early restoration of employment."

Discussions have been already held with many of the industries concerned, says the white paper, in order to find out what difficulties individual industries and firms expect to meet in switching over to peacetime production and absorbing men and women released from the services and from other war work.

SEEK AGREEMENT

LONDON

Great Britain is trying to obtain an agreement with the United States in timing the switch from war to peace production, Hugh Dalton, Economic Welfare Minister, told the House of Commons recently. Questions and answers disclosed that many members were disturbed over the effect on markets if United States manufacturers return partially to the production of civilian goods before British manufacturers.

"The second danger," says the white paper, "will come when people relax from the discipline and strain of war, and look around for opportunities to spend the money they have saved and to make up for their years of self-denial. To prevent an inflationary boom from a buying scramble while there is still a shortage of goods, there must be continued support for policy on the following lines:

"1—Rationing and a measure of price control for some time. Increases in rations of manufactured goods, such as clothing, will be regulated to correspond with increases in production. The speed at which food rations can be increased and varied will largely depend on the extent to which we can obtain overseas supplies.

"2—Price control cannot be effective unless it is accompanied by a stable general level of costs. If all will work together to keep the level of internal costs down, it should be possible to avoid any sharp rise in the cost of living. No undertaking can be given so far in advance to peg the cost-of-living index to any particular figure by government subsidies; for one important factor in our internal price level, the cost of our imports, will depend upon the future level of world prices, which cannot be forecast. But, generally, the government, if supported by the cooperation of all sections of the public, will continue its present policy of providing subsidies to prevent temporary and considerable rises in living costs.

"3—The habit of saving must still be encouraged. Unless people are still prepared to go on putting aside some part of their earnings in savings, instead of spending it on consumption goods, labor and capacity which is needed for schemes of postwar reconstruction and social development will have to be diverted to increasing the supplies of goods.

Control of Capital Necessary

"4—The use of capital will have to be controlled to the extent necessary to regulate the flow and direction of investment. Heavy arrears of capital expenditure on buildings, plant and equipment have to be overtaken, and construction on new development must begin. Without control, therefore, there would be a scramble to borrow, leading to a steep rise in rates of interest. The government is determined to avoid dear money for these urgent reconstruction needs. In this period, therefore, access to the capital market will have to be controlled to ensure the proper priorities."

To overcome the third danger, that production of unessential goods may interfere with the production of essentials, "it will be necessary to establish certain broad priorities and to enforce them for a time by means of the issue of licenses, the allocation of raw materials and some measure of control over the labor and staff required for industry." There are three main reasons why this must be done:

"1—During the war we have obtained a large proportion of our imports first by the sale of our foreign assets and later by lend-lease or on credit. This process cannot continue indefinitely. If we are to be able to buy the imported food and raw materials which we need to maintain our standard of life, we must expand our export trade.

"2—Production for the home market must be directed in the first place towards the necessities of civilian life and, until these primary needs are met, resources which could be applied to meet them should not be diverted to the production of luxuries for home consumption.

"3—Production of the capital goods needed to restart and re-equip industry at the highest pitch of efficiency must be rapidly expanded."

This is the first of two installments on Great Britain's postwar planning. The second will appear next week.

BENDING PLATE: This huge press for bending boiler plate six inches thick or more, under pressure of 6000 tons, made by the Baldwin-Southwark division, Baldwin Locomotive Works, Philadelphia, for a Chattanooga boiler plant, has just been eclipsed by a press of 8800-ton pressure made for export. It bends plates for boilers to power oil refineries, synthetic rubber manufacture and other industries

BRIEFS . . . .

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

Bryant Chucking Grinder Co., Springfield, Vt., recently completed a motion picture of special interest to plant engineers, tool and fixture designers, grinding room foremen and production men. It is available to clubs and engineering societies without charge.

—o—

Carpenter Steel Co., Reading, Pa., has completed a new heat-treating guide which should prove of value in tool rooms.

—o—

Lawrence Aeronautical Corp., Linden, N. J., has been selected by the Navy to manufacture two different types of automatic pilots.

—o—

American Standards Association, New York, has approved a supplement to the American Standard, Socket Set Screws and Socket Head Cap Screws, B18. 3-1936.

—o—

Kaiser Steel Co., Fontana, Calif., has had its 1944-45 assessed value reduced by the San Bernardino County Board of Supervisors from $14,493,060 to $10,200,000.

—o—

Engineers Specialties division, Universal Engraving & Colorplate Co. Inc., Buffalo, moved to larger quarters at 980 Ellicott street.

—o—

National Electrical Manufacturers Association, New York, announces that its Industrial and Commercial Lighting Equipment Section is publishing a series of direct mail promotion pieces for public utilities on a no-profit basis.

—o—

Western Electric Co. Inc., Baltimore, is occupying a new 100,000 square foot factory building in Scranton, Pa., owned by the Defense Plant Corp. The plant will be used for finishing operations on cable, field wire and instrument cords.

—o—

Briggs Clarifier Co., Washington, has appointed the W. P. Childs Machinery Co., Atlanta, Ga., distributor in western Tennessee and in north and central Georgia; Pate Supply Co., Birmingham, Ala., distributor for the state of Alabama, and Sullivan-Mears Co., Kansas City, Mo., for the states of Kansas and Missouri.

—o—

Whiting Corp., Harvey, Ill., announces appointment of the Cardinal Supply & Mfg. Co., Omaha, Nebr., as its sales representative in the Nebraska and western Iowa territory.

Bethlehem Steel Backlog Cut in Second Quarter

Decline accounted for by completed ship contracts. Steel orders well sustained, with operations at 105 per cent

REFLECTING progress in the working off of ship contracts, Bethlehem Steel Co.'s orders on hand at the end of the last quarter amounted to $1,471,000,000, against $1,663,000,000 at the end of the preceding quarter and $2,230,000,000 at the end of the third period in 1943, the company's all-time peak, President E. G. Grace announced. He indicated the present trend likely will continue.

Steel orders, however, are being well sustained, and especially at present by huge contracts for heavy ordnance, both shells and artillery.

Commenting on manpower, Mr. Grace believes that the priority referral plan put into effect nationally, July 1, by the War Manpower Commission, if administered fairly by all concerned, has the elements for accomplishing what will be needed in solving the labor shortage problem.

Referring to labor demands upon the steel industry, Mr. Grace declared that if there is a break in the Little Steel formula it will cost the country literally billions of dollars. Inflation, following such a break, would quickly extend beyond the bounds of steel and affect every industry in the land. And, he said, there is nothing in the situation to warrant further wage increases at this time in steel. Steel employes have more to spend for living purposes today than they had early in 1941, when the formula was put into effect.

He presented an interesting compilation to show the trend insofar as Bethlehem was concerned, a trend, however, that also took into account wages in the shipbuilding division. In the first quarter of 1941, the Bethlehem payroll amounted to $68,406,000, with the average hourly rate 97.3 cents, the average weekly rate $37.23 and the cost of living index at 100.9. In the second quarter of 1944, the Bethlehem payroll had increased to $212,175,000, with the average hourly rate up to $1.34, average weekly earnings up to $60.87 and the cost of living index up to 124.8.

Today Bethlehem employes number 263,000 against the average of 267,928 in the last quarter, 282,969 in the first quarter and 291,488 in the second quarter of 1943. Working hours per week have averaged 45.2 per quarter since the second quarter of 1943. Overtime in the last quarter amounted to $24,506,000, against $24,632,000 in the first quarter.

Capsules OF LIFE OR DEATH!

Valves—that's what these are—and their innocent appearance serves only to conceal their importance. For these valves are to modern warfare what the famous "horseshoe nail" (for the want of which the battle was lost!) stood for in the simpler fighting days of two hundred years ago. Designed for the control of oil, gas and other fluids, they are in active wartime service in aircraft of all types on every fighting front.

The four Weatherhead plants have long been fully engaged in making vital parts for the nation's war machines at the rate of more than a million a day—and are prepared to make the same gigantic contribution to the peacetime needs of the nation!

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Plants: Cleveland, Columbia City, Ind., Los Angeles
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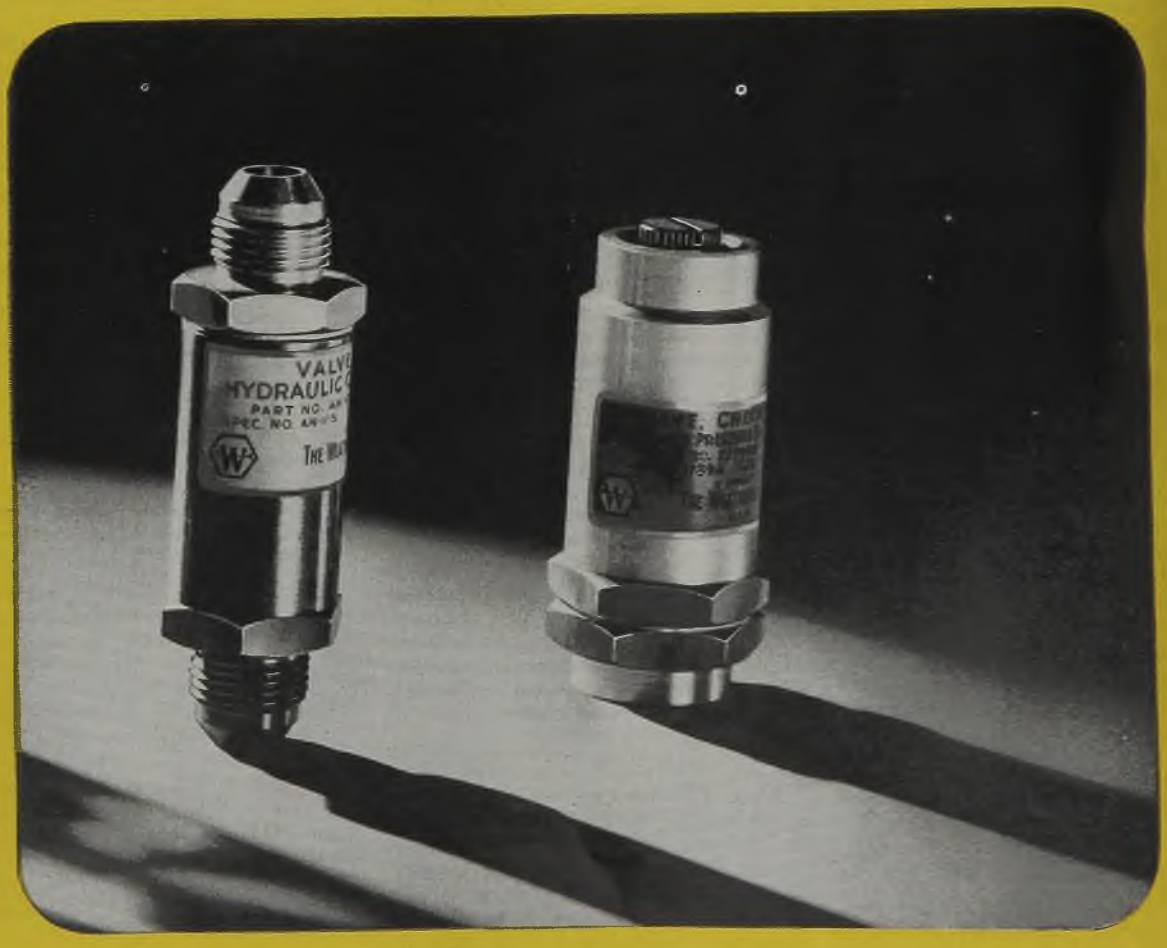


FREE: *Write on company letterhead for "Seeds of Industry"—a history of The Weatherhead Company, its many facilities and diversified products.*

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Experience indicates allowance of sick leave bonus, as asked of automobile industry by unions, would increase absenteeism by encouraging workers to malinger or to exaggerate their indispositions

DETROIT

TWELVE-DAY sick leave bonus per year for each hourly rated employe who is a union member is a favorite demand being made upon the automobile industry by the CIO. Three branches of the CIO have presented such demands to General Motors and they are now being heard by fact-finding panels of the WLB pending final outcome of the issue. A. T. Court of the GM labor economics section has made an analysis of the question and its overall effect on wages and costs which is worthy of review.

He points out the paid sick leave is an economic issue which cannot be analyzed independently of other provisions of labor contracts. Present high hourly rates paid in GM plants are based on the premise that employes will carry certain costs which are sometimes borne by employers, particularly time off for sickness. Thus any sick leave bonus would actually amount to a blanket raise in the wage level, further increasing the 23-cent differential between GM hourly rates and average for industrial employes.

However, even more serious for the war effort would be the effect of the sick bonus proposal on attendance of employes, since it is almost universal experience that allowing employes either full pay or anything like it for claimed sickness, or any compensation at all for the first few days of each alleged sickness, results in a sharp increase in the amount of time lost, with consequent delays in and interruptions to production. The proposal of 12 days' sick leave with full pay seems almost designed to increase absenteeism.

The principle is well established by industrial experience that if there is no financial loss to the individual from sickness, a substantial proportion of any group of employes will be tempted to malinger, or at least to exaggerate their indispositions, with a resulting sharp increase in absenteeism. Even with extremely close supervision, including visits to workers' homes by a doctor or a trained nurse on the first day of each reported sickness, the rate will run much higher where full pay is available than it does where the worker suffers a significant financial penalty for his absence.

Sick Benefits Are Temptation

The effect of increased rate of sick benefits on the number of sick claims per hundred workers can be shown by a comparison of the GM New Departure plant at Bristol, Conn., with the plant at Meriden, Conn. At the Bristol plant the regular $14 a week disability insurance payment, which starts after a week's waiting period, is supplemented under a private plan, by additional payment of $7 a week, retroactive for the first week and accumulating daily thereafter, giving a total of $21 a week sick benefits. The Meriden plant, located a few miles away, has only the regular $14 per week payment. Each year the rate of reported sickness is about 60-70 per cent higher at Bristol than at Meriden. Postulating from this experience, if an increase of benefits from $14 to $21 a week increases the frequency of sick claims by 60 per cent, what would be the effect of the $42 a week benefit rate proposed by the unions now?

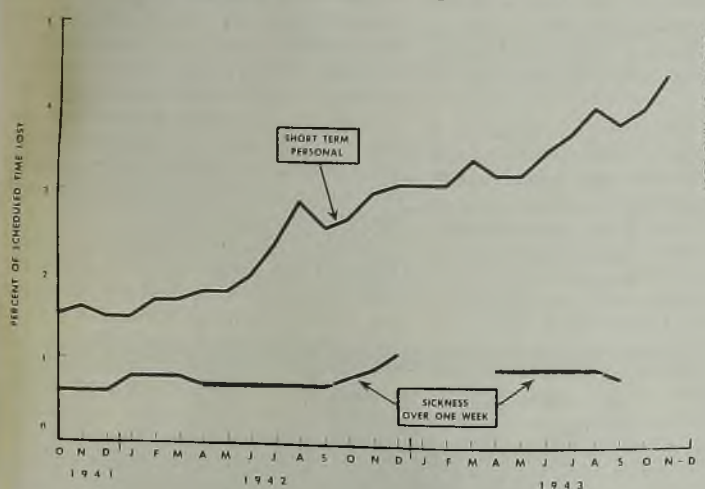
The degree to which a sick bonus plan is abused is dependent to some extent upon the policing of individual sickness cases, the degree to which supervision can follow up the individual employe and make him conscious of his work responsibilities, and the attachment of the employe to his job. However, even the most vigorous administration and the most dependable factory employes will show excessive reported sickness in the face of full pay temptations.

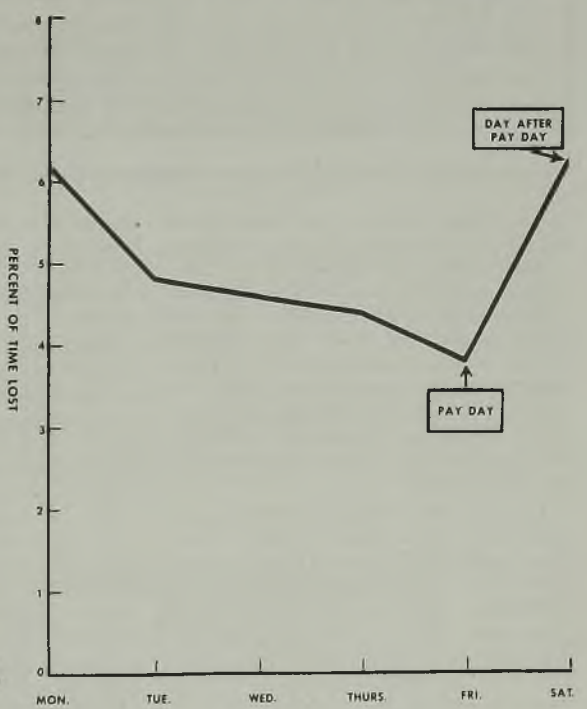
Furthermore, policing has to be done with doctors or trained nurses who are capable of actually examining the allegedly sick employe and putting the case up to the worker, his doctor, and his supervisor, squarely and authoritatively, if they find evidences of exaggeration of claims. Needless to say, there are no extra doctors or nurses available in these times to go around checking up on employes to see whether or not they are abusing a sick bonus, and even if there were, the cost of such careful follow-up would add materially to the expense.

The burden on supervision is increased manyfold by increases in absenteeism since it is necessary for supervision to follow up the attendance of the individual and help in reaching judgments as to the probable honesty of the individual claim, and to act as a guide to medical departments and the follow-up system on malingerers and persons who are exaggerating their illnesses.

A full-pay sick plan which results in a substantial number of individuals taking time off more or less at their convenience for various slight personal indispositions, makes for increased absenteeism which tends to be bunched up on certain preferred days, such as the days following pay days, and after weekends and holidays. When a shift opens

Charts showing (left) comparison in trend of short-term personal absences and sicknesses of over one week among General Motors male wage earners; and (right) average absenteeism by days on first shift operations through 1943





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with a high proportion of the force missing, the problem of rearranging those who do report imposes a further severe load on supervision and results in decreased efficiency throughout the shift far out of proportion to the number of employes absent. It is generally estimated that if as many as 25 per cent of the scheduled personnel fails to show up on any shift, there will be so many bottleneck departments unable to operate at all that the shift will be practically wasted.

The question arises as to how serious is the problem of true illness as a cause of increased absenteeism. An accompanying chart compares the trend of reported sick absenteeism lasting more than a week among GM workers with short-term absences for personal reasons, from 1941 through October, 1943. Note the comparatively static trend of sicknesses lasting over a week, in the face of a trebling of the short-term personal absences. This suggests strongly that personal factors and temporary indispositions have accounted for a good part of total absenteeism.

Further light is shed on the nature of short-term absenteeism by the second chart reproduced (page 73). It shows clearly how absenteeism is concentrated on the day after pay day and on Mondays, with good attendance on pay days themselves, providing further evidence of the nonmedical character of short-term absences in GM plants.

Comparison of short-term absences with sickness of over a week, according to the age of the person involved, shows the former at a peak among men under 25, while sickness lasting over a week is high beyond the age of 60. Thus the problem of short-term absences among men in GM plants is not due to sickness which increases with advancing age, but rather to personal needs and whims which divert the individual from his work. Yet plant records show that when individuals returning from absences of a day or two are asked "why?", 70 per cent report sickness—a natural answer which covers a multitude of sins. Obviously any full-pay sick bonus would compensate workers for these alleged short-term sicknesses and would make absenteeism even more attractive than it is today.

The unions' proposed sick bonus plan would not protect employes from any serious financial risk but instead would offer a further moral hazard for many of them. And every 1 per cent of additional absenteeism can be counted on to reduce production 2 per cent.

New war supply contracts, including renewals, in the Detroit WPB region totaled 153 in June, amounting to $508,000,000. In addition there were 271 facilities contracts closed, amounting to $7,000,000. Terminations or contract changes in 24 plants in the same area and during the same period totaled $228,000,000, with the bulk of the termination total concentrated in one plant.

Clarifying the word "cutback", Carsten Tiedeman, WPB regional director, points out that there are four different types. The first involves terminating a contract with a manufacturer and immediately replacing it with another. This is a cutback without any real curtailment of production or release of manpower.

The second type is termination of a contract in a plant which has tremendous backlogs of other war work; again any immediate curtailment of production or personnel is not likely.

The third classification is merely a cutting down of a contract from its peak —really nothing more than a bookkeeping cutback. For example, suppose an airplane plant is producing 300 planes a month and its schedule calls for 500 a month by December. If the peak schedule is cut back from 500 to, say, 350 monthly there is no effect on current production.

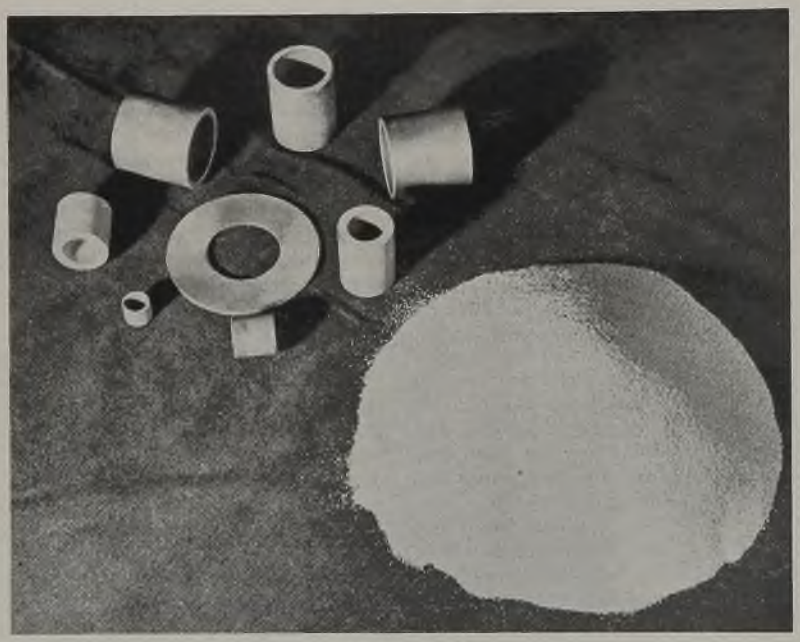
The fourth type is the only real cutback, such as when a contract is terminated or reduced without replacement. So far, this fourth type has been in the minority, most of the so-called cutbacks being in the first three categories.

Reports that new passenger cars actually have been started in production are heard regularly, particularly in areas outside of Detroit. They are definitely untrue, doubtless springing from increased activity in the manufacture of replacement parts by several builders. For example, a workman in an automotive plant may tell a friend about work being started on a new passenger car engine crankshaft, actually a replacement part, and before you know it the rumors have completed automobiles coming out of this plant.

Bodies Are Likely Bottleneck

When production can be resumed, it is a good bet that if it is on a restricted or quota basis for the first few months, a number of former body styles may be temporarily eliminated. This is only good manufacturing sense, for if a builder is permitted to produce at only half the rate of 1941, there is not much point in making the complete range of body styles. Hence there might be a plan worked out in the General Motors line, for instance, which would call for Chevrolet to make coupes, Pontiac two-door sedans, Buick four-door sedans, etc. By so narrowing the range, it would be possible to get back into production more quickly since it would be easier to schedule bodies, and bodies look like the neck of the bottle right now.

Alfred P. Sloan Jr., chairman, General Motors Corp., announced the retirement from active service in the corporation of the Fisher brothers, William A., Lawrence P., Edward F., and Alfred J. In 1919, General Motors purchased the Fisher Body Corp. Thomas P. Archer has been appointed general manager of the Fisher Body division to succeed E. F. Fisher. E. F. Armstrong assumes charge of the manufacturing staff.



POWDERED METAL: Self-lubricating bearings of powdered aluminum are being manufactured by Amplex Division of Chrysler Corp., Detroit. Capable of supporting high-bearing loads are much lighter than those of powdered bronze, copper, steel or iron. In the early days of the war, Amplex turned from bronze to powdered iron, since tin alloy, an important component, was scarce; now that aluminum is more plentiful, the new type of bearing has been developed, using the same machinery

Only NON-FERROUS AND STAINLESS FASTENINGS

When you have a toothache you go to a dentist. When you need legal advice you go to a lawyer. Both men are specialists.

By the same token . . . when you need non-ferrous and stainless fastenings come to the house that specializes on them . . . Come to the Harper Organization which is concerned exclusively with the manufacture of bolts, nuts, screws, washers, rivets and specials of Brass, Copper, Naval Bronze, Silicon Bronze, Monel and Stainless... an organization not concerned with common steel.

This specialization brings refinements in product quality and "extras" in service to customers that are most rare. New Catalog ready soon.

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WING TIPS

Liberator bombers' landing gear capable of absorbing impact loads of more than 100,000 pounds. Each main strut wheel equipped with 56-inch 250-pound tire casing, 37½-pound inner tube and hydraulic braking system

AIRCRAFT landing gear must be built to withstand the high impact loads involved in landing, to cushion the less severe jolts resulting from taxiing over rough landing strips, and also to stand up under the unpredictable stresses experienced in combat operations where landing strips are not always smooth and where pilots will not necessarily use airline caution in landings.

The 24-ton B-24 Liberator bomber, according to Ford engineers at the Willow Run plant building these ships, must have landing gear capable of absorbing impact loads of better than 100,000 pounds. The ship is equipped with Bendix Pneudraulic struts—air-oil strut cylinder assemblies. Two main struts weigh 1000 pounds each, and the third member of the tricycle landing gear is the nose wheel, all three being retracted during flight.

Each main strut wheel is equipped with a 56-inch 250-pound tire casing, a 37½-pound inner tube and a hydraulic braking system. The struts operate on somewhat the same principle as the automobile air-oil shock absorber. When an impact load is placed on the strut, the lower half, filled with oil, is telescoped into the upper half containing compressed air. The air cushion in the upper chamber carries the static weight of the bomber and cushions more moderate shocks of taxiing and takeoffs.

Distributes Landing Shock

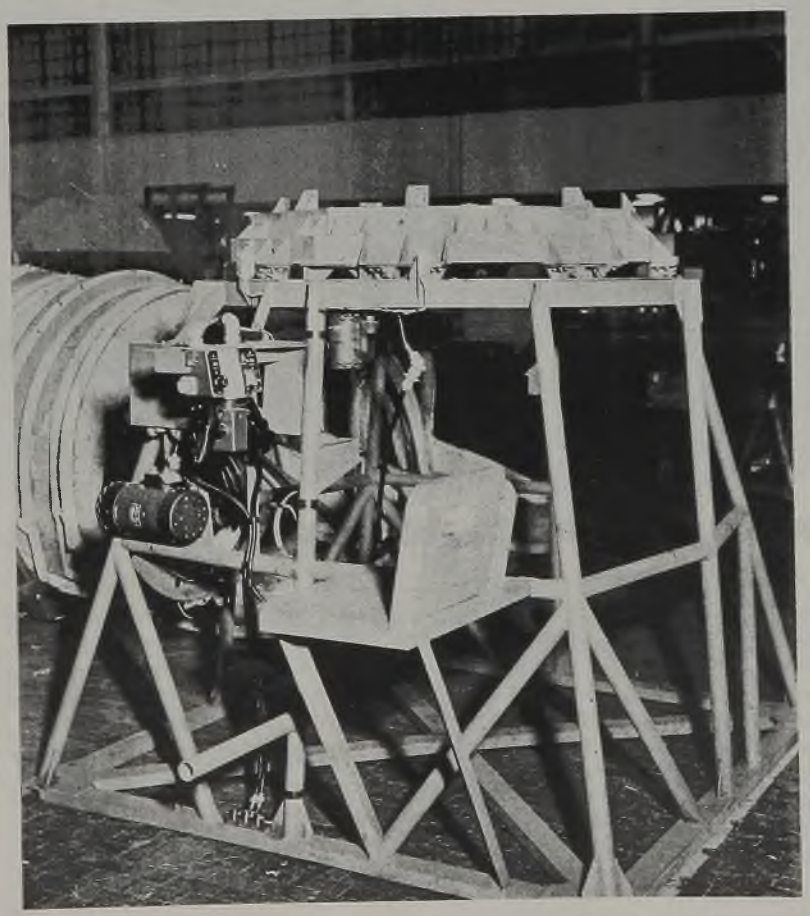
The struts are of chrome-molybdenum steel and are attached to main landing gear bearings in the center wing, to distribute landing shock over as large an area as possible. The strut is held rigid by a drag brace and a side brace, while the fork and axle assembly is held firmly by torque arms.

The landing gear is raised and lowered hydraulically. After the wheels are clear of the ground, the pilot pushes forward a control lever on the pedestal between the pilot and co-pilot. This opens a valve which directs hydraulic fluid at more than 1000 pounds pressure to the landing gear, causing the struts and wheels to retract into wells in the center wing. The gear can be retracted in a matter of 22 seconds.

Before making the landing approach, the reverse process is used. Indicator lights on the instrument panel show when the gear is down and locked, and a visual check is made by the flight engineer. About 850 pounds pressure is required to lower the struts, requiring about 44 seconds time.

Safety devices reduce the possibility of landing gear mishaps on takeoffs and landings. A switch on the fairing of the left strut prevents accidental retraction. In the event of power failure, the struts can be lowered by manual controls accessible from the catwalk.

The nose wheel is equipped with a 36-inch tire, tube and shimmy damper. With its strut, it requires 500 pounds hydraulic pressure for retraction and is the first of the bomber's "three legs" to raise because it requires less pressure. The wheel is of the 90-castor type, capable of turning 45 degrees to the right or left of the centerline. It retracts into a compartment under the flight deck of the plane.



TRAINING STAND: This new gunner's training stand, which mounts a standard electric turret, simulates many of the conditions experienced in actual combat. It was developed by engineers of the Glenn L. Martin Co., Baltimore, and is used by the Army Air Forces

C-46 Commando Has Unique Fire Protection

Important air support to the Allied invasion of Europe is being given by Curtiss C-46 Commando, a 25-ton transport which has the ability to rush to any point within 2000-mile radius a load of 30 fully equipped troops, a cargo of jeeps, artillery, or even a helicopter, traveling at 250 m.p.h. at a 27,000-foot service ceiling.

An integral part of the twin-engine C-46's design is a fire-fighting system capable of instantly choking any fire, large or small, which might occur in the engine compartments. Engineers of Walter Kidde & Co., New York, designed and installed the system which can flood either or both engine compartments with carbon dioxide gas, thereby reducing the oxygen content of the air from its normal 21 per cent to 14-15 per cent, thus smothering the toughest engine fires of the plane in a matter of seconds.

The system comprises two banks of four interconnected shatterproof steel cylinders of liquid carbon dioxide gas located either in the nacelles of the two engines or in a convenient location in the after compartment. Compressed to 850 p.s.i., this gas, upon release, expands to 450 times its stored volume, completely blanketing a blaze. Contents of the eight cylinders, when released into the engine compartments, provide a sufficient quantity of gas to extinguish the largest engine conflagration that might be encountered. If the

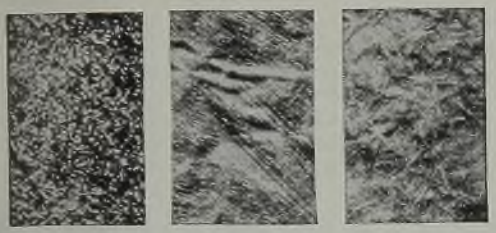
Here's a PAINTABLE Galvanized Sheet for Your New Peacetime Products

In most new and improved sheet metal products of the postwar years, long service life will be just as important as attractive appearance. Here ARMCO Galvanized PAINTGRIP sheets offer you decided advantages over ordinary galvanized metal.

This original Bonderized galvanized sheet requires no preparation for painting. The phosphate film insulates the paint from the zinc and holds it several times longer than an acid-etched galvanized surface. These photomicrographs tell the story.

The "Scratch" Test

This test shows how paint adheres to PAINTGRIP. The top of the sample is Bonderized. When scratched with a pen knife only a superficial mark is noticeable. Paint on ordinary galvanized (bottom half) comes off readily.



A B C

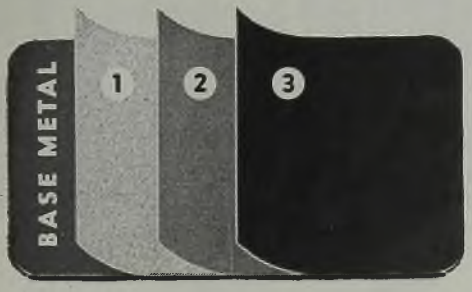
A This magnification shows that an ordinary galvanized sheet appears slick and difficult to "coat" with paint.

B Ordinary galvanized after acid etching. The etching has removed part of the protective zinc coating.

C Compare the mat-like paint-holding surface of ARMCO PAINTGRIP with that of the others. No coating has been removed and paint is insulated from the zinc.

Immediate Painting

ARMCO PAINTGRIP can be painted immediately. No costly acid etching or primers are needed. Thus the *full weight* of the protective zinc coating is preserved intact.



What Paintgrip Is....

1. A full zinc coating under—
2. ARMCO PAINTGRIP: A mill-applied Bonderized finish that insulates zinc from—
3. Paint or enamel that can be applied in any color.

If you see advantages here for your products, in reducing fabricating costs and stepping up peacetime sales, we'll be glad to discuss the use of ARMCO PAINTGRIP. Write for illustrated booklet. Just address The American Rolling Mill Company, 2111 Curtis Street, Middletown, Ohio.

GALVANIZED PAINTGRIP ARMCO STEEL

The American Rolling Mill Company

fire is small and only part of the fire-fighting agent is needed, all the gas need not be discharged at one time since each of the eight 5-pound cylinders has a cylinder valve which retains the gas in the cylinder. By means of a selector valve, the flow of carbon dioxide can be directed independently to any fire zone in the exact quantity needed, without impairing the ability of the system to cope with a later emergency during the same flight.

Manually operated control heads are assembled to two master cylinders. Each control head consists of a sheave and plunger. Rotation of the sheave in a clockwise direction depresses the plunger and unseats the pilot check of the master cylinder valves. Unseated, the pilot check permits the gas to pass around the check, through the valve gas passage to the pressure side of the piston. This pressure moves the piston and unseats the main check, permitting the carbon dioxide to be released into the system to check the fire.

Fire-detectors, with fine organic filaments which are instantly destroyed at the approach of flame, are located throughout the engine compartments at all points of flame egress. These detectors automatically send a red warning signal to the pilot the moment fire breaks out in either nacelle. Pulling a handle on the instrument panel releases carbon dioxide gas through an intricate pattern of nozzle arrangements located at all vulnerable points in both engine compartments.

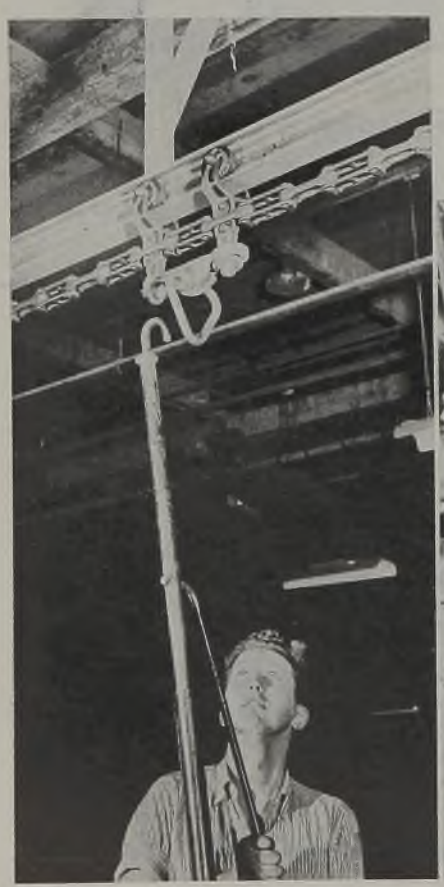
1600-Foot Overhead Conveyor Moves Raw Materials at Martin Plant

INCOMING raw materials and subcontracted items move through the main receiving depot at the Canton Division of the Glenn L. Martin Co., Baltimore, with dispatch and efficiency on a recently installed 1600-foot, continuous moving overhead chain conveyor.

The conveyor runs along the railroad loading platform, turns 90 degrees and runs the length of the truck delivery platform, turns once again and enters the warehouse passing down the main aisle of the building through the receiving station at which incoming materials for all Martin Baltimore plants are received, various inspection areas, and the inter-plant transportation area, and finally returns to the railroad loading platform.

The conveyor itself consists of an overhead, drop-forged, rivetless chain supported by an I-beam track. The turns are equipped with case hardened, ball-bearing steel rolls spaced on 4-inch centers. Floor type trucks and trailers and single trucks are hooked on to the conveyor by means of telescopic masts which engage forked type trolley attachments at prescribed load points. Two types of trolley attachments are used—one with a drop forged bracket and two 4-inch wheels for the single trucks, and a second with a load bar and forked bracket supported by two of the single trolleys for the trucks and trailers. The latter are spaced at 100-foot intervals along the chain with a former spaced at 25-foot intervals between them, giving the conveyor a capacity of 16 trucks and trailers and 48 single trucks. The trucks are equipped with ball-bearing, rubber-tired wheels, and each truck and trailer can carry a maximum load of 2000 pounds.

Incoming material for all Martin Baltimore plants is removed from freight cars and trucks at the Canton receiving platform and placed on the moving conveyor trucks. After it enters the building, each conveyor truck is disconnected from the chain while receiving reports on its cargo are written for record purposes. The truck and material are then once more attached to the conveyor and proceed to the inspection stations. Different areas are set up for checking different types of material such as castings, forgings, hydraulic, electrical and subcontracted assemblies. After inspection the material is conveyed to the inter-plant transportation stations for dispatching to the proper plant, or to the main raw stores warehouse.



Trucks and trailers are attached to the continuously moving conveyor chain, left, by means of telescopic masts such as the one shown here. They can be attached or disconnected at any place along the route of the conveyor. The chain, itself, never stops

The loaded trucks, below, move down the main aisle of the raw stores warehouse past the various inspection areas.

O.K.

SO YOU'RE IN THE DRIVER'S SEAT!

THE SNIPER'S bullets are still ping-ing... and you're being called on for everything from grading to pushing over pill boxes. That's when you find yourself whispering, "*Brother, this dozer's just GOT to go through!*"

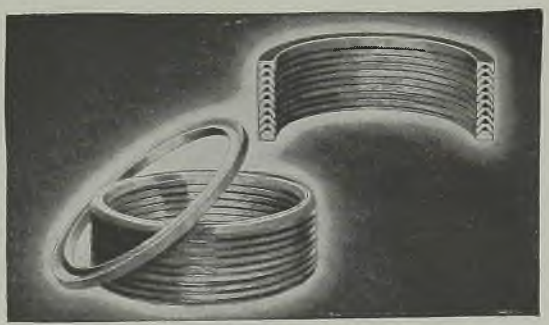
And that means that the hydraulic system which operates these efficient machines must not falter—even when oil, circulating at low pressure, is stepped up to a punishing high.

It means that hose and packing must take heavy punishment—be capable of withstanding extreme working pressures. United States Rubber engineers have developed types of hose and packing able to withstand this rugged treatment. The hose has wire-braided plies able to take heavy duty. Packing rings are automatic in action, responsive to pressure changes under temperatures ranging from -40° to 400° F.

Your equipment may never be put to such rigorous tests, but the greater margin of safety and dependability assures you longer, more trouble-free service.

SERVING THROUGH SCIENCE

HYDRAULIC CONTROL—Consists of pumps to create power, valves to direct it, a jack to apply it. U.S. Hose and Packing, both utilizing synthetic rubber, are impervious to destructive action of grease, oils, solvents and hydraulic fluids and capable of handling oil-pressures of enormous force.



U. S. MATCHLESS PACKING SETS—Are now being delivered in huge quantities to "dozer" manufacturers, Army Engineers, Seabees. Molded to accurate sizes; special top and bottom rings for square or bevel stuffing boxes.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

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

MEN of INDUSTRY

ADAM J. HAZLETT

Who has been elected vice president in charge of sales, Jones & Laughlin Steel Corp., Pittsburgh, noted in STEEL, July 31, p. 37.

J. A. IRELAND

Who has been appointed general manager of sales, Steel and Tubes division, Republic Steel Corp., Cleveland, reported in STEEL, July 31, p. 37.

R. W. KERR

Who has been elected to the board of directors, Plomb Tool Co., Los Angeles, noted in STEEL, July 17, p. 101.

Frank W. Ladky has been appointed president and a director of Darwin & Milner Inc., Cleveland. He continues as district manager of Allegheny Ludlum Steel Corp., Pittsburgh, and of Cory Steel Co., Chicago, in the states of Wisconsin and upper Michigan.

—o—

American Air Filter Co. Inc., Louisville, Ky., announces the following changes in personnel: **W. G. Frank** has been named assistant to the president; **H. C. Murphy**, vice president, has been appointed general sales director; **Howard W. Pound** is in charge of the Air Filter division, and **W. K. Gregory** will direct the Special Products division.

—o—

Lloyd W. Hopkins has been appointed sales manager, Reading Steel Casting division, American Chain & Cable Co. Inc., Bridgeport, Conn. His headquarters will be in Reading, Pa.

—o—

C. Ralph Welles, for 12 years manager of the New York office of Hanna Furnace Corp., Buffalo, has been appointed eastern district manager of sales. **Carl A. Harmon**, formerly metallurgical engineer for Republic Steel Corp., Cleveland, has joined the Hanna company as chief metallurgist.

—o—

United Engineering & Foundry Co., Pittsburgh, has announced election of the following as vice presidents: **William Hagel**, manager of machinery sales; **Horace Mager**, manager of roll and steel casting sales, and **Maurice P. Sieger**, chief engineer. **Charles M. Muchnic**, for many years the company's foreign sales representative, has been elected a director.

—o—

Newly-elected members of the Controllers Institute of America are: **George W. Knox**, Phoenix Iron Co., Phoenixville, Pa.; **Carl H. Laun**, Taylor Forge & Pipe Works, Cicero, Ill.; **Kenneth E. Paxson**, Upson-Walton Co., Cleveland, and **Laurence D. Luey**, Connors Steel Co., Birmingham, Ala.

—o—

Frank C. Angle, former manager of sales activities in the Pacific region for Allis-Chalmers Mfg. Co., Milwaukee, has been appointed manager of field sales offices, General Machinery division.

—o—

Harry W. Gray, until recently assistant to the general sales manager, Airtemp division, Chrysler Corp., Dayton, O., has joined Manning, Maxwell & Moore Inc., Bridgeport, Conn., in a sales capacity.

—o—

Three new district managers appointed by Mack Trucks Inc., Long Island City, N. Y., are: **E. W. Turnbull**, Akron, O.; **E. W. Atherton**, Albany, N. Y., and **J. A. Bascle**, New Orleans.

—o—

J. F. Oehlhoffen, formerly sales manager and advertising director, Bantam Bearing division, Torrington Co., South Bend, Ind., has joined Kaydon Engineering Corp., Muskegon, Mich., as assistant to the president. **H. J. Miller**, previously plant manager of Goodyear Aircraft Corp., Newark, O., division, has joined the Kaydon corporation as factory manager.

—o—

A. Morton Cooper has been appointed manager, general mill section, Industrial department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

Three appointments in the Motor division, General Electric Co., Schenectady, N. Y., are: **Elliott Harrington**, manager of sales, integral-horsepower, alternating-current motor section; **J. T. Farrell**, manager of sales, integral-horsepower, direct-current motor section, and **D. A. Yates**, assistant manager of sales for both sections.

—o—

W. A. Armstrong has been appointed chief of materials at Vultee field, Consolidated Vultee Aircraft Corp., San Diego, Calif. He succeeds **Reuel G. Phillips**, who has been named assistant director of purchases, San Diego office.

—o—

Elmer W. Pfeil, formerly manager of the salvage and reclamation department of Republic Steel Corp., Cleveland, and also manager of Republic's expediting department, has been appointed vice president and general manager of Anker-Holth Mfg. Co., Port Huron, Mich.

—o—

Thomas W. Pettus has been named executive vice president, National Bearing Metals Corp., St. Louis, succeeding the late Damon Wack.

—o—

John W. Stoutenburg, formerly with the Steel Plate & Shaping Corp., Detroit, has joined the Detroit district sales organization of Follansbee Steel Corp., Pittsburgh.

—o—

Eugene M. Smith, formerly associated with Aluminum Co. of America, Pittsburgh, has been appointed to the staff of Battelle Memorial Institute, Columbus, O., where he will be engaged in research in nonferrous metallurgy.

—o—

Ira Guilden has been elected president and temporary treasurer of Waltham Watch Co., Waltham, Mass.

—o—

Jay E. Miller, sales promotion manager, Industrial Products and Sundries division, B. F. Goodrich Co., Akron, O., has been named advertising manager of the division in addition to his present duties.

—o—

R. T. Muench has been appointed manager, X-Ray Products department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

—o—

Ronald R. Monroe has been elected president of the Brill Corp., New York, succeeding **Charles J. Hardy**, who has been elected board chairman. **Lester A. Blackford** is vice president of the company and **Edmund L. Oerter** has been

ROSCOE H. SMITH

WILLIAM J. PRIESTLEY

DR. WALTER M. MITCHELL

R. S. CLINGAN

elected secretary and treasurer. Newly-elected directors are: Mr. Monroe, Mr. Blackford, **John E. Rovensky, R. Howard Webster,** and **Frederick P. Whitaker.**

—o—

Roscoe H. Smith has been named head of the newly-established sales promotion department of Reliance Electric & Engineering Co., Cleveland. He will be assisted by **Kenneth F. Ertell,** who has been named assistant advertising manager. Under the new set-up, **C. V. Putnam** relinquishes his duties as advertising manager to Mr. Smith but continues as secretary. **Richard A. Geuder** succeeds Mr. Smith as manager of applied engineering, assisted by **John L. Van Nort** and **William C. Madsen.**

—o—

Neele E. Stearns, manager of the department of business procedures, Inland Steel Co., Chicago, has been appointed assistant to **Joseph L. Block,** executive vice president in charge of sales.

—o—

Walter V. McAdoo, formerly assistant to the vice president and general manager of Keystone Steel & Wire Co., Peoria, Ill., has been appointed director of public relations and secretary of the executive committee.

—o—

F. M. Beaudoin has been appointed manager of industrial relations, Petroleum Iron Works division, United States Steel Products Co., Sharon, Pa.

—o—

L. T. Willison has been appointed manager of cold finished sales, Jones & Laughlin Steel Corp., Pittsburgh, succeeding **C. F. Goldcamp,** resigned. He continues his duties as manager of ordnance sales.

—o—

William J. Priestley has been elected president of the following subsidiaries of Union Carbide & Carbon Corp., New York: Electro Metallurgical Co.; Electro Metallurgical Co. of Canada Ltd., Michigan Northern Power Co., and Union Carbide Co. of Canada Ltd. He succeeds the late Francis P. Gormely.

—o—

Dr. Walter M. Mitchell has been appointed director of research, Mack Trucks Inc., Long Island City, N. Y. Before joining the Mack organization, Dr. Mitchell was chief metallurgist at York Safe & Lock Co.'s special ordnance plant producing Bofors anti-aircraft guns for the Navy.

—o—

E. E. LeVan, former vice president and general manager of Haynes Stellite Co., Kokomo, Ind., subsidiary of Union Carbide & Carbon Corp., New York, has been elected president, succeeding the late Francis P. Gormely.

—o—

Stanley W. MacKenzie has been appointed director of purchases, United States Rubber Co., New York, succeeding **George M. Tisdale,** recently elected a vice president and member of the executive committee.

—o—

Albert W. Coleman has been appointed to the newly created position of sales manager for Manning, Maxwell & Moore Inc., Bridgeport, Conn. Other appointments by the company are: **Paul M. Rolli,** Pacific Coast district manager; **L. E. Gebhart,** Mid-Atlantic district manager; **Charles Stephan,** manager of the newly-created Electro-Mechanical division; **Lee P. Stillman,** manager, Tulsa Products division, and **James O'Connor,** sales engineer, Ashcroft Gauge Division.

—o—

Robert S. Clingan has been appointed general manager of sales, Copperweld Steel Co., Warren, O. Previously, he was Chicago district manager.

—o—

L. Abbett Post, manager, American Institute of Steel Construction, has been elected secretary-treasurer, Trade Association Executives in New York City. One of the new directors of the organization is **Theodore E. Veltfort,** manager of the Copper and Brass Research Association.

—o—

Adam D. Metz, templet foreman at the Shiffler Tower plant of American Bridge Co., Pittsburgh, has been awarded a Gary service medal in recognition of 50 years of continuous work.

—o—

E. G. Price has been appointed executive assistant, operating department, National Tube Co., Pittsburgh. He will be succeeded as general superintendent of the Lorain works, Lorain, O., by **L. F. Sattele.**

—o—

Dr. John A. Keenan has been named executive vice president, Standard Cap & Seal Corp., Chicago.

OBITUARIES . . .

Oliver A. Huberty, 68, machinist who helped develop the Lewis machine gun, died July 25 in Cleveland.

—o—

Irwin L. Pfundt, 44, sales manager, Usona Ornamental Iron Co., St. Louis, died July 26 in that city.

—o—

John M. Rose, 48, vice president and general manager of the Eastern division, Cleveland Wrecking Co., Philadelphia, died July 25 while on a business trip to Los Angeles.

—o—

Perry F. Garman, 60, general superintendent of the Morgan Engineering Co., Alliance, O., for 26 years, died July 24. He had been employed by the company 45 years.

—o—

Arthur J. White, 56, an inventor who was associated for more than 43 years with the Lamp division, Cleveland, of General Electric Co., Schenectady, N. Y., died July 31 in Cleveland. In 1919 he and a fellow worker, Louis Mitchell, developed a revoltionary type of equipment and method of production which brought about manufacture of tipless filament lamps on a commercial scale.

—o—

Dr. Edward Bausch, 89, chairman of the board, Bausch & Lomb Optical Co., Rochester, N. Y., and son of John J. Bausch, one of the founders of the company, died July 30 in Rochester.

THE BUSINESS TREND

Industry Apprehensive Of Reconversion Lag

INCREASING apprehension for the future is evident in the ranks of industry as favorable military and political developments abroad hint of possible early termination of the war in Europe.

Industrialists fear they will be caught flat-footed should Germany suddenly collapse and an avalanche of war order cancellations overwhelm them, confronting them with the imperative task of immediately shifting a large part of production emphasis to peacetime goods.

RECONVERSION—As things now stand, sudden collapse of the German military machine would catch the nation only barely started on this tremendous problem. Industry planning is well advanced, but government plans and policies, which must tie in with those of industry, are away behind. That is why industrialists are anxiously eyeing Washington as Congress reconvenes, hoping for quick and positive legislation which will clear the decks for reconversion action.

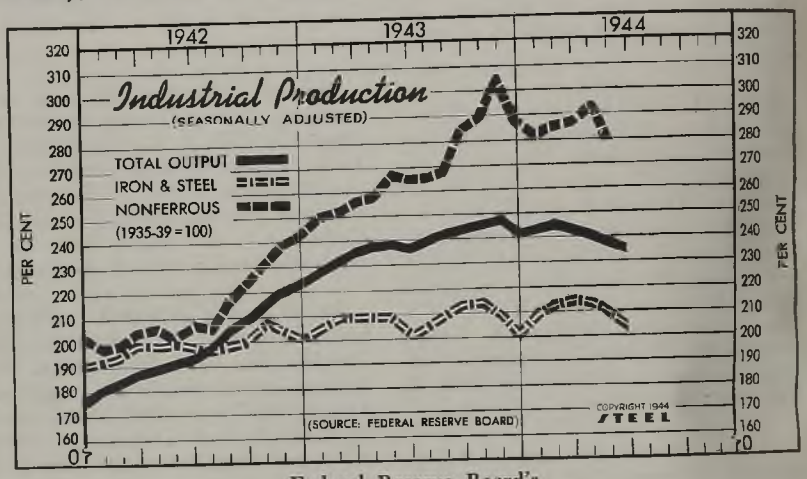
PRODUCTION—Little change was evident this past week in industrial activity. Pressure for war goods continued unabated. Schedules are reported hampered at some points by labor shortages, though the suspicion is voiced the manpower shortage is being overstressed by the military for whatever salutary psychological effect it may have in spurring labor to greater efforts. Overall war production is maintaining the fast pace of the recent past.

BAROMETERS — Steelworks operations have been fluctuating for weeks past, averaging around 96 per cent of ingot capacity. Manpower is a factor here, but as the summer progresses more optimism is noted that a sharp drop in the rate will be avoided. Freight carloadings for July 22 week totaled 903,034, decrease of 17,770 cars below the preceding week, and 19,196 more than in the like 1943 week. Electric power output rose fractionally but the increase over a year ago was the second smallest this year.

INDUSTRIAL PRODUCTION—Federal Reserve Board's seasonally adjusted index of industrial production was 235 per cent of the 1935-39 average in June compared with 237 in May and 243 in the first quarter. Employment and production of factories continued to decline slightly during the month.

STRUCTURAL BOOKINGS—June bookings of fabricated structural steel for bridge and building construction totaled 58,982 tons, compared with 34,163 tons in May and 79,409 in June of last year. Shipments amounted to 33,046 tons against 68,352 in the like period of 1943.

PROFITS—National Association of Manufacturers last week fired at critics who have been charging American industry with making exorbitant profits out of the war. Study shows while dollar volume was considerably higher last year than in 1939, net earnings in 1943 were low when considered in relation to the tremendously increased volume of production. Rate of profit declined from 3.1 per cent in 1939 to 2.8 per cent in 1943.



Federal Reserve Board's Production Indexes
(1935-1939 = 100)

	Total Production		Iron, Steel		Nonferrous	
	1944	1943	1944	1943	1944	1943
January	242	227	208	204	281	250
February	244	232	212	208	285	252
March	242	235	214	210	286	256
April	239	237	213	209	292	257
May	237	238	210	208	279	266
June	235	236	204	201	...	264
July	...	239	...	203	...	264
August	...	242	...	209	...	267
September	...	243	...	213	...	284
October	...	247	...	214	...	289
November	...	247	...	209	...	304
December	..	241	...	200	...	286
Average	...	239	...	207	...	270

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96	97	96	98
Electric Power Distributed (million kilowatt hours)	4,391	4,381	4,327	4,227
Bituminous Coal Production (daily av.—1000 tons)	1,997	2,053	2,000	2,015
Petroleum Production (daily av.—1000 bbls.)	4,608	4,615	4,587	4,133
Construction Volume (ENR—unit $1,000,000)	$41.1	$36.1	$34.5	$41.2
Automobile and Truck Output (Ward's—number units)	19,620	19,545	19,335	19,900

*Dates on request.

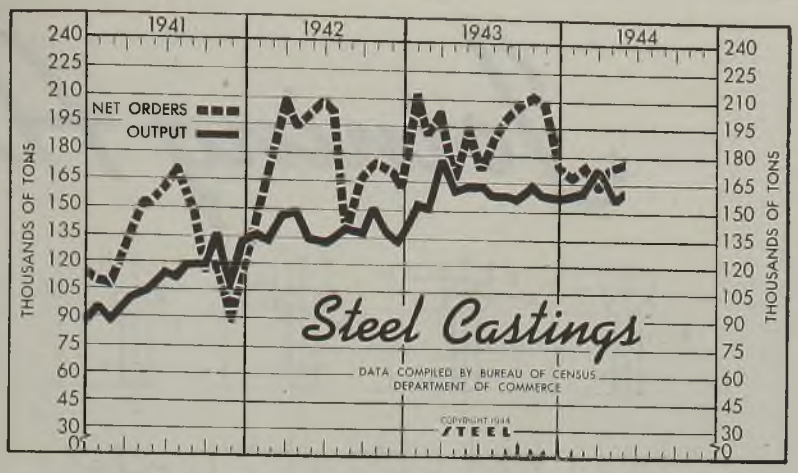
TRADE				
Freight Carloadings (unit—1000 cars)	915†	903	898	886
Business Failures (Dun & Bradstreet, number)	19	29	36	48
Money in Circulation (in millions of dollars)‡	$22,584	$22,531	$22,421	$17,799
Department Store Sales (change from like week a year ago)‡	+14%	+3%	+3%	+20%

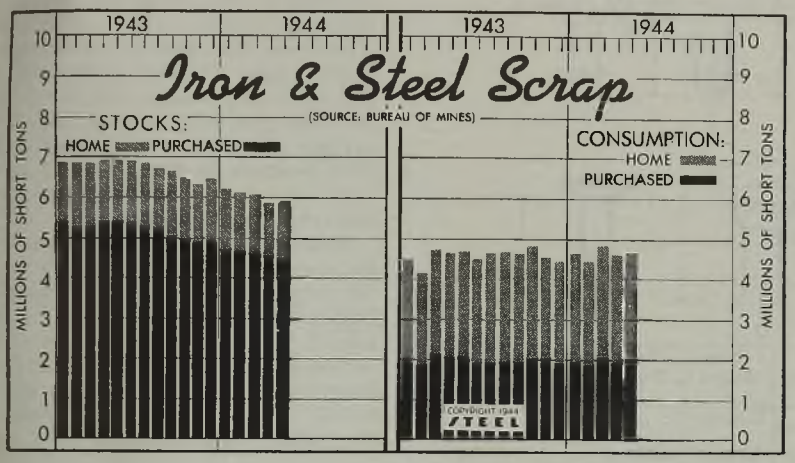
†Preliminary. ‡Federal Reserve Board.

Commercial Steel Castings

(Net tons in thousands)

	Orders 1944	Orders 1943	Production 1944	Production 1943
Jan.	167.7	218.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	177.0	192.5	161.8	163.6
June	....	....	171.7	....
July	....	....	187.2	....
Aug.	....	....	200.8	....
Sept.	....	....	214.1	....
Oct.	....	....	211.3	....
Nov.	....	....	209.3	....
Dec.	....	....	173.6	....
Total	....	....	2,333.4	....





Iron and Steel Scrap
Bureau of Mines

(Gross Tons—000 omitted)

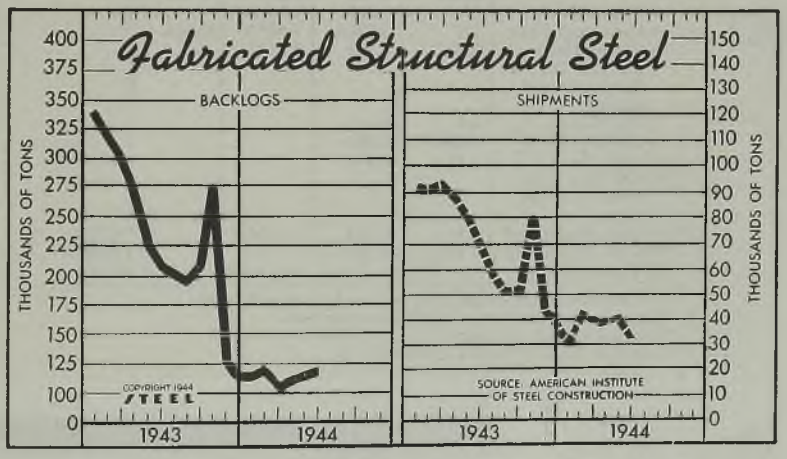
	Consumers' Stocks 1944	Consumers' Stocks 1943	Total Consumption 1944	Total Consumption 1943
Jan.	6,214	6,877	4,616	4,492
Feb.	6,134	6,871	4,414	4,178
Mar.	6,027	6,850	4,827	4,787
Apr.	5,932	6,918	4,629	4,642
May	5,966	6,905	4,683	4,723
June	....	6,916	....	4,493
July	....	6,860	....	4,670
Aug.	....	6,778	....	4,666
Sept.	....	6,618	....	4,657
Oct.	....	6,456	....	4,830
Nov.	....	6,391	....	4,581
Dec.	....	6,448	....	4,449
Mo.Ave.	....	6,740	....	4,599

Fabricated Structural Steel

(1000 tons)

	Shipments 1944	Shipments 1943	Shipments 1942	Backlogs 1944	Backlogs 1943	Backlogs 1942
Jan.	88.9	91.9	167.8	113.1	339.1	704.4
Feb.	41.5	90.8	164.6	117.6	321.0	706.7
Mar.	89.9	94.0	191.3	108.3	299.8	777.7
Apr.	41.1	86.6	187.2	111.2	272.5	772.4
May	43.4	78.9	184.2	116.3	220.6	843.8
June	88.0	68.4	182.7	122.7	207.1	869.8
July	....	56.8	189.9	....	201.8	808.6
Aug.	....	50.2	173.9	....	195.6	788.5
Sept.	....	51.8	169.8	....	208.1	716.0
Oct.	....	80.1	152.9	....	274.0	617.7
Nov.	....	42.7	130.4	....	134.6	566.6
Dec.	....	39.6	145.3	....	118.0	528.5

Source: American Institute of Steel Construction. Figures for 1943 to date cover members' reports only; for other years they are estimates for entire industry.



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$9,964	$11,026	$12,322	$8,227
Federal Gross Debt (billions)	$209.1	$208.6	$200.2	$144.8
Bond Volume, NYSE (millions)	$36.8	$52.4	$46.2	$70.1
Stocks Sales, NYSE (thousands)	4,153	7,511	9,932	8,162
Loans and Investments (millions)†	$57,304	$57,211	$51,152	$46,612
United States Government Obligations Held (millions)†	$42,424	$41,917	$37,832	$34,207

†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)†	250.2	248.8	248.9	243.8
Industrial Raw Materials (Bureau of Labor index)‡	113.8	113.9	113.2	113.4
Manufactured Products (Bureau of Labor index)‡	101.1	101.0	101.1	99.8

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

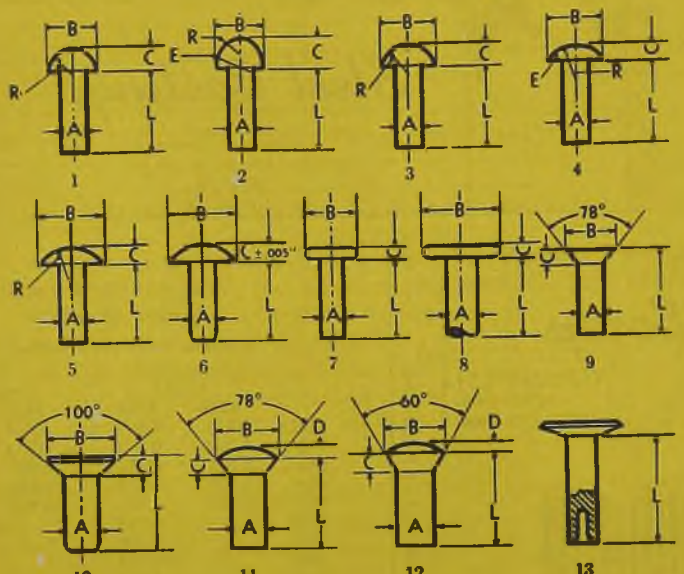
Joining Aluminum

By E. C. HARTMANN, G. O. HOGLUND and H. A. MILLER

Aluminum Research Laboratories
Aluminum Co. of America
New Kensington, Pa.

AMERICAN industry has never fully realized the possible economies that can be achieved by using the light alloys, particularly the aluminum alloys, as structural metal. There were many reasons for this, most of which are no longer valid. The end of the war will find fabricating capacity that can deliver metal in quantity, sizes, and high strength alloys to meet the most ambitious program to use the metal in all types of transportation, architectural, structural, or other fields.

Specific applications will be based on the economics involving consideration of the first cost and the extent to which a higher first cost is compensated by savings in operating and maintenance cost and on longer life which may result from improved resistance to corrosion of the metal. These factors are not properly the subject of this discussion except inso-



Kind	Width B	Head Depth C	Head Radius R	Edge Radius E	Oval Depth D
1 Button Head	1.75A	0.75A	0.885A	.....	.....
2 High Button Head*—Amer.Std.	1.50A + 0.031	0.75A + 0.125	0.75A — 0.281	0.75A + 0.281	.....
3 Round Head	2A	0.75A	1.042A	.....	.....
4 Mushroom Head	2A	0.625A	1.634A	0.50A	.....
5 Brazier Head	2.50A	0.50A	1.8125A	.....	.....
**6 Modified Brazier Head—AN-456 Aircraft	.....	.....	.....	.....	.....
7 Flat Head	2A	0.40A	.....	.....	.....
8 Tinners' Rivet	2.25A	0.30A	.....	.....	.....
9 Ctsk. Head	1.81A	0.50A	.....	.....	.....
**10 100° Flat Ctsk. Head—AN-426 Aircraft	.....	.....	.....	.....	.....
†11 Ctsk. Oval Head	1.81A	0.50A	1.7656A	.....	0.25A
‡12 Ctsk. Oval Head	1.577A	0.50A	.....	.....	0.187A
13 Tubular Shank	This rivet made with several sizes of heads.				

*The high button head supplied in sizes ½ inch and larger.
†For sizes up to and including 7/64-inch diameter.
‡For sizes ½ inch and larger.
**Standard Alcoa chamfer is optional.

Fig. 1 — (*Above*)— *Aluminum alloy rivets are supplied with these* 13 *common types of heads*

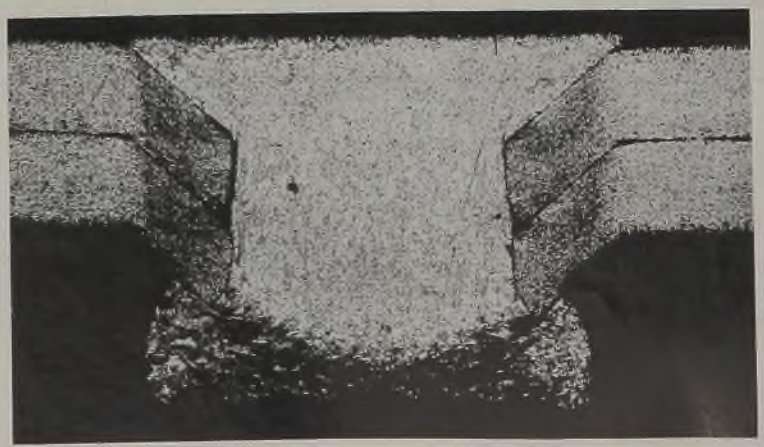


Fig. 2 — (*Right*)— *Cross section of a typical dimpled-riveted joint, using a* ⅛*-inch diameter rivet in* 0.040*-inch thick sheet*

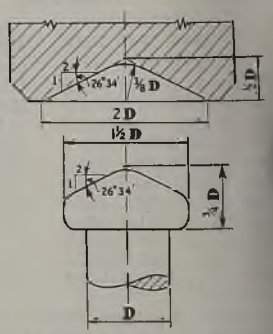


Fig. 3—(*Above*) *Nominal dimensions of cone-point head and rivet set*

...w Alloys

Most recent accepted practices for fabricating light alloys by riveting, welding, brazing, soldering and resin-bonding are discussed by authors in presentation also made before American Society of Mechanical Engineers. Riveting methods are described in first section and other means of fabrication will be covered in succeeding issues of STEEL

far as they pertain to ways and means of assembling parts made from the aluminum alloys. It is the purpose of the authors to make clear the many procedures that have become established for making joints in these alloys.

The authors propose to divide the discussion under the common practices: Riveting, welding, brazing, soldering, and a promising new possibility, resin-bonding. These methods will be considered as specifically as space permits to provide a comprehensive picture of the subject. Additional and more detailed information and training will be required to put the methods into practice.

Riveting

Riveting as a means of joining metal parts is, of course, a very old art and was adapted to aluminum alloy construction from the very early days of the aluminum industry. The riveting of aluminum alloy parts differs from the riveting of other metal structures only in material and certain phases of procedure.

Aluminum Alloy Rivets and Their Characteristics: Of the numerous wrought aluminum alloys commercially available today, there are five which are used commercially in the form of rivets for joining aluminum alloy structures. These are described as follows:

Commercially Pure Aluminum (2S): Rivets of commercially pure aluminum are very soft and are used only for nonstructural joints in construction involving the low strength aluminum alloys. They are not heat treated either during manufacture or subsequently by the user but are used in an intermediate cold-worked temper representing the condition in which they come from the heading tools. They are readily driven cold and in the driven condition will develop an average shear strength of about 11,000 pounds per square inch. Since their use is almost entirely confined to nonstructural joints, they will not be discussed further.

A17S Alloy Rivets: This alloy contains nominally 2.5 per cent copper, 0.3 per cent magnesium, balance aluminum. Rivets of this alloy are heat treated as the last step in their manufacture and are used without subsequent heat treatment by the user. They are driven cold and develop an average shear strength of 38,000 pounds per square inch in the driven condition. They are readily driven in sizes up to ⅜-inch diameter with ordinary equipment and can be cold driven in even larger sizes, especially if suitable squeeze riveters are available. Rivets of A17S are the most widely used of all aluminum alloy aircraft rivets and have also been successfully used in other types of structures where the parts to be joined are of aluminum alloy 14S, 17S, or 24S.

17S-T Alloy Rivets: This alloy consists nominally of 4 per cent copper, 0.5 per cent each of manganese and magnesium, balance aluminum. Rivets of 17S alloy are always heat treated before use. Ordinarily they are heat treated at the plant of the manufacturer before shipment and are subsequently reheat treated by the user just prior to use in order to render them soft enough to be headed easily. The heat treatment con-

(*Please turn to Page* 122)

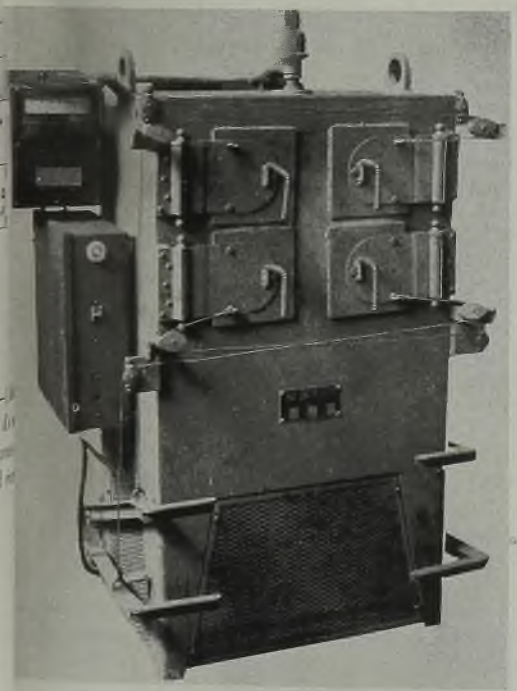


Fig. 4—(*Above*)—*This type of electrically-heated circulating air furnace is suitable for heating aluminum alloy rivets for hot driving*

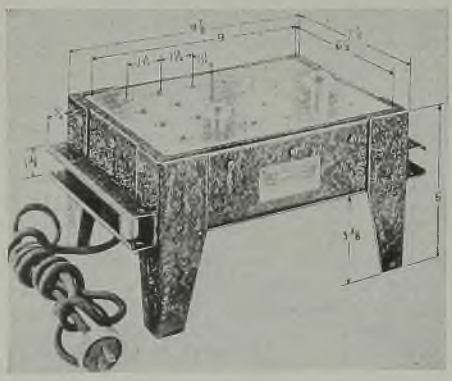


Fig. 5 — (*Right*)—*Type of automatic electrically heated hot plate suitable for heating aluminum alloy rivets for warm driving*

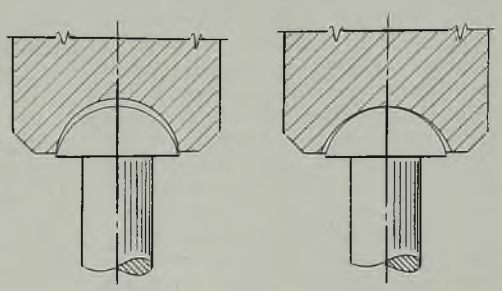
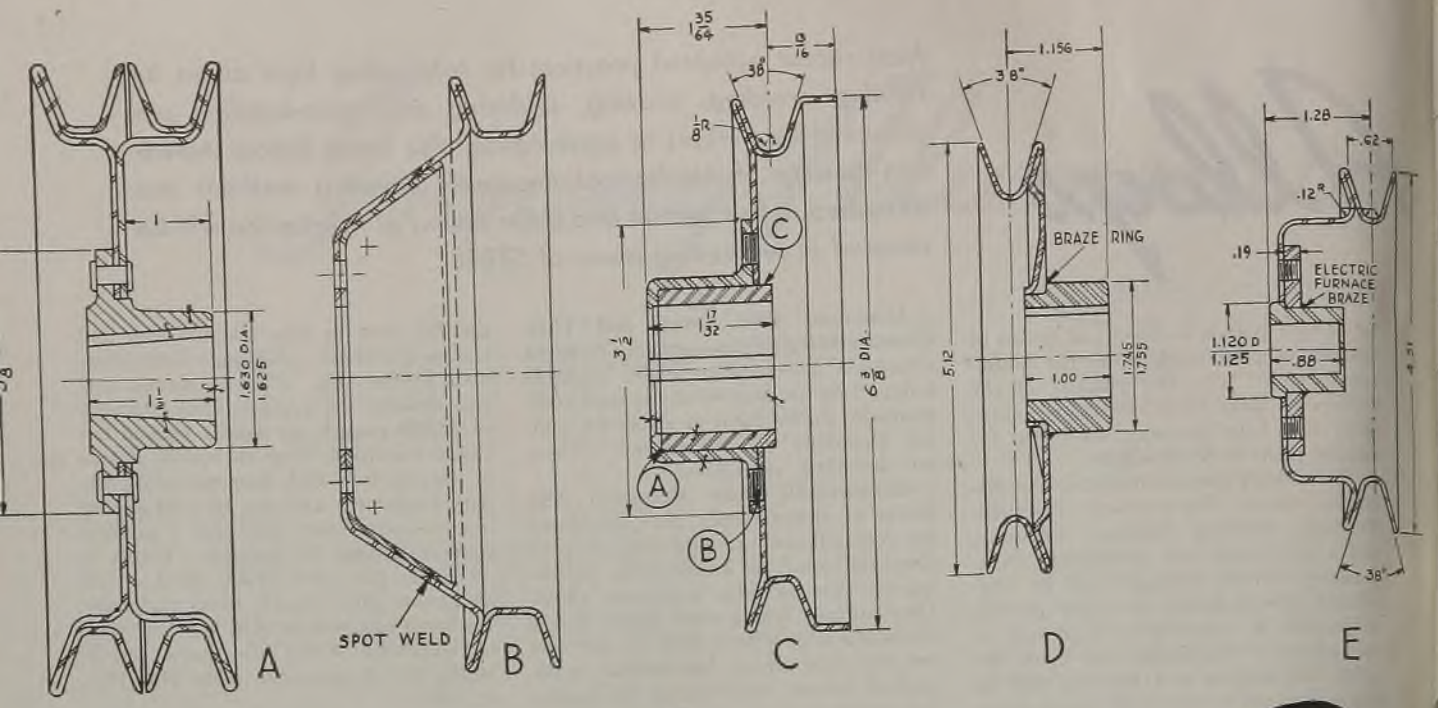


Fig. 6—(*Right*) *Sketch at left shows incorrect fit of the buckling tool on the manufactured head; at right, the correct fit. Clearances are exaggerated*



Automatic Roll

. . . . cuts production costs, speeds fabrication of fan and generator drive pulleys for jeeps, half-tracs, trucks, and other equipment. Ingenious use of roll forming with composite stampings, formed bar stock, malleable castings, etc. produces greatly diversified line of V-type pulleys. Assembly methods include riveting, projection and spot welding, silver brazing in electric induction units, copper brazing in controlled-atmosphere chain-belt furnaces

ROLL FORMING steel since 1926 has enabled the Spun Steel Corp., Canton, O., to accumulate a vast reservoir of experience in cold working steel and in building special machines for that work. Result was that at beginning of the war, a large proportion of the fan and generator drive pulleys used by the automotive industry came from this plant. Also refrigerator manufacturers and many others employed its pulleys widely.

W. G. Kilpatrick, director of engineering, points out that chief advantages of roll formed pulleys are assured strength and concentricity; light-weight; perfect dynamic balance due to uniform section of rolled steel from which they are made; excellent wear resistance resulting from work hardening of belt contacting surfaces during rolling; low cost because forming has eliminated or minimized finish machining; high production since all operations are accomplished on units having high hourly output such as mechanical presses, continuous belt conveyor type brazing furnaces and resistance welding machines. These advantages also apply to products other than pulleys, he adds. An example is the drive shaft housing and rear seal for landing craft, shown at Diagram "F" and Fig. 1.

Wide Variety of Types

Most pulleys manufactured are single-groove type, although some are double and a few have three or four grooves. Sizes range from 2½ to 16 inches in diameter. Pulleys are formed from 12 to 16-gage hot-rolled open-hearth low-carbon steel. Hub sections are made from malleable iron castings, or machined from solid round bar stock, or rolled and formed from relatively heavy gage strip stock, etc. Final product varies widely due to many different combinations of pulley and hub structures. Let's look at a few of these and follow their production through the shop to see how roll forming is utilized.

Incidentally, roll forming is usually the last operation in production sequence, the V-shaped belt groove being formed from the cylindrical flange of the cup-shaped pulley after it has been blanked, pierced and formed. Hubs are assembled prior to forming V-groove in most cases, but not all. Examination of typical pulley production sequence shown in Fig. 4 will reveal the system.

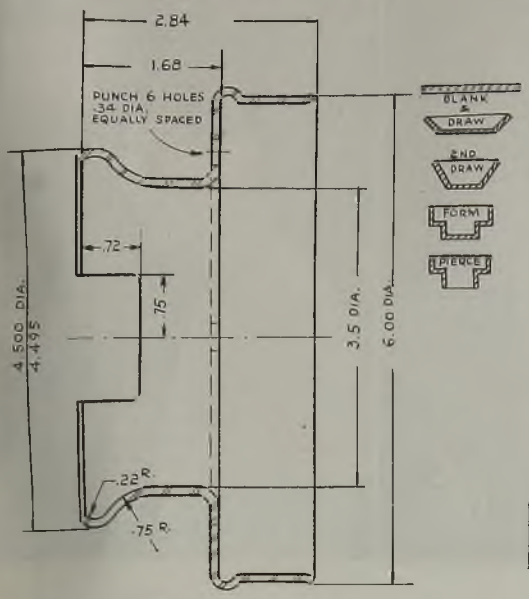
Pulley "A": Shown in Fig. 1 at extreme left is a double-groove pulley made as two single-groove units spot welded together at six points and riveted to a common hub of malleable iron. This is the exception that proves the rule mentioned above that most roll forming is done on completed pulley. Here the forming is done prior to assembling because otherwise there would be no way to accommodate the excess stock needed in roll forming.

Left-hand pulley section is first blanked out from 14-gage (0.078-inch) low-carbon steel and then drawn in a series of press operations to final shape except that the metal for the V-groove is left as a short section of a cylinder. This is then roll formed to final cross section shown in Diagram "A" on an automatic roll forming machine like that shown in

Diagram of cross sections: "A"—double-groove pulley made as two single-groove units; "B"—no hub; "C"—built-up hub; "D"—stamped reinforcing ribs; "E"—projection welded; "F"—drive housing

Fig. 1—These five pulleys and the special housing are typical of the various fabrications produced by automatic roll forming. Their production is detailed in the text

Fig. 2—Automatic roll-forming machine. Operator only reloads unit as opportunity presents, cycling being completely automatic. Entire head carrying pneumatic cylinder at right travels in to back up work during roll forming. Work can be seen here centered under splash hood. Forming rolls travel on cross slides



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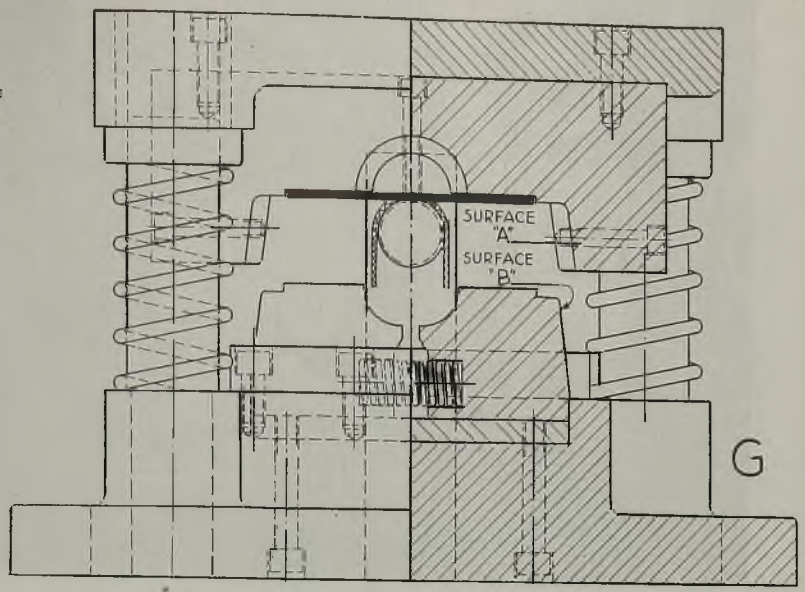
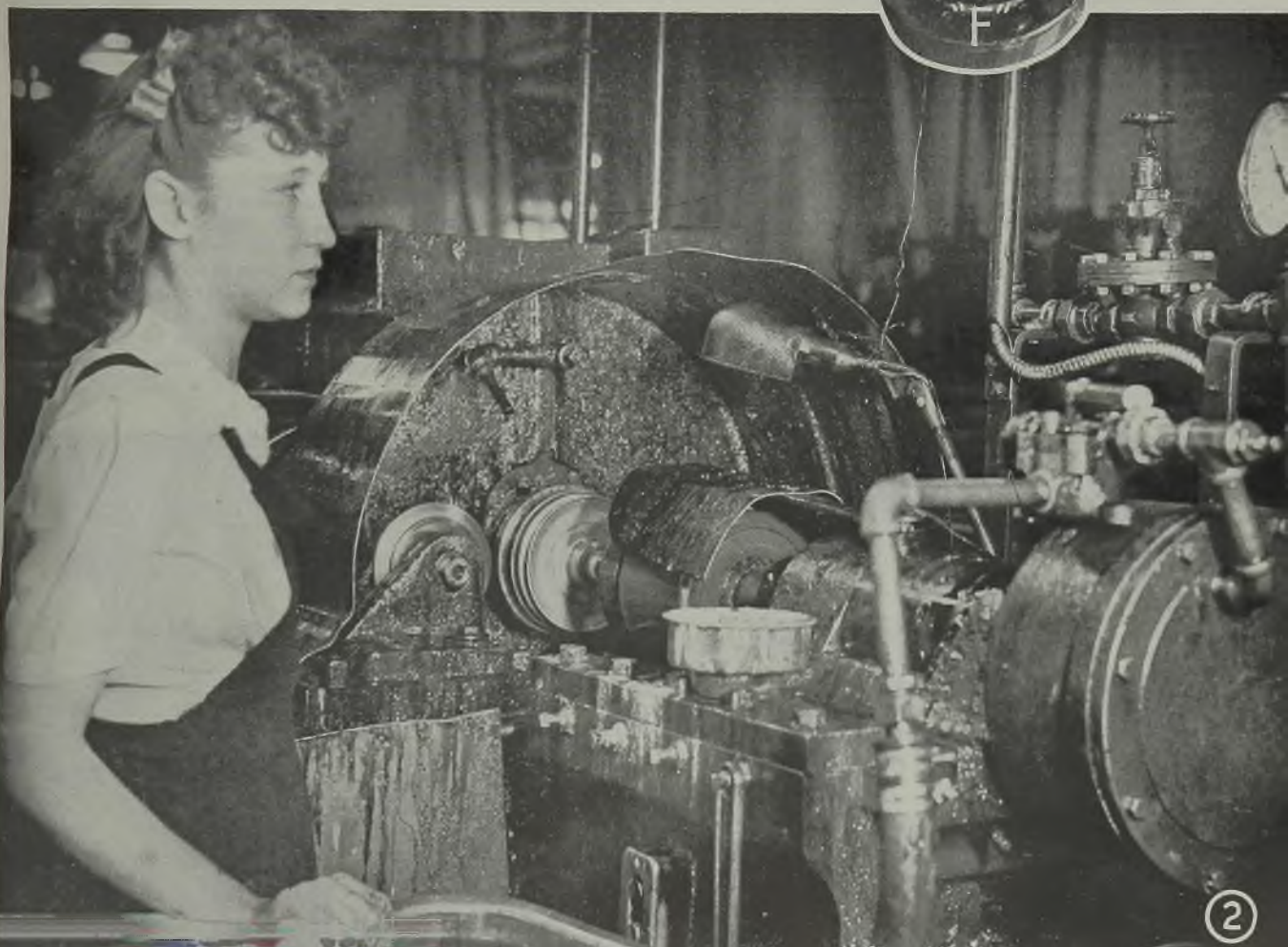
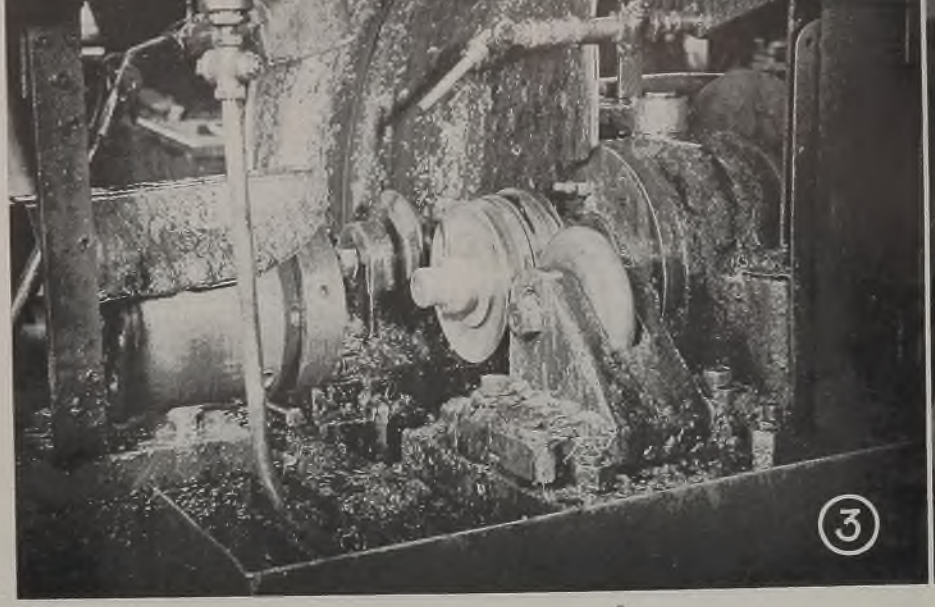


G

Forming

By G. W. BIRDSALL
Associate Editor, STEEL





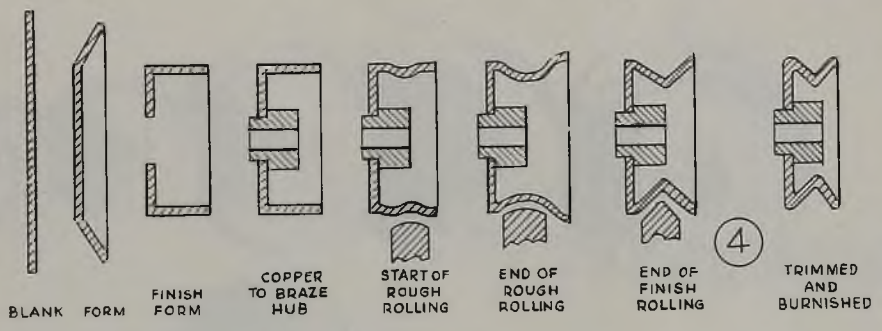


Fig. 2. Right-hand section is made separately in a similar manner.

Develops Special Roll-Forming Machines: When the company was first organized in 1926, it was for the express purpose of producing pulleys and similar products by roll forming on special machines developed by company engineers for that work. At that time, roll forming was done by hand entirely, the "hand" part being the advancing of the forming rolls into the work. In 1932, the company developed automatic machines which eliminate all the variables incident to "hand" operation by employing cams to advance the forming rolls with feeds and pressures under precise automatic control.

One of these is shown in Fig. 2. Pulley to be "spun" is placed on pilot arbor which rotates at about 1300 revolutions per minute. This arbor is integral with head stock or backing plate against which the periphery of the pulley on drive end rests. This placement is shown to the left and rear in Fig. 2. Then during roll forming, the pulley is squeezed between the head stock or revolving backing plate (whose axial position is fixed) and a rotating axially moving tail stock connected to the piston of an air cylinder seen at extreme right, Fig. 2.

The pulley being formed is thus centered on the pilot arbor yet is free to move axially with the "floating" tail stock, which also is piloted on the revolving head stock arbor. Both head stock and tail stock rotate with the pulley being roll formed. While pulley in Fig. 2 is a little smaller than Pulley "A", principle of forming is the same.

Automatic Roll Forming: This machine is entirely automatic. Once set up for a job, the operator need only load and unload the work from the machine. A. R. Wise, chief engineer, describes operation:

With work placed on pilot arbor, machine first advances "floating" tail stock against work, "squeezing" the cylindrical pulley section that is to be formed. This is done as the entire tail stock, with air cylinder seen at right, Fig. 2, advances on slides till it contacts the work. Pressure in air cylinder is held at a constant value by means of an automatic pressure regulator connected into the air supply line. Total pressure exerted is considerable as 80 pounds of air pressure is maintained in the 10-inch diameter cylinder on this job.

Tail stock advances its freely rotating backing plate sufficiently to move the piston far enough from the end stop so that it "floats" against the work, even though the pulley may narrow considerably as the belt groove is formed.

With the pulley clamped between the two forms or backing plates, the machine advances the roughing roll against the cylindrical section to be formed. Roughing and finishing rolls are mounted on

cross slides. Large cylindrical cams in the machine base move the cross slides by means of lever arms. Thus speed of movement and extent of movement of forming rolls are cam controlled.

Automatic roll forming machines are driven by 10-horsepower motors.

Roughing and Finishing: Roll forming is done in two stages. First a roughing roll is moved into the work. See Fig. 4 for typical sequence. Fig. 3 shows same machine as Fig. 2 but from the opposite side, the back half of the splash guard having been removed. Here the air cylinder is at the left, the roughing roll being in the foreground. Note contour of its working surface resembles a semicircle. This results in a gradual deformation of the metal as the roll advances, working the metal first in a narrow band in what eventually will be the bottom of the belt groove. Then as the roll advances, band of metal worked is widened.

Since there is no inside support during roll forming, the metal must be worked in a sequence that avoids collapse or formation of wrinkles. Of course one edge of the belt groove is well supported by the pulley web. The other edge is supported during roll forming by allowing a small band of excess metal there. Then as the belt groove is formed, this band tends to flare out to a slight cone shape and in so doing provides a support for the outer or free edge of the groove. Also pressure exerted by the tail stock helps support the work.

Considerable Rolling Pressure: Both roughing and finishing rolls are pushed against the revolving work under appreciable pressure, 1000 pounds being used on the work in Figs. 2 and 3. This quickly causes the metal to flow as desired. Rough rolling is followed immediately by the machine advancing the finish roll which quickly completes the job. See Fig. 4.

Tail stock maintains endwise pressure, assisting in the forming operation. As finish roll retracts, air cylinder and tail stock retract, operator removes formed part and loads a new piece. Machine then continues its cycle automatically. In fact, the automatic sequence cycle covers the unloading and reloading period also, nothing being required of the operator except reloading as the opportunity presents. Entire operation is fast, production on job pictured being 325 pieces per hour—almost 6 every minute.

After roll forming, piece is completed by trimming off the excess metal at outside edge in a trimming press. Subsequently, the pulley need only be bur-

Fig. 3—Same machine as in Fig. 2 but seen here from back side after half of splash guard has been removed. Roughing roll is on slide in foreground, finishing roll on slide in rear. During forming, work is clamped between backup plates which rotate with work. Left backup plate "floats" on air pressure, aids forming action by reducing width of pulley as groove is rolled

Fig. 4—Typical production sequence simplified to show roll forming operation. Note slight "flare" at unsupported edge of pulley rim. This aids in preventing wrinkling or collapse of the metal during forming

Fig. 5—Automatic 4-station burnishing machine smooths out profile of pulley after roll forming

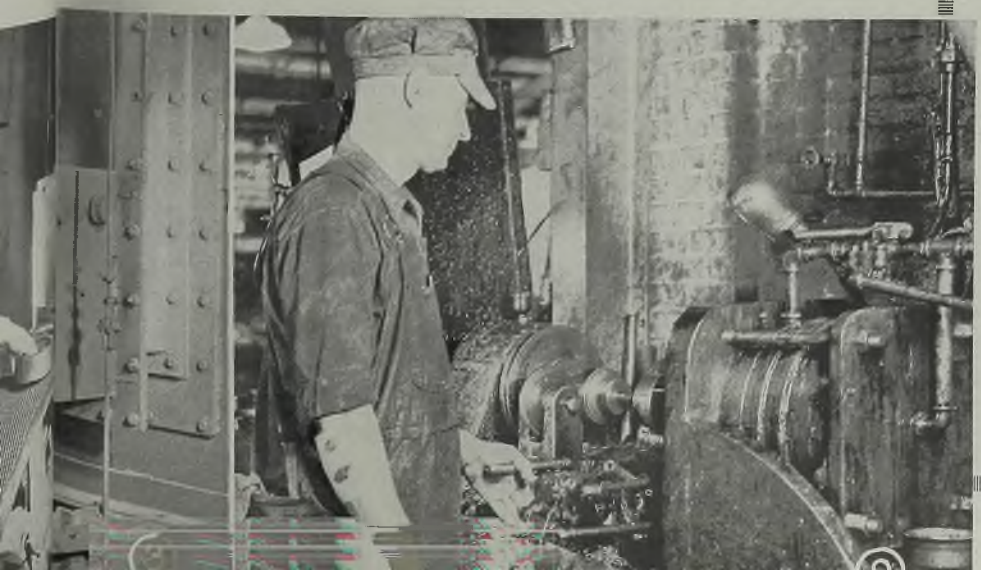
Fig. 6—Inspection of roll-formed belt-contacting surfaces is done on setup using dial indicator mounted on stand and positioned against surface. Rotating work by hand determines position and amount of any "out-of-round" which is corrected while work is still on this fixture

Fig. 7—Assembling pulley parts with rings of brass wire prior to brazing operation

Fig. 8—Loading assembled pulley parts onto chain belt conveyor of continuous electric brazing furnace. All furnaces have controlled atmospheres

Fig. 9—"Hand" roll-forming machine differs from automatic in that forming rolls are advanced against the work by air cylinders operated by the hand valve shown.

Photos by Birdsall



nished to produce a smooth profile on outside edges and it is ready for inspection.

Burnishing is done on automatic machines such as that in Fig. 5. This is a 4-station automatic unit. The operator need only load and unload the work at one of the stations while the machine indexes the work continuously from station to station.

Typical Production Sequence: Diagrams in Fig. 4 show main steps in production of a typical small pulley. It illustrates the development of the pulley shell from the blanking operation, through forming and piercing, brazing in of the hub, rough rolling, finish rolling, trimming and burnishing.

Fig. 6 shows inspection of belt contacting surfaces for runout. Pulley is mounted on mandrel and turned over by hand while a dial indicator mounted on a stand rests against the belt contacting surface. Any "out" is easily and quickly corrected by light tapping of pulley rim, since any variation detected is usually extremely small.

Pulley "A" Again: Let's follow through with Pully "A". As was pointed out, this pulley is roll formed *before* assembly, whereas usual procedure is roll form *after* assembly to hub. But here excess material that must be allowed for roll forming would interfere. Runout of belt faces is limited to 0.010-inch total indicator reading. The two pulley sections are joined to the common malleable iron hub by eight equispaced 7/32-inch diameter flat-head rivets. These are of a soft iron and all eight rivets are cold headed at one crack in a 50-ton mechanical press. The hub is finish machined before assembly, having a taper and a keyway on the inside bore.

Then the assembly is further strengthened by making six equispaced spot welds to join the two pulley shells in the web section.

Pulley "B"—No Hub: This unit, part of a fan drive for a landing vehicle, is noteworthy for its lack of a hub, being held directly to a motor sheave by six capscrews. To strengthen the pulley, its cone section is reinforced with another piece of formed sheet steel having the same shape.

After both pulley and reinforcement sections have been blanked from 14-gage (0.083-inch) low-carbon steel, they are formed separately and then assembled by spot welding at four points, using a 15-kilovolt-ampere machine. Then both pieces are pierced simultaneously in a single press operation and belt groove is roll formed.

Unit is finished by trimming off excess metal and burnishing.

Pulley "C"—Built-Up Hub: Unusual feature of this pulley is that its hub is made of "wrapping up" a piece of rectangular strip stock and brazing it into the inside of a drawn hub cup. Pulley shell is made from 0.065-inch stock by blanking, drawing and piercing.

Hub cup is made from 0.125-inch thick stock which first is blanked and then drawn in a series of operations to reduce the diameter and increase depth of the cup. Final forming is done on a 200-ton press to square up the flange, as this determines whether or not the pulley will run true. Hub cup is then finished by piercing end hole and trimming outside edge of flange.

"Wrapping Up" the Hub: Sleeve which fits inside hub cup is made from 0.250-inch strip stock, 1½ inches wide. A unique die set was designed to "wrap up" a length of this strip into a ring. Diagram "G" shows arrangement of die. Strip is inserted at top, shown solid. Here it rests on a round mandrel which is supported by an air cylinder sufficiently so that as upper die descends, first action is to wrap the work around upper half of mandrel, as shown by cross hatching.

Up to this time, air pressure has been sufficient to prevent movement of mandrel, but now it is seated against upper die which proceeds to carry it and the work down into the lower die, bending the legs part way together. Completion of the circle-forming operation is produced by the side motion of the two lower die halves which are pushed together toward the mandrel by the wedge action of surfaces "A" of upper die as it moves down on surfaces "B" of the lower die.

Subsequent upward movement of top die and mandrel is followed by a stripper which removes formed ring from the mandrel. Spring automatically separates lower die halves. While it seems simple, the trick here is to get correct action of air cushion for the mandrel.

Pulley "C"—Assembly: The above parts are put together by *brass* brazing. This is just like *copper* brazing except that a brass wire is melted into the joint. The zinc in the brass allows use of a somewhat lower furnace temperature, thereby increasing life of furnace elements and lowering heat costs. Brass brazing involves use of a flux, is suitable only for short flowing distances. Where joint design requires any length of flow, copper is employed (no flux).

Brass brazing is done in one of several continuous electric furnaces. Facilities include a 60-kilowatt wire mesh belt unit with a 12-inch wide belt, 6 inches vertical clearance; two 90-kilowatt furnaces with 18-inch wide wire mesh belts—one with 10 inches vertical clearance, the other 6 inches; and a 100-kilowatt roller-hearth unit with working area 20 inches wide, 8 inches vertical clearance. All units operate at a maximum of 2050 degrees Fahr. Electric Furnace Co. supplied the conveyor belt furnaces, General Electric Co. the roller-hearth unit.

Hub cup and sleeve of Pulley "C" are first assembled together, a brass wire ring being placed in the bottom of cup at "A", Diagram "C". This is supplemented by another ring on the flange at "B" and a third at "C" around other end of the sleeve. Entire assembly is brazed in one operation. Fig. 7 shows operator making up typical assemblies for brazing and in Fig. 8 the assemblies are being fed into one of the continuous chain-belt furnaces.

After brazing at 1850 degrees Fahr., assembled pulley is restruck in sizing dies in a 400-ton HPM hydraulic press. Dies are so designed as to "catch" all surfaces, thus squaring up the whole assembly.

Now inside diameter is rough and finish bored on a 3-station rotary table on a 2-spindle Barnes drill with hydraulic feed. Next automatic stub lathes are employed to machine the outside diameter of the hub, hub end and chamfer the hub opening. To meet finishing tolerances, about 1/64-inch of stock is left, just enough to clean up. Keyway is

(*Please turn to Page* 150)

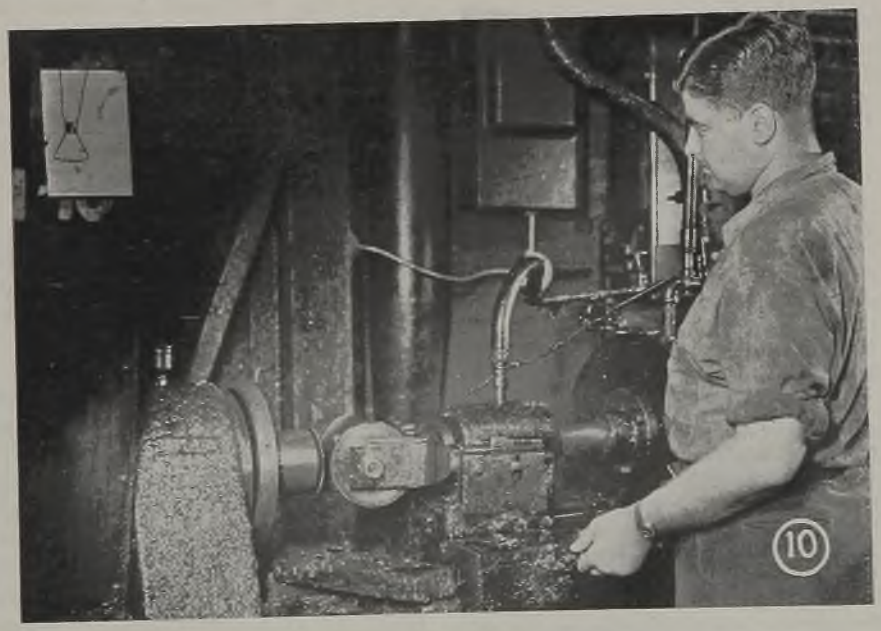
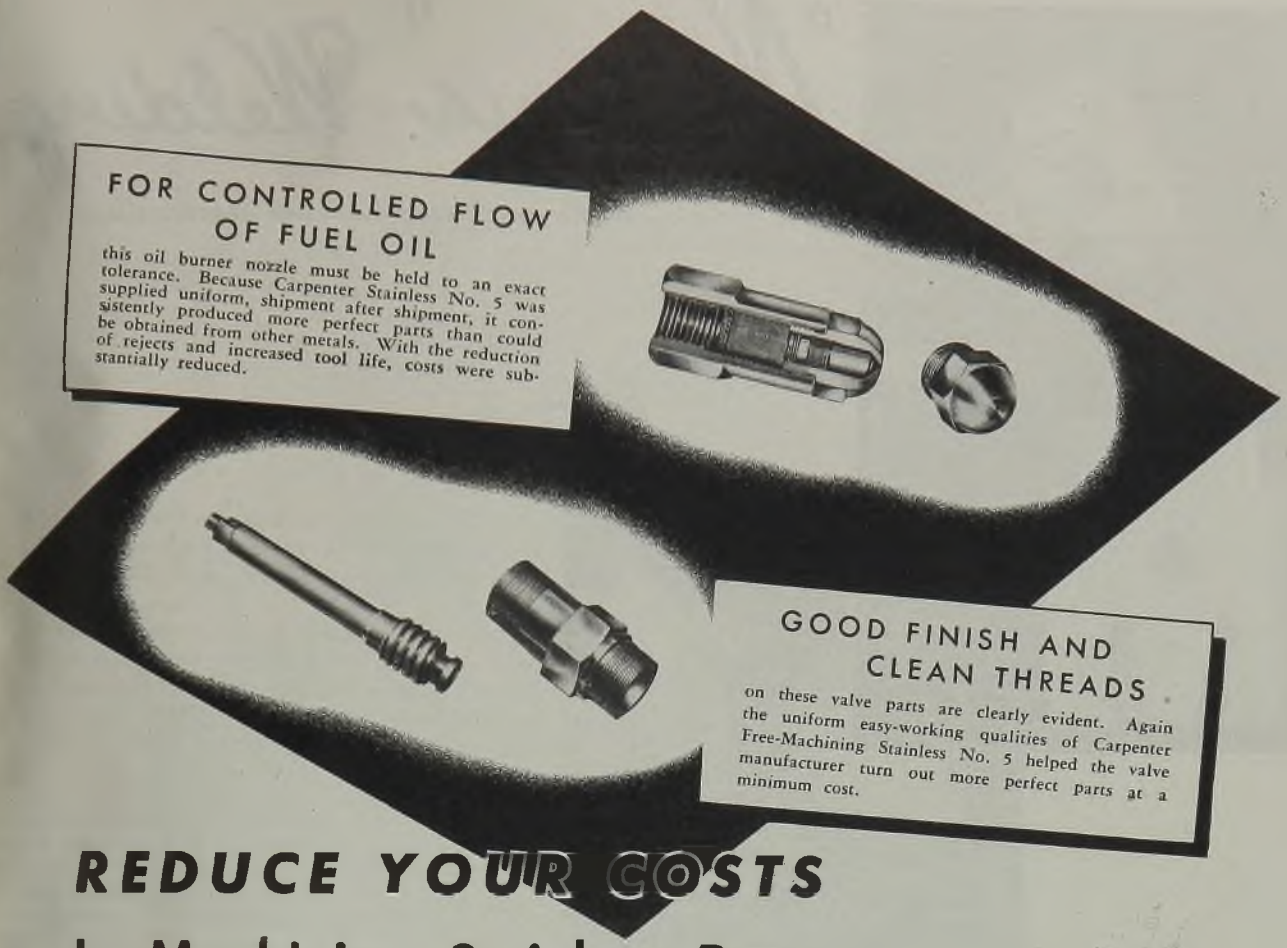


Fig. 10—*Many other special shapes are easily adapted to production by roll forming. Here work at left is spun against a double roller*



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"Nervous" Welding

. . . . a new process with unusual characteristics

By L. E. KUNKLER
President
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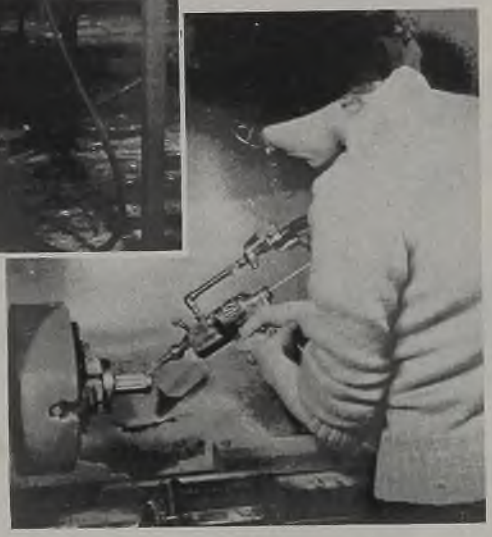

(Left, above)—Nervous weld machine is small and compact as shown here where it is being used to repair a cracked engine block

(Left)—Adding nickel by the nervous weld process for press fit application where only a few thousandths buildup is required. Density of metal deposited can be controlled by selecting air pressure and current values

NERVOUS welding constitutes one of the most recent innovations in welding, the process employing a low voltage, high amperage welder in combination with compressed air and a vibrator and being especially adapted for use in plugging holes and cracks in steel, gray iron, malleable and aluminum bronze castings. The process also may be used for adding metal to internal and external diameters for press fit applications.

The machine operates on 110, 220, 440 or 550-volt, single-phase current. The metal is applied with a pistol which is equipped with feed rolls and a trigger arrangement for manual feeding of the rod. Compressed air is supplied under 40 pounds pressure and also serves as a cooling device, the part being treated being held at a maximum temperature of 125 degrees Fahr.

In carrying out the process, the surface is contacted by the electrode which may be aluminum, bronze or nickel, depending upon the type of material being welded. The electrode is heated to a plastic stage and the compressed air breaks it down, somewhat in the same way as in the metallizing process. The recoil of the vibrator, or nervous pistol, actually pounds or forges the hot metal into the parent metal structure. This involves a combination of welding and forging of the structure as it is being built up.

Unquestionably one of the most important uses of this new process is in salvaging defective aluminum castings. The fusion is so good and the deposit so dense at the point of fusion that there is no apparent line of demarcation. The process can also be used for plugging holes in aluminum castings as well as adding metal to aluminum. It is stated that the deposit is 1 to 1½ per cent maximum of the density of the cast aluminum.

A midwestern manufacturing plant turning out bombsights had a great many rejects on aluminum castings. This company was using a low temperature zinc alloy rod and plugging the holes by welding and brazing. The method was not satisfactory because the repair would not stand Alumilite plating as the joints would open and in many cases lift up. This was caused mainly by the action of the sodium hydroxide solution used to prepare the casting for the plating process.

Three castings, each one representing an average of $75 labor in machine work and with two to three blow holes in each, were salvaged. These castings were filled with aluminum and when machined it was impossible to detect the areas repaired. At no time did the temperature of the casting or the area being prepared rise above body heat. These parts Alumilite plated perfectly.

A midwestern foundry was running at only 75 per cent of capacity because of a bottleneck in core boxes. In this plant the sand is projected into the core box hitting the target areas where the velocity of the sand forms a hole the size of a 50 cent piece from ¼ to ½-inch deep. As these holes get deeper less metal is added

As a "putting on" tool, the new method works well. Here it is being used to put a boss on an aluminum pattern, saving much time

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in some places to the casting, so in order to maintain uniform thickness of the castings, girls are employed to form out the core molds.

This is a slow and expensive process as no heat can be applied which would throw them out of dimension. A crew of patternmakers is then employed to rework these target areas in the core boxes with steel or brass. Each area takes an average of six hours labor and is not too satisfactory as the surrounding area where the bond is made will work away again in a short period of time.

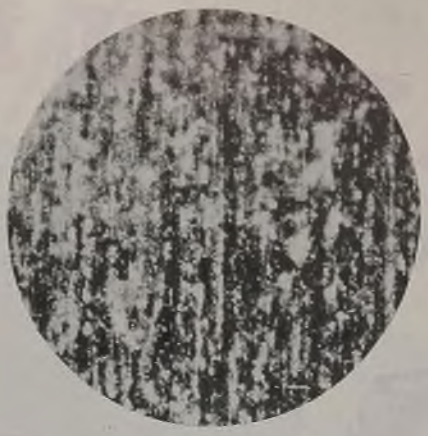
Five core boxes with an average of three target areas in each one were prepared and completed in 4½ hours, ready for service, with the nervous weld pistol. Time study estimated that this would have taken 9½ days of labor. Further tests have shown that with the process it is possible to satisfactorily armor these areas with nickel electrode.

At this same plant pattern fillets were also repaired by the new process. This work took only a few minutes compared to hours of tedious labor by the patternmaker, who heretofore had to scrape and file almost endlessly.

Saves Time and Labor

Another plant used the process on four powder loading trays for cannons, which are approximately 4 feet long by 18 inches wide. These castings contained innumerable blow holes. An actual count in one of the four castings showed 392 holes with an average size of $\frac{1}{8}$-inch in diameter and ¼-inch deep. These blow holes would have to be drilled out preparatory to filling these holes with low temperature metal. This would take the operator two days to complete, another two days to refill the holes with a low temperature metal and clean up the areas. This time was actually spent for each casting. The casting with 392 holes was finished by nervous welding in 6 hours.

In one case, a casting had a shrinkage fissure along one of the edges about an inch long. This should have been chiseled out, but instead, the operator, misunderstanding instructions, cut out a wedge throughout the fissure length ¾-inch wide and 1 inch long by ¼-inch thick, with



Section through aluminum nervous weld at 128 diameters. Note there is no line of demarcation between weld metal at top and base metal below

a hacksaw. When this mistake was discovered, the wedge was filled in by nervous welding. The inspector took a hammer to test the deposit, using the wooden handle, and pounded it severely without loosening the bond.

A Chicago patternmaker had an aluminum pattern on which the boss had been placed in the wrong location. Ordinarily, it would have been necessary to drill out and remove the boss, leaving a recess hole in the pattern. The hole would then have to be extended to receive the new boss in the new location. A new pattern would have to be made to provide a plug to fit this hole. Then a casting made from the new pattern worked to proper dimension and inserted in the prepared hole. Nervous welding was used to put the boss in the proper place in a few minutes.

An automotive rebuilder has repaired over 1200 cracked blocks of various types, including gas and diesel—with the nervous weld method, many with head cracks, cracks in water jackets or across the valve seat. In every case it has been possible to obtain a fill-in with a very dense deposit. Nickel rod is used for making this type of repair.

A firm in Cincinnati had a bell end for a 25-horsepower motor with the bearing recess mismachined 0.012-inch through the diameter. This part was built up with the nickel electrode to the desired dimension, plus 0.010-inch to allow for grinding to finish the bore to the size for a press fit.

Another plant had a salvage job involving 600 armatures which had been mismachined 0.002. Each of these armatures was worth $30, and the total diameter of the armature was to finish 0.155. To salvage these shafts they were ground under 0.010 on the diameter, and a rough, crater-like surface of 0.005 was added to serve as a bond for the sprayed steel. After metallizing they were then ground finished.

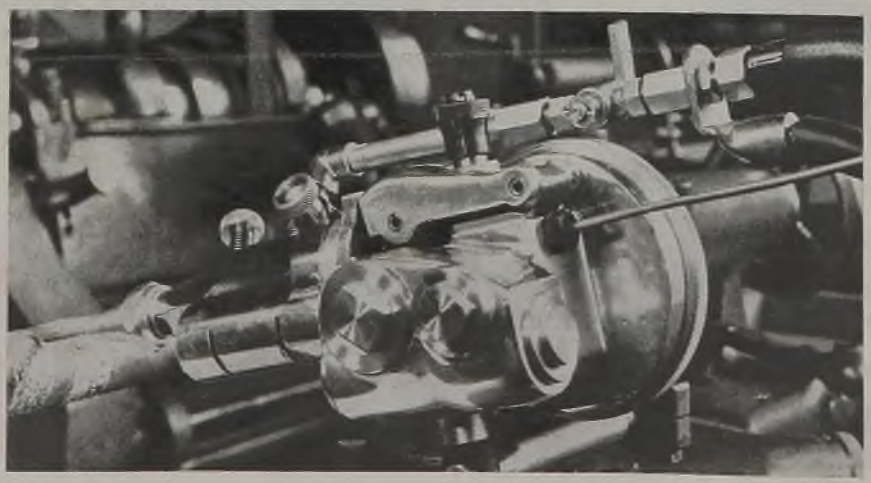
It has been demonstrated where changes such as bosses, fillets, or dimensional changes are required in an aluminum pattern, that they can be done efficiently with nervous welding. This is defined as *hole plugging* and it is possible to plug holes in aluminum and give a permanent bond, in fact, the result is an actual fusion. Large as well as small holes can be filled quickly and effectively. The process can also be called a "putting on tool" but in contrast to the metallizing process, a homogeneous bond is obtained, in place of a bond relying upon mechanical "keying" for its strength.

Dense Deposit, Excellent Finish

In using the process, as a hole plugger or putting on tool, a number of factors must be considered—the alloy of the casting, the speed of the machine tool, as well as the tools used. It is possible to apply a very dense deposit to obtain an excellent finish. Usually there will be a little different analysis to the aluminum rod than that of the casting or pattern. The deposit of the weld will be either softer or harder, depending upon the analysis of the casting. The patternmaker or the machinist will understand this from his experience in finishing.

For steel, gray iron and malleable castings, nickel rod is used and a slight discoloration of deposited metal from parent metal may be noted, and the fill-in will be noticeable in this respect. For bronze castings, a special bronze rod is used with small zinc content, and there is a slight discoloration in the bronze fill-in. However, with aluminum castings there is no evidence of discoloration.

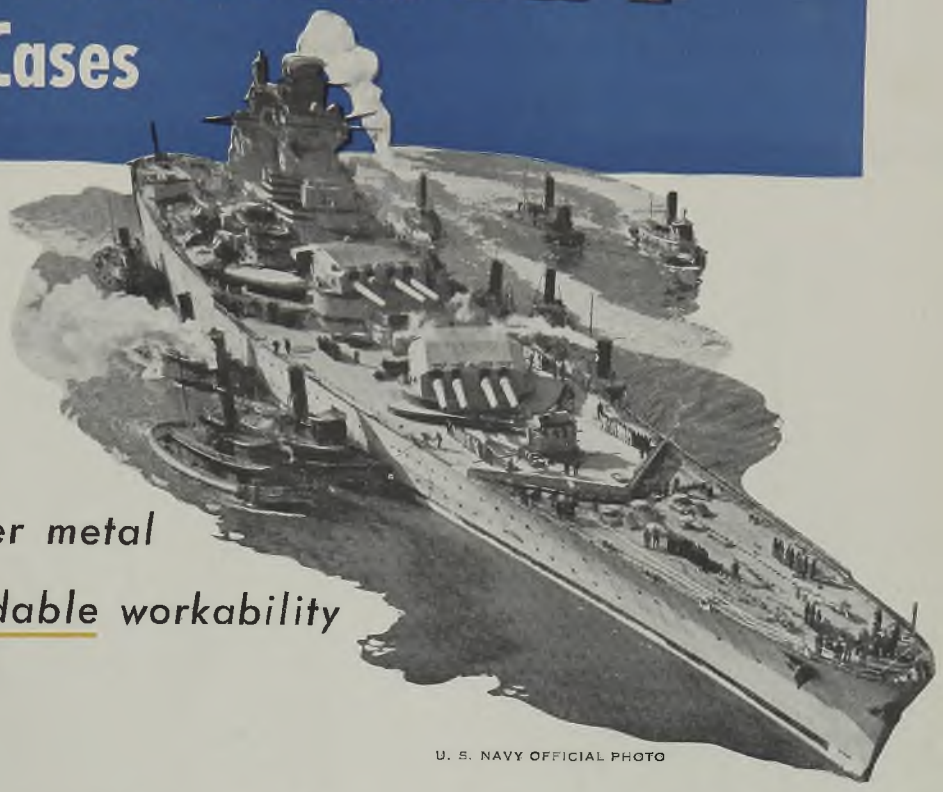
There is no chance of heat causing stress, distortion or damage to the piece. It actually gives a fused build-up that is so close in texture to the original casting that even X-ray photographs fail to show the fill-in or the line of demarcation. Tests show strength, as well as resistance to high pressures without leaking.



Closeup of nervous weld pistol, comprising power chamber and peening motor, mounted on a metallizing gun case for lathe operation. This type of setup is recommended for preparing shafts for metallizing and for all large shaft build-up work

It's BRASS...

for the Richelieu's 152 mm. Cartridge Cases



U. S. NAVY OFFICIAL PHOTO

... Because no other metal has such dependable workability

WHEN the pride of the French Navy, the 35,000-ton Battleship Richelieu came limping into New York Harbor, she proved a welcome addition to the United Nations' Fleet. Battered and bruised, her arrival presented the immediate job of repairing and refitting—and also the problem of providing ammunition for her secondary battery of fifteen 152 mm. guns.

The cases for this ammunition are the longest of their kind used by any ship afloat—three feet, seven inches. With a head diameter of 8.5625" and forty pounds in weight, they were regarded by our Naval experts as the most difficult to make. Yet thousands of these cases were produced rapidly and satisfactorily by the Rheem Manufacturing Company from discs of Anaconda 70-30 Cartridge Brass supplied by The American Brass Company.

Brass was specified for this job because no other metal could provide the dependable workability necessary for repeated deep drawing operations of such proportions—to the accurate dimensions necessary for ammunition of this type. Because of these unusual manufacturing requirements, the 16" diameter, .813" thick, 50-pound discs of Anaconda Brass were supplied to exceptionally close tolerance in composition, dimensions, anneal and surface finish.

Illustrations of the blanking, an intermediate drawing operation, the disc and a finished cartridge case, appear on the following page.

BIBLIOTEKA POLITECHNIKI ŚLĄSKIEJ

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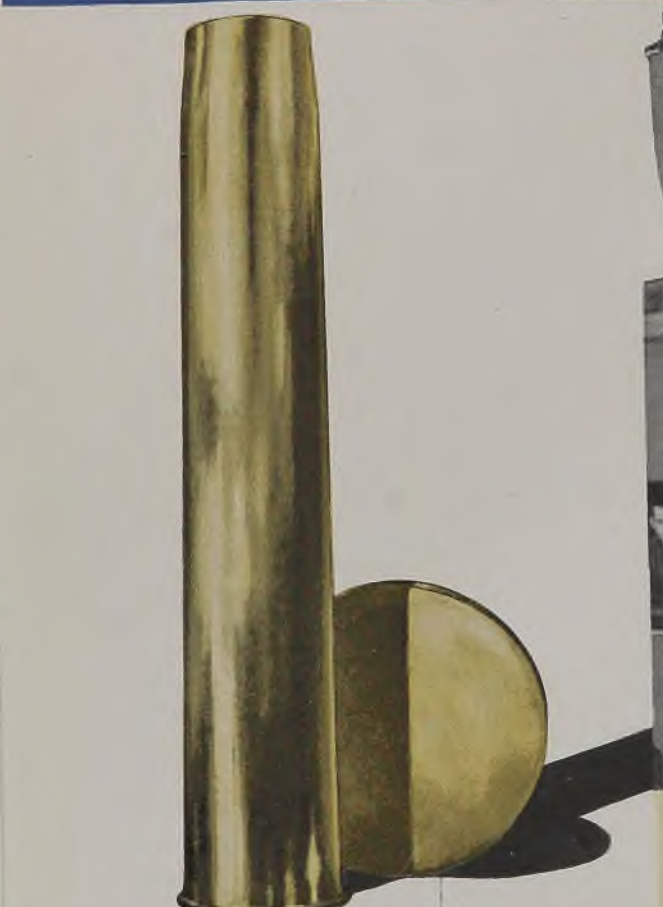

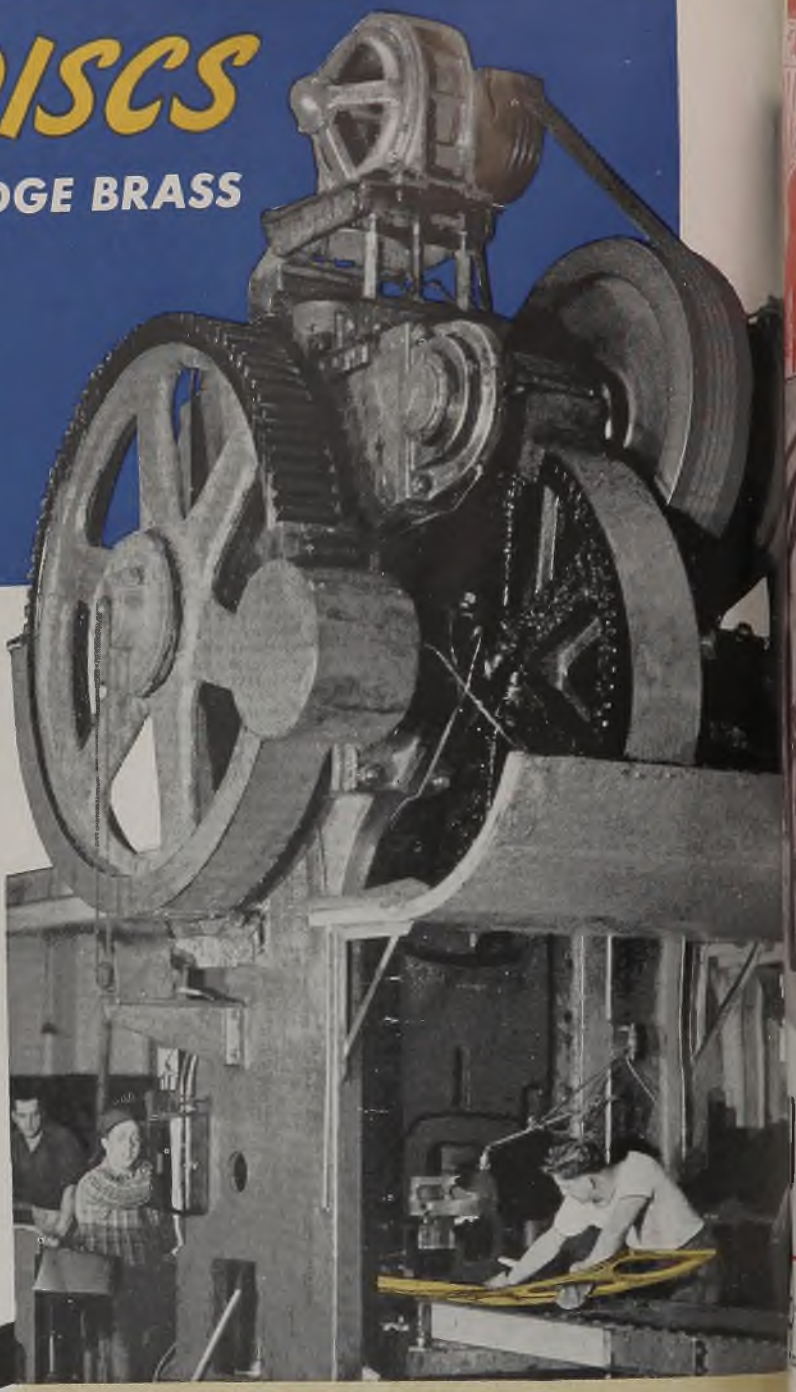

As described on the preceding page, 152 mm. cases for the Battleship Richelieu were produced from 16″ discs of Anaconda 70-30 Cartridge Brass. Above is the 600-ton press now used for blanking out large diameter discs at the Waterbury, Connecticut plant of The American Brass Company. A fifty-pound, 16″ disc, .813″ thick, and a 43-inch long finished case with a head diameter of 8.5625″, are illustrated at upper left. At the left is a view of an intermediate drawing operation on a hydraulic press in the shops of the Rheem Manufacturing Company where thousands of such cases were produced. Because the metal for this difficult job was *Brass* the cases were repeatedly drawn, annealed and redrawn, headed, tapered, drilled, tapped and machined without difficulty.

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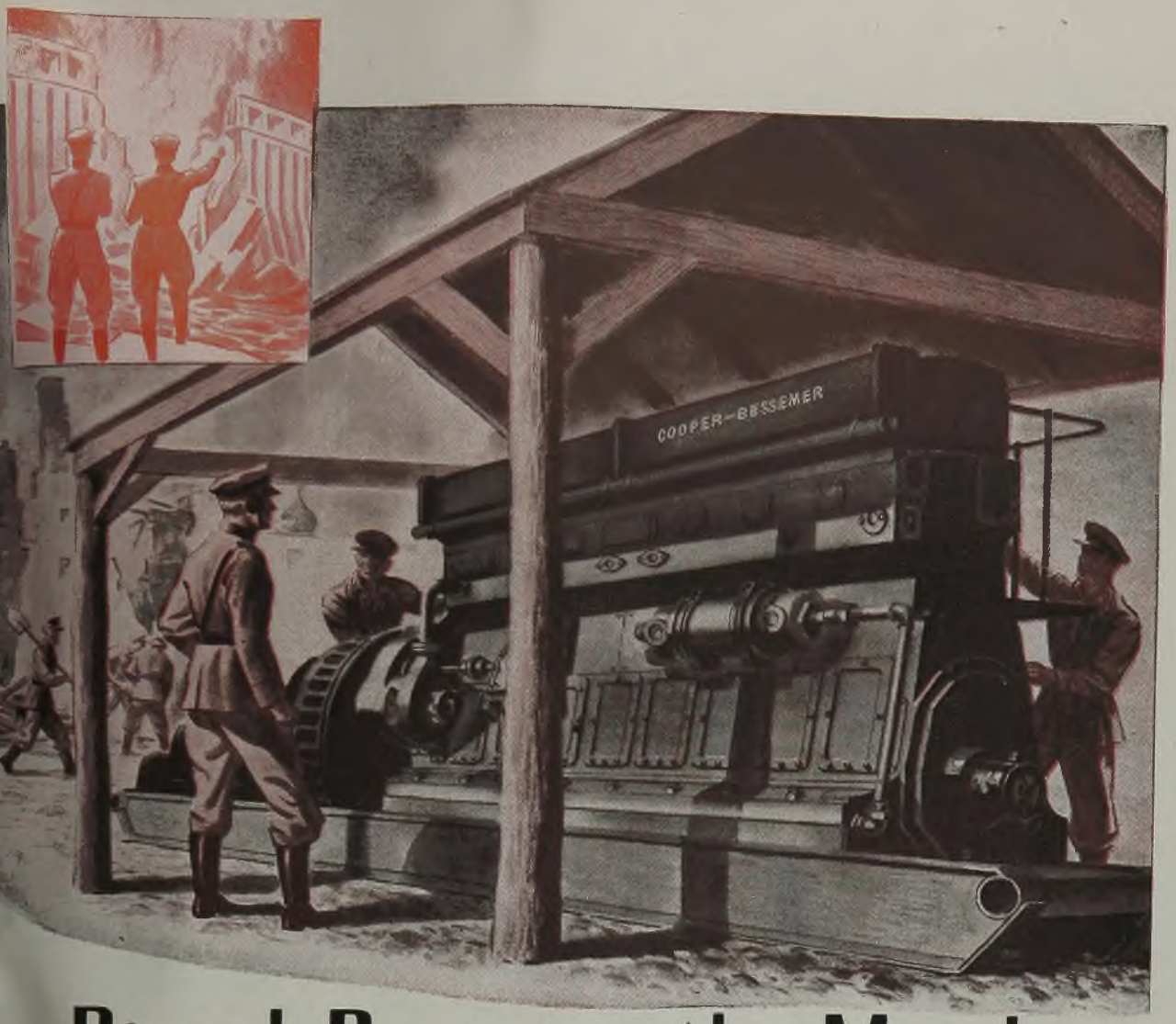

Diesel Power on the March

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Diesel engines by Cooper-Bessemer are the heavy-duty long-lasting type, built to do tough jobs—on shipboard, in locomotives, in cities, in the desert, at remote mines, in the oil fields—driving compressors, generators or pumps. They fill thousands of vital war jobs now, will serve in thousands of hard jobs of world reconstruction.

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BUILDERS OF DEPENDABLE ENGINES FOR 110 YEARS

How United States Designers Shift to Use of NE (National Emergency) STEELS

Highly stressed parts such as diesel engine studs employ substitute steels in program closely keyed to Navy requirements and to production problems

By O. L. MESENHIMER
Mechanical Engineer
Head of Design Department
Office Inspector of Machinery, U.S.N.
Cleveland

CONSIDERABLY more than two years ago, the Navy realized the critical condition confronting this country in the production of high alloy steels and in order to conserve these critical alloying materials took steps to permit the steel manufacturers to supply so-called NE (National Emergency) steels as these were becoming more readily available than steels previously or at that time being specified.

A program of substituting alternate steels, readily available and obtainable from some stock pile, together with the use of NE steels, then in the process of being rolled, was instigated in the diesel engine field, along with similar programs being undertaken for many other applications. The policy then set up was that steels with chemical properties varying from those specified for steels previously proved by actual service with a given engine model would be approved for use provided the physical requirements of the proved steels are met by the substitutes and the parts produced are otherwise suitable for the purpose intended and satisfactory to the engine builder.

Under these conditions and for the parts concerned, the government was prepared to waive the requirements of the contract guarantees, if requested to do so, until such time as full information concerning the performance of these alternate steels became available. However, all manufacturers concerned were requested to expedite determination of the processing of these steels to insure that satisfactory physical properties might be obtained and thereby remove any remaining doubt as to their applicability. Thus, as much effort as practicable, was to be made toward shortening any waived guarantee period by actual tests of the parts made of substitute materials in engines in the fleet as well as in test laboratories.

As a matter for discussion here, cylinder head studs have been selected as a representative part of the engine for which alternate steels were being considered. This is a highly stressed part and is subject to severe conditions of operation resulting (1) from the repetition of explosion within the cylinder (which at times lifts the head from its seat), (2) from the effects of temperature change, (3) from continuous vibration during operation and (4) from the personal element involved in the process of tightening and retightening of cylinder head nuts.

From actual service conditions, experience had shown that SAE-3135 or SAE-2340 were well suited for the purpose intended when heat treated to give a minimum ultimate tensile strength of from 130,000 to 140,000 pounds per square inch with a minimum elastic limit or yield strength of from 110,000 to 115,000 pounds per square inch. Minimum elongation in 2 inches was determined to be in the neighborhood of 16 to 17 per cent with a reduction of area of 50 per cent minimum.

These specification requirements are tabulated on the accompanying chart showing a hardness range of 260-290 brinell for SAE-3135 and a range of

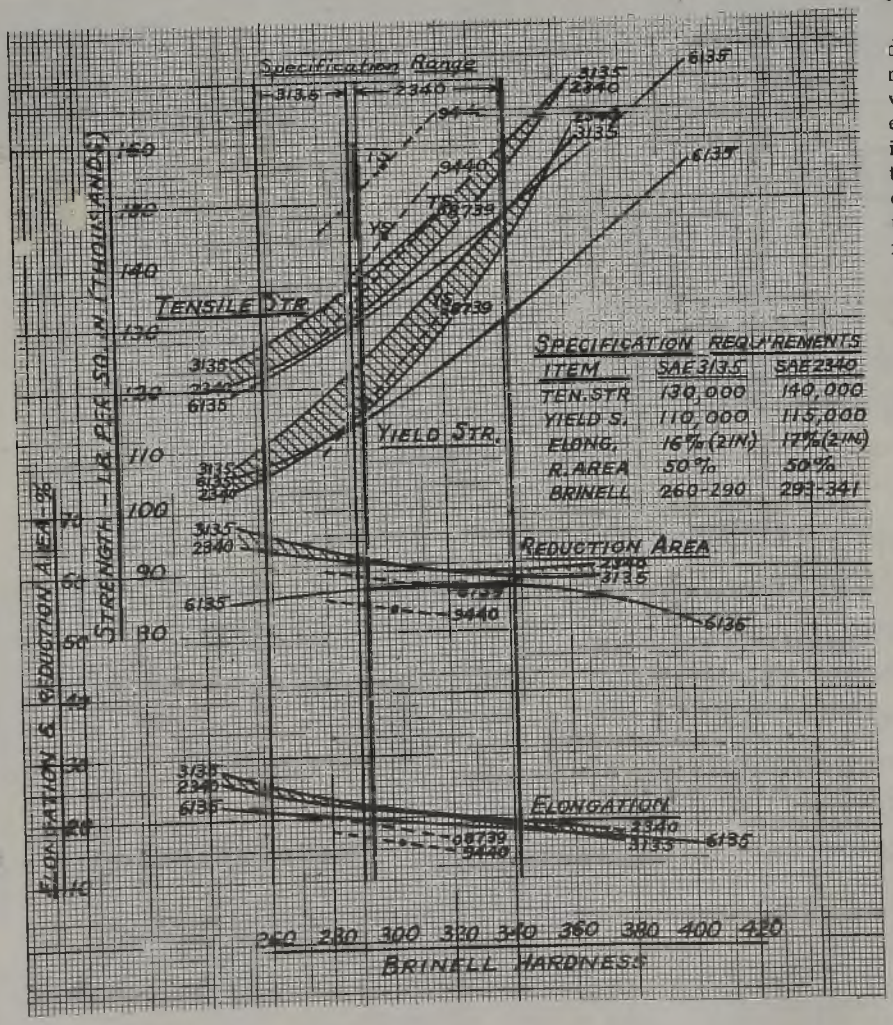

Chart shows physical properties plotted against brinell hardness. Specification range for SAE-3135 and SAE-2340 is shown. Hatched areas indicate range of the two proved steels

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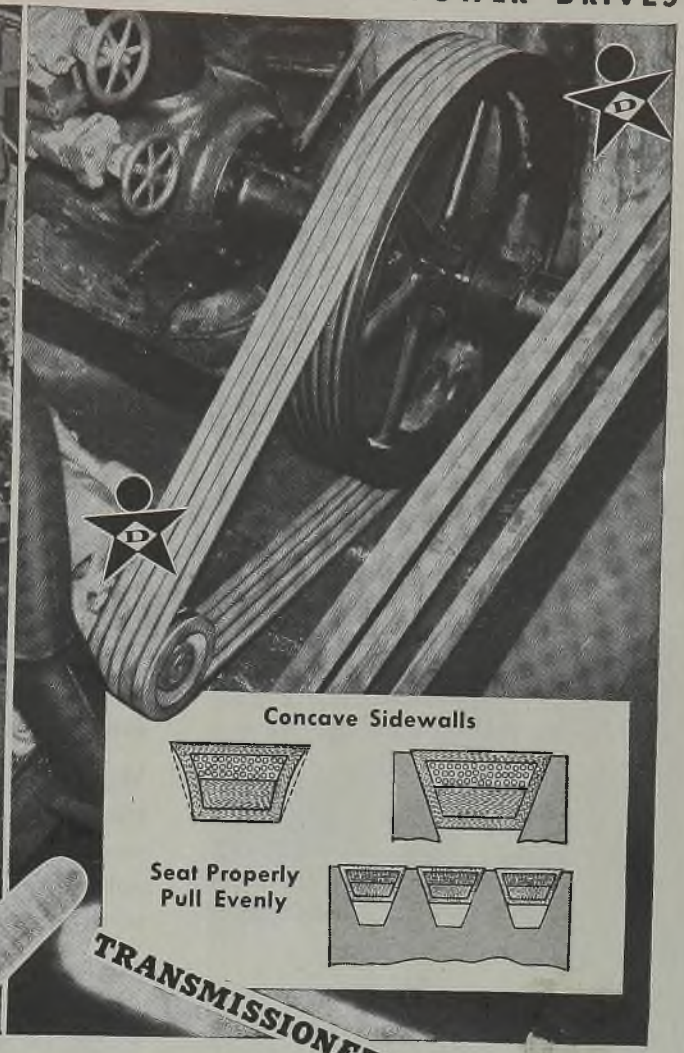

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THE WHEELS OF IN[illegible]

293-341 for SAE-2340, the former being specified for some models and the latter for others, depending upon the design characteristics of the engine. Other high alloy steels are also specified for cylinder head studs on other model diesel engines, such as SAE-X4340. But for the purpose of this discussion, only the first two proven steels mentioned will be considered. It should be pointed out, however, that the physical characteristics and specified requirements after heat treatment of these other proven steels are near or within the range of those under consideration.

From the above, it will be concluded that no matter what steel is used, provided it is a proper heat-treating grade, the heat treatment is to be varied as necessary to produce the physical properties desired. As noted, this applies to NE steels as well as to any of the higher alloy steels.

Prior to going more or less entirely to the use of NE steels, some comparative tests were conducted on SAE-3135, SAE-2340 and also on SAE-6135, for which a large stock pile was found to be available. The results of these tests are shown on the chart and in Table I.

The chart was made up to show ultimate tensile strength, elastic limit or yield strength, elongation and reduction of area as ordinates, and these values were plotted against each corresponding value of brinell hardness as the abscissa. Hardness of the samples ranged from 260 to 400 brinell; however, the hardness range mainly under consideration was from 260 to 340, which in turn was subdivided into two ranges, namely, from 260 to 290 and from 293 to 340, in line with the specification requirements of the two proved steels.

(Top, right)—Piston being lowered into cylinder liner. Note studs in liners and crankcase

(Bottom, right)—Cylinder head being installed over cylinder head studs in liner and crankcase. Cleveland Diesel Div., General Motors Corp. photos

For comparison, values in Table I are listed for approximately the averages of these three ranges, together with the chemical analysis of the steels. Physical properties for NE-8739 and for NE-9440, taken from published results for relative diameters, were plotted on the chart and are listed in Table 1.

The results of this comparison show that NE-8739 falls within the shaded area between the curves for SAE-3135 and SAE-2340 for both tensile and yield strength, and the elongation and reduction of area of this steel is very close to that of the proved steels. NE-9440 does not appear to be as good a steel for the purpose intended, neither does SAE-6135, but it is concluded that both of these steels could be heat treated so as to meet the minimum values of the specification requirements. NE-9440 seems to show embrittlement tendencies, comparatively, and none of the substitutes appear to have as high a toughness factor as the proved steels.

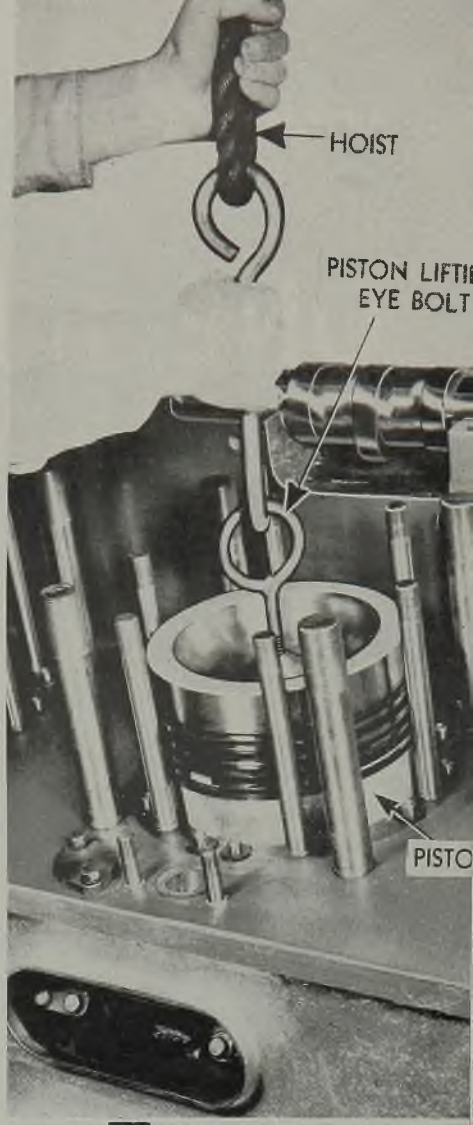
However, the proof of the pudding is in the eating thereof, and up to the present writing casualty reports have failed to show any increase in failures of the substitute steels over that of the proved

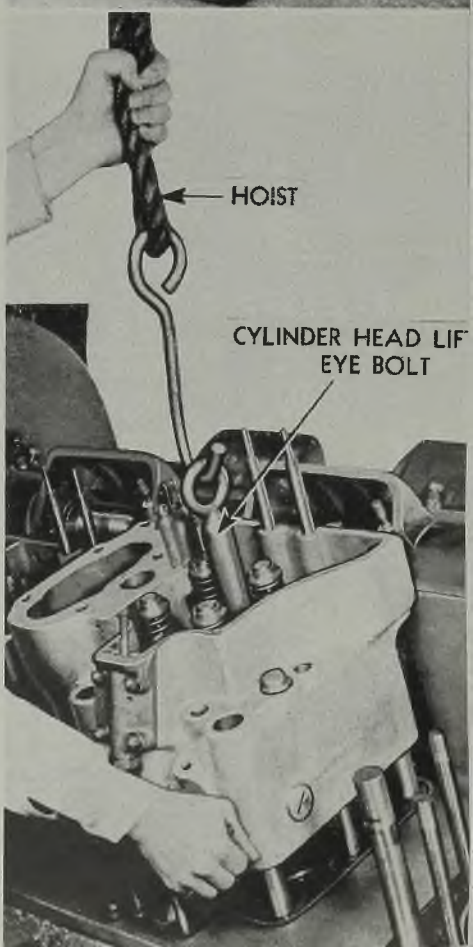
(Please turn to Page 160)

TABLE I—STEEL COMPARISON DATA

Item	SAE-2340	SAE-3135	SAE-6135	NE-8739	NE-9440
Chemical Analysis					
Carbon	0.35-0.45	0.30-0.40	0.30-0.40	0.35-0.40	0.38-0.43
Manganese	0.60-0.90	0.50-0.80	0.60-0.90	0.70-0.90	0.90-1.20
Phosphorus	0.040 max.	0.040 max.	0.040 max.	0.040 max.	0.040 max.
Sulphur	0.050 max.	0.050 max.	0.050 max.	0.040 max.	0.040 max
Nickel	3.25-3.75	1.00-1.50		0.40-0.60	0.20-0.40
Chromium		0.45-0.75	0.80-1.10	0.40-0.60	0.20-0.40
Vanadium			0.18 desired 0.15 min.		
Molybdenum				0.20-0.30	0.08-0.15
Silicon					
Basic O. H.	0.15-0.30	0.15-0.30	0.15-0.30	0.20-0.35	0.40-0.60
Acid O. H.	0.15 min.	0.15 min.	0.15 min.	0.15 min.	0.15 min.
Physical Properties					
Ultimate T. S.	144,000	149,000	140,000	148,500*	165,000
Yield S.	129,000	137,000	123,000	132,000*	155,000
Elong. (2 in.)	20%	20%	19%	16%*	15%
Red. Area	60%	60%	58%	57%*	52%
Hardness (B.H.)	320	320	320	321 *	320
Ultimate T. S.	128,000	134,000	127,000	129,000	145,000
Yield S.	111,000	118,000	111,000	109,000	132,000
Elong. (2 in.)	22%	23%	21%	20%	18%
Red. Area	62%	64%	55%	60%	55%
Hardness (B.H.)	280	280	280	280	280
Ultimate T. S.	135,000	141,000	133,000	139,000	156,500*
Yield S.	119,000	127,000	117,000	120,000	144,500*
Elong. (2 in.)	21%	21%	20%	18%	16%*
Red. Area	61%	61%	57%	59%	53%*
Hardness (B.H.)	300	300	300	300	302 *

*Taken from results published in METAL PROGRESS (A. S. M. Journal) for relative diameters.





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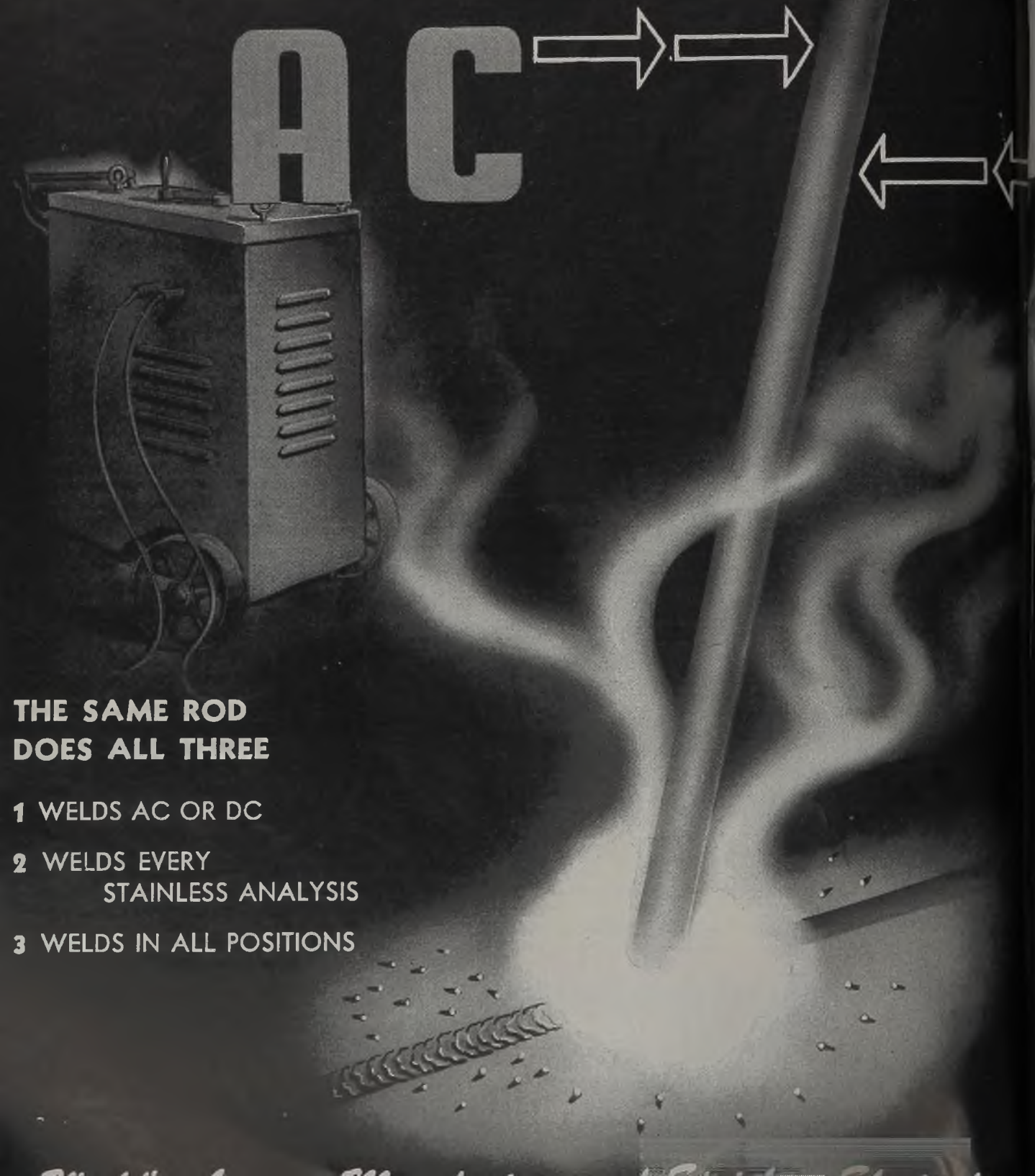

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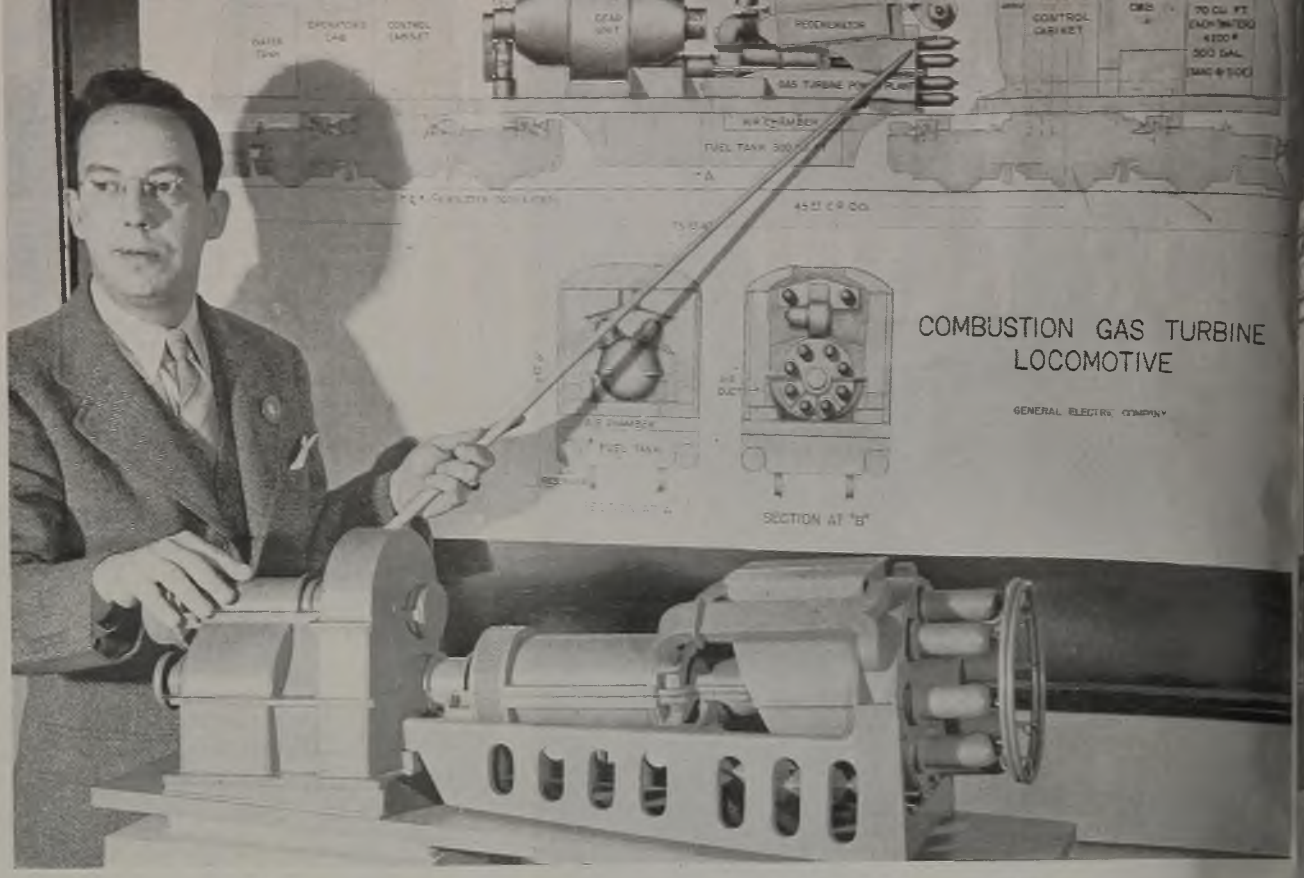


Fig. 1—Two promising fields for gas turbines are indicated here by Mr. Salisbury as he points to a drawing of a proposed 4500-horsepower locomotive, with a model for a 3000-horsepower gas turbine for ship propulsion in foreground

Gas Turbine Developments...

cause engineers to predict important fields in postwar cargo and transport aircraft. Approach to limit of gasoline engines comes in sizes (2000 to 8000 horsepower) at which gas turbine becomes highly efficient power source

By J. K. SALISBURY
Turbine Engineering Division
General Electric Co.
Schenectady, N. Y.

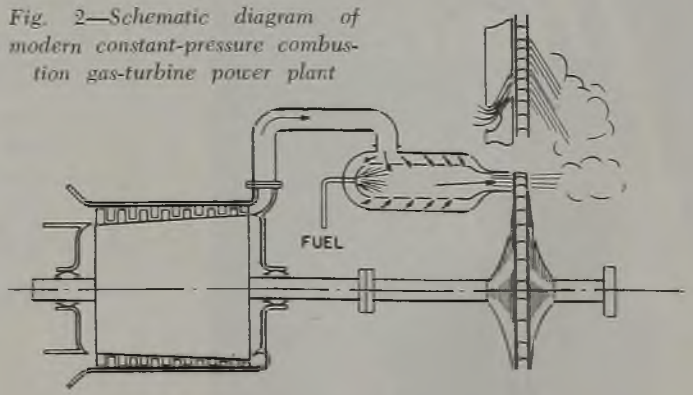
THE MODERN constant-pressure combustion gas turbine in its simplest form, consists of a compressor, a combustion chamber, and a turbine as indicated by the diagram shown in Fig. 2.

The term "constant pressure" is used to distinguish this machine from the explosion gas turbine. However, the term does not indicate that the pressure is constant for operation at all loads but rather that a steady-flow process is used.

In the constant-pressure unit, atmospheric air is compressed in the compressor to several atmospheres pressure and then taken to a combustion chamber into which fuel is injected. The burning of fuel raises the temperature of the compressed air which is then taken to the turbine in which it produces power, just as superheated steam produces power in a steam turbine. The greater part of the power produced (about two thirds) is required to drive the compressor. Only the remainder is available for doing useful work.

The history of the past two centuries is replete with records of the attempts of many people to find a satisfactory prime mover operating on combustion gases. It has been, and still is, probably the most frequently "invented" of all prime movers.

Fig. 2—Schematic diagram of modern constant-pressure combustion gas-turbine power plant



All of the early inventors encountered extreme difficulty in obtaining useful output from their machines. The reasons for this difficulty are today quite obvious. For example, Fig. 3 illustrates the minimum turbine-inlet temperature at which useful output can be obtained, plotted against machine efficiency. Modern turbine and compressor efficiencies are in the 80 to 85 per cent range, hence useful output can be obtained with temperatures as low as about 6[illegible] degrees Fahr.

Fortunately the output of the gas-turbine power plant increases very rapidly as the turbine initial temperature is increased, or as the compressor inlet temperature is decreased. This fact is illustrated in Fig. 6 in which are shown progressively the effect of decreasing the compressor-inlet temperature, and increasing the turbine-inlet temper[illegible]

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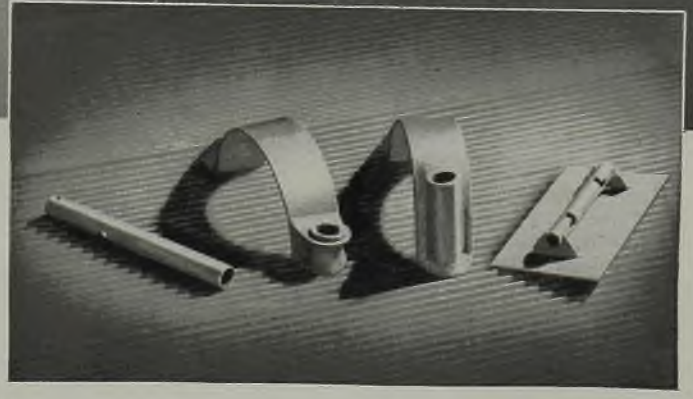
Ammunition boxes for army bombers, showing use of tubing for handles.

(Left to right) An ammunition box handle, clamps for Hydraulic Landing gear on a pursuit plane and side handle for ammunition box.



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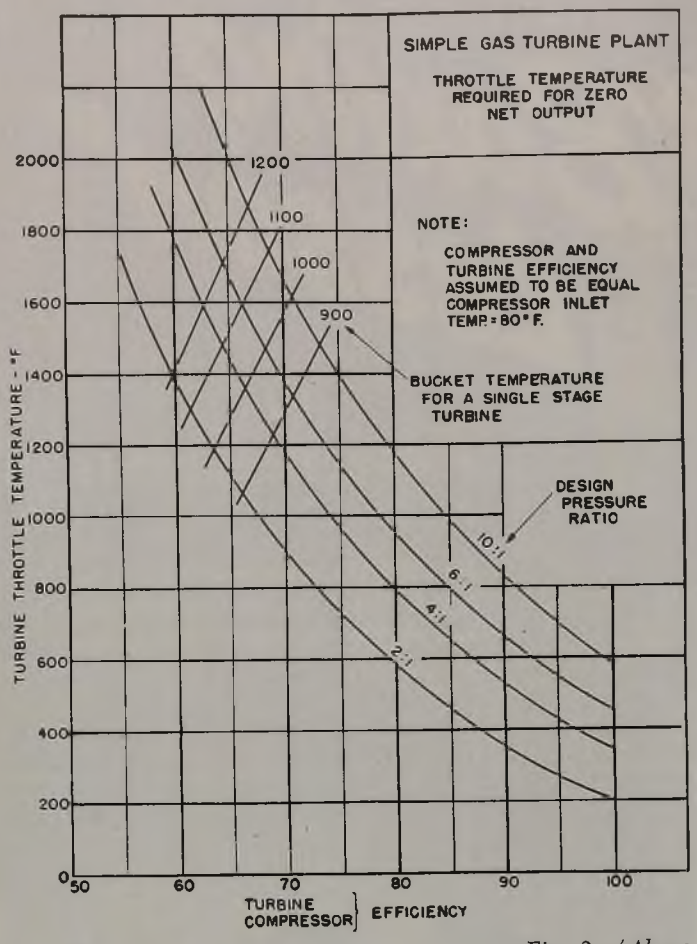

Fig. 3—(Above, left)—Minimum temperatures for useful output

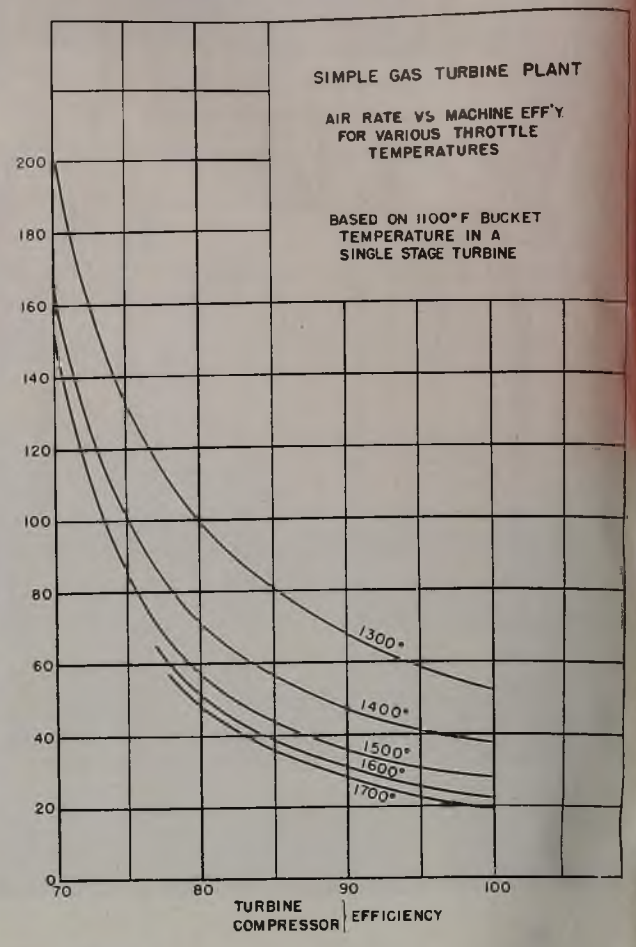

Fig. 4—(Above, right)—Relation of air rate to machine efficiency for various temperatures

ture. Fig. 6 assumes, for convenience, that the flow and specific heat of the fluid have such values that the temperature change represents numerically the output in horsepower (the flow would be 10,600 pounds per hour when using air). The temperatures as chosen are arbitrary.

The outputs are shown on both a theoretical and an "actual" basis, the theoretical and actual bases being 100 per cent and 80 per cent machine efficiency, respectively. The circled figures indicate clearly the rapid decrease in the ratio of the gross to the net turbine power, as well as in the machinery power to net power ratio. It is to be noted also that the ratio of actual to theoretical net power increases very rapidly as the turbine-inlet temperature is increased and the compressor-inlet temperature is decreased.

Early Machines Bulky

The early inventors were forced to use machines of tremendous size because of limitations in machine efficiency and temperature. This fact is illustrated in Fig. 4 where the air rate (analogous to steam rate) of a gas turbine is plotted against machine efficiency for various turbine-inlet temperatures. These curves assume operation at the pressure ratio required to give a constant turbine-bucket temperature of 1100 degrees Fahr. in a single-stage turbine such as the General Electric Co. contemplates in its present developmental work. Whereas the early experimenters were forced to use cycles having air rates higher than 200 pounds per horsepower-hour together with machinery which was consequently very bulky, the modern gas turbine with its high efficiency machinery and high initial temperatures is able to operate at air rates of less than one quarter of this value.

Thus progress in aerodynamic design and metallurgy, resulting in better efficiencies and higher inlet temperatures, has definitely brought the physical size of the gas turbine into the range of practicability.

When designed for modern conditions of temperature and efficiency the gas-turbine power plant is extremely compact, light in weight, and approaches in efficiency some of the other modern prime movers. This compactness and simplicity in design is, in fact, one of its outstanding virtues.

The Turbine: There are several possible arrangements of the turbine in a combustion gas-turbine power plant, all of which are theoretically identical in thermal efficiency. Furthermore, it is possible to use either a single or multistage turbine of any type. The primary objective is both high plant efficiency and compactness.

The General Electric Co. has chosen a single-stage turbine of the impulse type which, although admittedly somewhat lower in efficiency than a multistage turbine, has the compensating advantage of permitting higher initial turbine temperatures. The expansion through the turbine occurs in a single step and results in a large reduction of temperature before the hot gases come in contact with the buckets. The only parts which are subjected to the maximum temperature of 1600 degrees Fahr. are those which are stationary and which have relatively low stresses.

The most highly stressed part of the machine, namely the wheel and buckets, is subjected to a much lower temperature when a single stage is used.

Operating Characteristics: For illustrative purposes, the basis of nearly all of the calculated data is a nominal turbine and compressor efficiency of 80 per cent. Small variations of these efficiencies will not seriously effect the relationship of the characteristic curves in the comparison of various cycles. In most cases the cycle pressure drops have been neglected. Since pressure drop is exchangeable for compressor or turbine efficiency, the fuel consumption data presented herein would require higher efficiencies than 80 per cent in accordance with the magnitude of the cycle pressure drops. For an actual design it is, of course, essential that the minor variations, such as variable specific heat, reheat factor, presence of the small quantity of fuel, pressure drops, etc., be properly taken into account in order that the output

THE METAL INDUSTRY AND ITS FUTURE

Design for Tomorrow

ATTEND THIS YEAR'S METAL CONGRESS OCTOBER 16-20 IN CLEVELAND

In Cleveland's big Public Hall this October 16th, the metal industry will meet to take stock of its present tremendous fund of information during the 26th annual National Metal Congress and War Conference Display.

To knit together these developments of the war years as a compact design for tomorrow, some 30,000 metal men will attend this five-day meeting. They will see more than 300 exhibits devoted to new improvements in metals, processes, products and equipment.

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Certain choice display spaces are still available even though 300 companies have already reserved space. For complete information on displays, wire collect to American Society for Metals, 7301 Euclid Avenue, Cleveland 3, Ohio.

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CLEVELAND'S *Public Hall*

OCTOBER 16 THRU 20, 1944

AND WAR CONFERENCE DISPLAY

Sponsored by the American Society for Metals, in cooperation with the American Welding Society, the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and X-Ray Society and the Society for Experimental Stress Analysis.

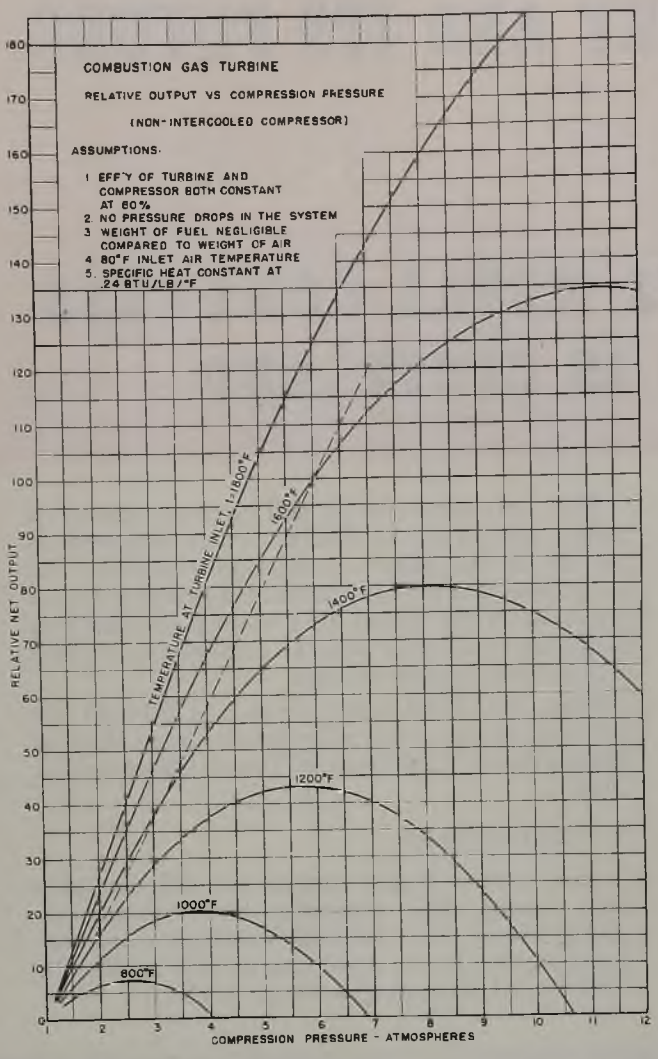


Fig. 5—(Above, left)—Net output as a function of operating pressure

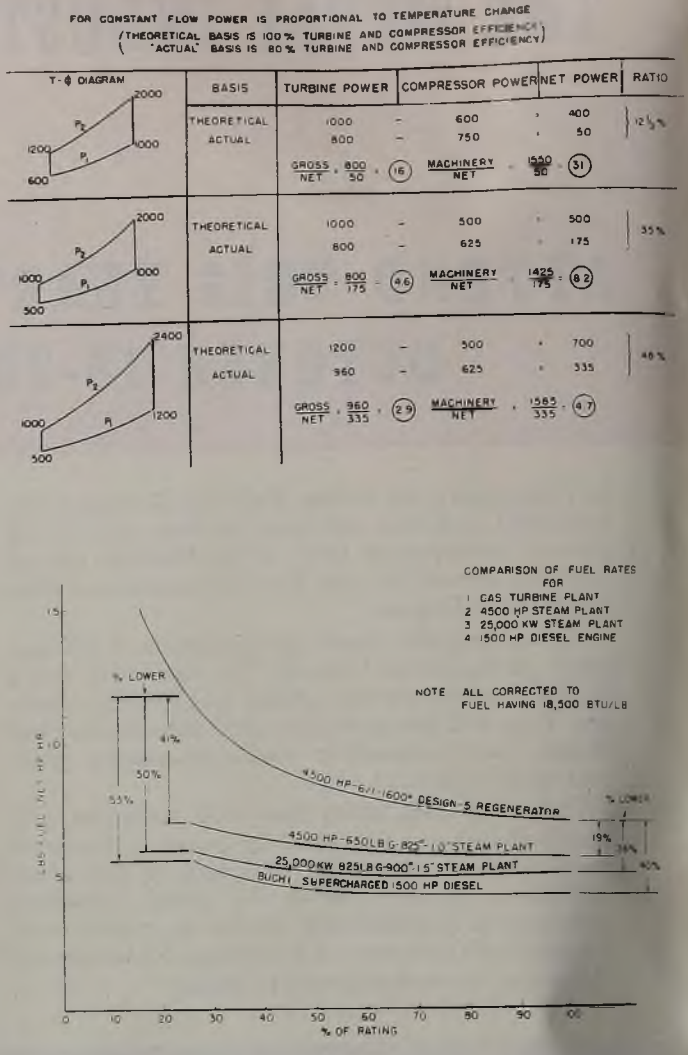


Fig. 6—(Top, right)—Effect of temperatures and machine efficiency on power output

Fig. 7—(Bottom, right)—Comparison of fuel rates for gas-turbine, steam-turbine and diesel plants

the machine will be as predicted. This is true to a greater extent for the gas-turbine plant than for a steam plant because of the "leverage" resulting from the large ratio of machinery power to net power, and the comparatively short energy range which is used.

Many Variables Involved

Fig. 5 shows the manner in which the net output at the coupling varies as the pressure ratio (hence speed) varies, for various initial temperatures. Note the rapid decrease in power as the inlet temperature is decreased. The variation in power is approximately linear with respect to pressure ratio over part of the range. In an actual gas-turbine plant it is desirable to reduce the temperature as the speed (pressure ratio) is reduced in order that excessive bucket temperatures will not be encountered. This reduction in speed also improves the thermal performance. The actual operation curve would, in Fig. 5, cut across the various temperature lines as the pressure ratio is decreased, in the manner indicated by the dash line.

Many variables are involved in the study of the gas-turbine power plant. Oddly enough, this simplest of all power plants offers so many alternative methods of operation that a clear conception of the interrelationship of all of the variables is rather difficult to obtain. In fact it is nearly impossible to present a clear, concise, graphical picture of all of these variables in simple form.

The gas-turbine power plant in operation can be affected externally only by change of the fuel supplied or of the speed. The former can be controlled automatically or otherwise through a fuel pump or throttle valve, while the latter is controlled by the character of the load applied to the gas-turbine coupling. These two variables—speed and fuel—therefore represent the most logical ones against which to illustrate the characteristics of the power plant.

Application of Gas-Turbine Power Plant: In considering the possible applications of the gas-turbine power plant, one of the first questions likely to arise in the minds of engineers is "How does its efficiency compare with that of other prime movers?"

Fig. 7 shows a comparison of the fuel rates of a gas-turbine power plant (designed for six atmospheres pressure and 1600 degrees Fahr. temperature) with steam plants and a Buchi supercharged diesel, all corrected to the same fuel heating value. It must be emphasized that again purely arbitrary values of compressor and turbine efficiencies have been chosen, namely 80 per cent at rated load. Pressure drops and auxiliary power have been taken into account. Increase of the efficiency level will rapidly reduce the fuel rate. For these assumptions, Fig. 7 indicates that both the steam plant and the diesel plant exceed the gas-turbine plant in overall fuel economy. It must be remembered, however, that the present gas-turbine power plant has as its chief virtue not good fuel economy but rather simplicity, compactness, lightness of weight, and an almost complete absence of auxiliaries. In these it has no peer.

Although the diesel plant at first glance appears to be most outstanding of the plants shown, several facts must be considered. While some diesel plants have been and are operating on the heavier and cheaper fuel oils, by far the greater proportion of the users prefer to use the higher grade ash-free diesel fuel intended

(*Please turn to Page* 146)

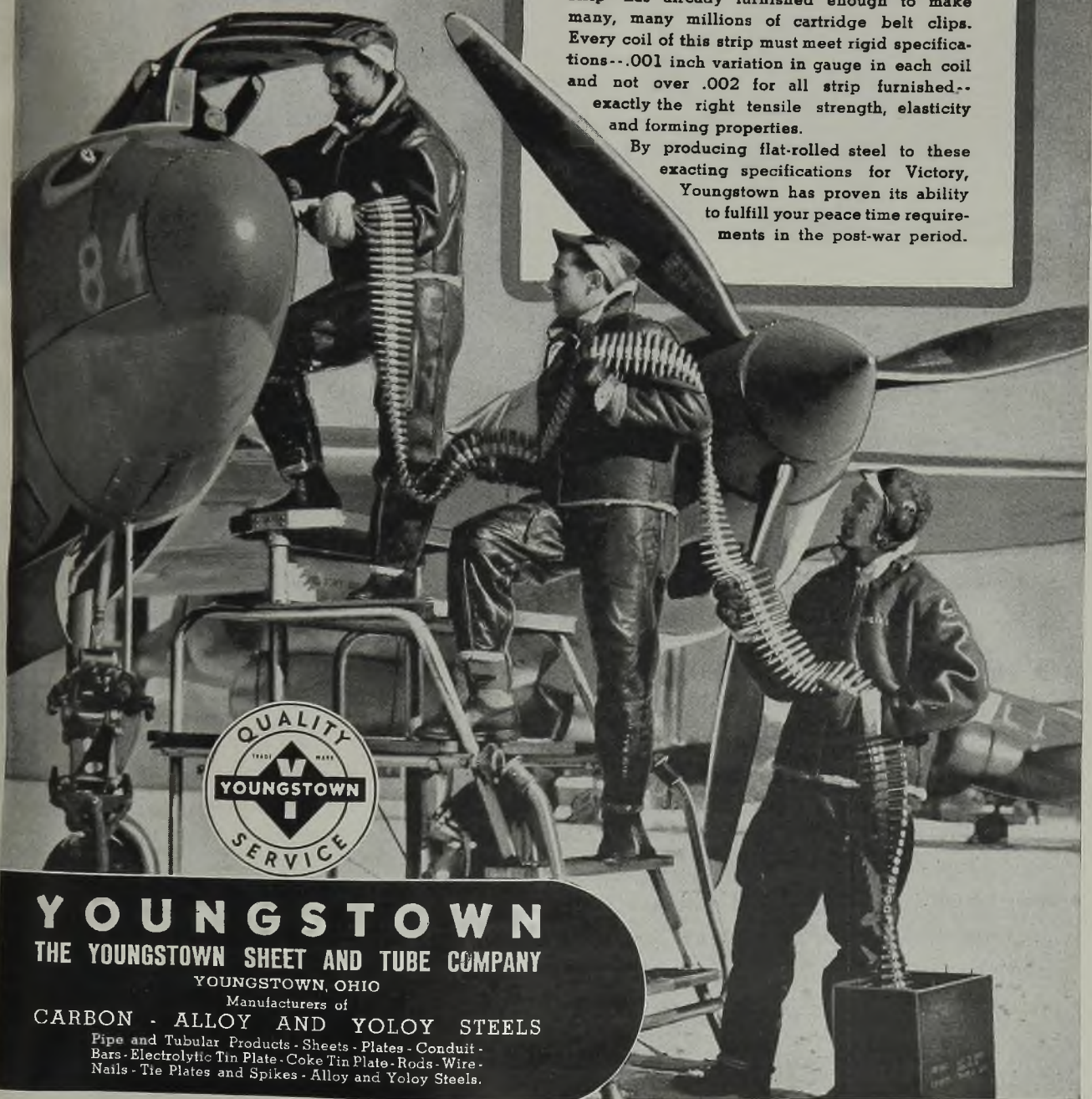
They said it couldn't be done

PRIOR to the present emergency it was considered an impossibility to produce narrow strip to exacting specifications on any of America's wide strip mills;- but Youngstown's skilled workmen, chemists and metallurgists proved otherwise.

Machine gun belts of webbed fabric cluttered up precious space inside planes and tanks, and were apt to jam gun mechanisms at critical moments. So American engineers designed a simple little clip of high carbon steel. Each clip interlocks over two cartridges, and links them into a continuous flexible belt, so unvarying in dimensions that it flows through a 50 caliber gun like "greased lightning",--as high as 800 shots per minute.

For these links, Youngstown is supplying steel strip--has already furnished enough to make many, many millions of cartridge belt clips. Every coil of this strip must meet rigid specifications---.001 inch variation in gauge in each coil and not over .002 for all strip furnished--exactly the right tensile strength, elasticity and forming properties.

By producing flat-rolled steel to these exacting specifications for Victory, Youngstown has proven its ability to fulfill your peace time requirements in the post-war period.



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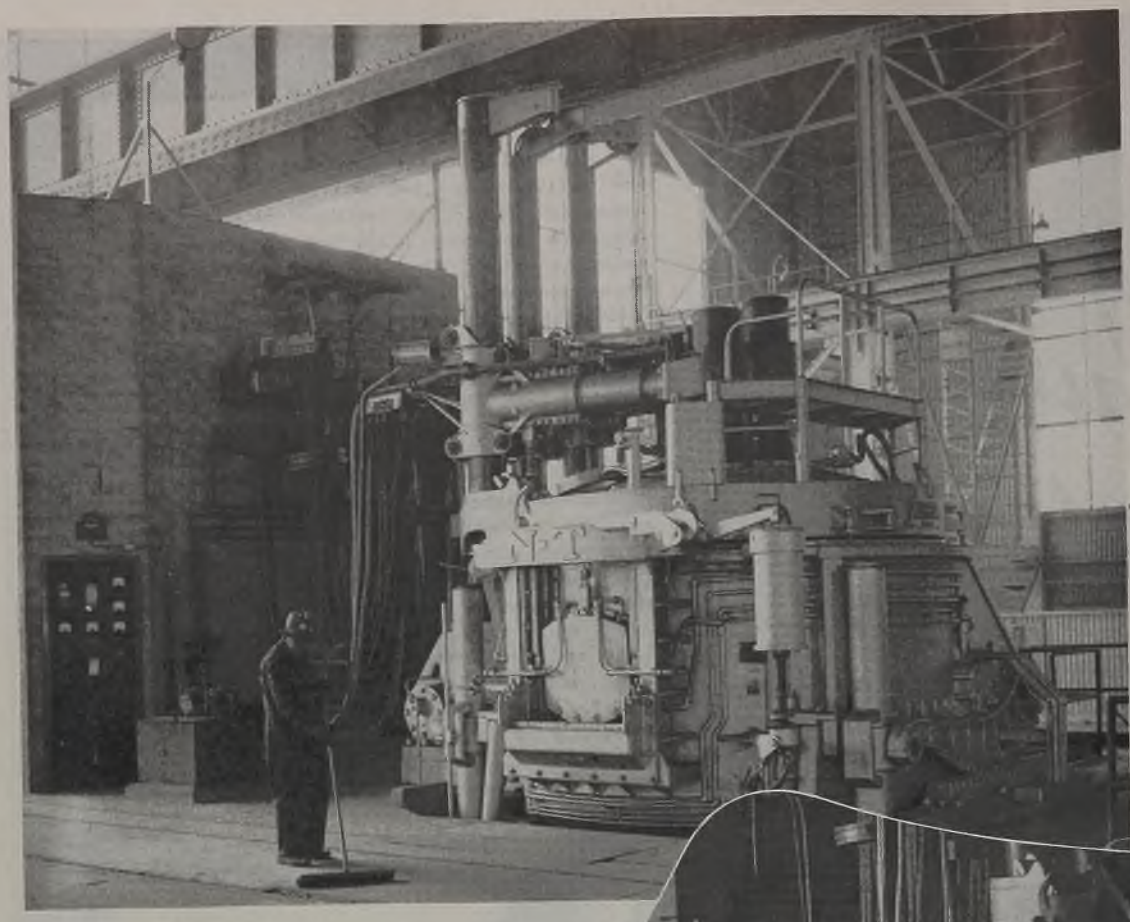
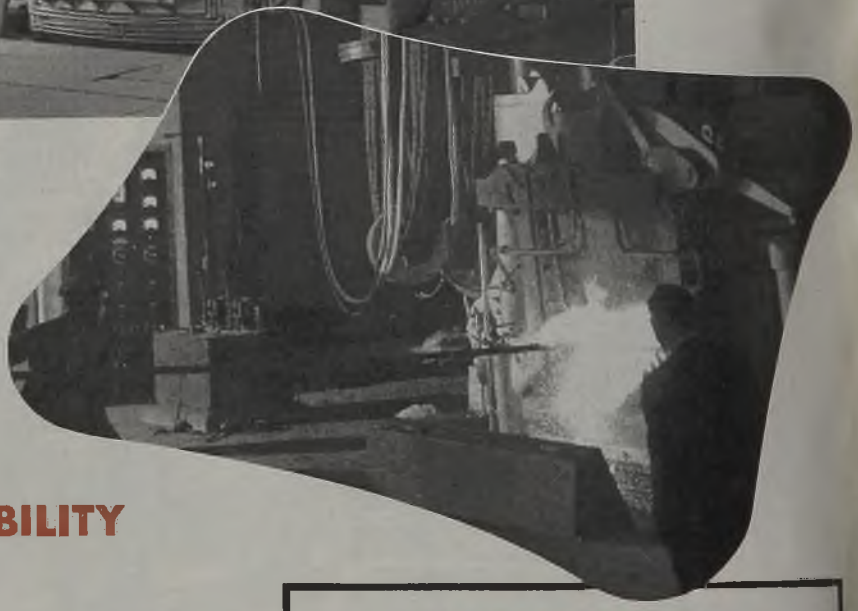


Lectromelt

SELECTED FOR ECONOMY... AND DEPENDABILITY



★ This recently installed NT Lectromelt, doing daily duty in a West Coast ingot mill, pours heats of 15 to 20 tons. It was chosen because of its ease of operation, economy and dependability.

By reducing the time between heats, Lectromelt's top charge features increase tonnage per man hour. Top charge type Lectromelt furnaces are designed to meet your needs for melting quality steels and irons. They are available in sizes ranging from 100 tons to 250 pounds.

MOORE RAPID

Lectromelt

FURNACES

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PITTSBURGH LECTROMELT FURNACE CORPORATION

PITTSBURGH 30, PENNA.

The Manufacture of ELECTRIC FURNACE PIG IRON

Electric furnaces in Europe used for smelting iron ore are cylindrical crucibles with gas-tight tops. One day's output always remains in hearth and insures uniform metal at each cast. Highly basic slags are carried. One ton of pig made with 700 pounds of inferior fuel, 2000 kilowatts of energy and two man-hours of labor

By CHARLES HART
President
Delaware River Steel Co.
Chester, Pa.

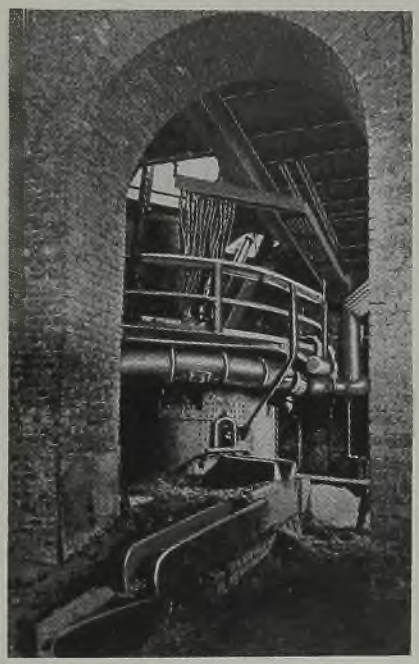
STANDARD ferromanganese and pig iron may be produced either in the blast furnace or electric smelter; the relative cost of electric current and fuel is usually the determining factor. This ratio is definite and for the purposes of this discussion it may be stated that these conditions are on a parity when the cost of 1 kilowatt hour equals that of 2 pounds of coke. Allmand has maintained that the electric pig iron furnace will begin to compete with the blast furnace when 1920 kilowatt hours (or 2300 kilowatt hours if the furnace gases are taken into account) are cheaper than 0.7-ton of coke. It should be noted that these formulae refer to standard coke. The fact is that fuel for the electric furnace may consist of one-third metallurgical coke and the balance of coke breeze, lignite or other inferior materials.

Electricity a Competitive Factor

Manufacture of ferromanganese in Europe finds the use of electricity to be a competitive factor. Due to the cheapness of water-driven power plants, the cost per kilowatt hour meets the conditions formulated above, and the present low-shaft types of furnaces which now predominate in Europe are interchangeable for the production of ferromanganese and pig iron. There has been a large production of the former metal over the last several years. An American company smelted ore originating in Africa in electric furnaces operated in Norway. Due to war interference, this operation has been transferred to American furnaces in which the use of water power is mandatory from a competitive phase.

Production of pig iron electrically is concurrent with the perfection of the dynamo, and it is to this machine that our high production of electrically made products is attributable. Attention to the electric smelting of iron ore dates from the beginning of the present century, in the first decade of which innumerable designs of furnaces were offered for this purpose.

These furnaces employed various methods of arc heating, but none was successful until three Swedish engineers perfected them. The high shaft furnace is still in use in that country, due to its committment to the use of charcoal as a fuel. These designers, after many trials, developed a furnace with a shaft placed upon the dome of a relatively large hearth through the roof of which as many as 12 electrodes were inserted. The gases were exhausted and cleansed, and a portion recycled through the tuyeres in the furnace which had been so placed that the incoming gases had a cooling on the hearth's roof as well as some reducing effect on the descending stock. In the low shaft type, two European furnaces dominate the field and are used all over the Eastern Hemisphere. The Tysland-Hole or Spigerverk furnace, originated in Norway, and owned by "Electrokemisk". Its principal competitor is the German controlled Siemens Halske furnace. These furnaces produce, by long odds, most of the electric pig iron of Europe, with competition from various other low shaft furnaces of which little is known. These predominating furnaces in the case of pig iron production are essentially large cylindrical crucibles with gas-tight tops. The electrodes for the 12,000 kilowatt ampere furnace usually of a diameter approaching 43 inches are placed vertically in the furnace at the angles of an equilateral triangle.



Electric pig iron furnace located at Domnarfvet, Sweden

The Norwegian type uses the Soderberg electrode exclusively. These furnaces are lined with Chamotte brick in their outer rings, further improved by the use of Radex or magnesite brick where conditions require greater heat resistance. The lining is further protected by the method of filling the furnace whereby the stock lies against the lining, and serves to protect it as well as afford less strain on the electrodes. The erosive action of the active bath is further abated by an increased depth of the hearth or well. At least one day's product remains in the furnace at all times, which produces the same effect as our American metal mixers, and has the further advantages of electric control and prompt additions of stock to meet emergencies. It is possible to make these alterations as the occasion arises, and the metal coming from the electric unit is far more regular than that obtainable from our most modern blast furnaces.

Carbonaceous Fuels Used

The furnace under discussion can be operated under varying electric loads without materially affecting its output. For this reason it is an "electric equalizer" as well, and ties in well with the electric current which prevails in the larger integrated steel plants. Due to the size of the modern walls, these electric furnaces can stand for hours even though the electric input be materially lessened. This furnace can readily handle pyritic agglomerates or other high-sulphur materials as at Imatra, Finland, where these residues containing as much as 1 per cent of sulphur yielded pig iron containing less than 0.01 per cent of this element. The plant is operated on a guarantee of minus 0.03 per cent.

This result is due to the facts that these slags can be made highly basic and that additional heat may be obtained quickly by the simple movement of an electric switch. In the matter of fuels, anything carbonaceous will

From a paper presented at the general meeting of the American Iron and Steel Institute, New York.

Final Announcement of the

All Entries must be received

THE invitation to participate in the Shafer Achievement Awards by submitting ideas you may have for the extended use or improvement of Shafer Concavex Self-Aligning Roller Bearings has been made three times already.

But the final day when entries can be accepted is close at hand. If you intend to submit an entry, we suggest you do so without delay.

Because of the importance of bearing performance to the machines responsible for the industrial security and welfare of America in the days ahead, we believe it will be a signal honor to any man whose entry receives an award. Winners of the awards will be named as soon as possible after September 1st, 1944, in magazines with national circulation.

We are sincerely concerned to secure such ideas . . . the better to serve manufacturers and operators of machines in their quest for more efficient and economical operation in the trying days after the war. In the face

SHAFER CONCAVEX SELF-ALIGNING BEARINGS

Reg. U. S. Pat. Off.

Shafer Achievement Awards

not later than September 1st, 1944

of the amazing technological progress that has resulted from the exigencies of the war, we believe that in the contacts thousands of engineers and technical men have had with Shafer Bearings, some of these men must have developed new uses for Shafer Bearings, or found ways of improving their design, manufacture, application or servicing. In order that such ideas may not be lost to us and through us to machinery users in general, we have instituted the Shafer Achievement Awards.

All suggestions and ideas will be judged by the following authorities:

JOHN J. SCHOMMER, Professor of Industrial Chemistry, Illinois Institute of Technology. Nationally recognized authority on industrial processes and engineering design.

PHILLIP C. HUNTLEY, Formerly Head of Mechanical Engineering Department, now Head of Civil Engineering Department, Illinois Institute of Technology. Widely known engineering consultant.

CHARLES A. NASH, Associate Professor Electrical Engineering, Illinois Institute of Technology. An Authority of broad practical experience in Electrical and Mechanical Engineering.

ARTHUR H. WILLIAMS, Vice-President, in charge of Engineering, Shafer Bearing Corporation.

Awards as stated above will be made according to the merit in whatever ideas are submitted as valuable contributions to the art of design, manufacture, application or use of Shafer Self-Aligning Bearings. The opinion of the judges will alone determine the relative merits of any ideas submitted and all decisions of the judges will be final. In the event of any ties, identical or duplicate awards will be made. The Shafer Bearing Corporation reserves the right to adopt or make use of any ideas submitted.

It must be remembered that sometimes simple ideas prove to be the most worthwhile ideas. Ideas of seemingly limited application may point to a principle of great value. An extended or complex presentation is not required. There are no limitations as to eligibility of entrants or form of entry. However, the time limit cannot be extended beyond September 1st, 1944, in justice to the men who already have entered their ideas and are awaiting the jury's decision.

The Basic Shafer Idea. Shafer Concavex Self-Aligning Bearings . . . neither ball nor roller bearings . . . combine the advantages of both. A Shafer Bearing utilizes the effective contact *area* of a ball many times its size . . . yet it eliminates such a ball's ineffective *mass* . . . providing automatic self-alignment, high radial load capacity, automatic end-thrust absorption, superior shock resistance and long life.

Address your entries or requests for further information to:

Shafer Achievement Awards Committee

Shafer Bearing Corporation

ashington Blvd., Chicago 7, Illinois

answer. The absence of the high shaft eliminates the blast furnace demand for strong cokes, inasmuch as the carbon of the fuel is only a reducing agent and a furnisher of carbon for the impregnation of the pig iron. Anthracite coal, brown coal, lignite, and even peat coke is readily usable. All the heat required for the chemical reactions is supplied by the electric energy. Calcite stone is the preferred flux, although dolomite will suffice as well. Precalcination is preferred, in that the useless CO_2 is eliminated. The matter of flux has reached such refinement that in some cases calcium ferrite made by the Rolfsen process is substituted for the natural fluxes. The gases obtained are applicable to any use other than at the furnace itself, in that they are not recycled or needed for steam producing purposes. About 20,000 cubic feet of gas per ton is obtained with a heat value of 260 B.t.u. per cubic foot. Therefore 5,000,000 B.t.u. per ton of iron are made available for other uses, as against a net obtained from the most modern blast furnace of 3,500,000 B.t.u. per ton.

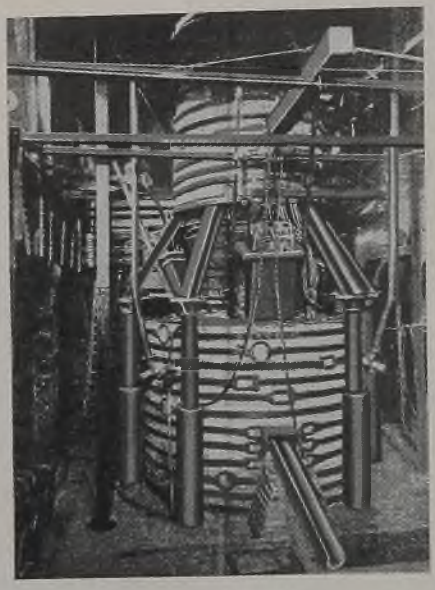
Conditions Differ in United States

As an example of the working of blast furnace and electric furnace the sum of the heat carried away by the gases and the heat produced by the oxidation of CO to CO_2 amounts to 4,600,000 calories per ton of iron with the former and only 1,150,000 calories in the latter.

The Siemens Halske furnace is not unlike the Spicerterk type, excepting that it employs the prefabricated type of electrode, made continuous by the American "nippling" method. The electrode arrangement follows the Norwegian plan, but the furnace is more centrally charged, with greater load of the stock on the electrode and less cooling effect upon the furnace of the hearth. However, an interesting sidelight on abnormal operations in Italy is noteworthy in that the anthracite coal used contained 35 per cent of ash, the balance being gas house coke. These materials were used in a ratio of 3:1, and a total of 1030 pounds of fuel was required in conjunction with 2600 kilowatt hours of electric energy per ton. The slag contained 34 per cent of magnesia. These data are offered, not only as a metallurgical curiosity, but as an instance where the normal blast furnace could not have met the conditions which prevailed. It would seem that either of the foregoing types of furnaces is capable of handling any electric smelting problem with equal facility.

Normally it may be assumed that these furnaces will produce pig iron with a consumption of 700 pounds of inferior fuel, 2000 kilowatt hours of electricity and 2 man-hours of labor per ton. This art is applicable wherever electric current costs less than carbonaceous fuel.

Unfortunately these conditions do not exist in the principal steel producing centers of North America, where steel plants producing pig iron from Lake Superior ores are the dominating factors. In this territory the cold rule of taking the ore to the fuel to be smelted prevails. Pittsburgh is the front row example of this plan, due to its proximity to the Connellsville beehive coke oven operations. No one could have stopped this city from becoming the dominating steel producer, although the later introduction of the by-product coke oven, which places the fuel at any point where a market exists for the by-products, brings Chicago, Buffalo, and Cleveland into an increasingly competitive position. The Lake ores are brought to these various consuming points in a



Electric pig iron furnace located at Trollhatten, Sweden

movement which for size and efficiency has no equal in any other part of the world, and on this account electric smelting of iron ore has made no headway in these United States.

Although current quotations on coke would indicate that a preferential ratio for the electric furnace exists, it must be understood that the real criterion is the actual cost of pig iron made from by-product coke in the fully integrated steel plant. Therefore, the use of electric furnace must ordinarily be relegated to such places as are easily accessible to cheap ore and expensive fuel, or where the power plants are capable of furnishing electric current at prices under two mills per kilowatt hour or for special uses wherein the benefits derived from metal in small quantities are desired.

The foregoing study of the possibilities of the electric smelter in the United States clearly indicates that this process in noncompetitive with our present-day blast furnace, due to their size and the abundance of by-product coke at any consuming point. In these completely integrated plants, wherein all the low-cost features exist, practically 90 per cent of all our steel is produced. However, in certain locations where cheap electric current is in close contact with fuel and iron ore, it is possible to establish electric smelting units on a competitive basis.

Furthermore, it is possible to install this equipment in certain specialized cases. Iron foundries of fairly large capacity lend themselves to the employment of the electric furnace, whereby freight on the pig iron and remelting costs are avoided, and the increase in sulphur content is eliminated. The "metal mixer" feature of this electric furnace guarantees a uniformity of pig iron which is unattainable in any other manner.

A further use for this type of furnace is the production of recarburizing metal. Its "electric equalizing" effect, as well as the "metal mixing" quality, renders the electric furnace particularly adaptable to this work. It should be a welcome addition when inserted in the circuit of any steel plant, for it is completely flexible and may, if desired, be shut down over the week-end. Its application to the recarburizing of the steel bath lies in the fact that the metal produced may be of any character desired, even to the production of spiegeleisen as high as 40 per cent in manganese content.

Eliminates "Ferro" Additions

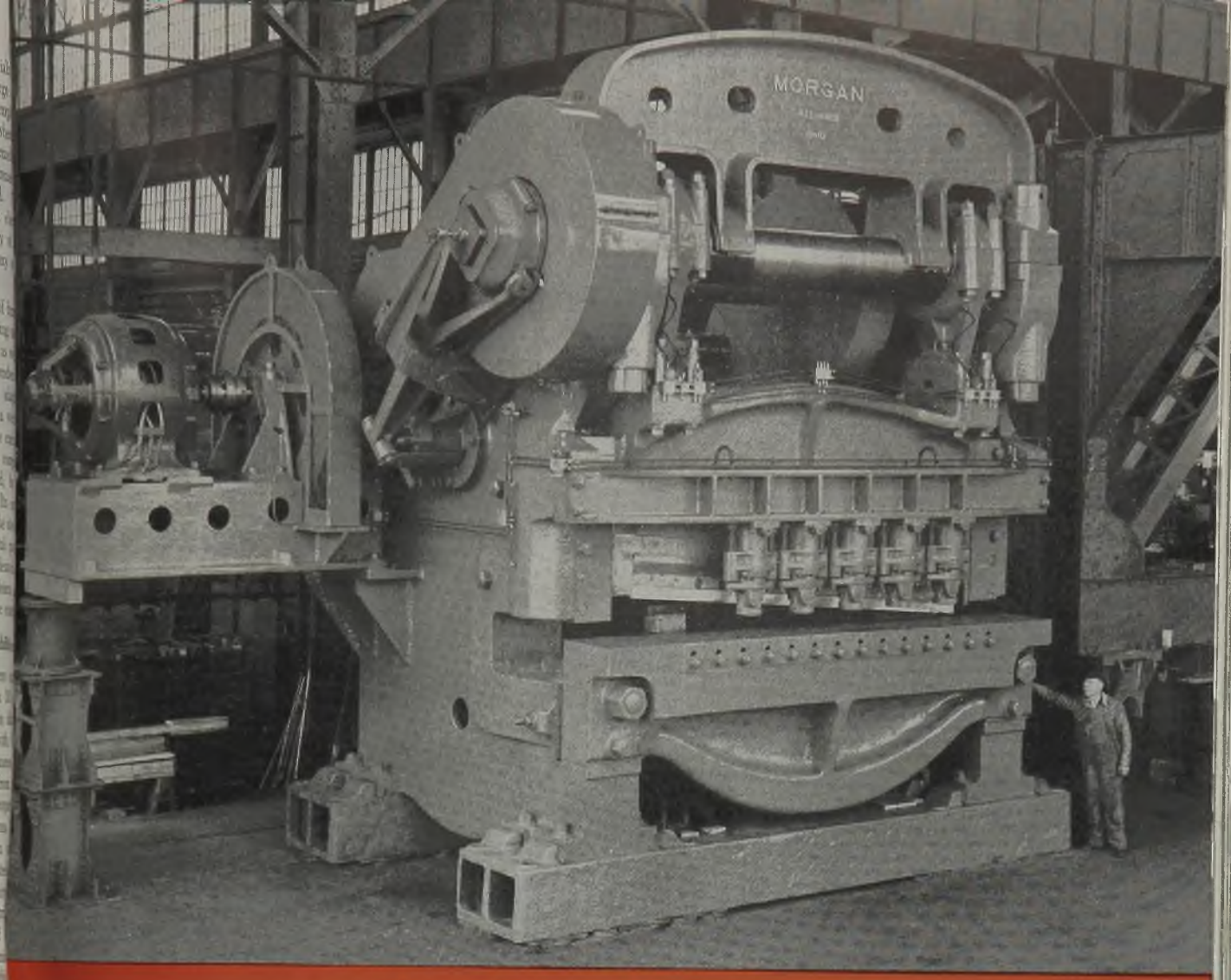
Originally rail steels were carburized by using 10 per cent of a 10 per cent spiegel in molten condition direct from a cupola, in conjunction with 0.2 or 0.3 per cent of ferromanganese. Later, molten pig iron direct from the blast furnaces was used with proportionate increases in the ferro additions. The benefits to be derived from additions of molten metal to "killed steels" has been the subject of recent inquiry. The metal obtainable from the electric furnace can be made to meet any of these requirements and with the elimination of ferromanganese. This method of recarburization will replace the present method of adding ferromanganese to the bath in the case of low-carbon steels, and the joint addition of molten pig iron and "ferro" in the case of rail or other high-carbon steels.

The electric furnace metal will eliminate these "ferro" additions, and the metal offered will be exceedingly uniform. Much of the current will come from excess electricity available as indicated in any large steel plant circuit. Furthermore, the electric unit may be closed down over the week-ends with a minimum electric current consumption, which, by the way, is generally abundant during this repair period. If it is desired to accumulate this metal for stockpile, or other reasons, advantage can be taken of this excess week-end current by keeping the furnace operating at full capacity.

Another pertinent use for the electric smelting furnace is that of smelting ores high in titanium.

Advances have been made in producing commercially pure manganese by electrolytic methods. The staff of the Bureau of Mines led this investigation, and after a great amount of laboratory work, a small pilot plant was erected and operated until the outbreak of the present war, when it was put on a semicom-

(*Please turn to Page* 140)



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FOR SHEARING 2″ ARMOR PLATE

● Among the many types of mill equipment built by Morgan, is the 144″ plate shear illustrated above for shearing 2″ armor plate. Push button control is provided for operating the hydraulic clutch and hydraulic hold-downs. Of massive construction, this shear is typical of the type of mill equipment Morgan designs and builds. Morgan engineers rely upon a highly skilled shop organization, modern equipment and progressive ideas in building steel mill machinery.

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Presses • Special Machinery for Steel Mills

THE MORGAN ENGINEERING CO.
ALLIANCE, OHIO

Pittsburgh, 1420 Oliver Building

Platform at Iron Notch Protects Furnacemen

Fig. 1—(Above)—Method used in placing platform in position and removing after tap hole has been drilled

Fig. 2—(Below)—Hinged gate covers opening between drill shank and pipe through which drill is inserted

Fig. 3—(Right, below)—Platform in position and start of drilling operations at tap hole

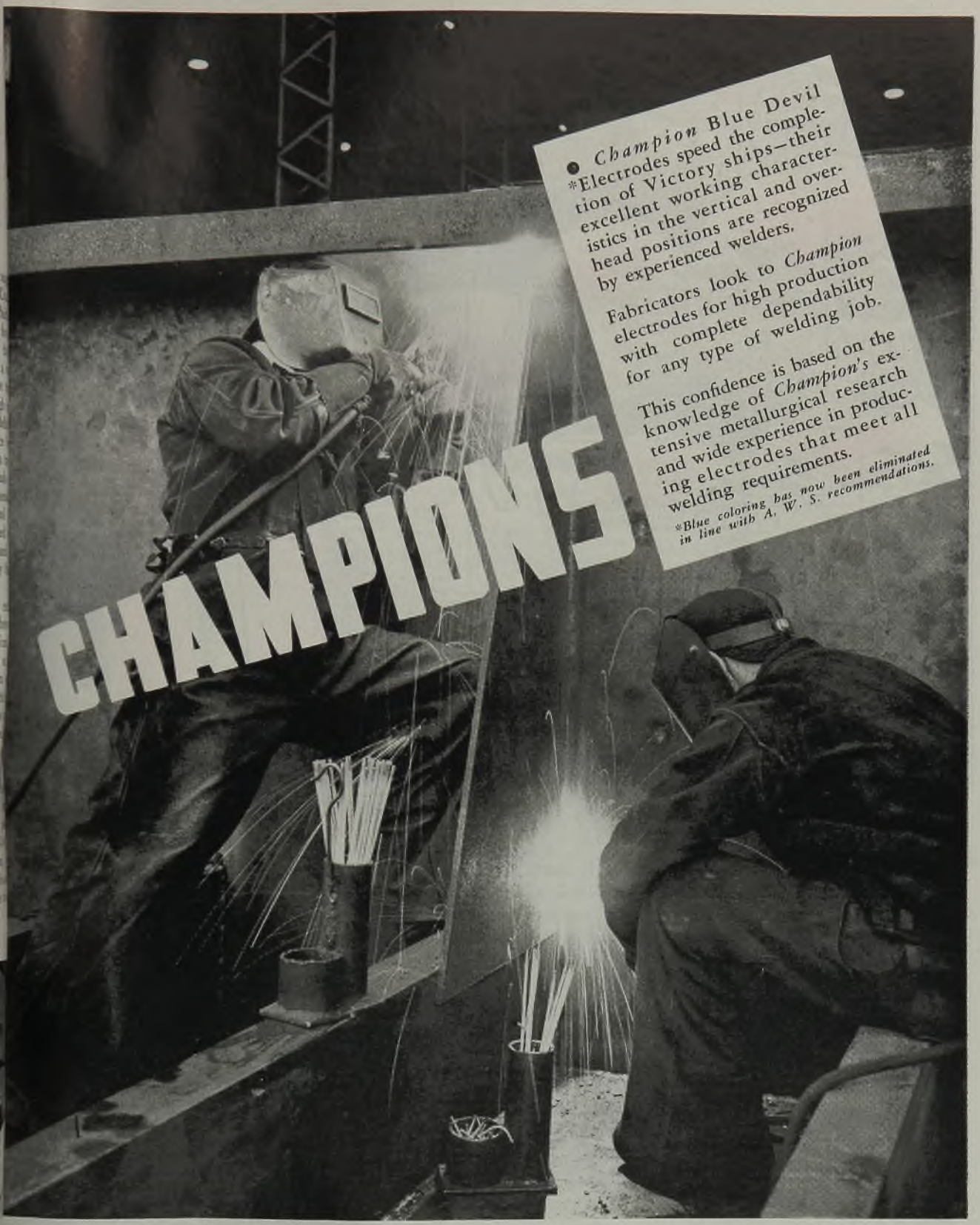
SAFETY DEVICE recently suggested and adopted at the Tennessee Coal, Iron & Railroad Co. is a platform which completely covers the iron trough for a distance of about 12 feet from the blast furnace tap hole. It acts as a working platform while drilling out the tap hole and, in case of a break-through into the molten iron while drilling, deflects the flame or sparks into the space between its lower surface and the iron trough.

The platform, which is made in one piece of ¼-inch plate, with nonskid surface, is 54 inches wide and 12 feet long. It is braced and stiffened by small angles welded underneath and is elevated to the proper height by three pins under each side.

A 3 x 4-inch angle at the end of the platform closes the opening between the splasher plate and the platform.

A 4-inch pipe is welded at an angle in the middle of the platform near the front, and the drill is inserted through this pipe. A hinged gate on the upper end of the pipe can be closed after the drill is inserted and fits snugly around the drill shank.

A hook has been welded in the center of the platform so that it can be easily removed or placed in position by means of a jib crane with a 12-foot boom, mounted on a furnace column. An air cylinder suspended from the boom raises and lowers the platform, while the boom itself is swung by hand.



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Use a **CHAMPION** Gray Devil straight polarity for fillet welds.

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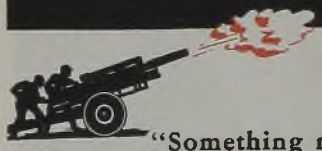
THE CHAMPION RIVET CO. • 11200 HARVARD AVENUE, CLEVELAND, OHIO

E A S T C H I C A G O · I N D I A N A



"Something new has been added" to the accuracy of artillery fire. Gun crews are scoring more direct hits on enemy positions —each of our big guns is giving fortifications, pill-boxes and other pockets of resistance rougher treatment than has previously been the case.

The reason is twofold. First, our artillerymen have better guns and are better trained than in any previous war. Second, the shells they are using fire more accurately and uniformly.

One of the big reasons for this is a new shipping container for shells that is made of WELDED STEEL TUBING. Different and far better than any previous method, this new "case" holds each shell snugly and securely, protects it from the rough usage that goes with fast battle action, seals it against moisture, heat, cold and the hundred and one other things that destroy shell accuracy.

This latest use of WELDED STEEL TUBING is one of the most important ways to which this versatile material is being put to win the war. And it's a conclusive demonstration, we think, of the manner in which it can be employed to improve products for both war and peace.

We'll be glad to help you make plans for the use of WELDED STEEL TUBING in present and future products — and give you actual production help when war's demands lessen. Write, wire or telephone and let us show you what we can do.

THE STANDARD TUBE CO.
Detroit Michigan
Welded Tubing Steel Forgings

★ *Complete Tube Stocks Maintained by* ★
STANDARD TUBE SALES CORP., One Admiral Ave., Maspeth, L. I., N.
LAPHAM-HICKEY COMPANY, 3333 West 47th Place, Chicago, Ill.
UNION HARDWARE & METAL CO., 411 East First Street, Los Angeles, Ca

ALIEN PATENTS

Available to Industry

STEEL is presenting a list of enemy patents of interest to the metalworking industries. Many of these are available on a nonexclusive royalty-free basis under simple licensing terms. Copies of any patents listed may be obtained by addressing the Commissioner of Patents, United States Patent Office, Washington 25. Include 10 cents for each patent, specifying serial number.

These patents are classified by types of operation, such as metal founding, metalworking, metal rolling, metal bending, metallurgy, metal treatment, metal forging and welding and the like. Included are enemy patents, patents pending and patents in enemy-occupied countries.

CLASS NO. 148—METAL TREATMENT

LIST OF ENEMY PATENTS

DESCRIPTION	PATENT NO.
Metallurgical product and process of producing same	1689456
Method of producing hard alloys	1877063
Method of centrifugally casting pipes in chilled molds	2129382
Process for increasing the strength of metallic bodies	1557367
Case hardening process for steel articles	1635384
Cold working metal bars	2225064
Hardening cobalt nickel chromium iron alloys	2245366
Hardening cobalt nickel chromium iron alloys	2247643
Process for the production of a weatherproof oxide layer on electron metal	1642309
Process for producing an insulating coating	1853437
Method of preventing tarnishing of metal articles	1995225
Well covering coating composition	2161319
Process for the preparation of a rust preventing coating on metallic objects	2163984
Process for producing coatings on zinc and galvanized articles	2219977
Process of producing black colored aluminum or aluminum alloys	2247580
Method of surface treating objects of cast magnesium base alloys	2288552
Process for making coating materials for deoxidation of rust	1893495
Improved process for bronzing articles and parts made of iron and alloys of iron and carbon	1997141
Method for burnishing iron and steel articles	2217586
Process of producing iron sheets for laminated electric transformer cores	2230319
Coat resisting object containing iron and aluminum	2129840
Method of conserving pickling liquor	2118802
Method of bright pickling articles of copper zinc alloys	2125458
Cleaning of metallic surfaces	2171981
Method of the machine for cutting gears	1812239
Device for the local annealing of pressed parts	1589235
Method of removing gases from metals	1795384
Permanent magnet	2293240
Method of improving aluminum alloys	1631930
Process of improving the qualities of nickel beryllium alloy	1685570
Process of improving aluminum alloys	1726194
Process for improving nickel tin alloys	1924244
Process for improving nickel molybdenum alloys	1924245
Process for improving cobalt molybdenum alloys	1949313
Process of normalizing ternary and multiple alloys forming solid solutions	1992325
Process of treating cobalt tungsten chromium alloys	2027780
Production of magnetizable alloy	2075283
Method of manufacturing permanent magnets	2124607
Method of annealing sheet metal	1672172
Treating metal shapes	1830550
Manufacture of steel	1843456
Process for the manufacture of iron and steel	1844994
Process for producing a steel having a lesser tendency to blue fracture and brittleness due to ageing	1941101
Process for increasing the mechanical strength properties of steel	1957427
Chrome nickel steel alloy product and method of making the same	2027554
Process of producing metals for electrical purposes	2067036
Magnetic material and manufacture thereof	2085118
Process for the production of rails	2088282
Method of rolling and treating silicon steel	2113537
Process for the manufacture of sheets, bands, tubes, rods and the like and in particular wire	2121415
Production of magnetizable materials	2123138
Method for manufacturing magnetic material of high permeability in sheet form	2173240
Method of treating alloys	2174368
Method of manufacturing hollow articles from metals	2190536
Easily machinable magnetizable body having a small coercive force and the method of producing the same	2224934
Process for improving the strength qualities of steel wire	1732615
Ferromagnetic materials	1873155
Cobalt tungsten iron alloy	2011976
Process of producing hard alloys	2048647
Alloy and process for making same	2048648
Metals of the platinum group and certain alloys	1990277
Production of a protective layer on iron	2097024
Formation of chromium containing layers of ferrous surfaces	2219004
Formation of chromium containing layers on the surface of ferrous articles	2219005
Process which consists in causing chromium to diffuse	2255482
Salt bath for annealing metal articles	1906455
Process for the hardening of steel	2248732
Process for producing homogeneous metalliform carbonitrides and for superficial nitrification of tungsten	1803276
Process for producing malleable iron castings	2231120
Process for the manufacture of articles which are made of iron or steel and are threaded or possess surfaces which make tight joints	2236209
Method of bright annealing elongated metal bodies	2240099
Method of annealing iron sheets or strips	2249556
Process for the hardening of iron and the like with the aid of a gas generated in the hardening furnace	1848958
Hardening of steel	1876170
Hardening medium and process for hardening tools of iron or steel	1893077
Method of treating low carbon steel and the like	1700674
Process for improving the heads of railway rails	1764844
Process for the manufacture of rails with hardened heads	1828325
Heat treatment of manganese hard steel objects	1968960
Gear production	2288999
Process of improving aluminum alloys	1629699
Process of improving aluminum alloys	1656502
Aluminum alloy	1892840
Aluminum alloy	1921089
Copper alloy	1692936
Copper alloy amenable to heat treatment	2068817
Drawn brass bearing alloys	2145[illegible]
Steel alloy and process of making the same	1661907
Method of welding rail joints	1704410
Method of heat treatment of steel	1733669
Process for the improvement of the properties of iron beryllium alloys	1746356
Process for making steel insensible to the action of hot gases and vapors	1829118
Process of hardening copper containing steels for structural and similar purposes	1835667
Homogeneous armor plate	2059746

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INDUSTRIAL EQUIPMENT

Speed Reducer

The new AirKooled worm gear speed reducer offers greater horsepower ratings for worm speeds of 580 to 1750 revolutions per minute. This unit dissipates heat due to the rise in temperature of the oil bath by drawing cooling air through the double-walled ribbed

housing with a suction fan mounted on the worm shaft. At 1750 revolutions per minute the ratings are approximately doubled at all ratios. The unit is about two sizes smaller than a standard unit of the same capacity. It is manufactured by the Philadelphia Gear Works, Philadelphia.

Drawing Machine

John S. Barnes Corp., 301 South Water street, Rockford, Ill., has developed a 7½-ton hydraulic cold-drawing machine, illustrated below

The drawing die is mounted centrally on the working table and supports the workpiece. When the work is set up the machine cycle is started by depressing the two "forward" pushbuttons simultaneously. A small cylinder ram at the left traverses forward and stops behind the die, then the large ram moves forward forcing the work through the die. The drawn piece upon leaving the die is steadied by the small ram. Thus the large ram moves forward exerting a differential load of 5 tons upon the work. When the drawing operation is completed the "return" pushbuttons are depressed causing the large ram to return to the starting position. The dual pushbutton control system requires the use of both hands in operating the machine, eliminating all danger to the operator.

The dial pressure gage on the left, front face of the machine clearly indicates the die loading throughout the drawing cycle. The two adjacent control handles operate speed control valves which permit variable traverse rates up to 240 inches per minute. The hydraulic structures are unit mounted within the left end of the machine base whereas the electrical control panel is located at the opposite end of the base. All equipment is readily accessible for servicing by removing the sheet metal covers.

Timer-Contactor Units

Combination timer-contactor package units designed to provide the simple, low cost, automatic, electronic control for resistance welders are announced by Weltronic Co., Detroit 19. The units may be used with new machines or to convert manually or cam-timed welders for automatic, electronic control. When used with air or hydraulically operated welders, the new units eliminate interunit wiring, simplify installation and maintenance, and permit mounting of all controls on a machine if desired.

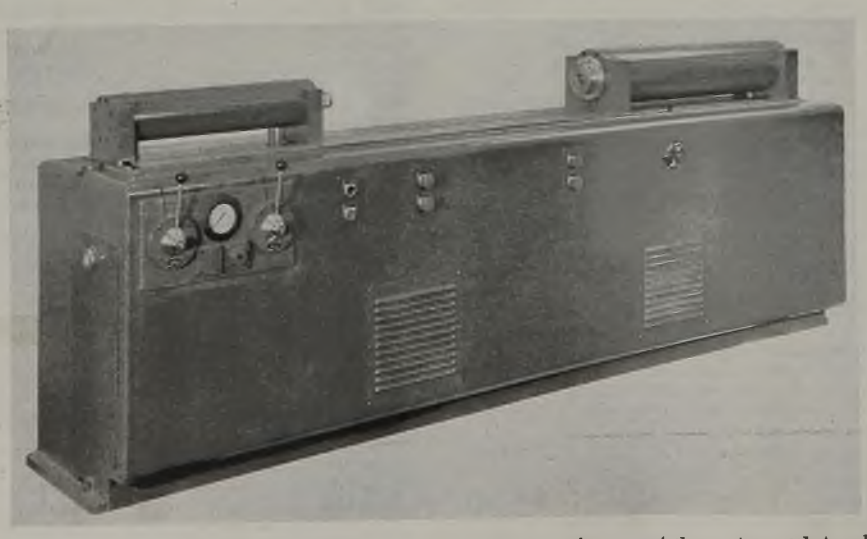
A universal wall or floor mounting cabinet, 16½ inches wide by 33 inches high and 10½ inches deep, houses any combination of interchangeable Nema-type timers, together with a choice of Weltronic ignitron or mechanical-type contactors as required for the operation of the welder. Exclusive plug-in control panels permit the change from any Nema-type control to another for inspection or welder conversion. A single power supply unit operates all standard panels from either 115, 230 or 460-volt alternating-current lines.

Ignitron contactors provide high current capacity contacting at practically unlimited speeds for welding thin sections, aluminum and alloyed metals. Standard panels accommodate size A, B, or C tubes and include protection auxiliaries. Synchronous timing and heat control may be added for complete machine control at any time without rewiring or scrapping any element of the basic timer-contactor controls.

Hydraulic Press

E. W. Bliss Co., Fifty-third street and Second avenue, Brooklyn 32, N. Y., offers a 200-ton hydraulic press for the compression of powered metals. It is

provided with a fully automatic cycle. Pressure and speed are both adjustable over a wide range, making the press available for different types of work with correct pressure control at all times. Similar presses are available in capacities to 5000 tons in this model, as well as in a duplex model, with or without center core rod. Duplex presses have independent speed, pressure and stroke control on each slide making them available for a wide variety of flanged work.



Near Infrared Unit

Where quick, easy, controlled heating is required, a convenient hand-model, LRJ-3 near infrared unit has been developed by Fostoria Pressed Steel Corp.,

(*Please turn to Page* 142)

(All claims are those of the manufacturer of the equipment being described.)