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STEEL

The Magazine of Metalworking and Metalproducing

SEPTEMBER 18, 1944

Number 115—Number 12

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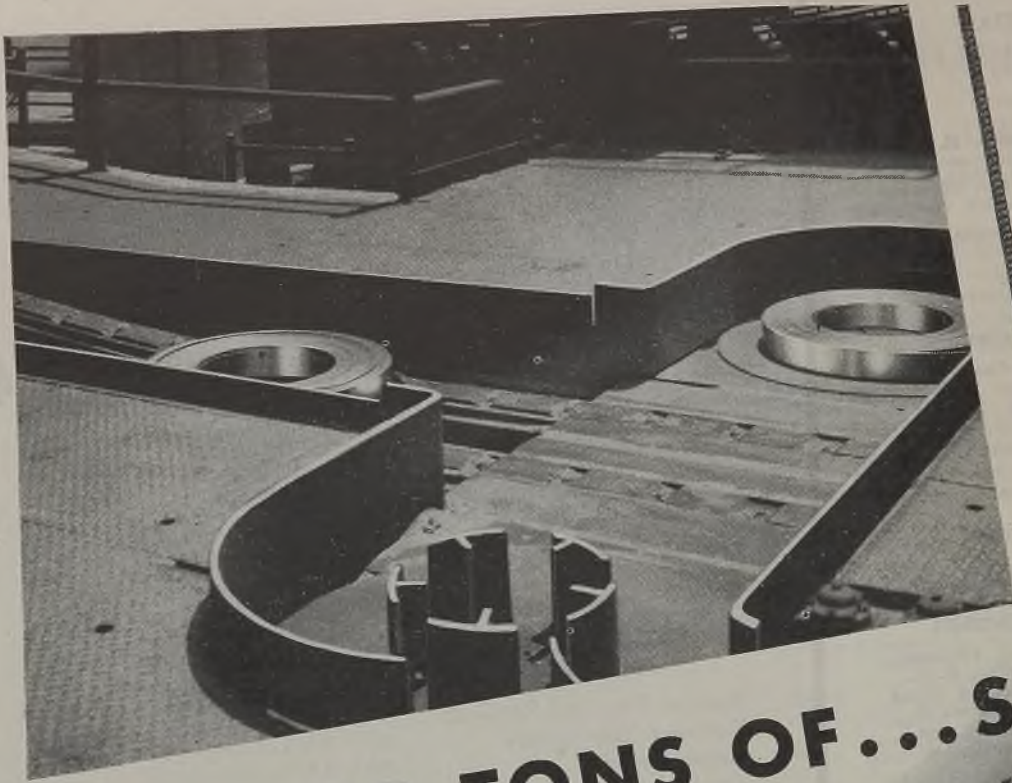
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TONS AND TONS OF... SAFETY

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Simplify! Simplify!

Prior to Labor day, the federal government was woefully behind schedule on plans for reconversion. In spite of urgent pleadings by Bernard Baruch for the administration to tackle this problem realistically, the numerous agencies concerned with it seemed unable to get off dead center. Even Donald Nelson's earnest efforts to launch a piecemeal, pilot type of reconversion met with rebuffs from all sides. Congress appeared to be in a deep sleep on the subject.

Shortly after Labor day, everybody in Washington seemed to leap with one accord to the realization that reconversion really is a big thing and that it needs attention right away. It matters little whether this awakening was induced by the fast rush of American troops to the German frontier or by the proddings of Candidate Thomas E. Dewey. The pertinent fact is that official Washington at long last is alert to the problem.

However, alertness alone will not suffice, nor will cleverly written press releases to the public, nor voluminous reports to the President. There must be careful planning and with it purposeful doing. The stage for effective reconversion cannot be set by paperwork alone. An organization for reconversion must be perfected and this will entail a lot of decisive action.

From the standpoint of industry, one of the most important preliminary steps the government can take is to reduce the number of contacts between industrial companies and government agencies. No manufacturer can shift to peacetime work in an orderly manner if he has to check every detail with each of the dozens of agencies to which he now is beholden.

The suggestion of Acting WPB Chairman Krug that as much of the reconversion problem as possible be handled by single industry committees is a step in the right direction. Apparently it is Mr. Krug's idea that one industry committee would replace the present WPB and OPA committees. Would it not be possible to carry this idea farther—to the point where all of the necessary controls by WPB, OPA, WMC and the other agencies could be exercised through a single body dealing with each industry?

We doubt whether anybody high in Washington officialdom realizes the extent to which bureaucratic complications retard a manufacturer from doing the things he ought to do. Every individual agency contact means a delay—usually an unnecessary delay. Any corporation official can quote illuminating chapter and verse on this subject.

The government approach to reconversion should be: Simplify! Simplify! Simplify!

WAGE MANIPULATION: The Bureau of Labor Statistics has completed a study showing the pay a wartime worker can expect when he returns to his old peacetime job. The average employe in industry in May, 1944, received in straight pay and overtime \$1.017 per hour, working 45.4 hours per week. If he had returned to his January, 1939, peacetime job at the present basic pay in that job, he would have received \$0.865 per hour. Of

the reduction of 15.2 cents per hour, 7.2 cents results from the loss of overtime in going from 45.4 to 40 hours per week and 8 cents results from the fact the base rate of the peacetime job is 8 cents less than the base rate of the wartime job.

We have no quarrel with these figures. Perhaps they will serve some statistical purpose well. We do feel, however, that wage rates generally are farther out of line with performance than at any time

in history. Wages have been manipulated by government influence to the point where the actual work performed by the individual is a minor factor.

We look forward to the day when employe and employer can mutually arrive at rates more consistent with services rendered and received. —p. 84

OUTPUT MAINTAINED: American industry is working under a terrific handicap of uncertainty. Industrial executives and government officials know that the war in Europe may end almost anytime. They feel keenly the necessity and the plain duty of producing to the utmost until the signal to ease off is given, but at the same time they are under strong pressure to get set for a quick shift.

Considering these circumstances, industrial production is being maintained remarkably well. Most barometers of activity are down slightly from a week, a month or a year ago. An exception is petroleum output which is at a peak. Electric power output, freight car loadings and steel ingot output are off, but not alarmingly. In fact, steel output in August, while below that of July and of August last year, brings the total for eight months in 1944 to 60,005,971 tons, exceeding the 58,880,791 tons produced in the like period of 1943.

Under current restrictions, this is an exceptionally good record. —pp. 82, 106

MAKING "SWARF" PAY: Every manufacturing plant in which considerable machinery work is done has a problem of collecting and disposing of the metal removed by turning, boring, drilling, milling and other operations. The British call these cuttings "swarf." The value of "swarf" as usable scrap depends largely upon how carefully it has been segregated and how well it has been prepared for use.

The Warner & Swasey Co., Cleveland, has developed an efficient system for handling this problem. It embraces not only a smooth-running organization for collecting, segregating and shipping the metal, but also facilities for briquetting certain types of material. Briquetted cast iron borings are used in the cupolas of its own foundry. Under certain conditions certain turnings of steel and other metals are briquetted to advantage.

Systems of this type are desirable for two reasons: They make for "good housekeeping" in that no great amount of waste metal is permitted to accumulate around machines. They increase the value of the scrap, for own use and for sale. —p.112

17 CENTS PER DEATH: In writing this, we are venturing far from our accustomed editorial beat. Our excuse for digressing is that we believe you will be interested.

Speaking before the convention of the American Association for the Advancement of Science at Cleveland, Dr. Henry S. Simms, Columbia University, presented the following data on money spent in medical research. In 1940, for each death resulting from infantile paralysis, \$525 was spent in research on that affliction; for every death from infectious diseases, \$4 was spent; for every death from cancer, \$2.18; kidney diseases, 38 cents; and for every death from heart and artery ailments, 17 cents.

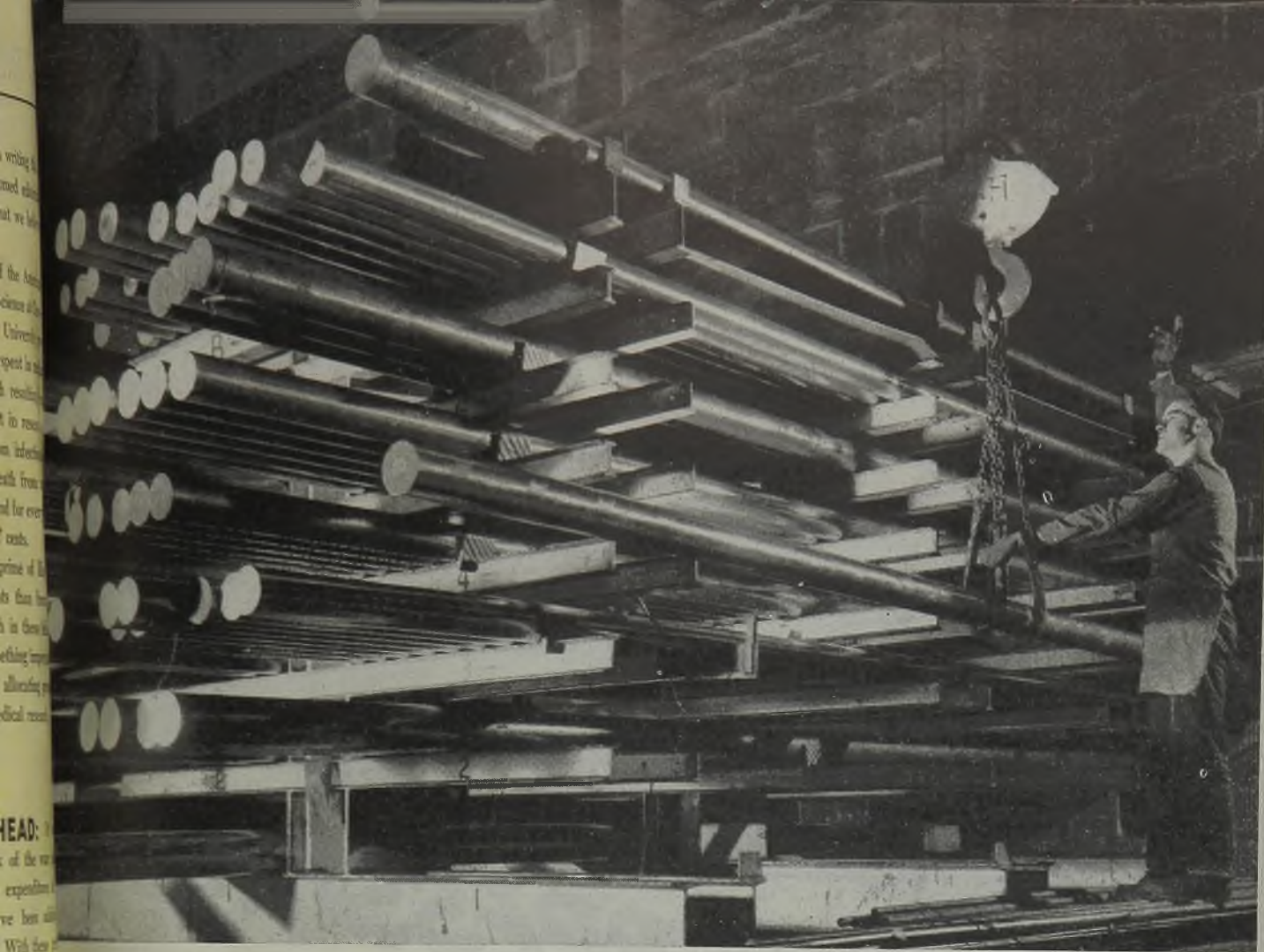
More industrialists die in the prime of life from heart, artery and kidney ailments than from any other cause, yet medical research in these fields is woefully inadequate. This is something important to remember the next time you are allocating personal or corporate contributions to medical research.

CANADA LOOKS AHEAD: It is estimated that since the outbreak of the war plants and equipment representing an expenditure of approximately \$1,200,000,000 have been added to Canada's production capacity. With these greatly expanded facilities, the dominion will enter the post-war period with capacities in certain lines—notably aluminum, magnesium and shipbuilding—which exceed the highest peacetime demand of the past by large margins.

Canada will attempt to utilize her new facilities and experience to the best advantage. Already Canadian shipbuilders have proposed that the government restrict its coastal trade to ships of dominion register or hereafter built in Canada and that future navy work be done in Canadian shipyards. They also suggest that "if necessary" Canadian shipowners engaged in foreign trade be subsidized.

In seeking to be more self-contained economically, Canada is doing exactly what every other Allied industrial nation will do after the war. To insure equal opportunities for all deserving nations will be a major postwar problem. —p. 101

E. L. Shaner
EDITOR-IN-CHIEF



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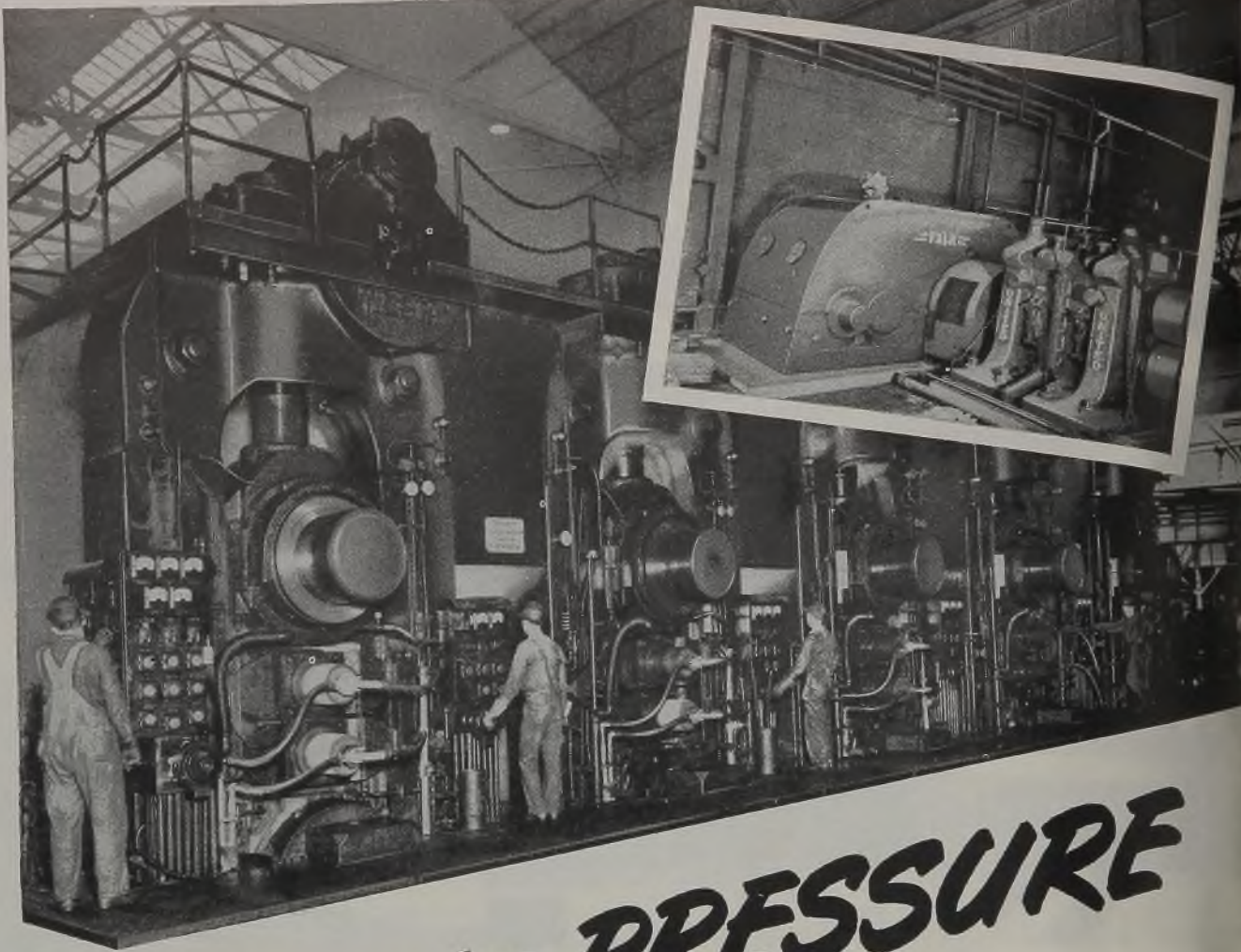
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Panel Members Differ On "Facts" of Union's Demand for Increase

Industry and labor representatives file "dissenting opinions" with War Labor Board. Report holds guaranteed wage would be ruinous to producers. Says rate adjustment not precluded by Stabilization Act of 1942

DIVIDED reports on the "facts" in the United Steelworkers' demand for a 17-cent hourly wage increase and other concessions were submitted to the War Labor Board late last week by its "basic steel" fact-finding panel.

Although the panel was not charged with making any recommendations to the full board, the public, industry and labor members failed to see eye-to-eye on the "facts" of the case. Both the industry and labor members of the panel submitted supplementary reports noting their disagreements with the public members.

A fourth report to the board was submitted by a special panel summarizing the evidence in the American Federation of Labor's petition for modification of the Little Steel wage formula. This report likewise made no recommendations, although a supplementary comment by the labor member urged that the board take action toward modification.

May Hold More Hearings

The reports by the basic steel panel, and those of other panels, will be the basis on whether the full board will decide to recommend a change in the wage stabilization policy. It is possible the board will hold further public hearings on the issue.

The record of the basic steel case included 4100 pages of transcript of the hearings in addition to approximately 50 separate briefs and exhibits filed by the union and the 85 companies involved.

The 85 companies in the basic steel case employ more than 400,000 workers and include all the steel producing companies which have contracts with the union. More than 500 other companies are included in two other cases being heard by other WLB panels.

Public members of the basic steel panel are: David L. Cole, chairman, a member of the second regional WLB; and P. P. Feinsinger, vice chairman, director of the WLB's disputes section, and on leave as professor of law at the Univer-

sity of Wisconsin. Industry members: Hugh Morrow, president, Sloss-Sheffield Steel & Iron Co., Birmingham; and Edwin D. Bransome, president, Vanadium Corp. of America, New York. Labor members: John Despol, San Francisco; and Stephen Levitsky, Pittsburgh. Both are international representatives of the United Steelworkers.

The major findings of fact include:

WAGE INCREASE: "Since Oct. 2, 1942, as well as before, the stabilization authorities have stressed the interdependence of wages and prices, in warning against the inflationary spiral which would result from an increase in the one to offset an increase in the other. These authorities have also expressed the view that labor would lose rather than gain if wages were increased, on the assumption that prices would rise faster than wages. At the same time these authorities have stated or implied that if wage rates were stabilized and other items affecting the cost of living were not stabilized, or returned to the levels of Sept. 15, 1942, so far as practicable, it would be unjust to deny workers increases in wages which would meet at least a part of the increase in the cost of living. In the light of the circumstances under which these statements and implications were made, the panel does not undertake to determine whether or not there has been a "commitment" that an increase would be granted. It is a reasonable inference however that the wage stabilization program would be re-examined from time to time in the light of changing conditions.

"There is no evidence that Congress in passing the stabilization act meant to preclude the President, in formulating a wage program, from considering previous or subsequent increases in the cost of living, or to limit his consideration to the increase which had occurred between January, 1941, and May, 1942. Congress rejected an amendment to the bill which became the Stabilization Act of Oct. 2, 1942, which amendment was expressly



DAVID L. COLE

designed, among other things, to incorporate the Little Steel formula into the law.

"The policies and program of the government in the administration of the stabilization act have recently been approved by the stabilization agencies, and by the Congress in extending that act for another year.

"As part of the wage stabilization policy and program, compensation to workers for increases in the cost of living has been limited to the increases occurring between January, 1941, and May, 1942. There is no evidence to support a finding that Congress or the President at any time meant that increases in the cost of living since May, 1942, should under no circumstances be considered in the administration of the national wage stabilization policy or program. The National War Labor Board has announced that on the basis of this and other reports it will determine whether or not to hold a public hearing on the question of what, if any, recommendation it should make to the President regarding a change in the Little Steel formula. This panel was specifically directed to take evidence for the board's consideration."

COST OF LIVING: Although the panel made no study of the cost of living, it commented on the adequacy of the Bureau of Labor Statistics index. The union had contended the BLS index was not an accurate yardstick, and that living costs actually had increased 43.5 per cent from January, 1941, to December, 1943, instead of the 25 per cent shown by the BLS index. The panel's report says:

"The BLS index indicates average changes in retail prices of selected goods,

rents and services bought by families of wage earners and lower-salaried workers in certain large cities. It does not show the full wartime effect on the cost of living of such factors as lowered quality, disappearance of low-priced goods and forced changes in housing and eating away from home. It does not measure changes in total living costs—the total amount families spend for living.

“Although certain types of revisions have been made by the BLS to keep its index abreast of the changing war economy, as an accurate index of retail prices under present conditions it requires some upward revision. . . .

“In addition, the BLS index is inadequate as a measure of changes in the cost of living of wage earners in the sense of reflecting necessary family expenditures resulting from involuntary changes in living habits. The index point value of this factor cannot be estimated with any fair degree of accuracy by this panel, but this factor is real nevertheless. The BLS index was not intended to reflect such changes of this character.”

HOW WORKERS HAVE FARED:

“Since Jan. 1, 1941, steelworkers have received general wage increases totaling 15.5 cents, which is 18.2 per cent of the January, 1941, straight time average hourly earnings. On April 1, 1941, by collective bargaining the steelworkers received an increase of 10 cents per hour in their wage rates. Of the 5.5 cents ordered by the board, 2.3 cents, or 2.7

MURRAY SEES RAISE

CIO President Philip Murray, speaking before the United Automobile Workers' convention in Grand Rapids, Mich., last week, predicted the Little Steel formula would be revised upward within a week. “I am satisfied the formula will be changed,” he said. “It has to be revised in the interest of our country and people.”

Many observers wondered if this statement means Mr. Murray has advance information of the administration's intentions.

per cent, was ordered as a special ‘time equity’ because of the ‘change in the rules of the game’ and the balance was ordered because the steelworkers were still entitled to that amount to compensate for the changes in the cost of living under the Little Steel formula from January, 1941, to May, 1942.

“Average weekly earnings of steelworkers have risen from \$29.88 in 1939 to \$49.77 in 1943 (66.6 per cent), and average annual earnings from \$1514 in 1939 to \$2612 in 1943 (72.5 per cent). From 1939 to 1943 the employes in all manufacturing industries had an increase in average weekly earnings from \$23.86 to \$43.14 (80.8 per cent) and in average annual earnings from \$1355 to \$2363 (74.4 per cent).”

From January, 1941, to April, 1944,

straight time hourly earnings rose from \$.852 to \$1.073, which is 22.1 cents or 25.9 per cent. The difference between 22.1 cents, the increase in straight time hourly earnings, and 15.5 cents, the amount of the total general increases in wage rates in this period, is 6.6 cents, which is attributable to increased incentive or production earnings, merit increases, promotions, and shifts in employment among low and high paying firms, regions and occupations.

ABILITY TO PAY: Discussing the effect of the requested wage increase on the financial situation of the companies the panel said:

“In the four years, 1936-1939, the 3 companies had a combined net income which amounted to 3.6 per cent of the combined average capital stock and surplus and they paid dividends amounting to 2.7 per cent of capital stock and surplus. In 1943 the same companies had a combined net income of 5.3 per cent of their combined capital stock and surplus and they paid dividends which were 4.0 per cent of their combined capital stock and surplus. The general wage increase demanded if granted, other things remaining equal, would result in a net income to the companies of less than 5.3 per cent but more than 3.6 per cent of their combined capital stock and surplus.”

The panel expressly refrained from considering whether the wage increase would require price relief, “because the authority to determine that matter has been lodged exclusively with the Economic Stabilization Director.” The panel, however, made the following observations: “A general wage increase will increase unit costs of production because production is now practically full capacity. A decrease in production, however, will tend initially to reduce unit costs of production, because (a) premium overtime pay will be reduced or eliminated, and (b) marginal or the less efficient plants and equipment will be shut down first.”

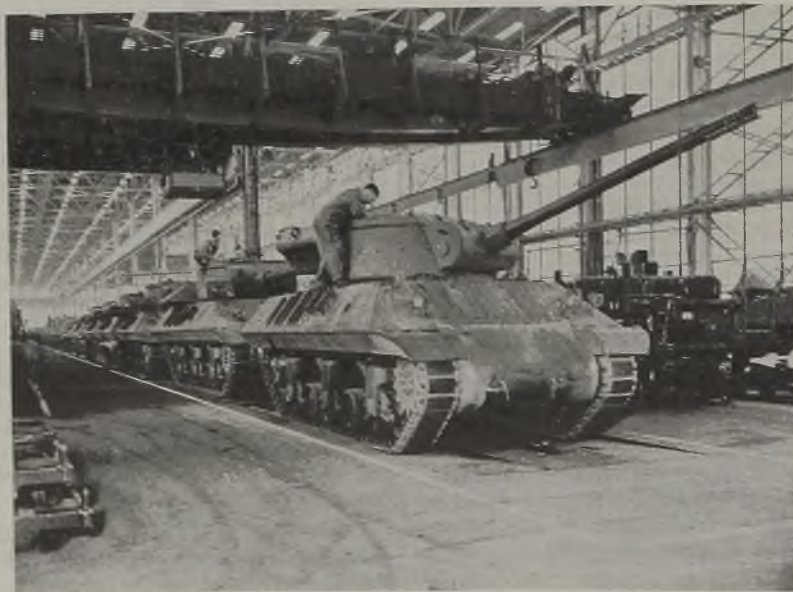
GUARANTEED ANNUAL WAGE:

“If production should fall to 60 per cent or less of capacity and remain there for any serious length of time, insolvency of the industry would be inevitable if the liability under the guaranteed annual wage plan in the form presented by the union must be absorbed,” the panel held.

“Unemployment in the steel industry is due largely to fluctuations in the demands for its products. Both seasonal and cyclical influences cause irregularities in demand which result in irregularities in the amount of work available. It has not been established that the steel industry by itself has the ability to avoid these fluctuations.

“If the union's demands were granted and production fell to the 1936-1938 levels, the companies, being required to employ or pay 500,000 people for 40 hours each week, would have too much

(Please turn to Page 200)



ARMY'S NEWEST: Here's the M-36 gun motor carriage, the latest major tank destroyer. It mounts a 90-millimeter gun whose 24-pound armor-piercing projectile can rip through several inches of enemy armor. Vehicle has a speed of 30 miles an hour, cruising range of 150 miles, can ford small rivers and climb steep grades. It is shown above coming off the assembly line at the Grand Blanc, Mich., tank plant of the Fisher Body Division of General Motors. NEA photo

Industry and Labor Dissent

Employer members cite union's history in wartime strikes; question continuance of maintenance of membership and checkoff. Say rate increase would be inflationary

ALTHOUGH industry and labor members of the basic steel wage panel agreed with many of the findings of the public members incorporated in the report, both filed voluminous supplementary reports.

The labor members' report constituted an argument on why each of the 14 demands considered by the panel should be granted. Much of the union's original argument was reiterated to support its claim for a blanket approval of its demands.

The comment of the industry members included a brief summary of their findings of fact and remarks on those parts of the report with which they disagreed.

The industry members held that inasmuch as the panel had made no study of the cost of living and inasmuch as the studies of organized labor were "partisan, unscientific and inaccurate in method and unreliable", that the panel should not undertake to make any findings of fact with regard to it.

They also pointed out that average earnings of workers have increased much more than the increase in wage rates. "From January, 1941, to April, 1944, wage rates of workers in the steel industry rose 15.5 cents, or 18.2 per cent of their average straight time hourly earnings for January, 1941. During the same period their average hourly earnings, including overtime, increased 28.9 cents, or 33 per cent.

The evidence before the panel does not sustain the contention of the union that the economic position of the steelworkers has deteriorated since January, 1941, nor does such evidence warrant the conclusion that the steelworkers have suffered any undue hardship because of the stabilization of wage rates in the steel industry."

Industry members took issue with the union's contention that an increase in rates would not be inflationary.

"On the contrary, increased wage payments to industrial workers have been one of the principal causes for the increase in the cost of living since January, 1941, and to an important extent those increased wage payments have been the result of increases in wage rates.

"Any modification of the Little Steel formula such as would be necessary to permit the granting of the union's demand for a general wage increase in these cases would result in general wage increases in industry generally which would increase the consumer purchasing power to an extent that would seriously imperil the entire national economic stabilization program."

Industry members denied the union's argument on the companies' ability to pay the higher wages.

"On the basis of employment in the

iron and steel producing industry in January, 1944, the estimated additional employment costs to that industry of granting such demand would exceed \$220 million. That estimate does not include any amount for increased costs due to (a) corresponding increases in wages which might have been granted to employees not covered by the agreements between the companies and the union; or (b) increased costs of materials and services which might result from the granting of similar increases in other industries.

"If such a general wage increase should be granted the companies would have to increase substantially the prices of their products in order to be able to earn a fair and adequate return on the investments in the companies."

The industry members agreed with the public members that a guaranteed annual

wage would impose a ruinous financial burden on the industry.

Regarding maintenance of union membership, the industry members stated:

"The statements of fact which have been presented to the panel by the companies, and which have not been refuted by the union, with regard to (a) contributions of funds of the union to the CIO Political Action Committee; (b) the failure of the union to take adequate disciplinary measures against those of its officials and members who have participated in strikes and work stoppages; and (c) the actions of union officials with regard to the Christmas strike of 1943, merit the serious attention of the board in its consideration of this issue."

The companies estimated the cost of granting seven of the 14 demands of the union would be \$691.4 million, while the union's estimate was \$314.6 million. The industry members believed the union's estimates greatly understate such costs, "especially since they do not include estimates of the cost of granting the guaranteed annual wage or sick leave with pay." They believed the estimates of the companies was "reasonably conservative and merit the serious consideration of the board."

Present, Past and Pending

■ HUNT-SPILLER MFG. CORP. CONTROL ACQUIRED

BOSTON—A. S. Campbell Co. Inc., East Boston, has acquired control of the Hunt-Spiller Mfg. Corp., South Boston, Mass., for 134 years engaged in producing castings and armor. Neil C. Raymond will head the company. Conjecture is that Hunt-Spiller in future will be more active in the automotive parts industry.

■ BRAZIL'S STEEL PLANT NEARLY COMPLETED

NEW YORK—Brazil's first heavy industry, the Volta Redonda steel mill, will begin operation the first of next year, according to George A. Katila, American engineer, who has been employed by the Brazilian National Steel Co. to work in the by-product coke plant.

■ BETHLEHEM HOLDS BIG SHIPWORK BACKLOG

BETHLEHEM, PA.—Building of Navy ships into 1947 is included in Bethlehem Steel Co.'s production schedule, E. G. Grace, president, told employes last week. By the end of 1944 Bethlehem's repair yards will have handled 30,000 ships during the war years.

■ INLAND SETS NEW STEEL SHIPMENT RECORD

CHICAGO—Inland Steel Co. during August shipped 251,270 tons of finished steel, a new all-time company record. Previous peak was 247,345 tons in March, 1943.

■ WIRE ASSOCIATION TO MEET AT PITTSBURGH

PITTSBURGH—Annual convention of the Wire Association will be held here at the William Penn hotel, Oct. 16-19. The convention will have all the regular features in addition to some added advantages not heretofore possible.

■ LONGFIELD RESIGNS FROM STEEL DIVISION, WPB

WASHINGTON—Resignation of C. H. Longfield as assistant director for production, Steel Division, War Production Board, was announced last week. It was also reported that Melville W. Cole has resigned from the Plate and Shape Branch, Steel Division, to return to his post with Bethlehem Steel Co.

■ MORE COAL MINES CLOSED BY STRIKES

CHARLESTOWN, W. VA.—Approximately 6300 coal miners in West Virginia and Kentucky last week joined 7000 others in idleness as spreading strikes of supervisory workers closed 19 more operations for a total of 35. Production loss is estimated at nearly 75,000 tons of coal daily.

Pullman-Standard Tank Termination Procedure Providing Case Study

Second largest settlement in the Chicago district nearing completion. Methods followed may serve as guide to other industries. Problems encountered, steps taken to simplify and facilitate adjustment detailed



CHICAGO'S second largest terminated war production contract—that of the Pullman-Standard Car Mfg. Co.'s M-4 tank program at its Hammond, Ind., plant—is nearing final settlement. This was revealed Sept. 7 when Maj. C. T. Everett, head of the termination section, Tank-Automotive Branch, Chicago Ordnance District, addressed the final session of the war problems school of the Chicago Association of Commerce on contract termination.

When halted on Oct. 1 last year, the Pullman-Standard \$469,000,000 tank contract was nearly 56 per cent completed, the undelivered balance being \$207,000,000, a figure exceeded only by the \$217,000,000 terminated tank contract of the International Harvester Co., Chicago. The latter's claim was settled recently for \$25,300,000, or less than 12 per cent for the total contract. (STEEL, Aug. 7, p. 58).

Indications are the Pullman-Standard contract will be settled for a much smaller figure, as practically all of the \$15,000,000 inventory has been disposed of to other builders of the M-4 tank and the company was immediately switched to manufacture of airplane parts.

According to Major Everett, the African campaign necessitated tanks in very large numbers and production was keyed to meet that requirement by having eleven of the country's largest manufacturers making M-4 tanks at increasing rates. At the conclusion of the campaign, requirements for other ordnance items increased and that for tanks decreased.

Consequently, builders of the M-4 tank were reduced from eleven to three.

The Pullman-Standard termination was authorized July 22, 1943, and was to become effective in January, 1944. Tanks were assembled and a great deal of the machining was done in one large building of approximately 30,000 square feet.

In the following paragraphs, Major Everett details some of the problems which complicated termination, enumerates important steps in procedure,

and makes suggestions as to how termination can be simplified and shortened by prime contractors and subcontractors in the future.

"In August, 1943, it was determined that the Air Corps had urgent requirements for extruded components and that the principal tank building area building No. 10, was ideal for that purpose. Therefore, effective date of termination was revised to Oct. 1, 1943. There were 275 tanks to be produced in September, which was a few more units than the regular monthly production schedule. Building No. 10 was to be vacated by Oct. 1. The final tank was completed Sept. 25 and machinery and equipment for the extrusion plant began to arrive during September.

Considerable Planning Necessary

"To have the building vacated by Oct. 1, it was necessary to do considerable planning. This planning, of course, received first consideration due to the short notice, resulting in practically no planning to meet the termination problem. As each machine tool finished its operation, a crew of men immediately started to disassemble and remove it. As the last tank went down the line, a crew of men followed moving all the production equipment. This served to make the problem very complex, a more difficult production job, which had practically eliminated termination work and planning. However, the deadline of Oct. 1, 1943, was met.

"Due to the short notice, considerable inventory was left on hand which would not have been there had the contract proceeded as originally planned ending in January. However, this was only one more complicating factor. To give you a brief picture of the size of the job, there were involved 365 subcontractors who were scattered throughout many states, and the inventory located at the plant of the prime contractor alone was in the neighborhood of \$15,000,000.

"Two major points complicated the termination problem: 1. The necessity

of vacating this large manufacturing area and a number of storage buildings adjacent thereto which were being taken over by the Air Corps; and 2. Several artillery items were placed with the contractor to utilize his former tank employees and the available space released by the cancellation of the tank program. This involved all of the production problems connected with the new artillery items.

"This case was handled similarly to the International Harvester Co., inasmuch as there was a negotiator, an accountant and a contracting officer's representative at the plant working as a team to assist the Pullman-Standard team.

"Forms for filing subcontractor claims and instructions to subcontractors were developed based on the experience gained in the Harvester contract. However, it was eight weeks before we were able to get these printed and in the mail to the subcontractor. That is just an example of one detail which can result in considerable delay to the rapid settlement of terminations. There are many, many similar delaying factors which, unless thoroughly studied before termination, will result in numerous delays.

"Immediately upon cessation of work Oct. 1, 1943, an inventory was taken by Pullman-Standard employees. Upon completion of the inventory, it was submitted to the contracting officer's representative at the plant and it was found to be incomplete and containing a greater percentage of error than would normally be the case. One of the reasons for this was that a considerable amount of material was being moved while the inventory was being taken. Limitations



M-4 tanks lined up at the Hammond, Ind., plant of Pullman-Standard Car. Mfg. plant were awaiting shipment to the war zones when this photograph was taken on the occasion of presentation of the Army-Navy E award to company employes more than a year ago. NEA photo

space necessitated storage of material throughout the plant in buildings over the 265 acres. It was impossible to stop all production while taking inventory, as a number of contracts were still active, therefore, proper segregation and classification of material could not be made for inventory purposes.

"In settling claims of subcontractors, we have found three major factors to which contractors have not given sufficient consideration, thus delaying settlement of their own claims:

"First—We found that many companies are underestimating the importance of the termination job and create one or two-man departments to handle the work, resulting in undermanned staffs which cannot cope with the intensity of the job.

"Second—Many contractors when preparing their termination claim feel they should be allowed to add a percentage cost for handling purchased materials. They overlook the fact that their accounting departments in all probability have included such costs in their overhead rate.

"Third.—Contractors are required to take definite action in an attempt to locate outside sources or return to original suppliers all raw stocks, purchased parts and supplies shown on their inventories. Also, to make a recommendation as to disposition of that material and to make their own offer even if it is a scrap price. Many of the subcontractors fail to attend to this requirement. The result of such failure on the part of the

contractor to attempt disposal and to provide evidence of his action, or to make his own recommendation and offer for the material, will delay the settlement of his claim until such time as he has complied with requirements.

Many Common Subcontractors

"Inasmuch as the tank program was of such a large size and there were many prime contractors, the result was a relatively large number of common subcontractors. In this particular case, there are 19 common subcontractors which are located in other ordnance districts. Some of the other prime contractors, also common with these specific subs, were terminated several months after this contract was terminated. That tends to make a more complex problem of settling with these particular subs. In this case, the district in which the common subcontractor is located has been delegated authority, both by the prime contractor and by this district, to perform a complete job of settling with this contractor; even to the extent of disposing of the inventory and making final negotiation. They then prorate the charges among the various primes involved and their decision in proration is final.

"Of the 365 subcontractors, 268 had given us a 'no charge' release and we expect a 'no charge' release on two more. Of the 95 left, I believe there are 59 settled and paid; 17 are very close to being settled and, of course, the other 19 are being handled entirely by other ord-

nance districts. Any subcontractor who requested a partial payment has been given such a payment.

"With reference to disposition of the inventory which was located at the plant of the prime contractor, I might say that we were in a fortunate position by having three tank program contractors continue to produce. I believe that the successful liquidation of this inventory was in a large degree due to the speed in advising the remaining contractors of the materials available and, also, by making it easy for them to do business with us.

"There has been a total of 1977 transactions by either sale or transfer of tank component items. The cost of this material was \$11,255,000, with a total loss of \$157,000.

"Supplies and equipment valued at over \$2,000,000 were liquidated — the total number of transactions was 504 through sales or transfers to other contractors; total loss \$19,500. To summarize this information, the total to date involves 2523 transactions on material which was valued at \$14,300,000, including all obsolete and unusable items and so forth which were scrapped. The total loss was \$1,800,000, or to summarize the liquidation of this inventory, it was sold or transferred to other tank builders or returned to the original source of supply at a loss of a little better than 12 per cent. There is, of course, some remaining inventory on which transactions are not entirely completed, however, these are not included in the aforementioned figures. I believe that if contractors will make a sincere and aggressive program to attempt the disposition of a terminated inventory, it can be done."

Post-V-E-Day Pattern Takes Form

Immediate relaxation of most wartime controls promised. Return to 40-hour week in some plants likely. Byrnes urges repeal of profits tax. Outlines cutbacks, etc.

PLANNING for reconversion at long last has taken a comprehensive aspect. Cutbacks in munitions contracts, resumption of civilian production, relaxation of various wartime controls over materials, manpower and use of facilities, disposal of surpluses, an approach to the establishment of pricing policies during the transitional period and taxing policies for after the war are covered in a report signed by James F. Byrnes, director of war mobilization, to the President.

To what extent this report is a political document and to what extent it represents an actual blueprint for reconversion is problematical. However, it summarizes and consolidates the thinking by various war agencies on the problems and gives assurance that the administration will let down the barriers to a partial return to normal business when Germany is defeated. And, incidentally, it includes all the little political touches—promises for more gasoline for motorists, lower taxes, high level of employment and national income, etc.

Mr. Byrnes' report follows a series of statements and announcement by the individual agencies. These include:

1—Statement by J. A. Krug, acting War Production Board chairman, before the Senate war investigating committee that WPB will eliminate practically all limitation and materials conservation orders immediately after Germany capitulates.

2—Statement by Manpower Commissioner Paul V. McNutt before the same committee that with the ending of the war in Europe the required hiring of male labor through the United States Employment Service and the fixing of employment ceilings would cease. The 48-hour week in war plants and the non-regulatory functions and programs of USES will be continued, Mr. McNutt thought. (Mr. Byrnes apparently differs somewhat with the WMC chairman and recommended return to the 40-hour week "except to take care of production necessary to the war effort and some specially tight labor areas").

3—Announcement by the WPB that the first few "spot authorizations" for civilian production have been approved. As of Aug. 31, only three out of 457 applications had been approved and these were for companies employing only a few men.

4—Announcement by Will L. Clayton,



JAMES F. BYRNES Fears "Fears of Timid People"

surplus property administrator, that between May 15 and Aug. 15 approximately \$38 million of surplus war property had been disposed of by authorized agencies. Remaining inventories Aug. 15 were \$313 million.

5—Announcement by the Production Executive Committee of the WPB that from June 15 to Aug. 31 a total of 407 cutbacks proposed by the procurement agencies amounted to \$421 million.

Plans To Relax Wartime Control

According to Mr. Byrnes' report, the administration proposes to relax a majority of its wartime controls over industry and labor immediately after V-E Day (victory over Germany), but will not relinquish the basic authority under which the controls have been exercised.

Notwithstanding the retention of basic wartime authority, the administration report offers the hope that the fall of Germany soon will be followed by the resumption of civilian goods manufacture on about the same level as in 1939.

"With the defeat of Germany," says Mr. Byrnes, "the requirements of the procurement agencies for materiel and supplies will be reduced by approximately 40 per cent . . . The need will still remain to give full protection to the necessary war programs for the conduct of the war with Japan, but in so

doing every opportunity will be provided to permit the resumption of maximum civilian production without delay, thus preventing extended unemployment."

The procurement agencies have prepared special programs for continuing the war with Japan and these will be implemented immediately after Germany falls.

Mr. Byrnes said the lag between cancellations and resumption of civilian manufacture can be shortened by the lifting of most wartime controls.

The war mobilization director referred to the WPB program for relaxing present controls and the substitution of the following:

1—Establishment of a new military preference rating to be assigned to the programs of the War Department, Navy, Department, Maritime Commission, Shipping Administration, and military Lend-Lease. Contractors will be required to accept orders in this rating band and to fill these orders in preference to any other orders.

2—Establishment of a new civilian production preference rating band subordinate to the military rating, but superior to all other ratings to be used only if necessary to protect the more essential civilian programs. It is anticipated that this rating band will be necessary and it will be used only in

the event programs in this category fail to meet schedules.

3—The new rating structure will be placed in effect immediately following the defeat of Germany. It will automatically assign the new ratings to the prime contractors of the designated programs and these prime contractors will be directed to extend the ratings to their suppliers. After an appropriate period has elapsed to permit a re-rating and rescheduling of orders, all other outstanding preference ratings will become void.

4—The priority regulations now in effect will be amended to conform to these changes.

5—The Controlled Materials Plan will be revoked immediately after the defeat of Germany, except that it will remain in effect for steel and copper during the remainder of the quarter in which the revocation is issued. In effect, orders under the Controlled Materials Plan become priority orders; however, suppliers will be permitted to receive and fill all orders placed after the defeat of Germany to the extent made possible by the cancellation of orders which they then hold under the Controlled Materials Plan.

6—L and M orders will be revoked, except for a few selected orders which must be retained as a mechanism for programming items which will continue in short supply, such as tires, batteries, motors, lumber, and some textiles and chemicals.

7—The WPB will retain the authority which it now has to continue or to institute controlled mechanisms to cope with individual production and procurement problems, to include the authority to issue individual directives to manufacturers or suppliers to produce or deliver a product or products to a designated purpose. This will permit the WPB to take appropriate action to prevent or to correct hardship cases.

After contracts are canceled, contractors will be offered advance payments and loans for quick financing. Mr. Byrnes outlined procedure for inventorying and disposing of equipment and materials pertaining to the war contract.

Mr. Byrnes predicted that many of the wartime manpower controls could be lifted after V-E Day, and that we should return to a 40-hour week to spread employment. Some war plants, however, probably will have to be continued on a 48-hour week until Japan is defeated.

On reconversion prices, Mr. Byrnes' report said the Office of Price Administration now is attempting to work out a formula.

On postwar taxes, Mr. Byrnes said: "Before the manufacturer returns to production he will want to know something more than the ceiling price. He will want some idea about taxes in order to determine whether there will be a profit in his business. . . . Before a man puts his own money and asks his friends to put money in a business he wants

INDUSTRY COMMITTEES

WASHINGTON — Appointment of single industry advisory committees to deal with the Office of Price Administration, War Production Board and other government agencies concerned with the problem of reconversion is being considered. Heretofore it has been considered advisable to have separate committees on pricing and production. Now, however, opinion is growing that one committee for each industry charged with the entire reconversion problem, including pricing, would be more effective in facilitating quick action. These committees would be made up of representatives of small, medium and large business, thus making all groups vocal.

The OPA is understood to be working on reconversion pricing formulas and it is expected that some time next week these may become operative, thus cutting red tape in establishing prices on thousands of civilian items.

to know that there is some prospect of his making a profit.

"The excess profits tax is a war tax. With the ending of the war there should be an end to excess profits taxes. It cannot be done upon V-E Day because we will still have war production and war profits, but the administration and

the leaders of the congressional committees might well announce an intention to urge the elimination of the excess profits taxes when the war with Japan is at an end.

"We should consider, also, the advisability of allowing manufacturers to depreciate new machinery substantially in the years in which such machinery is purchased. Great Britain has incorporated such a plan in its current budget. This action would induce many companies to hazard new ventures, thereby increasing employment. It would give a real incentive to companies to keep our industry ahead of the rest of the world.

"I have requested a survey to be made to determine what war controls can be modified after V-E Day. To enforce controls requires personnel. When the controls are released government employes should be released. The scheduled reduction of procurement in the War Department, the removal of controls by the War Production Board, and other agencies, should make it possible for many government workers to return to their homes when Germany surrenders.

"The justification for rationing is the short supply of a commodity. When the supply is sufficient for normal demands rationing should cease. Many foods have already been removed from the ration list. Others will be removed as soon as supplies justify removal."

In general, Mr. Byrnes said, the "fear of timid people may temporarily retard our return to full production and full employment. But it will be only for a short time."



CRUCIAL PERIOD AHEAD: Manpower Commissioner Paul V. McNutt, left, warns members of the Senate War Investigating committee that there is a "desperate need for increased production" of weapons to defeat Germany. Others in the photo are, left to right: Sen. James Mead, New York, chairman of the committee; Sen. Harold Burton, Ohio; and J. A. Krug, acting chairman of the War Production Board. NEA photo

August Steel Output Totals 7,469,800 Tons

American Iron and Steel Institute reports production during first eight months of 1944 ahead of 1943

PRODUCTION of 7,469,800 tons of steel during August was reported last week by the American Iron and Steel Institute.

August production was slightly below the July output of 7,474,297 tons, and also was less than the tonnage produced in August, 1943, when 7,586,464 tons were turned out.

Total output in the first eight months of this year, however, was ahead of output in the corresponding months of last year, 60,005,971 tons as against 58,880,791 tons in first eight months of 1943.

During August, the steel industry operated at an average of 94.1 per cent of capacity, compared with 94.4 per cent in July and 98.3 per cent in August a year ago.

Steel production averaged 1,686,185 tons per week in August, as against 1,691,017 tons per week in July and 1,712,520 tons per week in August, 1943.

Steel Shipments Total 5,597,631 Tons in July

Steel shipments in July totaled 5,597,631 net tons compared with 5,703,314 tons in June, according to the American Iron and Steel Institute. For the first seven months this year, shipments totaled 40,513,244 net tons.

Included in the July total were 1,055,204 tons of plates, raising the total for seven months to 8,010,244 tons. Hot-rolled bar production was 966,743 tons, and cold finished bars were 169,861 tons. Hot-rolled sheet production totaled 1,020,912 tons, cold rolled sheets, 313,931 tons, and galvanized 113,958. Hot-rolled strip output was 221,951 tons, and cold-rolled, 97,609 tons.

U. S. Steel's Shipments Off Slightly in August

U. S. Steel Corp's August shipments of finished steel products decreased 11,040 tons to 1,743,485 net tons. This compares with the showing in the corresponding month of 1943 and 1942 of 1,704,289 and 1,788,650 tons respectively.

Monthly comparison of corporation's shipments are presented in the table below:

	(Inter-company shipments not included) Net Tons		
	1944	1943	1942
Jan.	1,730,787	1,658,992	1,738,893
Feb.	1,755,772	1,691,592	1,616,587
Nar.	1,874,795	1,772,397	1,780,938
Apr.	1,756,797	1,630,828	1,758,894
May	1,776,934	1,706,543	1,834,127
June	1,737,769	1,552,663	1,774,068
July	1,751,525	1,660,762	1,765,749
Aug.	1,743,485	1,704,289	1,788,650
8 mo.	14,130,864	13,405,067	14,057,906
Sept.	1,664,577	1,703,570	1,864,227
Oct.	1,794,968	1,787,501	1,851,279
Nov.	1,660,594	1,665,545	1,624,186
Dec.	1,719,624	1,849,635	1,846,036
Total	20,244,830	21,064,157	20,458,937
Adjustment		*449,020	*423,323
Total		20,615,137	20,416,604

*Decrease.

Steel and Iron Produced for Sale in July

AMERICAN IRON AND STEEL INSTITUTE CAPACITY, PRODUCTION AND SHIPMENTS											
Period: JULY - 1944											
Steel Products	Number of companies	Items	Maximum Annual Capacity Net Tons	Current Month				To Date This Year			
				Production		Shipments (Net Tons)		Production		Shipments (Net Tons)	
				Net Tons	Per cent of capacity	Total	To members of the industry for conversion into further finished products	Net Tons	Per cent of capacity	Total	To members of the industry for conversion into further finished products
Ingots, blooms, billets, tube rounds, sheet and tin bars, etc.	47	1	xxxx	xxxx	xxx	726,429	222,778	xxxx	xxx	5,003,478	1,576,296
Structural shapes (heavy)	10	2	8,977,450	302,873	40.9	299,815	xxxx	2,331,797	45.4	2,279,321	xxxx
Steel coils	4	3		7,363		8,455	xxxx	41,154		41,732	xxxx
Plates (sheared and universal)	23	4	16,021,220	1,055,204	77.9	1,036,769	67,665	8,010,244	85.9	7,797,026	368,788
Skulls	6	5	xxxx	xxxx	xxx	59,201	47,810	xxxx	xxx	486,046	379,688
Rails—Standard (over 60 lbs.)	4	6	3,625,000	180,277	58.8	184,509	xxxx	1,335,836	63.3	1,333,594	xxxx
—All other	6	7	518,600	21,981	50.1	16,340	xxxx	113,984	37.8	114,283	xxxx
Splice bars and tie plates	13	8	1,743,500	62,955	42.7	66,807	xxxx	473,047	46.6	486,053	xxxx
Track spikes	10	9	350,640	11,186	37.7	11,838	xxxx	85,587	41.9	91,413	xxxx
Hot Rolled Bars—Carbon	37	10	xxxx	709,053	xxx	573,023	75,426	5,080,609	xxx	4,234,393	542,623
—Reinforcing—New billet	15	11	xxxx	39,484	xxx	44,723	xxxx	268,317	xxx	285,033	xxxx
—Rerolled	15	12	xxxx	4,883	xxx	5,589	xxxx	48,746	xxx	54,080	xxxx
—Alloy	23	13	xxxx	213,323	xxx	167,210	31,413	1,818,334	xxx	1,332,671	262,211
—Total	46	14	21,170,110	966,743	54.0	790,545	106,839	7,216,066	58.6	5,906,177	804,834
Cold Finished Bars—Carbon	24	15	xxxx	139,672	xxx	137,802	xxxx	1,045,052	xxx	1,040,319	xxxx
—Alloy	22	16	xxxx	30,180	xxx	27,816	xxxx	242,787	xxx	216,659	xxxx
—Total	30	17	2,711,650	169,851	74.1	165,618	xxxx	1,287,849	81.6	1,256,978	xxxx
Tool steel bars	17	18	214,970	214,970	58.7	10,817	xxxx	83,092	66.4	79,968	xxxx
Pipe and Tubes—Butt weld	16	19	2,289,130	109,804	56.7	115,387	xxxx	823,974	61.8	823,070	xxxx
—Lap weld	8	20	967,900	41,531	50.8	42,184	xxxx	338,220	60.0	337,763	xxxx
—Electric weld	9	21	1,225,170	78,462	75.8	77,415	xxxx	469,902	65.9	465,445	xxxx
—Seamless	15	22	2,625,250	188,978	85.1	206,422	xxxx	1,365,095	89.3	1,373,449	xxxx
—Conduit	7	23	184,500	6,494	41.6	4,881	xxxx	33,015	30.7	32,185	xxxx
—Mechanical tubing	11	24	1,038,450	63,643	72.5	59,454	xxxx	476,844	78.9	476,602	xxxx
Wire rods	25	25	6,883,170	334,347	57.5	95,052	21,379	2,562,463	64.0	725,751	190,647
Wire—Drawn	40	26	5,555,130	279,918	59.6	162,691	5,938	2,074,837	64.2	1,184,324	31,284
—Nails and staples	18	27	1,240,900	48,566	46.3	50,437	xxxx	395,031	54.7	388,436	xxxx
—Barbed and twisted	15	28	546,230	19,856	43.0	19,764	xxxx	147,451	46.4	146,309	xxxx
—Woven wire fence	15	29	1,110,200	30,007	32.0	29,592	xxxx	222,812	34.5	222,072	xxxx
—Bale ties	12	30	150,660	5,898	46.3	6,921	xxxx	46,183	52.7	45,886	xxxx
Black Plate—Ordinary	9	31	xxxx	xxxx	xxx	43,378	-	xxxx	xxx	276,746	886
—Chemically treated	8	32	464,000	9,580	24.4	8,045	xxxx	89,811	33.3	85,038	xxxx
Tin and Terne Plate—Hot dipped	9	33	3,719,650	195,628	62.2	187,792	xxxx	1,078,987	49.8	1,153,703	xxxx
—Electrolytic	10	34	2,155,100	59,665	32.7	58,163	xxxx	388,180	30.9	368,680	xxxx
Sheets—Hot rolled	28	35	20,085,600	1,020,912	60.1	517,134	21,182	7,286,104	62.3	3,687,999	147,339
—Cold rolled	14	36	7,318,780	313,931	50.7	157,342	xxxx	2,133,814	50.1	1,160,511	xxxx
—Galvanized	15	37	2,681,130	113,958	50.3	109,653	xxxx	753,777	48.3	742,153	xxxx
Strip—Hot rolled	22	38	8,549,590	221,951	30.7	139,213	22,314	1,559,196	31.3	994,112	160,896
—Cold rolled	34	39	3,267,470	97,609	35.3	87,847	xxxx	686,813	36.1	638,780	xxxx
Wheels (car, rolled steel)	5	40	348,800	23,999	81.4	22,799	xxxx	170,033	83.8	166,661	xxxx
Axles	6	41	416,170	14,302	40.7	14,217	xxxx	119,963	49.5	115,916	xxxx
All other	5	42	172,290	4,447	30.5	4,705	xxxx	25,405	25.3	25,784	xxxx
TOTAL STEEL PRODUCTS	153	43		xxxx	xxx	5,597,631	515,905	xxxx	xxx	40,513,244	3,660,638
Effective steel finishing capacity	153	44	64,722,000	xxxx	xxx	xxxx	xxxx	xxxx	xxx	xxxx	xxxx
Percent of shipments to effective finishing capacity	153	45	xxxx	xxxx	xxx	92.9%	xxxx	xxxx	xxx	97.8%	xxxx

Shipyards Expecting Cutbacks

Signs increasing that huge wartime shipbuilding job in the San Francisco Bay area is nearing completion. Much repair work anticipated

SAN FRANCISCO

HERE and there, signs are increasing of an approaching large scale cutback in shipbuilding in the San Francisco Bay area. Thus far overall production has not been affected noticeably, but the dropping of a shift in one large yard, completion of a contract in another smaller plant, announcement of plans for reconversion and widespread reports and rumors of work terminations by November or December add up to indicate that the West Coast huge wartime shipbuilding job is nearing its conclusion.

As contracts taper off, however, it is expected that ship repair work will be continued extensively and even expanded considerably during the closing months of the war with Japan. This view is borne out by the Navy announcement that facilities of Pacific Bridge Co.'s shipbuilding yard at Alameda, Calif., will be utilized for vessel repair work beginning Oct. 1.

This yard, which is owned by the Navy and is operated by Pacific Bridge Co. has been making a type of vessel which recently reached a point of production where the supply is more than adequate for all future needs. The plant has been employing about 1500 workers. Following completion of the vessel contract, the yard has been transferred from the Navy Bureau of Yards and Docks to the Navy Bureau of Ships, which will supervise the repair work.

That Henry J. Kaiser interests also are anticipating the approach of contract termination is seen in announcement by the Kaiser Co. that the Richmond, Calif., yards can be reconverted to production of peacetime heavy industry products, such as locomotives and railroad equipment in a period of only three days.

Clay P. Bedford, general manager of the Richmond installation, also estimates that "only a little more time will be needed to shift to manufacture of plane assemblies, of heavy duty trucks, of refrigerators or other heavy household appliances".

The Kaiser firm also has indicated it plans to establish a new Standard Gypsum Co. plant in the San Francisco area,

possibly at Richmond Yard No. 2. Kaiser recently announced acquisition of a half interest in the gypsum company.

That some shipbuilding yards in this area will fare better than others in the closing days of the war is obvious, but trends of the fighting itself will be the major influence in the type of vessel to be constructed. One of these types appears to be tankers. This is indicated in a message received by Marinship Corp. from Admiral E. S. Land, chairman of the Maritime Commission, pledging "absolutely no cutback in production at Marinship after the defeat of Germany." Marinship now is producing tankers at its Sausalito, Calif., yard.

Plans of in-migrant shipyard workers, when the contracts are terminated, have been indicated by preliminary reports of a labor survey by the Oakland Chamber of Commerce. The results compiled thus far show that one out of five workers who came from other states to work in five major East Bay shipyards definitely plan to leave California when their war jobs are ended, and 45 per cent contemplate establishing residence "somewhere

in California". Of the total number of ship workers interviewed, a total of 56,860, there are 5363, or 9.43 per cent, who have indicated they plan to leave the labor force, either to return to school, retire, or, in the case of women, return to their duties as housewives.

July Employment Decline Smaller in Los Angeles

During July there was a net decline of 2000 industrial wage earners in Los Angeles county contrasted with a net decline of 14,900 in June. Declining employment was recorded in the general iron and steel group, foundries, heating and plumbing supplies (except electric), structural steel and ornamental iron work, aircraft and parts, shipbuilding and repair, nonferrous metals and their products, electrical machinery and equipment, industrial and metalworking machinery.

Fifteen classifications of nondurable goods industries were reported as expanding labor forces, chiefly fruit canning and preserving plants.

POSTWAR PRELIMINARIES

WAGES—Workers who migrate from war plants to former jobs face reduction of about 15 cents an hour in terms of weekly take-home pay, due to shorter work-week and loss of overtime pay. See page 84.

TAXES—Fourth general report of House Special Committee on Postwar Economic Policy and Planning provides barometer of likely attitude of Congress on excess profits taxes and corporate levies. See page 86.

CONTRACT SETTLEMENT—System of partial payments of war contract termination claims, second step to speed up settlement of war contracts, announced. See page 88.

RECONVERSION—Complicated war agencies and insistence on multiple approval of reconversion moves seen delaying resumption of civilian goods manufacture. See page 91.

POSTWAR EFFICIENCY—Structural steel industry urged to establish a standard system for ascertaining and recording costs. See page 92.

CANADIAN INDUSTRY—Dominion to enter postwar era with enlarged industrial facilities, but will still be dependent upon imports of many products. See page 101.

HYDRAULIC COMPONENTS—To overcome disadvantages of high freight rates, West Coast maker of hydraulic system components concentrates on products of unexcelled engineering design and production sequence, manufacture involving latest heat treating methods. See page 108.

BRIQUETTING "SWarf"—Typical of today's conditions is scrap problem, accentuated by large materiel demands and by tremendous increase in metal-cutting capacity of modern machine tools. Effective system of briquetting "swarf", or borings and turnings, returns them to use in marketable form. See page 112.

HELIUM WELDING—Trend toward expanded use of magnesium alloys accounted for in large measure by flexibility of helium-shielded arc welding. Sound welds achieved with aid of standard welding machines on light and heavier gages. See page 125.

BONDING METAL PARTICLES—Study with long-range implications for powder metallurgy is that recently concluded on bonding particles of iron, copper and silver by heat but without pressure. See page 131.

Bureau of Labor Statistics Shows How War Altered Wage Rates

Workers who migrate from war plants to former jobs are faced with reduction of about 15 cents an hour in terms of weekly take-home pay—assuming rates remain the same. Results from shorter work-week and loss of overtime premiums

SIGNIFICANT to employers is a recently completed Bureau of Labor Statistics study showing the extent to which the country's wage structure has been altered during the war. It reflects the extent to which compensation of workers has been increased upon leaving old jobs and going to work in war plants paying high rates for straight time and overtime. It also shows the reduction in take-home pay that will become effective when (1) overtime working schedules are abandoned and (2) workers begin migrating back to peacetime industries in which compensation has not risen to the same extent as at war plants.

The study is of value to employers who recall their wage positions before the war, who are conscious of wartime wage changes in their geographical areas or in their industries, and who are trying to form some idea as to the level of wages they can afford to pay in the peacetime period ahead.

In undertaking the study, the Bureau of Labor Statistics sought primarily to get the answer to this question: What will happen, if the present levels of basic pay are retained, if (1) there is a cutback to the 40-hour work-week, and if (2) workers who left different peacetime industries to go into war work at higher pay migrate back to their old industries?

Workers Face Cut in Wages

The basic facts emerging from this study are as follows:

1—In May, 1944, all manufacturing industries employed their workers an average of 45.4 hours per week for which they paid them an average of \$1.017 an hour, including both straight hourly earnings and extra pay for overtime.

2—Eliminating extra pay for overtime, straight-time pay for all industries in May of 1944 averaged \$0.945 per hour (for a 40-hour week).

3—If these workers, in May, 1944, had still been employed in the industries that employed them in January of 1939, they would have received average pay of \$0.865 an hour for a 40-hour week instead of the \$0.945 an hour which they did receive in May of 1944 for 40 hours' work.

In other words, assuming that wages stay where they now are, workers who migrate from war plants back to their old industries are faced with a total cut of \$0.152 in the hourly wage rate in terms of weekly take-home pay. Of this reduction \$0.072 results from going from a 45.4-hour to a 40-hour week, and \$0.08

results from the lower straight-time hourly rate of pay reported in peacetime industries.

In examining the accompanying average earnings table (p. 86), it should be noted that:

Column 1 represents average total weekly income per week for each period

indicated, prior to deductions for social security, income and victory taxes, bond purchases or any other authorized deductions.

Column 2 represents the average pay per hour of work. These figures were obtained by including both straight-time and overtime pay in their proper proportion.

Column 3 represents average straight-time hourly wages for a 40-hour week for the periods indicated.

Column 4 shows straight-time hourly wage rates that would have been paid since January of 1939 had the higher and lower-wage industries been represented in their former proportions. This column, by comparison with figures in columns 2 and 3, indicates the extent to which the average worker gained by migrating to war work paying higher

COMPARATIVE WAGES IN VARIOUS INDUSTRIES

Industry	Hours Worked per average week	Average pay per week	Average earnings per hour cents
Blast furnace, steelworks, rolling mill products	46.1	\$53.43	116.0
Gray iron and semisteel castings	47.9	51.30	107.4
Malleable castings	48.0	50.24	104.7
Steel castings	46.4	51.36	110.6
Cast iron pipe and fittings	47.0	40.88	87.5
Wirework	47.5	49.83	104.9
Cutlery and edged tools	46.6	44.06	94.5
Stamped enameled and galvanized ware	45.3	45.63	100.7
Fabricated structural steel	49.9	50.95	113.5
Steel forgings	47.5	58.20	122.7
Screw machine products	48.6	49.83	102.5
Radios and phonographs	45.7	41.03	89.1
Machinery and machine shop products	48.4	53.17	110.0
Engines and turbines	49.8	60.48	122.1
Tractors	46.7	52.67	112.7
Agricultural equipment, excluding tractors	48.4	54.13	111.9
Machine tools	50.8	56.99	112.1
Machine tool accessories	49.6	58.59	118.2
Textile machinery	48.6	47.08	97.0
Typewriters	49.3	48.87	99.1
Cash registers	49.5	59.45	121.0
Washing machines, domestic	45.9	47.28	102.9
Locomotives	49.0	64.18	131.0
Cars, electric and steam railroad	46.6	53.44	114.7
Aircraft and parts, excluding engines	46.8	54.07	115.5
Aircraft engines	47.4	61.62	130.1
Shipbuilding	48.0	64.11	133.6
Nonferrous metals, smelting and refining	46.4	49.16	106.0
Cordage and twine	44.9	32.36	71.9
Men's shirts, collars, nightwear	37.5	24.42	65.1
Millinery	30.7	32.37	88.4
Handkerchiefs	38.4	24.00	62.4
Textile bags	41.3	28.01	67.6
Boots and shoes	40.3	30.98	76.7
Slaughtering and meat packing	49.9	46.41	93.4
Baking	45.3	38.01	84.2
Flour	48.7	40.61	83.2
Butter	47.1	33.64	70.2
Cigarettes	42.3	31.97	75.5
Paper bags	43.5	32.96	76.1
Book and job printing	42.1	42.09	99.3
Paints, varnishes	47.8	46.12	96.0
Drugs, medicines, insecticides	43.3	34.76	80.7
Small-arms ammunition	46.3	44.98	97.1
Petroleum refining	47.0	58.40	124.4
Coke and by-products	46.2	47.58	102.8
Rubber tires and inner tubes	45.5	57.16	125.8
Photographic apparatus	45.8	48.18	105.8
Anthracite coal mining	41.9	48.54	115.9
Bituminous coal mining	43.8	51.67	117.7
Metal mining	44.4	44.59	100.3
Laundries	43.8	27.04	61.9
Cleaning and dyeing	44.3	31.42	73.1

The CONE AUTOMATIC MACHINE COMPANY

sees many

GOOD THINGS AHEAD



It is reported that

A recently patented heating plate has two elements from which four degrees of heat may be obtained by using them singly or in combination as well as in series or parallel.

get ready with CONE for tomorrow

A new patent covers the use of perforated plates at the bow of a small, fast motorboat which permits the hull to ride on a cushion of foam.

get ready with CONE for tomorrow

Spraying the interior of a freight car or truck with dry ice is being tried as an inexpensive method of refrigeration.

get ready with CONE for tomorrow

Serious consideration is being given to the making of illuminating gas near the coal mines and its delivery by pipe line.

get ready with CONE for tomorrow

Cigarette paper, formerly a French monopoly, is now being successfully made in this country.

get ready with CONE for tomorrow

A capsule has been developed that is said to be effective in the prevention of seasickness in about 75% of the cases tested.

get ready with CONE for tomorrow

Cloth is being made from shredded redwood bark mixed with wool.

get ready with CONE for tomorrow

Experiments are being made to determine the suitability of animal blood for human transfusion.

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Shafts for generators are now being squeezed into shape with dies.

get ready with CONE for tomorrow

A new plant processes 25,000 pounds of milkweed floss per day.

Shoal draft boats with tunnel sterns are made more efficient by the use of a small stand-pipe over the propeller which is kept full of water by a vacuum pump. The propeller is thus constantly surrounded by water although above the water level.

get ready with CONE for tomorrow

Anthropology is not popularly thought of as a commercially useful science, but anthropologists were consulted in designing seats for aircraft, gas masks, and goggles, and they might well be turned loose on the problems of private and public furniture after the war.

get ready with CONE for tomorrow

Airplane propellers are now being made of sponge rubber over a metal core.

Apparatus now in use by our army is expected to make it possible for civilians to forecast weather accurately as much as 24 hours ahead.

get ready with CONE for tomorrow

One of the country's largest chemical companies states that 46% of its gross sales for last year consisted of products unheard of fifteen years ago.

get ready with CONE for tomorrow

Rayon is being used for tire cord, parachutes, paint brushes, pump packing, bullet-proof gas tanks, lint-free gloves, electrical insulation, gas-proof clothing, cartridge bags, felt, and rugs.

get ready with CONE for tomorrow

Optimistic producers of synthetic rubber say that, in the future, people will buy new automobiles to go with their old tires.

get ready with CONE for tomorrow

Ball bearings are now being made small enough to replace the jewels used in many precision instruments.

Tomorrow's
production
should eliminate
second operations



The 3-Spindle Conomatic produces these wheel hub bolts from SAE 1030 in 34 seconds each. Slot milling in the large diameter and stamping the letter on the end are done without stopping the spindle. Conomatics reduce costs, save time, and eliminate second operations.



CONE

AUTOMATIC MACHINE CO., INC. ★ WINDSOR, VERMONT, U.S.A.

10

straight-time wages plus extra pay for overtime.

Column 5 shows the average straight-time hourly wages that would have been paid since January of 1939 on the basis of the proportion between high-wage and lower-wage industries that prevailed during the month of January of 1941, according to the report.

Column 6 shows the average straight-time hourly wages that would have been paid since January of 1939 on the basis of the proportion between higher-wage and lower-wage industries that prevailed in October of 1942. (The October, 1942, relationship was selected as the base in this calculation because the wage stabilization order of September, 1942, became effective at that time.)

Column 7 shows the Bureau of Labor Statistics cost-of-living index for each period indicated, on the basis of 100.0 for the period 1935-1939 inclusive.

The study summarized above becomes more useful when considered in conjunction with the Department of Labor's report of hours and earnings during the month of May, 1944.

During that month, May, 1944, workers in the durable goods industries worked an average of 46.8 hours weekly and were paid \$52.05 or 111.3 cents an hour, on the average.

Non-durable goods workers, on the other hand, worked 43.2 hours weekly, and were paid \$37.04 per week or 85.8 cents an hour, on the average, study of the department shows.

Excess Profits Tax Repeal, Lower Corporate Levies Recommended

House postwar committee says personal income tax must supply bulk of federal funds. Says attainment of prosperity will be primarily a job for private enterprise, with government providing the setting and acting as referee

A BAROMETER of the attitude Congress likely will take toward important postwar economic problems is seen in the fourth general report of the House Special Committee on Postwar Economic Policy and Planning, a 69-page document. Of special interest is the committee's statement on general policies:

"The goal of postwar economic policy is the creation of conditions favorable to the expansion of our peacetime production, so that the national labor force will be gainfully employed and the national income will be adequate to sustain an active market for goods and services, with improved living standards.

"For the attainment of postwar prosperity we must look primarily to the efforts of private enterprise, its management and its labor force. The role of the government is essentially to provide the setting in which these efforts will have the best prospects of success. At the same time it is the obligation of the govern-

ment to take direct public measures for the protection of its citizens against the economic hazards which are unavoidable in a progressing economy that preserves freedom of private enterprise and individual opportunity—especially during the difficult period of transition from production for war to production for peace.

"A large part of American industry has had to be commandeered for war production. Both labor and capital have been diverted from their normal channels. In relaxing the wartime government controls to release war-restricted resources for civilian production, public policy must follow a course that will avoid either a hampering rigidity or a chaotic looseness during the transfer of our economic resources to peacetime pursuits.

"Private business and labor cannot reasonably be expected to make their full contribution to a rapid and effective reconversion of the economy unless the Congress and the appropriate executive agencies are prepared to back up the economy with measures designed to stimulate productive investment and generate useful employment."

Covers Wide Range of Subjects

The realm of postwar economic policy covers a wide range of subjects, and these must be fitted into a consistent and harmonious body of postwar legislation, says the report. Hence the committee's conviction that all aspects of the postwar economic program should be under one central policy guidance. The committee favors reorganization of the Office of War Mobilization as the Office of War Mobilization and Reconversion, its director to supply this central policy guidance. The director, the report says, might be helped by letting him look to an advisory board, also to industry advisory boards, for advice and information.

The report recognizes the deferred construction demand as holding a lot of potential postwar employment, favors hastening of plans for stimulation of state and local public works by a system of grants-in-aid, and urges preparation of a "reserve shelf of useful public works to be put in operation in case serious unemployment should develop as the postwar period progresses." The committee, the report says, intends to make further studies of the steps necessary to stabilize the postwar construction industry at a high employment level.

But the committee, says the report,

AVERAGE EARNINGS OF FACTORY WORKERS

Year and Month	Gross Average Earnings		Straight-time Average Hourly Earnings —Based on Employee-Hours by Industry—				Cost of Living Index (1935-39=100.0)
	Per week (1)	Per hour (2)	As currently reported (3)	As of Jan. 1939 (4)	As of Jan. 1941 (5)	As of Oct. 1942 (6)	
1939	\$23.86	\$0.633	\$0.622	\$0.622	\$0.640	\$0.659	99.4
1940	25.20	.661	.648	.637	.654	.671	100.2
1941	29.58	.729	.702	.681	.700	.722	105.2
1942	36.65	.853	.805	.758	.781	.812	116.5
1943	43.14	.961	.894	.820	.846	.882	123.6
1939							
Jan.	23.19	.632	.623	.623	.641	.662	99.7
1941							
Jan.	26.64	.683	.664	.648	.664	.682	100.8
1942							
Jan.	33.40	.801	.762	.729	.751	.779	112.0
Apr.	35.10	.822	.777	.740	.762	.790	115.1
July	36.43	.856	.809	.759	.783	.814	117.0
Oct.	38.89	.893	.839	.782	.807	.839	119.0
Dec.	40.27	.907	.847	.784	.809	.842	120.4
1943							
Jan.	40.62	.919	.859	.794	.819	.852	120.7
Feb.	41.12	.924	.863	.795	.820	.854	121.0
Mar.	41.75	.934	.870	.802	.827	.861	122.8
Apr.	42.48	.944	.878	.808	.833	.867	124.1
May	43.08	.953	.885	.813	.840	.873	125.1
June	43.25	.959	.891	.817	.843	.878	124.8
July	42.76	.963	.899	.823	.850	.885	123.9
Aug.	43.52	.965	.897	.822	.848	.884	123.4
Sept.	44.39	.993	.925	.843	.871	.909	123.9
Oct.	44.86	.988	.916	.836	.863	.899	124.4
Nov.	45.32	.996	.923	.840	.867	.906	124.2
Dec.	44.58	.995	.927	.846	.873	.910	124.4
1944							
Jan.	45.29	1.002	.931	.850	.877	.913	124.2
Feb.	45.47	1.003	.931	.851	.878	.915	123.8
Mar.	45.63	1.006	.934	.854	.881	.918	123.8
*Apr.	45.56	1.012	.942	.862	.888	.925	124.5
*May	46.13	1.017	.944	.865	.892	.928	125.0

recognizes that public works represent a spending of the people's money, and that a commensurate public service resulting from these outlays is the least that can be expected. "Large government spending in itself is not a satisfactory stimulus to sustained production. The Works Projects Administration at its peak employed not more than 4 million people, only at subsistence wages. The national debt at that time was less than \$35 billion in contrast with the possible \$300 billion incurred at the end of the war. The stability of our national credit may be threatened if deficit spending is increased any substantial amount."

What the report says about taxes is of special significance. Assuming that during the first few years after the war federal expenditures may approach \$20 billion per annum, production and employment must exceed previous peacetime peaks if the burden of taxation is not to be intolerable. Federal expenditures must be held to the minimum consistent with the proper functioning of the government, and the tax structure will have to be revised, says the report.

"It will be possible, it seems clear, to reduce taxes in the aggregate substantially below the extreme wartime levels," says the report. "Consideration should be given especially to the relief of those tax burdens which bear heaviest upon the lower and middle income groups, and those which penalize the enterprising businesses to which we must look for a large share of the funds for expansion of employment opportunities.

"The personal income tax should be regarded as the main reliance for federal tax revenues after the war. In view of anticipated revenue requirements, this will mean an income tax with a broad base, a fairly high normal rate in relation to prewar standards, and substantial surtax rates on the middle and upper income groups.

"Congress should take steps at once to make all future issues by state and local governments fully taxable, as is already the case with federal securities. These tax-exempt securities serve in large measure to provide a refuge from taxation for high income receivers, and they remove incentives to enterprise and risk taking.

"The committee feels that present corporate income taxes should be reduced if a serious deterrent to business expansion is to be avoided. Repeal of the wartime excess-profits tax would be an essential part of this program."

Individuals whose incomes fluctuate widely from year to year should be granted the right to obtain tax adjustments by means of some income-averaging device, the report goes on. "This change will tend to equalize the tax burden on fluctuating incomes as compared with that on stable incomes, and should also provide important tax relief to small noncorporate businesses and for workers with irregular employment.

"Excise taxes which are costly to administer, are a source of annoyance, and

bear unfairly on those with low incomes, should be cut out as far as possible, although income requirements may make it necessary to retain the levies on a few items.

"The committee believes that a revised postwar federal tax structure would do much to release the native energies of the American people and provide equitable treatment for all elements of the population. There can be no escape from the heavy tax burden that lies ahead. If, however, this burden can be intelligently and equitably adjusted so as to permit the attainment of a satisfactory high level of productive employment, all groups should have larger incomes after the payment of taxes, and consequently higher standards of living."

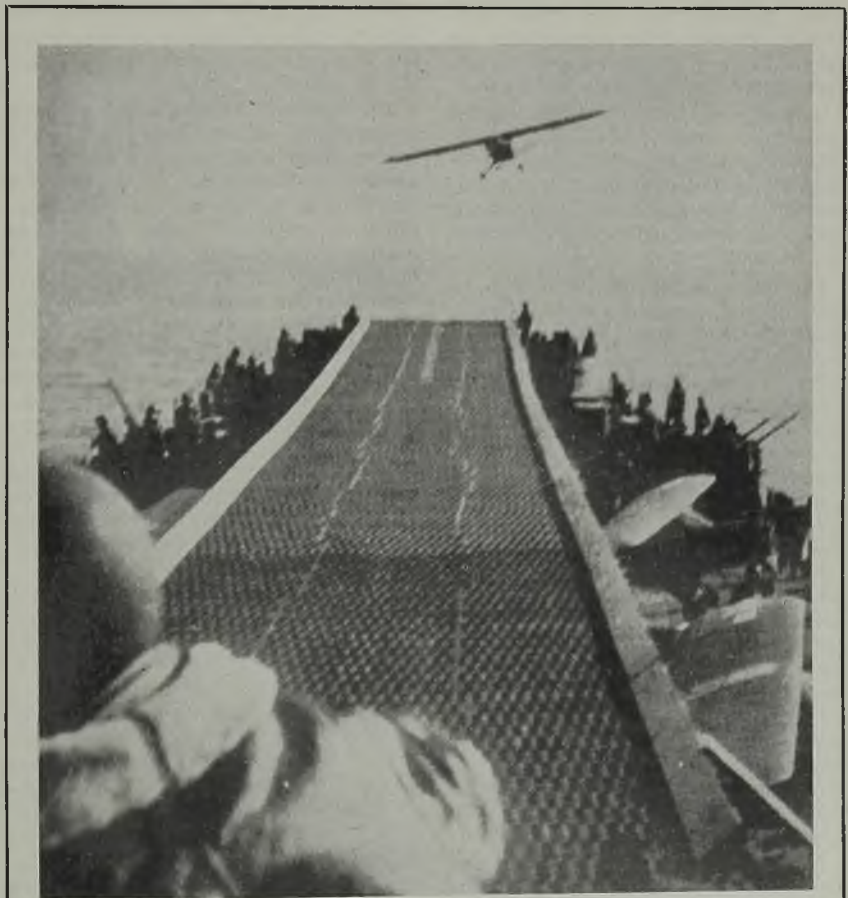
Foresees Job of Delicate Balancing

The report foresees a problem of delicate balancing because of the vast amount of purchasing power that has accumulated in the hands of the public due to war savings on the one hand and because of the great expansion in our manufacturing facilities during the war on the other. "The Congress, by providing for precautionary measures," says the report, "may exercise a large degree of control. Such measures include: 1—Gradual and

co-ordinated discontinuance of controls after the cessation of hostilities; and 2—consumer credit restrictions to avoid excessive purchasing which may develop." It may be necessary to control credit to maintain a balance between the forces of inflation and those of deflation. The report indicates Congress may have to take action to care for temporary financing needs of industry.

"The vast sums needed by enterprises to overhaul and expand plant and equipment; for long-term capital to buy government-owned plants; and as working capital and additional equity funds to start new businesses can be partially met through the following means: Accumulations of individual savings; volume of liquid funds held by corporations; stronger position of banks to assume risks; prompt settlement of contract terminations; broad lending powers of the Reconstruction Finance Corp.; and new types of commercial bank credit other than self-liquidating loans (e. g., through private pools) adopted by commercial banks," the report says.

The committee proposes in various ways to implement a substantial foreign trade and investment flow which, the report says, is an essential part of our continued prosperity.



PORTABLE LANDING STRIP: Equipped with a portable landing strip, this Coast Guard LST serves as a baby aircraft carrier, discharging and receiving airplanes in invasion operations. The ship has a capacity of 15 planes. NEA photo

Prompt Partial Payments of War Contract Claims Provided

Office of Contract Settlement rules that contracting agencies must provide war contractors with adequate interim financing within 30 days after proper application under new regulation. Payments must be from 75 to 90 per cent of estimated costs

SYSTEM of partial payments of war contract termination claims, the second step to speed up settlement of war contracts, was announced last week by Robert H. Hinckley, director of contract settlement. Contracting agencies have been directed to provide war contractors with adequate interim financing within 30 days after proper application under the provisions of general regulation No. 2, issued by the Office of Contract Settlement. The first regulation, providing for guaranteed termination loans (T-loans) was issued Aug. 24, 1944.

A prime contractor or subcontractor whose war contract has been canceled can file application immediately for partial payment of the costs incurred by him that are allocable to the terminated portion of the contract. The making of partial payments does not relieve contracting agencies of the responsibility for making the final settlements with the utmost promptness, regulation No. 2 states.

It is provided that immediate partial payments of at least 75 per cent and up to 90 per cent of his estimated costs shall be made within 30 days of application by the contractor. Upon submission of adequate accounting data, additional payments may be made.

The intent of regulation No. 2 is to make partial payments in the largest amount believed reasonable on the basis of allowable allocable costs.

Partial payments are to be made to prime contractors on their own applications and on applications of subcontractors submitted through the prime contractors and any intervening subcontractors to the government. A standard form to be used in making this application accompanies the regulation.

Provision is made for immediate partial payments based on contractors' estimated allocable costs; for cost-supported partial payments where detailed accounting data have been presented, and for controlled partial payments where potential insolvency of a contractor requires protection of the government's interest or the interest of a subcontractor. This form of interim financing was provided by Congress in the Contract Settlement Act, approved July 1, 1944.

Mr. Hinckley said provision had been included for making partial payments direct to subcontractors in exceptional cases where unwarranted delay would be caused by dealing only through the prime contractor and intervening subcontractors. In cases of subcontractors below the first tier (sub-subcontractors), who

of necessity must file their claims through contractual channels, it may be more expeditious for such lower tier subcontractors to avail themselves of interim financing through the guaranteed termination loan procedure as described by the director of contract settlement in his regulation No. 1. T-loans enable any war contractor to convert into cash at his local bank about 90 per cent of the sound value of his war assets frozen by contract termination.

After the last war, many claims for contract settlement were tied up for a year or more because machinery was not then available for interim financing. In this war, with 50 per cent of our productive capacity devoted to war contracts, it is essential to make possible immediate reconversion to peacetime production. The two regulations make it possible for factories to begin promptly upon termination of war contracts to direct their energies to peacetime production.

Mr. Hinckley has been associated with governmental affairs since 1933 when he was appointed to direct the emergency relief program in several far western states. He also has been interested in aviation, having helped to organize the Utah-Pacific Airways of Ogden, Utah, in 1928; having been designated chairman of the Civil Aeronautics Authority in 1939 and soon thereafter having been appointed assistant secretary of commerce for air. He left the latter post in 1942 to become assistant to the president of Sperry Corp., New York city, resigning recently to assume his present duties as director of the new Office of Contract Settlement, created to carry out the contract termination act recently enacted by Congress.

The procedures for contract settlement were drawn up by a committee composed of representatives of the War and Navy Departments, United States Maritime Commission, Reconstruction Finance Corp., Smaller War Plants Corp., War Production Board, Foreign Economic Administration and the Treasury Department. They were approved by the Contract Settlement Advisory Board.

WLB Bans Extension of Steel Labor Wage Rates

Common labor rates in the steel industry cannot be extended to other industries, even though they are in the same labor market area. This was de-

creed last week by the National War Labor Board in affirming the Fifth Regional Board's denial of wage increases to 300 employees of the Patterson Foundry & Machine Co., East Liverpool, O.

The workers, represented by the United Steelworkers of America, CIO, sought to increase their 60-cent common labor rate to the level of the 78-cent rate paid common labor in the steel plants of the district.

WLB also ordered the Steel Improvement & Forge Co., Cleveland, to put a Fifth Regional Board's directive into effect, providing for standard voluntary maintenance of membership and check-off of dues in the International Brotherhood of Blacksmiths and Drop Forgers, AFL union. Formal appeal in this case is still pending.

The board denied the petition of United Automobile Workers, CIO, at the plant of De Vilbiss, Toledo, O., from the regional board's order denying a five-cent hourly increase to nonproductive workers.

Metal Product Shipments Decline 2.5 Per Cent

Shipments of metal products reported in the first quarter of this year were valued at \$18.3 billion, representing a decline of 2.5 per cent from the fourth quarter of 1943, according to a report by the Industry and Facilities Branch, War Production Board. This decline in shipments was a reversal of the upward trend followed since the beginning of the defense program.

Detroit and Seattle Areas Have Highest Wage Levels

A survey of wages paid in 31 cities of 250,000 or more population, made recently by the Bureau of Labor Statistics, reveals that Detroit and Seattle have the highest wage levels in the country. It also disclosed that the level of wages in the highest-wage areas is almost twice as high as in the lowest-wage areas.

Detroit ranks first in manufacturing occupations and Seattle first in nonmanufacturing, BLS said. In manufacturing, Toledo is second and Portland, Ore., third. Wages were 10 per cent or more above the general average in San Francisco, Portland and Cleveland. At the bottom of the list were Atlanta, Ga., Dallas, Tex., Birmingham, Ala., San Antonio, Tex., Memphis, Tenn., and New Orleans. Houston, Tex., and St. Louis were at least 10 per cent below the average.

Higher than average wages but less than 10 per cent more than the average were found in Toledo, O., Pittsburgh, Philadelphia, Los Angeles, and Milwaukee. Wage rates in Indianapolis, Minneapolis, St. Paul, Cincinnati, and Washington were about average. Columbus, O., Baltimore, Louisville, Ky., and Boston are relatively low-wage areas.

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

ALUMINUM: WPB has discontinued allotting aluminum in the eight specified forms and now is using the word "aluminum" to indicate any and all of the following forms previously allotted: Rod, bar, wire and cable; rivets; forgings, pressings and impact extrusions; castings before machining; sheet, strip, plate and foil; tubing; tube blooms; ingot and powder. Consumers' applications to WPB must continue to specify, however, the particular forms of aluminum desired.

A person who has received an allotment in terms of the eight forms may combine such allotments into one account. He may make allotments to his suppliers in terms of "aluminum" without further specification. In placing authorized controlled material orders for aluminum, he may charge them against such a single account, irrespective of the forms or shapes desired. If a person receives an allotment in one or more of the specified shapes, he may treat it as an allotment of "aluminum" without regard to such shapes.

L ORDERS

BURIAL VAULTS: Restrictions have been removed on the gage of wire and size of openings in reinforcing mesh for concrete burial vaults. The permitted tin content of solder for metal liners used in wooden caskets to provide hermetical sealing has been increased from 21 to 30 per cent. As before, use of steel for reinforcement is limited to 15 pounds per vault and only rerolled rail stock, "top cuts," or scrap iron or steel may be used. Requirement has been removed that metal liner manufacturers file monthly reports on production and shipments on form WPB-1600. (L-64)

OXY-ACETYLENE APPARATUS: Order L-123 has been revoked, thus lifting restrictions on the use of nonferrous metals in the production of oxy-acetylene apparatus used in welding, heating, spraying or cutting of metals. This order is superseded by order L-123 which requires a preference rating of AA-5 or better for delivery of the apparatus and other types of general industrial equipment unless deliveries are to be made in accordance with priorities regulation No. 24. Temperature controllers and regulators, meters and controls and recording instruments, used in electro-plating and anodizing, have been deleted from the general industrial equipment order, but are still subject to restrictions in other limitation orders. (L-123, 1-268)

RUBBER PROCESSING MACHINERY: Manufacturers of rubber processing machinery and equipment may fill, as unrated orders, any orders that are not authorized on form WPB-1277, provided they do not interfere with the production and shipment of orders specifically rated on WPB-1277. Used rubber processing machinery now entirely removed from control and may be bought and sold without restriction. Applications for authorization are no longer required to purchase repair parts, or to obtain permission to rebuild rubber processing machinery. (L-143-277)

ALUMINUM BINDER PARTS: Aluminum now available for the manufacture of metal loose-leaf binder parts and units, and mechanical fittings. Previously, the only metals available for such users were iron, steel and zinc. Fabricators who wish to obtain materials to make this type of binder or parts may get them under Controlled Materials Plan regulations or Priorities regulations 13 and 25. (L-188)

HOUSE TRAILERS: Manufacture of house trailers is no longer limited to producers who made them during the first three quarters of 1942. Application for permission to produce

them, however, must still be made to WPB and production is still limited to the number authorized per quarter.

Trailers and expansible mobile houses manufactured to fill specific orders from or for the account of the Army, Navy, United States Maritime Commission, War Shipping Administration or the National Housing Agency are exempt from all the provisions of the order. Manufacture of expansible mobile houses is still prohib-

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ed except to fill orders from or for these agencies.

Use of a small additional amount of steel is now permitted in the production of house trailers. Maximum permitted body length of a house trailer has been increased from 23 feet to 24 feet. (L-205)

TACKLE BLOCKS: End-use restrictions applying to manufacture of tackle blocks have been removed. The amended hardware schedule also permits additional sizes and designs; extends the permitted use of bronze bushings, and further restricts the use of malleable iron. (L-236)

M ORDERS

ZINC: Restrictions on the use of zinc and zinc products have been modified. Such items as washing machines and vacuum cleaners and sweepers have been removed from the prohibited list (A) and the use is permitted when the production of these items is restored. Other items on list A, such as automotive trucks, tractors, trailers and diesel engines, and gas-fired stoves and ranges now being manufactured in limited quantities may use zinc if the manufacturers desire and if there is no restriction in any other WPB order. Restrictions on the use of zinc or zinc products for protective coating or plating (other than paint), except for articles on list A, are removed.

The amended order includes a new list B, which enumerates articles for which zinc or zinc products may be used. For articles not on either list A or B, the quota has been increased from the previous 60 per cent of 1941 use to 80 per cent for zinc products. Relief from provisions of the amended order M-11-b are limited to such action as may be authorized under Priorities regulation No. 25, which provides for "spot" authorization where it does not interfere with war production. (M-11-b)

LEAD: All requests for exceptions from the restrictions on the use of lead, contained in order M-38, except for the use of foil in packaging cigarettes, tobacco, cigars, candy, gum, beverages or fluids (other than for cap inserts for medicinals) must now be filled under Priorities regulation No. 25.

An authorization granted under PR No. 25

will not waive certain restrictions on the use of lead or lead-base alloys contained in other WPB orders unless the order containing them or a direction to PR No. 25 specifically states that it will. In the absence of such a statement, it is also necessary to get relief from the restrictions of the other order in the manner provided in the order.

Exceptions from the delivery restrictions of order M-38 or the reporting requirements may be requested only by filing an appeal. Appeals also are the only means of getting exceptions from the prohibition of the use of lead foil for packaging the excepted articles mentioned above. Appeals should be filed with WPB field offices. (M-38)

PRICE REGULATIONS

MACHINE TOOLS: Manufacturers' maximum list prices for new machine tools that are priced on the basis of a comparable machine tool made by the same manufacturer must be adjusted to reflect the resale discount allowed to dealers or agents. This action places a new machine tool that is comparable to others produced by the same manufacturer under coverage of the provision for resale discount found in the regulation governing prices of new machine tools. (No. 67)

Appointments-Resignations

A. H. Bunker has been appointed chief of staff, WPB, and will continue as vice chairman of the Office of Metals and Minerals, as well as director of the staff of the Production Executive Committee which is handling the cutback problem.

This appointment, coupled with that of H. G. Batcheller as chief of operations, is a move to streamline the board's organization to deal with reconversion.

James A. Folger of San Francisco has been appointed chief deputy vice chairman for field operations, WPB. He succeeds Harcourt Amory who has resigned to return to private business.

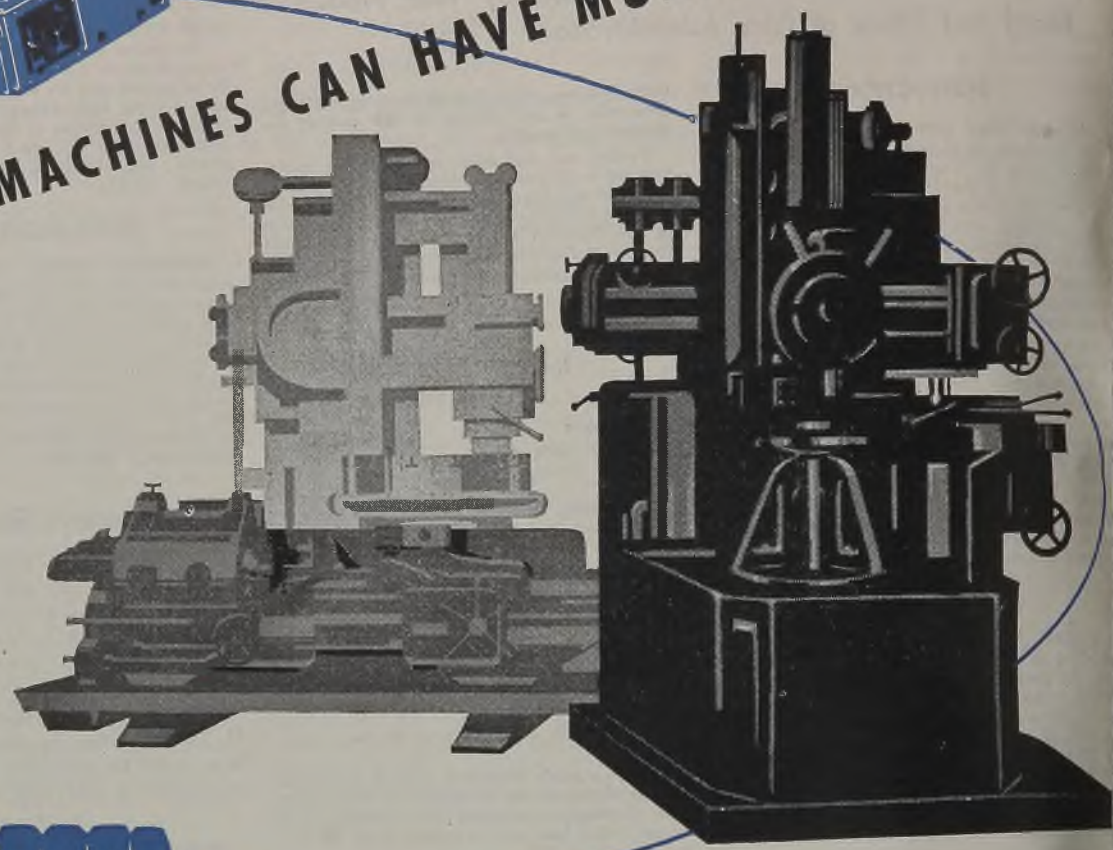
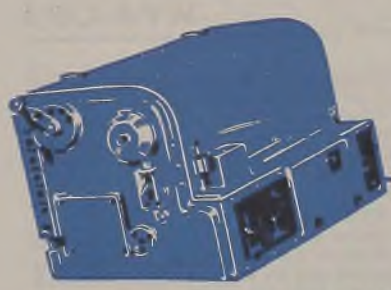
Tudor Bowen of New York city has been appointed deputy vice chairman for field production operations, WPB, while Samuel L. Shober of Philadelphia has been appointed deputy vice chairman for field distribution operations.

James E. Wilson, Detroit regional WPB deputy director in charge of priorities distribution, has resigned. He joined WPB in Washington in November, 1941, and was named regional priorities manager at Detroit in January, 1942.

Frederick W. R. Pride has been appointed general counsel for the War Contracts Price Adjustment Board, succeeding W. James MacIntosh. Mr. Pride was formerly counsel for the Navy Price Adjustment Board. Lieut. Col. W. W. Watts has been named general counsel of the War Department Price Adjustment Board, succeeding Mr. MacIntosh in that position.

Maxwell L. McCullough of Dallas, Tex., has been appointed deputy administrator for rationing, Office of Price Administration, succeeding Charles F. Phillips.

NOW...MACHINES CAN HAVE MULTI-TRACK MINDS



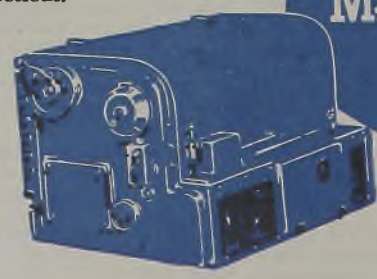
For the first time — an automatic control that is as versatile as manual control

The Bullard "MAN-AU-TROL" principle of automaticity transfers to a simple automatic control, man's ability to think and act for himself . . . and with an accuracy and consistency far beyond any man's ability.

A machine, for example, can now be made to turn out a given part . . . and then can be changed over to machine an altogether different part . . . in a matter of hours, not days. Thus the Bullard "MAN-AU-TROL" gives you the advantage of *increased production* and *lower costs* offered by special-purpose machinery . . . plus the advantage of complete flexibility within the range of manually operated machinery — flexibility that even includes manual operation, instantly, as desired.

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Complicated war agencies and insistence on multiple approval of reconversion moves seen delaying return to civilian goods manufacture. Detroit WPB official proposes establishment of regional demobilization boards to simplify task

JAMES E. WILSON, retiring priorities specialist and deputy director of the local WPB office, in his valedictory statement hit the nail squarely on the head when he described how manufacturers are hopelessly snarled in reconversion problems because every step they take has to be approved by Washington agencies, and the resulting delays are appalling. As a corrective, he proposed the establishment of regional war demobilization boards which he claimed would reduce by 60 to 80 per cent the time required for industrial reconversion under the present setup.

"With all moves toward reconversion having to be approved in Washington," he said, "a manufacturer endeavoring to reconvert is confronted by an enormous and highly complicated problem. Every step he intends to take in getting materials and starting production of a civilian product he must first clear with the WPB, the WMC, the OPA and, if a change in hours or wages is involved, as will be the case in thousands of instances, the WLB.

"Allowing 15 days to three weeks for clearance in each agency means a possible three months delay. This, plus the time required to clear the RFC, the DPC, Treasury Procurement and Army, Navy, AAF or other property disposal agencies means a possible four to six months delay. In each case the manufacturer must explain his problems to each agency, many of which operate under their own policies and interpretations without local points of co-ordination and understanding.

"With a regional war demobilization board in operation in each of the 13 WPB divisional areas, the problems of each applicant, for reconversion, policy matters and all other factors would be handled simultaneously by representatives of all necessary agencies. The single hearing of cases, problems or applications would save two to three months time for industry and would tend mightily to avoid serious unemployment."

Industry throughout the country is suffering from acute agency-itis and, unless something is done about it quickly, manufacturers are simply going to disregard the various regulations and controls, proceed with their reconversion and argue afterward. In some scattered cases, this is being done today. The sad part of the situation is that the public is being misled by flowery statements and reports like the recently issued Byrnes' document on reconversion which appear to make reconversion a simple matter all nicely planned in Washington. The trouble with the Byrnes' report is that it is nothing more than a press release to the newspapers; it has little if any imple-

mentation down through the myriad government and military agencies, and the implementation is essential if industry is to get anywhere. However, the public, after reading the Byrnes' report and other statements from top Washington officials gets the impression that everything on the reconversion front is working smoothly and will place the blame for the delays which are occurring squarely on industry's doorstep, when actually the blame belongs with the policy of "government by press release."

The political implications in such a setup are obvious, and the timing of the Byrnes' report just after the nationally heard speeches by Dewey and Bricker reflects more than a little ingenuity.

Still Operates Under Old Formula

A concrete example of the delay involved in waiting for officially promulgated regulations to filter down to the local level is the case of surplus machine tools. A new formula for determining their price was issued July 12 by the surplus war property administrator, but as late as last week Army Ordnance had not incorporated the details in its regulations and was still operating under an earlier OPA formula.

The Automotive Council for War Production has been doing its vociferous best to persuade government authorities to speed up procedure for war plant clearance. Two specific recommendations have been made:

1. That military agencies assign and train their representatives now to check and approve inventory lists as they are being prepared by war contractors after contracts are terminated, so that inventory items can be removed from plants without holding up during the entire 60-day waiting period provided for in the contract settlement act.

2. That Congress adopt immediately a Senate amendment to the Surplus Disposal bill now in conference, which provides that military agencies be authorized to determine in advance of war contract termination exactly what equipment and materials will be needed for military purposes. Of the remainder, the government should decide what proportion has any other clearly foreseeable use, and the balance should be classified and disposed of as scrap. Each contractor should be advised as to government requirements for handling, storing and disposing of the different classifications of government-owned termination inventory.

Such action, it is pointed out, would keep an additional burden off taxpayers' shoulders, as it would prevent the wasteful practice of filling valuable warehouse space with war items which will have no utility except as scrap at the very time when there will be insufficient space to



AMPHIBIOUS WEASEL: A water-going version of the famed Weasel has been revealed by Studebaker Corp. (STEEL, Sept. 4, p. 70). Primary difference between the earlier Weasels and the new craft is a longer boat-shaped body. Its advantage over other amphibious craft, says its manufacturer, is its ability to climb steep river banks and its ready conversion to water travel. Propulsion is from a continuous circuit track powered by a Studebaker passenger car engine

store useful war surpluses. Estimates show that as much as 90 per cent of some termination inventories are good for nothing but scrap.

There are many production tools, costing thousands of dollars originally, which it will be difficult if not impossible to adapt to any type of civilian production. One example is a 3300-ton aluminum rod extrusion press used in aircraft production. Complete installation cost \$250,000 and required six freight cars for transport. Another is the large number of heavy-duty vertical boring mills developed to machine tank com-

mitting transfer of space in the main Packard plant to production of replacement parts. The purchase of the new space was financed entirely by Packard and while nothing more than wartime usage is seen for the plant at the moment, the company felt it a wise investment since it will facilitate reconversion. About 1200 employees will be required to staff the plant, and 130 machines will be moved into the new space. H. A. Garvey will direct operations.

Parts suppliers last week were receiving inquiries for specified quantities of various elements from several of the

crew of three, mounts a 37-millimeter cannon and a 50-caliber machine gun, and was used in the paratroop invasion of southern France, being carried to the scene of action by gliders.

Wraps likewise have been taken off a new type of armored car built in Ford plants at Chicago and St. Paul. Known as the M-20 utility car, it is six-wheeled, 7-ton unit with an armored hull, but with no top turret such as is carried on the similar M-8 which Ford builds. Hull itself serves as the frame of the car and the engine is cradled between two sets of power driven axles, making the rear end of the car a four-wheel drive. Rear sets of wheels work on a bogey-type suspension.

Annual report of the treasurer of the UAW-CIO at the organization's ninth annual convention last week in Grand Rapids, attended by approximately 2300 delegates, shows clearly how this union has grown to the big business classification. Average of 1,047,227 dues-paying members was listed for the past 11 months and assets of the organization now total \$2,512,277, an increase for the year of around \$889,000. During the past 12 months receipts were \$6,251,310 and expenditures \$5,389,345. Bulk of the income was from the per capita tax of 4 cents on the dollar which the international union collects from dues paid to locals. During the year, 122 new local unions were chartered, bringing the total now up to 793. Proposals were up for discussion at the convention to increase dues another 50 per cent, dividing the increase evenly between international and locals.

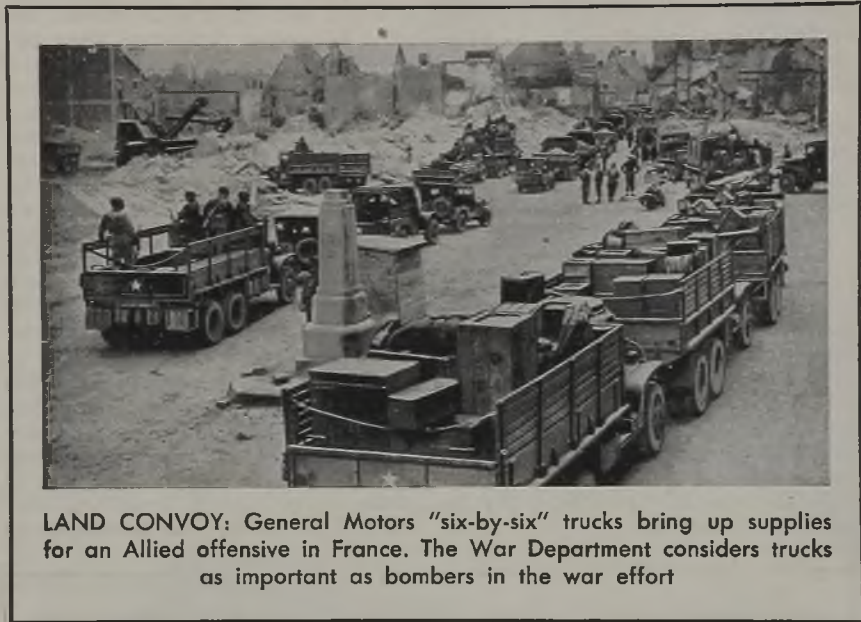
Two forehearth cupolas, operated for a number of years with varying degrees of success in the Ford Motor Co. foundry at the Rouge plant, are being torn out and replaced with standard types of cupolas. Originally an experimental installation, the forehearths proved workable in production, except that wear of the refractory lining was almost too excessive to be practicable.

Urges Industry To Increase Efficiency, Refine Costs

Robert T. Brooks, executive vice president, American Institute of Steel Construction, New York, last week urged the structural steel fabricating industry to establish a standard system for accounting and recording costs.

"As we approach the postwar period we should make a special effort as an industry to increase efficiency and refine costs. It is a matter of common experience that what one yields in adopting a standard is more than made up in the benefits which follow."

Brooks called attention to the A.I.S.C. cost manual published as a guidebook for the structural steel fabricating industry, and urged wider usage of this information in all industry and public dealings.



LAND CONVOY: General Motors "six-by-six" trucks bring up supplies for an Allied offensive in France. The War Department considers trucks as important as bombers in the war effort

ponents. Little utility can be imagined for these 112,000-pound giants which cost \$49,500 each. A third example is the Greenlee unit developed for machining aircraft engine cylinder heads. The unit is 180 feet long and weighs close to 300 tons. Costing a neat \$650,300, it performs 213 separate machining operations and delivers one head per minute. While scrapping of such a unit seems an enormous waste, any peacetime use is doubtful, unless it could be disassembled and the various units rebuilt as individual machines.

Top motor plant executives were meeting last Thursday with E. L. Cushman, head of the Detroit War Manpower Commission office who has been given jurisdiction of "manpower reconversion" for the entire automotive industry. The first question considered was the transfer of several hundred engineers to the preparation of specifications on parts and assemblies for passenger cars. This shift can be made easily without any interference to war production, and in fact may have already been achieved.

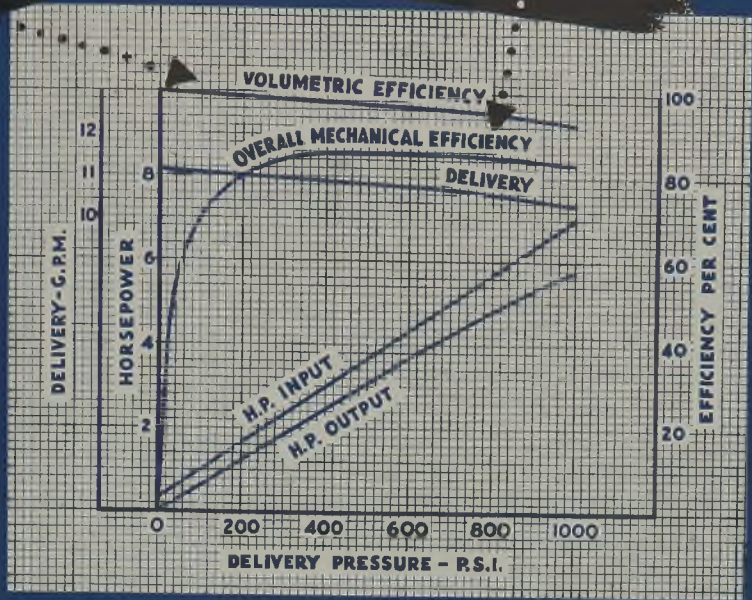
Packard has announced the purchase of the Hem avenue plant of Bundy Tubing Co. here, providing 110,000 additional square feet of floor space which will be used immediately for machining Rolls-Royce engine crankcases, thus per-

motor companies. Cadillac's inquiries, for example, carried the notation that the quantities shown were for four months requirements. It appeared likely that the originally proposed quota system or allocations to each producer was in process of abandonment, particularly in view of the WPB announcement that all controls over industry, with a few exceptions, would be dropped with the defeat of Germany, and in view of the resignation of L. R. Boulware from the WPB, an official who had been one of the prime movers behind the allocation idea.

Some controversy appears to be developing over the Buick tank destroyer described in detail in this department last week. The company had dubbed it the Hellcat over a year ago and so referred to it right along, but when the Ordnance Department announced its appearance in a Labor Day parade here, it was christened the Whippet, possibly because of the fact there is a Navy fighter plane built by Grumman known as the Hellcat. A solution might be to compromise and call it the Whippet. The companion tank built by Cadillac, also described in these pages a week ago, is known as the Greyhound. A third newcomer in the tracklaying vehicle field is a small 7-ton airborne tank called the Locust built by Marmon Herrington Co. It carries a

HIGHER VOLUMETRIC EFFICIENCY...

HIGHER MECHANICAL EFFICIENCY:



Typical curves shown are for V-104-D pump at 1200 rpm; curves for other models are similar. Above curves are for oil having viscosity of 150 S.S.U. at 100° F., temperature of 120° F.

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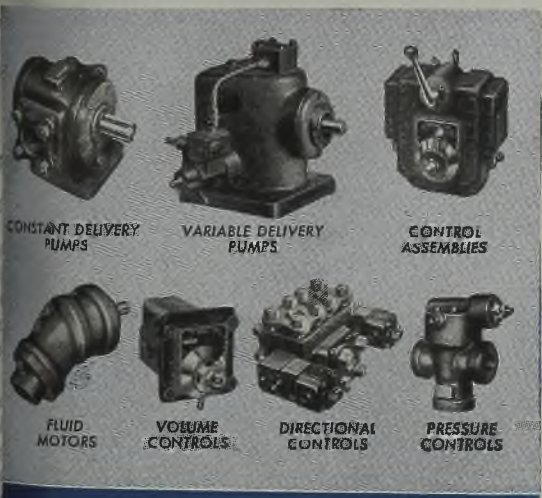
These performance curves merit careful consideration when selecting constant delivery pumps for oil hydraulic power and control systems. The overall mechanical efficiency is extremely high throughout the important working pressure range. Note that pump delivery and efficiency are not reduced appreciably as pressure is increased. These features, together with the 1000 psi continuous working pressure that is possible, effect an important reduction in pump size and cost. This higher working pressure also means a substantial saving in first cost and in space occupied by cylinders, valves, piping, tank, etc. for a given speed and power. Other important advantages of Vickers Balanced Vane Type Pumps include: (1) Hydraulic Balance which cancels out bearing loads and means much longer pump life, (2) cartridge assembly contains all pumping parts that move and is important to the simplicity, easy inspection and minimum maintenance of these pumps, (3) compact, yet rugged, (4) automatic wear take-up, (5) temperature adaptability, etc. Ask for Bulletin 40-25a for all the facts about Vickers Balanced Vane Type Pumps.

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and Control Function

Electrification of aircraft progressing through wartime research. Many knotty problems solved. Engineers discuss electrical control in automatic pilots, high frequency ignition circuits, design of aircraft accessories, etc.

SOME of the many ways in which General Electric Co.'s accelerated research and development work in electrifying aircraft for war may be reflected upon postwar aviation were indicated in a group of technical papers presented by company engineers during the AIEE Los Angeles Technical meeting, Aug. 29 through Sept. 1.

Flight and laboratory tests, most of them conducted in co-operation with the Army Air Forces, have led to the answers to a score of knotty problems which might have remained unanswered for many years except for the urgency of war.

Many aspects of aircraft electrification were discussed; electrical control in automatic pilots, high frequency ignition circuits, design of aircraft accessories, and air-conditioned test chambers.

The most prevalent failures in the electrical systems of combat aircraft are caused by vibration of main-engine-driven generators. To remedy this condition, one of the papers suggested a program of flight and laboratory tests to obtain vibration data which can then be used to determine necessary improvements in design. On the basis of available information and the tests already conducted by General Electric, a stiff mounting flange and a flexible drive assembly having a satisfactory damping device were recommended as the primary requirements of a generator from the standpoint of avoiding vibration failure and obtaining the most satisfactory mechanical performance.

New Types of Ignition Systems

Discussion of high frequency ignition circuits yielded the information that new types of ignition systems are now being developed to meet the need created by recent advances in aircraft engine design. The new designs yield higher power outputs at higher altitudes and thus certain limitations of the conventional high tension ignition system have become of great concern to the ignition engineer. It has become necessary to generate and distribute higher and higher voltages at extreme altitudes, where air becomes a poor insulator, but the higher energies at the spark plug accelerate the erosion of its electrodes and decrease its life. Fuels with high lead content and cold running plugs have increased the danger of spark plug fouling, thus causing considerable trouble in operation. Although most of these problems have been brought under control, the author of the paper feels that if these variables continue to increase, it will not be possible to obtain the desired results without making a radical departure from existing systems.

Another problem of general interest

discussed at the convention was electrical control in automatic pilots. A G-E authorized paper came to the conclusion that automatic pilots are one step towards completely automatic controls for aircraft. As a separate problem, the step has been satisfactorily solved in a number of ways. One of the major advances has been brought about by the electrification of several components for the automatic pilot, including the gyro motors, the error signal pickoff, the follow-up units, and the amplifying units including the transfer valve. The electrical pick-off and follow-up signals have made possible electrical trim controls for adjusting the stability of the aircraft and the use of small potentiometers, together with the recently developed electric gyros of instrument size, allow all of the controls with the exception of the "on-off" oil valve to be mounted on the instrument panel directly in front of the human pilot. Flight 6 test results have proved the superiority of the auto-pilot, characterized by the above features, as a relief type of automatic pilot.

Tests on electrical equipment for aircraft have an important part in their production, and although actual flights are essential for the final check, quicker methods are needed for preliminary valuation of new materials at high altitudes. One of the papers read described the new air-conditioned chambers, which are being used to make factory tests at the limiting conditions to which aircraft are

exposed. The new chambers were provided to accelerate the development of aircraft apparatus. They duplicate the cold, clean dry, rarefied air of the stratosphere and permit uninterrupted investigations under the direct supervision of apparatus designers. These test chambers are used to test a range of equipment from totally enclosed one-watt computer motors to pressure-ventilated 40-kva alternators.

These simulated high-altitude tests are of special value in the testing of carbon brushes. Formerly, the authors stated, when electric machines were taken to high altitudes of 25,000 to 40,000 feet on modern military aircraft, the carbon brushes wore rapidly, insulation sometimes failed, lubrication was uncertain, and windings overheated. Under the new method, designers are more quickly completing new apparatus, are better predicting its performance, and are reducing the amount of flight testing required to develop new aircraft.

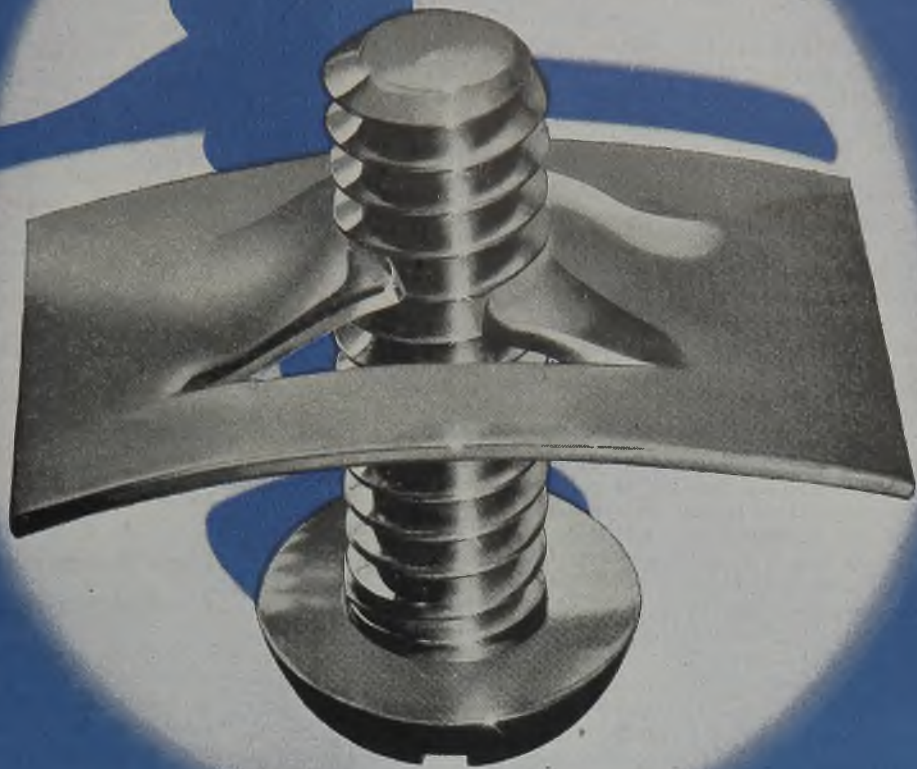
The papers referred to specifically in this article are: "Aircraft Electrical Accessory Vibration Investigations," by D. R. Miller; "Analysis of High Frequency Ignition Circuits," by A. W. Robinson Jr.; "Electrical Control in Automatic Pilots," by C. M. Young, E. E. Lynch, and E. R. Boynton; and "New Test Chambers for Aircraft Electric Apparatus with Particular Reference to Carbon Brushes," by E. R. Summers and J. F. Settle.

Propellers Used as Brakes In New Navy Blimp

The newest and largest blimp, the Goodyear M-1, designed for the Navy,



PROPELLER BRAKES: Reverse thrust Curtiss electric propellers can bring this Navy blimp to a virtual standstill in the air. Built by Goodyear, it will be used for antisubmarine patrol



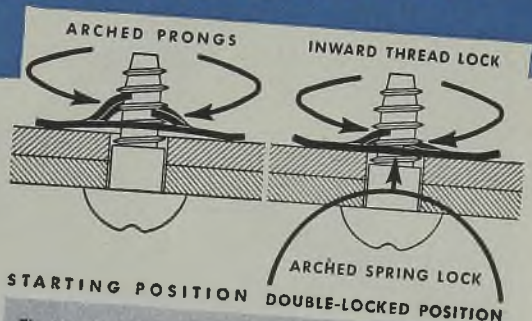
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Made of LIVE spring steel, accurately heat treated, the SPEED NUT has two arched prongs that cushion and ABSORB the most severe vibration, to definitely prevent vibration loosening.

In addition, SPEED NUTS are extremely light in weight. They are quickly and easily applied. And they cost considerably less than other fasteners.

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The base and the prongs of the Speed Nut remain well arched and there's no installation torque as the screw quickly turns into the Speed Nut to starting position.

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In England: Simmonds Aerocessories, Ltd., London

can use its propellers as "brakes" in the first adaptation of fully-controllable-reversible aircraft propellers to lighter-than-air craft, according to engineers of the Propeller Division, Curtiss-Wright Corp. at Caldwell, N. J.

Operation of the propellers as "brakes" is accomplished without reversing their direction. In addition the new blimp can be brought to a virtual standstill in the air by reversing the blade angles of one of its Curtiss electric propellers to create "reverse" or backward thrust.

The use of this reverse pitch feature in combination with the fully controlled pitch of normal forward thrust of the other propeller, has greatly facilitated handling and landing of the new blimp, the largest non-rigid airship yet to be constructed in this country.

Reverse thrust—long used to give Navy flying boats increased maneuverability on water—greatly facilitates the landing of the new blimp. Engineers also reported that the controllable feature permits adjustments of blade angles in flight, and contributes to faster take-off when the blimps are heavily loaded.

The flight engineer needs only to set the blades at take-off angle; then by speeding the engine, the blimp—traveling on its landing wheel and using its underside as a wing—can make a running take-off.

Rocket Power Used To Aid Plane Take-offs

Rocket power is successfully helping heavily laden planes into the air, according to the AAF Materiel Command,

Wright Field, O. Despite the successful nature of the tests, these take-off units probably never will see tactical use as Materiel Command engineers have found such use extremely limited.

Originally developed as a means of lifting heavy loads into the air from short, front-line runways, the rocket take-off units are capable of doing their job. Front-line reports, however, indicate that short runways are hazardous for planes returning from a mission, not because of load but because crews were fatigued and planes often shot up or crewmen wounded. Consequently, longer runways were planned from the first in an effort to cut down the number of landing accidents.

The Germans are reported to have placed such take-off units in tactical use. A possible explanation lies in the high altitude propeller used by the Luftwaffe. This "prop", designed for flight at high altitudes, hampers take-offs.

German rocket experiments had been carried on for several years when the AAF launched its own intensive experiments in 1940. The Germans first used rocket power for propelling gliders.

As opposed to the jet propulsion engine, which takes its oxygen from the air, a rocket carries its own supply—making rockets theoretically capable of flying above the oxygen level. Rockets carry both fuel and oxygen. Early experimenters used gasoline and pure liquid oxygen. The burning fuel expands and is thus forced through a nozzle at the rear, giving the plane a forward push—the same effect achieved in another way by jet propulsion.

Materiel Command experts faced two

major problems—suitable fuels and oxidizers, and a nozzle which would stand the terrific heat of the ignited gas. This latter problem has been solved. Better combinations of fuels and oxidizers still are being sought.

Two types of take-off units were developed, the fixed and the droppable. Attack planes were equipped with the fixed type, with the nozzle emitting the gaseous flames from the rear of the engine nacelle. Other, heavier planes, were equipped with droppable rockets attached to the under side of the wings. This type could be dropped by parachute and salvaged for use again. The rockets are designed to operate until the plane is airborne and the landing gear has been retracted.

Although the tactical utility of the take-off units has been proved negligible, rocket experiments continue, with emphasis on sustained rocket flight, long a dream of pseudo-scientific fiction writers. At the current stage, such rocket engines are relatively ineffective.

New Aluminum Landing Mat Contracts Are Placed

Need for lightweight airplane landing mats which can be airborne or carried by small cargo vessels into places inaccessible to heavy equipment has been met through development of an aluminum mat.

Contracts for the manufacture of aluminum mats have been let with the U. S. Gypsum Co., Chicago, and the United Steel Fabricators, Wooster, O. The contracts call for 12,000,000 square feet of landing mat, in the construction of which more than 45,000,000 pounds of aluminum will be used.

The aluminum landing mat is built up of a large number of sections, called "planks," each approximately 15 inches by 10 feet. The planks are ribbed and pierced with flanged holes for increased stiffness. The flanged holes also make for a lighter mat. Assembly of the planks into a landing mat is effected by fitting adjacent planks together by means of a slide lock, known as a "bayonet lock."

Aluminum Co. of America was requested by the U. S. Engineers Corps to work with the contractors currently producing steel landing mats and develop a suitable lightweight mat without sacrificing any of the strength characteristics of the steel mat.

The design of the aluminum landing mat is quite similar to the steel mat. The sheet in the aluminum mats is Alcoa 61S-T alloy, 0.188-inch thick, having a yield strength of 35,000 pounds per square inch.

The aluminum mat is not designed to replace but to supplement the steel landing mat program. The portable feature of the aluminum mat will prove exceptionally valuable in those sections where transportation is extremely difficult and speed is imperative.



No this B-25 medium bomber is not on fire. The flames and smoke issue from a fixed assistant take-off unit under test at Wright Field, O. AAF Materiel Command officers have been testing rocket assisted takeoffs since 1940. They are successful but probably will not be used tactically

It takes *MORE THAN*
a Handbook and Slide
Rule to design a GOOD

HEAT TREAT FURNACE



probably reject them as unimportant. They're not even mentioned in the textbooks.

But the design and construction of a first grade heat treat furnace takes all these variables into consideration. It is the result of formal engineering practice and long years of practical experience which alone develops that rare quality, **JUDGMENT**. Experience in furnace design and construction is the principal difference between the excellent and the mediocre installation.

The young engineering graduate with a Tau Beta Phi key may have a very good working knowledge of the theory of combustion, heat transfer, metallurgy, structures, and machine design, and still not be able to design an effective heat treat furnace which will perform economically. The reason is there are too many variables in furnace engineering that the young man has never heard of. And even if he had, he would



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MEN of INDUSTRY



HOWARD E. ISHAM



E. H. CARMANY



LEON B. THOMAS

Howard E. Isham has been appointed assistant vice president, United States Steel Corp., Pittsburgh. He will continue as assistant treasurer.

E. H. Carmany has been appointed vice president in charge of eastern operations of Wyckoff Steel Co., Pittsburgh, with headquarters at the company's Empire Works, Newark, N. J.

Leon B. Thomas, for the past nine years chief metallurgist, melting superintendent and assistant to the general manager of all five plants of Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., has been appointed foundry manager for the Wilson Foundry & Machine Co., Pontiac, Mich.

John J. Couch, formerly vice president, G. S. Rogers & Co., Chicago, has been elected president to fill the vacancy caused by the death of George S. Rogers on July 6. Other promotions include: E. L. Milford, vice president; David H. Henry, vice president and secretary, and Royce R. Baker, treasurer.

Fred O. Kolberg, formerly associated with Crosley Corp., Cincinnati, has joined Warren City Mfg. Co., Warren, O., as works manager. Norman S. Eastin has been named supervisor of costs and procedure, and Harry E. Johnson is general accountant for the company. Previously, Mr. Eastin was affiliated with E. W. Bliss Co., Brooklyn, N. Y., and Mr. Johnson was with Aaron DeRoy Motor Car Co., Detroit.

J. T. Clinton has been named sales manager, Moore Enameling & Mfg. Co., West Lafayette, O., succeeding J. E. Newman, who resigned as sales manager to take a similar position with Union Fork & Hoe Co., Columbus, O.

C. R. Pritchard has been appointed to the newly-created position of general sales manager of the appliance and merchandise department in the home appliance and construction materials sales organization of General Electric Co., Schenectady, N. Y. A. M. Sweeney is

manager of sales of all major appliances; C. W. Theleen is manager of sales of all traffic appliances and vacuum cleaners. Both will be responsible to Mr. Pritchard. A. C. Sanger, appliance sales manager during the past year, has resigned. A. L. Scaife has been named merchandising manager for the entire appliance and merchandise department, reporting to Mr. Pritchard, L. H. Miller becomes manager, household refrigerator division, and C. J. Enderle becomes manager, sink and cabinet division.

Charles S. Mattoon has resigned as director of industrial relations for the Curtiss-Wright Corp.'s Airplane division, Buffalo, to serve as an industry member of the National Airframe Panel of the War Labor Board, Washington.

Hugo W. Liebert has been appointed general works manager of the tractor plants in the Manufacturing division of Allis-Chalmers Mfg. Co., Milwaukee, and Fred S. Mackey has been named general works manager of the general machinery plants in the company's Manufacturing division.

Douglas H. Allen has resigned as president of the Rubber Development Corp., effective Oct. 1, and will be succeeded by Francis Adams Truslow, now a vice president.

S. C. Johnson & Son Inc., Racine, Wis., has announced the following appointments in its sales and research division, in preparation for expanded post-war operation: Ray W. Carlson, sales manager, who will supervise operation of the field sales organization; John H. Hurley, manager of the product finishes department, who will direct merchandising activities on behalf of industrial waxes, Wax-O-Namel product finishes, water repellents for the textile industry, and protective coatings for farm perishables; James W. Barrett Jr., manager of the maintenance products department, who will direct merchandising activities covering maintenance waxes and wax-fortified paints for industrials and insti-

tutions, and water repellents for laundries and dry cleaners; Walter A. Bridgeman, manager of field research, Research and Development division, who will direct all activities in connection with field research on new and established products, and Harvey W. Blankenship, industrial sales promotion manager, who will devote his efforts to the advertising and promotion of all products going into the industrial and institutional fields.

M. G. Werme has been appointed chief development engineer, Wickwire Spencer Steel Co., New York, with headquarters at the Buffalo plant. He is succeeded as superintendent at the Clinton, Mass., plant by Gordon Lloyd, formerly power and fuel engineer, Carnegie-Illinois Steel Corp., Pittsburgh. Victor Chartner, since 1930 chief engineer, Pittsburgh Steel Co., Pittsburgh, has joined Wickwire Spencer as chief mechanical engineer, with Buffalo as headquarters.

Harold C. Olson has been named sales manager, and John A. Toth is assistant sales manager, Bantam Bearings division, Torrington Co., South Bend, Ind.

Irving Schwartz, for over 20 years associated with Scully Machinery & Equipment Corp., and its predecessor, the Foundry division, Scully-Jones & Co., Chicago, recently severed this connection and is forming his own organization to handle used or reconditioned foundry and industrial equipment. Temporary office has been established in room 1537, Utilities building, 327 South LaSalle street, Chicago.

Leonard Kebler, president, Ward Electric Co., Mt. Vernon, N. Y., for 40 years, has been elected board chairman, a newly-created position. He is succeeded as president by Dawson J. Burns. Arthur A. Berard has been named executive vice president and general manager, Anthony W. Borghard is vice



L. I. JAYNES

Who has been made manager of the new Sheet Sales division, Wheeling Steel Corp., Wheeling, W. Va., reported in STEEL, Sept. 11, p. 92.



THOMAS BARTLETT

president and manager of special accounts, **Frank G. Logan** has been elected vice president and manager of research and development, and **Louis H. Haight** has been re-elected secretary-treasurer.

Thomas Bartlett, formerly general superintendent of tool planning and manufacturing, Curtiss-Wright Corp., Buffalo plant, has joined the staff of Lawrance Aeronautical Corp., Linden, N. J., as operations manager.

Harold G. May has been appointed regional director of the Management Engineering Division, Labor Relations Institute, for Michigan and Ohio, with headquarters in the Donovan building, 2457 Woodward avenue, Detroit.

Howard C. Sauer has been named general manager of the newly-created Foreign division, Timken Roller Bearing Co., Canton, O. For the past three years Mr. Sauer has been chief of the Anti-friction Bearings Section, Tools Division, WPB, and prior to serving WPB he was branch manager of the Timken New York office.

Charles J. Hardy Jr., formerly member of the law firm of Hardy, Stancliffe & Hardy, and until recently on active duty with the United States Navy, has been elected a vice president and a director of American Car & Foundry Co., New York. Among his duties will be handling public relations for the company.

R. E. Bressler, formerly vice president and chief engineer, has been elected president and treasurer, Kol-Master Corp., Oregon, Ill. He succeeds the late Joseph Reed, who died June 12. **Henry G. Wickham** has been elected vice president, and **Joseph C. Reed** is secretary. All were elected to the board of directors.

New directors of La Plant-Choate Mfg. Co. Inc., Cedar Rapids, Iowa, are: **Alfred Kauffman**, director of Link-Belt Co., Chicago; **Roy Fruehauf**, executive vice president, Fruehauf Trailer Co., Detroit; **Howard Hall**, president, Iowa Mfg. Co. and Iowa Steel & Iron Works,



KRESTON T. SORENSEN

Cedar Rapids; **Owen N. Elliott**, senior partner of Elliott, Shuttleworth & Ingersoll, and **Archie D. Dennis**, secretary-treasurer, La Plant-Choate.

Kreston T. Sorensen has been made vice president in charge of production, William Sellers & Co. Inc., Philadelphia. Prior to joining the company about a year ago, Mr. Sorensen was in charge of design of special secret ordnance weapons and material for the Ordnance Department, having charge of the engineering section located at the Franklin Institute, Philadelphia.

C. Leslie Jamison has been appointed vice president in charge of sales, Strauss Co. division, Portable Lamp & Equipment Co., Pittsburgh.

Littleton C. Barkley has been appointed sales manager of the Manhattan Mechanical Rubber Goods sales department, Raybestos-Manhattan Inc., Passaic, N. J.

Arthur Nutt, vice president of Engineering, Wright Aeronautical Corp., Paterson, N. J., has resigned after 28 years with

the company and its predecessors. He has pioneered in the field of aircraft engine design and development and at one time served as president of the Society of Automotive Engineers.

David J. Bonawit has been appointed chief engineer, Marshall-Eclipse division, Bendix Aviation Corp., South Bend, Ind. Previously he was executive engineer of the Manhattan division of Raybestos-Manhattan Inc., Manheim, Pa.

Charles Stein has joined Tri-Clover Machine Co., Kenosha, Wis., as general manager of all plant operations.

Wilbur C. Osha, until recently general welding superintendent, Berwick, Pa., plant of American Car & Foundry Co., New York, has been appointed general supervisor of welding for the company's 12 plants.

Olin H. Philips has been placed in charge of laboratory metallurgical research work of all plants of American Car & Foundry Co., New York, succeeding **John W. Steinmeyer**, who has been transferred to the New York research department.

M. K. Saunier has been appointed to represent Progressive Welder Co., Detroit, in the Chicago area, succeeding **Wallace A. Stanley**, who returns to company headquarters as special assistant to **E. J. DelVecchio**, field sales manager.

Kenneth N. Nichols has been made chief engineer in charge of production, Craft Mfg. Co., Chicago.

H. W. Davis has been appointed assistant manager of sales, Sheet and Strip Steel division, Weirton Steel Co., Weirton, W. Va., succeeding the late **L. W. Briggs**. For the past two and one-half years Mr. Davis has served with the



R. J. DAVIS

Who has been named works manager, Union Steel Castings division, Blaw-Knox Co., Pittsburgh, as it was announced in STEEL, Sept. 11, p. 92.



FOSTER E. FIKE

Who has been appointed manager of the Rock Falls, Ill., plant of Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., noted in STEEL, Sept. 11, p. 91.

Sheet and Strip Steel Branch, WPB, recently being chief of the Sheet Section of that branch.

Leon C. Reed has been appointed assistant manager, Railroad Sales division, Inland Steel Co., Chicago, and Kenneth J. Burns has been made Chicago district sales manager.

Ray C. Bender has been appointed Chicago district sales manager, Alloy Rods Co., York, Pa. Previously he was welding supervisor and engineer, Continental Foundry & Machine Co., East Chicago, Ind.

Two members of the staff of American Steel & Wire Co., Cleveland, have ex-

changed positions. Harry F. Clarke has been appointed superintendent of the spring mill and rail bond department at South Works, Worcester, Mass., and Robert D. Knight has been named director of spring mill products. The move is intended to round out the overall experience of the two men.

Robert S. Kirksey, vice president, Fruehauf Trailer Co., Detroit, in charge of Pacific Coast headquarters in Los Angeles, has been elected a director of the company.

John A. Dillon is leaving the Office of Defense Transportation soon for private industry. He is a director of the Standard Stoker Co., New York and

Erie, Pa., and formerly was vice president, Pittsburgh Screw & Bolt Corp., with offices in New York.

Owen D. Young and Gerard Swope resigned Sept. 8 as chairman of the board and president, respectively, of General Electric Co., Schenectady, N. Y., and Charles E. Wilson has been re-elected president. No announcement of a successor to Mr. Young was made.

G. Rider Neff, advertising manager and manager of the Aircraft and Special Products division, Lamson & Sessions Co., Cleveland, has resigned after 16 years with the company to join Cleveland Cap Screw Co., Cleveland, as general sales manager.

OBITUARIES . . .

George H. Charls, 66, nationally known Ohio industrialist, and president of Metro Coal & Limestone Inc., Canton, O., died Sept. 11 in Cleveland. Starting as a laborer with the American Rolling Mill Co., Middletown, O., Mr. Charls advanced rapidly, becoming general sales manager and vice president. In 1918 he became vice president and a director of Stark Rolling Mill Co. and Berger Mfg. Co. in Canton, O. He left after three years to assume the presidency of United Alloy Steel Corp., Canton.

Mr. Charls later served as president of the National Association of Flat Rolled Steel Manufacturers and was a vice president of the American Iron and Steel Institute. In the past 10 years his activities included the executive directorship of the State Interorganization Conference at Columbus, O., directorships of the Metropolitan Paving Brick Co., Canton, and the Allied Corp., and the presidency of Metro Coal. Mr. Charls was one of the first men to perfect and use stainless steel, and in 1915 he received a gold medal award at the San Francisco Fair for his collaboration in the development of pure iron.

William A. Anderson, 74, president, John A. Roebling's Sons Co., Trenton, N. J., died Sept. 10 in Princeton, N. J. Mr. Anderson entered the employ of the Roebling company in 1888 as a time-keeper. He had been a vice president, treasurer and general manager for several years when, in June 1936, he was elected president.

Henry W. Avery, 88, founder and former president of Avery Stamping Co., Cleveland, died Sept. 9 in Cleveland.

Clifford A. Stothers, 66, secretary and director, Pfaunder Co., Rochester, N. Y., for more than 30 years, died in Rochester Sept. 8. Mr. Stothers spent a year in England in 1919 supervising construction of his company's British affiliate, Enamelled Metal Products Corp. Upon his re-



GEORGE H. CHARLS

turn to Rochester he assumed charge of transportation and steel purchases for the company.

Raymond H. Jones, 41, general superintendent, Commercial Forgings Co., Cleveland, died Sept. 10. He had started with the company when it was founded 25 years ago. He was a member of the American Society for Metals.

R. J. Wetzel, 52, manager of engineering and manufacturing, Standard Tool Co., Cleveland, died there Sept. 12. He had been associated with the company 36 years.

Harry J. Walker, 82, president of the former H. J. Walker Mfg. Co., Cleveland, which supplied pistons and crankcases for Ford Liberty motors used by Allied planes 26 years ago, died Sept. 8 in Los Angeles.

George A. Hughes, 71, founder and board chairman of Edison General Electric Appliance Co. Inc., Chicago, died Sept. 9 in that city. Mr. Hughes founded Hughes Electric Heater Co. in 1910, the first firm to manufacture electric heating ranges. The company merged in

1918 to form the Edison General Electric Appliance Co.

Donald B. Colliver, 44, general purchasing agent since 1930 for Anaconda Wire & Cable Co., New York, died Sept. 9 in Dobbs Ferry, N. Y.

Gustave A. Reiman, 53, personnel manager, National Lock Co., Rockford, Ill., died Sept. 3 in that city.

Clarence E. Williams, 67, one of the organizers and former vice president and director, National Gypsum Co., Buffalo, died Sept. 7 in Evanston, Ill.

John Meyer, 64, treasurer of the Schaible Foundry & Brass Works Co., Cincinnati, died Sept. 9 while on a business trip to Chicago.

Alanson O. S. Allan, 67, general sales manager, Cleveland Hardware & Forging Co., Cleveland, died Sept. 10 in that city. He had been affiliated with Cleveland Hardware 49 years.

Charles E. Leach, 76, retired first vice-president, New York Air Brake Co., New York, died Sept. 4. He had been with the company from 1890 to 1943.

Charles R. Wright, 47, shop superintendent, Ferro Enamel Corp., Cleveland, for the past 10 years, died Sept. 8 in that city.

Henry W. Behrend, 72, since 1936 superintendent of Henry P. Boggis Co., Cleveland, manufacturers' agents, and for 40 years representative for Cleveland Automatic Machine Co., Cleveland, died Sept. 5 in that city.

George R. Brown, 49, superintendent of manufacturing engineering at the Kearney, N. J., plant of Western Electric Co., died in Newark, N. J., Sept. 7.

Harry Barney, 65, founder and president, Barney Machinery Co. Inc., Pittsburgh, died Sept. 6 in that city.

Dominion To Enter Postwar Era With Greatly Enlarged Capacity

Plants and equipment representing expenditure of \$1,200,000,000 added since outbreak of war. Self-sufficiency advanced but country still dependent on imports of many industrial needs

TORONTO, ONT.

CANADA will enter the postwar period with substantially enlarged industrial facilities. Since the outbreak of war new plants and equipment representing an expenditure of approximately \$1,200,000,000 have been added to dominion's production capacity.

In addition, there is now in Canada a knowledge of new trades and methods of developing raw materials which, government officials believe, will contribute considerably towards national self-sufficiency along certain lines in peacetime.

Officials stress, however, that the dominion has not attempted to make herself economically self-sufficient, that she was forced to expand industrially when she was unable to import war materials of which she was in need. They add that Canada is and will continue to remain dependent on other nations for many of her industrial requirements.

Heading the list of industries which have taken on impetus from wartime exigencies is aluminum, in which Canada

has increased many times her peacetime production. She ranks second after the United States in world production of this metal. Magnesium production also has made great strides in the dominion. Canadian shipbuilding has developed beyond the most optimistic expectation, and recently the major Canadian shipping companies placed before the federal government their proposal that Canada restrict its coastal trade to ships now registered in Canada and hereafter built in Canada, and that "if necessary" it subsidize Canadian shipowners engaged in foreign trade out of Canadian ports. They also urge that Canada do its own naval shipbuilding, and also adopt a policy of government aid to Canadian yards to enable them to turn out ships for foreign account.

Donald Gordon, Prices Board chairman, states the Canadian civilian supply situation shows no signs of immediate or rapid improvement and individual cooperation in meeting the situation should be continued. He asks Canadians to buy

carefully and only for actual current needs and stresses the importance of avoiding the spreading of exaggerated shortage stories and starting rumors.

Mr. Gordon says that little in the way of metals is freely available for civilian production.

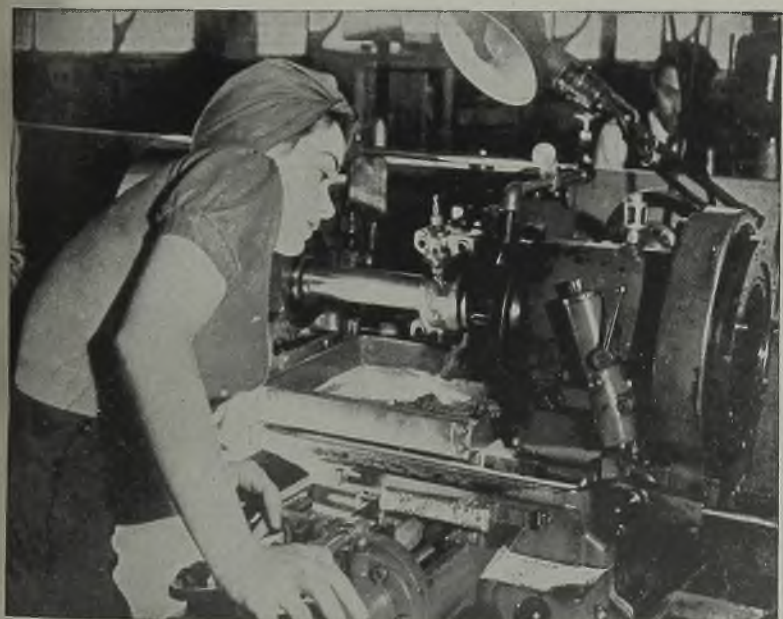
"Some aluminum may shortly be released," he continues. "We are making a few washing machines, some stoves and electric irons and a few other household appliances, but it will be some time before this production reaches any sizable volume."

As a preparatory step toward postwar resumption of normal trade relations, the Canadian government has undertaken to facilitate the interchange of samples of new types of machinery and equipment between companies in Canada, the United States and Britain, C. D. Howe, Minister of Munitions and Supply announces. He explained that this undertaking implements a resolution passed by the Combined Production and Resources Board, on which Canada is represented, and pointed out that actual transfer of samples of machinery and equipment would take place between manufacturers in the three countries. He emphasized that Canadian manufacturers must still comply with the regulations restricting use of labor and steel, nonferrous metals and other scarce materials. In other words, the samples must be produced without detriment to the war effort.

New Crown Company Formed

The Munitions Department announced recently that Aero Meters Ltd., a new Crown company, has been formed to take over and operate the Sutton-Horsley Co. Ltd., instrument plant which was recently acquired by the government. The property is located at Leaside, Ont. The board of directors consists of L. F. Winchell, president; W. H. McLachlan, vice president; and Arnold Gaine, treasurer.

To meet the labor needs for heavy ammunition which is in increasing demand, and because reserves of small arms ammunition are adequate, over the next three months the staffs of the small arms ammunition plants in greater Montreal will be reduced by approximately 3500, the Munitions and Supply Department announced. National Selective Service has been informed of the projected decline in the numbers of those required in the small arms ammunitions industry in the area. Its officers are making arrangements for an orderly transfer of the ammunition workers. Those laid off are urgently required, particularly at Cherrier and at other plants in Montreal. The three plants affected are operated by Defense Industries Ltd. They are the Westmont and Verdun plants and the Montreal Works. By the end of December, it is expected operations at the Montreal works and the Westmont Tool works will be terminated. The Verdun plant will continue to produce but on a considerably lower scale.



WOMAN AT WORK: Not only will Canada enter the postwar period with a vastly enlarged industry, but it also will have a much larger industrial working force. As in the United States, Dominion women have been drawn into munitions plants by the exigencies of war. Will these women, such as the girl machine operator in a Bren gun plant, shown above, be content to relinquish their jobs when hostilities end? NEA photo

Leeds & Northrup Long Term Program

Founder's conception of social justice keeps company free of labor strife and makes for unified organization. Employees own stock, share in profits and have voice in determining many policies. Co-operative group acts as advisor to management

"A BUSINESS organization should be a unified group of people banded together to earn a living for its members, seeking to do justice among all of them and to the rest of the world."

Upon this concept of social justice the management of Leeds & Northrup Co., Philadelphia instrument manufacturers, have over the past thirty-odd years built an industrial relations program which has kept the company remarkably free from labor strife and which gives members of the organization a spirit of "belonging". The program was described recently to the Metal Manufacturers Association of Philadelphia by Charles S. Redding, president of the company.

Mr. Redding gives credit for the conception of the program and for its early development to Morris E. Leeds, founder and chairman of the board of the company.

"Many years ago he became a close student of industrial relations and did not hesitate to apply to his own business those principles and policies

which he believed led to social justice. Those of us who are now actively engaged in the management of the business have been brought up by him and are glad to continue his policies, for we have found from long experience that they are productive of good results from the standpoint of both employer and employe."

Leeds & Northrup's industrial relations plan covers the entire range of personnel, from the highest executive to the lowest apprentice. The program is divided into four phases, which Mr. Redding describes as: (1) The executive set-up; (2) the ownership set-up; (3) the bonus plans; and (4) the general industrial relations set-up.

In the executive set-up, the company has an executive committee which acts as an advisory board to the president

in determining company policies, plant expansion, large purchases of new equipment, questions of interdepartmental relationships, etc.

The committee meets each morning for from a few minutes to several hours. Membership includes the chairman, president, vice president, director of research, general sales manager, factory manager, treasurer and director of engineering. Through this group all the top executives are kept thoroughly informed of all company matters.

Much of the committee's time is devoted to personnel problems as the management believes this to be a prime responsibility.

Ownership of the company is vested in three types of stock. The first type is employees' shares which are held by employees only and which have all the voting power unless the guaranteed dividends have not been paid on the participating shares. The board of trustees determine who can buy the shares and how many. The value of the shares is determined by a formula based upon the company's past five years' earnings,

This group of five is the Leeds & Northrup production bonus group whose responsibility it is to pass on recommendations for changes in bonus standing of the members of the group as a whole. Left to right, they are: P. V. Roth, shop engineer; C. J. Roberts, chief inspector; J. C. Hess, factory superintendent; J. W. Harsch, chief engineer; and L. Teker, purchasing agent



Program Pays Dividends

and upon the asset value of the shares.

When a holder of employees' shares leaves the company for any reason, his employees' shares are automatically converted share for share into what are known as interim shares. These correspond to the employees' shares except that they have no vote unless the guaranteed dividends on the participating stock are unpaid, and they are freely transferable. Provision is made for having them converted at the succeeding annual meeting, or, if it is so decided, over a period of years into participating shares with a guaranteed annual return. The purpose of the interim shares is to tide over a situation when a large holder of employees' shares leaves the company and might thus suddenly increase the amount of guaranteed dividends at a time when the company might not be in a position to meet them.

Participating shares have a guaranteed cumulative income of 5 per cent and shares with the employees' and interim shares in profits up to 8 per cent. They have no vote unless the guaranteed dividend is unpaid.

Bonuses Based on Group Effort

Bonuses in Leeds & Northrup date back to about 1910. At first bonuses were paid only to a few and were based on individual effort. Later bonuses were based on group effort and were extended to many more employees.

Bonus participants are divided into two classes—salesmen, and those engaged in other activities, known as the production bonus group.

The distribution of the bonuses is far from being uniform. In a good year they may vary from several times annual salary to a fraction of annual salary, depending upon the position and importance of each participant in the organization. Salaries are modest but adequate. Thus in good years, key men are very well compensated, while in poor years the company does not have an excessively high salary roll to carry.

Normally each participant is examined annually as to his relative position in the bonus scale and necessary changes are made. These changes are recommended by a group of five selected by the participants and who annually make a thorough study of each participant and of likely candidates for participation.

When the production bonus group was organized twenty or thirty years ago, the group of its own volition decided to hold monthly dinner meetings, at its own expense and on its own time, at which company problems are discussed. The meetings were continued even during the depression when there were no bonus funds to distribute.

"It is felt this set-up has been of very great value indeed as it has welded

our management group into a unified organization," says Mr. Redding.

In 1937, a supplementary bonus fund was established which pays benefits to all employees of more than a year's service. For the fiscal year ended May, 1944, these payments amounted to from 5.5 to 11 per cent of the employee's base income, the variations being due to length of service.

Mr. Redding attributes much of the industrial relations program's success to an organization known as the L&N Co-operative Association, to which every employe automatically belongs. It annually elects a council which acts as an advisory body to the management, and to it are referred practically all problems of industrial relations.

"Its council has provided the means whereby we have been very largely able to prevent grievances from becoming issues," say Mr. Redding. "It has been the means whereby management has been able to work out personnel problems in a manner satisfactory to both employer and employe. More than once its advice has prevented us from making mistakes which might have been serious."

The council has remained an advisory body and at no time has become a bargaining group. Employees of Leeds & Northrup have an independent union with which management has a contract.

Specific arrangements in the Leeds & Northrup industrial relations program include generous hour, wage, vacation, insurance and unemployment compensation benefits, many of which were adopted by the company before such practices became general.

The company adopted the 40-hour work-week long before it was forced to do so by law.

Set Up Wage Committee

As to wages, the company's policy has been to keep rates in both wage and salary brackets at least equal to the going rate in the community. Mr. Redding says: "We have, and for a number of years have had, a very definite arrangement for reviewing quarterly the rate of each hourly employe and those salaried employees earning less than a specified amount. We have set up a number of committees, known as minor wages committees for each branch of our organization. Each committee comprises the appropriate executive committee member, our personnel manager (who sits on all minor wages committees), and the foreman or section manager under whom the individual being considered serves. These minor wage committees sit monthly and each month consider one-third of the personnel of the department involved. In this way each individual is considered four times



CHARLES S. REDDING

a year. At these meetings an individual's record is examined and after a discussion a decision is reached as to whether or not he deserves an increase. After the meeting each individual is told the result of the discussion—unless he has voluntarily stated that he does not want to have the matter discussed with him each time."

Several years ago when it became apparent the cost of living threatened to rise, the company instituted a cost of living bonus plan under which wages and salaries were to rise and fall with the cost of living index. This plan had a roof of 25 per cent increase and if the cost of living rose beyond the point yielding a 25 per cent increase the plan was to be examined.

Leeds & Northrup's overtime schedule provides time and a half for all hours in excess of 40 per week or eight per day, double time for hours in excess of 12 a day and on Sundays and holidays, and time and one-tenth for hours scheduled before 8 a. m. and 4:45 p. m.

Vacations, insurance and unemployment benefits have been scheduled on a varying basis, with years of service generally determining the benefits.

Carnegie-Illinois Re-employs Over 4000 Veterans

More than 2000 of the rehired servicemen were former employes. About 43,000 have gone into armed forces

CARNEGIE-ILLINOIS Steel Corp., Pittsburgh, subsidiary of the United States Steel Corp., already has re-employed more than 4000 veterans of World War II. J. L. Perry, president of the company, told leaders of the Indiana State Chamber of Commerce at a dinner meeting in Chicago recently.

Mr. Perry added that over 2000 of the veterans re-employed are former Carnegie-Illinois employes.

"Forty-three thousand employes have gone into the armed services since Pearl Harbor," Mr. Perry said. "Replacement of such a large number, who held experience and skills we could ill-afford to lose, has meant recruiting and replacing work of no mean proportion; yet the plants maintained their production and facilities, and in some cases the working force was expanded.

"It is not known how many of the former employes now serving in the armed forces will return. Of course, it is our wish that all of them return and that all of them who do return will want to return to employment with our company. We have a well-defined and comprehensive re-employment policy. The implementation of this policy is regarded by all supervisors of the company as one of the most, if not the most important duties they have."

Mr. Perry said there are more than 15,000 women working in Carnegie-Illinois plants alone, with 11,000 of them engaged in 360 different operating jobs.

Oliver Company Plans To Buy Cleveland Tractor Co.

Subject to stockholders' approval Oct. 3, Cleveland Tractor Co., Cleveland, will transfer substantially all its property and business to the Oliver Farm Equipment Co., Chicago, according to W. King White, president, Cleveland Tractor. Stockholders will receive a third of a share of Oliver stock for each share of Cleveland Tractor, according to the terms of the agreement. Oliver company proposes to sell \$8,200,000 of preferred stock and to increase its authorized common from 800,000 shares to 1,600,000, splitting the present shares two for one.

Cleveland Tractor, now employing about 1800 workers, will be continued as division of the Oliver company which employs more than 4800 war workers.



OVERSEAS DESTINATION: One of the unusually large, wood-burning, narrow-gauge locomotives recently completed by H. K. Porter Co. Inc., Pittsburgh, for service in French equatorial Africa. Weighing 229,000 pounds with tender, the engine is shown during a test

BRIEFS

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

William Hart Adler Inc., Chicago, announces opening of new offices at 720 North Michigan avenue, Chicago.

Machinery & Welder Corp., Chicago, about Oct. 1 will move into its new building at 1324-26 West Fulton street, Chicago, which is now under construction.

Sundstrand Machine Tool Co., Rockford, Ill., has published a new booklet "Oil Power Fluid Motors".

Blaw-Knox Co., Pittsburgh, has received high praise for performance of its spreader-vibrator which operates in combination with a finishing machine, solving the problem of coping with difficult concrete mixes on a production basis.

Thomas Machine Mfg. Co., Pittsburgh, announces a new standard line of steel plate vertical punches.

Square D Co., Detroit, announces opening of a new manufacturing plant and warehouse at 2310 Ranier avenue, Seattle.

Industrial Machine & Supply Co., a new corporation, plans to reopen a factory formerly occupied by the National Metal Products Co. at Butler, Pa., with 12,000 feet of floor space. It will produce screw machine products in the post-war period. In its initial war production contracts, the new corporation will employ about 120 workers.

Baldwin Locomotive Works, Eddy-

stone, Pa., has opened an eastern district office at 1152 Broad Street Station building, Philadelphia. Territory covered will include Pennsylvania, Ohio, portions of Michigan and New Jersey and states along the eastern seaboard from New Jersey south.

Nash-Kelvinator Corp., Detroit, is prepared for the postwar period with an improved selective dealer franchise and equipped with detailed plans pointing to a high level of employment and expansion of car sales and service in the low-priced car field.

Dow Corning Corp., Midland, Mich., announces first commercial production of "silicones," new organo-silicon polymers.

American Pipe & Construction Co., Amercoat division, Los Angeles, recently published a new catalog on plastic coatings.

Aero Meters Ltd., Ottawa, Canada, has been formed to take over and operate the Sutton-Horsley Co. Ltd.'s instrument plant which was recently acquired by the Canadian government.

Bureau of Foreign and Domestic Commerce, Metals and Minerals Division, Washington, has completed a survey for the Defense Plant Corp. on the aluminum situation before the war, the expansion program, and the current situation.

Addressograph-Multigraph Corp., Cleveland, is advertising in a number of national magazines to assure men in

the armed forces that postwar jobs await them.

American Zinc Institute, New York, has published a book containing the results of a survey made on 7600 farms in 36 states, titled, "A Survey of Roofing on Farm Buildings."

American Society for Metals, Cleveland, will receive the Ordnance Distinguished Service Award at the Metal Congress, Oct. 19, in recognition of its contribution to the war effort.

W. H. Nichols & Sons, Waltham, Mass., has published a catalog illustrating the design and uses to which its miller can be put.

Continental Industries Buys Walsh Holyoke Works

One of New England's leading fabricators of steel, the 50 year old Walsh Holyoke Steam Boiler Works, Holyoke, Mass., has joined Continental Industries Inc., New York investment and management company.

A committee of export specialists in engineering, product planning and sales distribution has been selected from Continental's staff to study the company's foreign markets, Chester A. Bolles, chairman of the Continental board, reveals.

Like the other companies in the Continental group, management of the Walsh Holyoke Steam Boiler Works will remain essentially intact. Except for resignation of Vincent P. Marran, former president, officers of the company will be the same as those of the parent company, the Franklin Machine & Foundry Co., Providence, R. I. Walsh Holyoke is a division of the latter company which is also a part of the Continental group.

Mr. Bolles, who as chairman of the board for Continental and Franklin, also will be head of the Walsh Holyoke, whose officers will consist of Robert S. Holding, president; Albert V. Smith, John Watt, both vice presidents and Frank Donnelley, secretary-treasurer.

Acting general manager for Walsh Holyoke will be Louis Beauregard while Marlan I. Dennert, assistant treasurer, will have charge of finance and records.

Ransome Machinery Co. Appoints Distributors

Ransome Machinery Co., subsidiary, Worthington Pump & Machinery Corp., Dunellen, N. J., announces appointment of the following organization as distributors of the Ransome line of welding positioning equipment.

They are: Post Welding Supply Co., Birmingham, Ala.; Hobart Welder Sales Service, Cleveland; W. P. & R. S. Mars Co., Duluth; American Machinery & Supply Co., Omaha, Nebr.; Arcway Equipment Co., Pittsburgh, Philadelphia, Balti-

more and Richmond, Va.; Hobart Sales Service Supplies, Buffalo and Syracuse, N. Y.; Peoria Welding Supply Co., Peoria, Ill.; Big Three Welding Equipment Co., San Antonio, Corpus Christi, Dallas, Houston, and Ft. Worth, Tex.; Moline Welding Service, Moline, Ill.; Chicago Welding Sales Co., Chicago; Victor Equipment Co., San Francisco, Fresno, Los Angeles, and San Diego, Calif.; Austin-Hastings Co. Inc., Cambridge and Worcester, Mass., and Hartford, Conn.; J. E. Raney & Co., Boston, and Welding Engineering & Sales Co., New York city, Buffalo and Syracuse, N. Y.

S. K. Wellman Co. Plans To Expand in Postwar Era

S. K. Wellman Co., Cleveland, plans to double capacity of its No. 1 plant in Cleveland and to establish a factory in Canada and to open plants in Africa, England, and Australia in the postwar period, according to S. K. Wellman, president of the company.

The company proposes to have 32 warehouse distributors across the country. Working with the distributors, the company will have specialists in the automotive, textile, and machine tool industries. Preparations for a big market in parts for road building, earth moving and materials handling equipment are being made.

Fairbanks-Morse Buys Pomona Pump Company

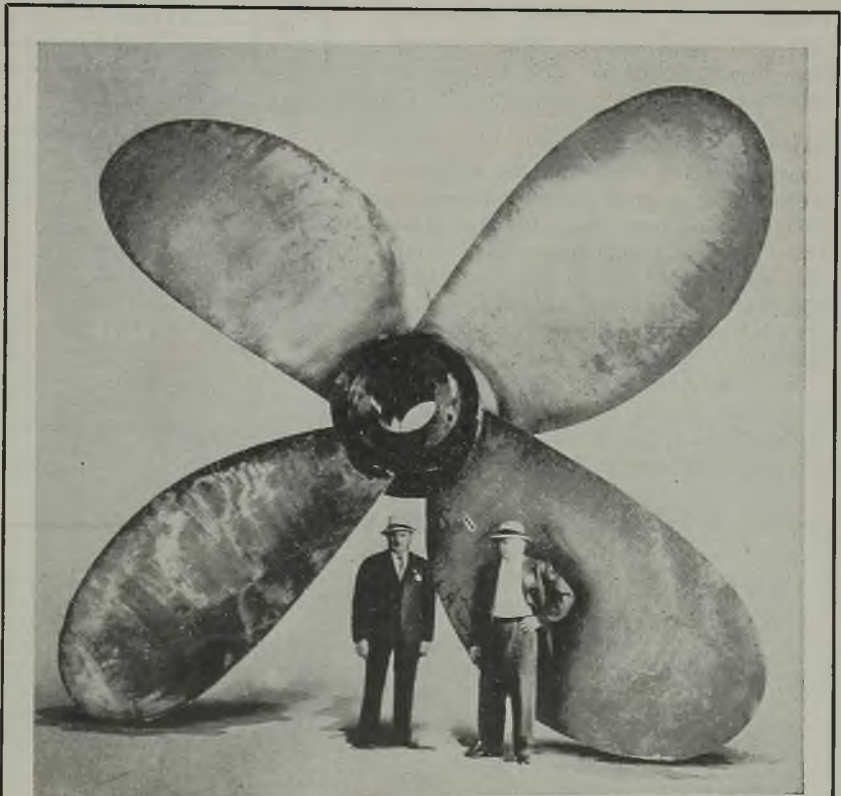
Acquisition made from Joshua Hendy Iron Works in a \$4,000,000 transaction. No changes in personnel

FAIRBANKS, Morse & Co., Chicago, has purchased the Pomona Pump Co., division of Joshua Hendy Iron Works in a \$4,000,000 transaction.

Announcements of the sale were made simultaneously in Chicago by R. H. Morse Jr., general sales manager of Fairbanks-Morse, and in Sunnyvale, Calif., by Charles E. Moore, president, Joshua Hendy. Sale was effective as of Sept. 2.

All physical assets, patents and trademarks of the Pomona and Westco pump lines were included in the transaction. The Pomona firm has plants in Pomona, Calif., and St. Louis. With acquisition of this line, Fairbanks-Morse becomes the world's largest manufacturer of turbine pumps.

No changes in personnel are contemplated.



GIANT PROPELLER: Two normal-sized men are dwarfed by this giant bronze propeller, cast for a Great Lakes ore carrier. It weighs 60,000 pounds, has a diameter of 22 feet, was made by Baldwin's Cramp Brass & Iron Foundries Division at Philadelphia. NEA photo

THE BUSINESS TREND

Large Order Backlogs Sustaining War Output

INDUSTRIAL activity is sustained at near record pace by huge order backlogs, against which only minor headway has been made in recent weeks. However, it should be noted these bookings are being gradually reduced, reflecting the easing in requirements of some war programs and recent concerted effort on the part of many companies to reduce inventories to a workable minimum level. Barring early cessation of European hostilities, industrial production is expected to show little fluctuation over the next few months.

BAROMETERS—Most industrial indicators temporarily moved to lower levels during the Labor day week ended Sept. 9. The decline recorded by the majority of business barometers was somewhat greater than that registered in the comparable holiday week of 1943 and 1942. More industrial firms closed down over the Labor day weekend this year because of the accumulated need for relief from long working hours, together with necessity to repair hard pressed operating equipment.

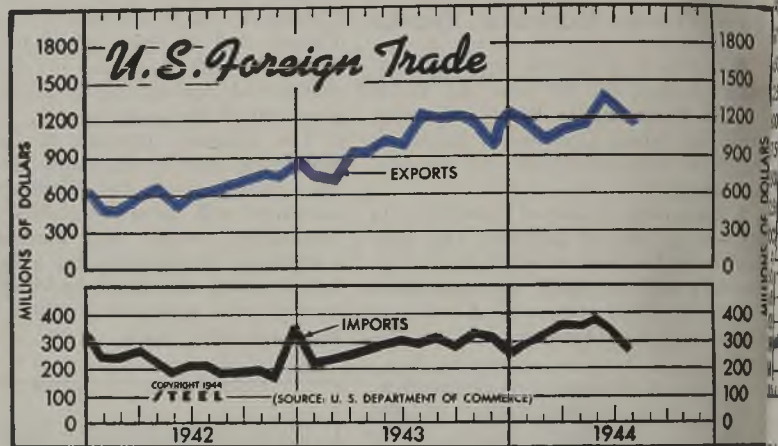
The national steel ingot rate eased one-half point to 96 per cent during the holiday week, in contrast with a gain of the like amount to 99 per cent in the corresponding week a year ago. Other business indicators to record declines include: Electric power consumption, bituminous coal production, revenue freight carloadings, truck assemblies and engineering construction awards.

EMPLOYMENT—Number of wage earners employed in manufacturing industries recorded the seventh consecutive monthly decline during June. Latest United States Department of Labor figures show manufacturing employment in June at 12,974,000, drop of slightly over one million from the peak of 14,007,000 reported last November.

In contrast with this downward trend in overall manufacturing employment, a slight upturn in the number of steel industry employes occurred during June and

July. Although steel employment last July of 571,400 workers was well below the peak of 659,000 during June 1942, total payrolls in the latest period of about \$142 million are substantially above the comparable June 1942 steel industry's payroll of \$118 million. Higher wage rates and overtime payments account for the sharp upturn in payrolls.

FOREIGN TRADE—United States exports in July recorded the third consecutive monthly decline to \$1,198,000,000. The July figure was 6 per cent less than in the preceding month and 16 per cent below the peak of \$1,419,000,000 reported last May. Lend-lease shipments during July amounted to \$937 million, or 78 per cent of the month's total. They also represented a decline of 7 and 19 per cent respectively from the June and May Lend-lease exports. For the first seven months exports of \$8,406,000,000 represented the largest total for that period in history.



Foreign Trade
Bureau of Foreign and Domestic Commerce
(Unit Value—\$1,000,000)

	Exports				Imports			
	1944	1943	1942	1941	1944	1943	1942	1941
Jan.	1,192	780	481	325	300	228	254	277
Feb.	1,086	719	480	303	313	234	254	238
March	1,158	988	628	357	359	249	272	248
April	1,162	980	717	387	359	258	235	248
May	1,419	1,085	535	385	386	281	191	22
June	1,271	1,002	648	330	330	295	215	24
July	1,198	1,262	650	365	288	300	213	27
Aug.	1,204	703	460	...	...	315	186	21
Sept.	1,233	732	425	...	...	285	196	21
Oct.	1,193	802	666	...	...	329	200	30
Nov.	1,074	787	492	...	...	317	168	21
Dec.	1,241	873	653	...	...	278	358	30
Total	12,716	8,035	5,147	...	...	3,369	2,742	33

FIGURES THIS WEEK

INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	96	96.5	97.5	99
Electric Power Distributed (million kilowatt hours)	4,228	4,415	4,415	4,229
Bituminous Coal Production (daily av.—1000 tons)	1,925	2,002	2,000	2,015
Petroleum Production (daily av.—1000 bbls.)	4,689	4,658	4,667	4,354
Construction Volume (ENR—unit \$1,000,000)	\$25.4	\$60.3	\$39.5	\$36.6
Automobile and Truck Output (Ward's—number units)	17,285	20,055	18,895	18,860

*Dates on request.

TRADE

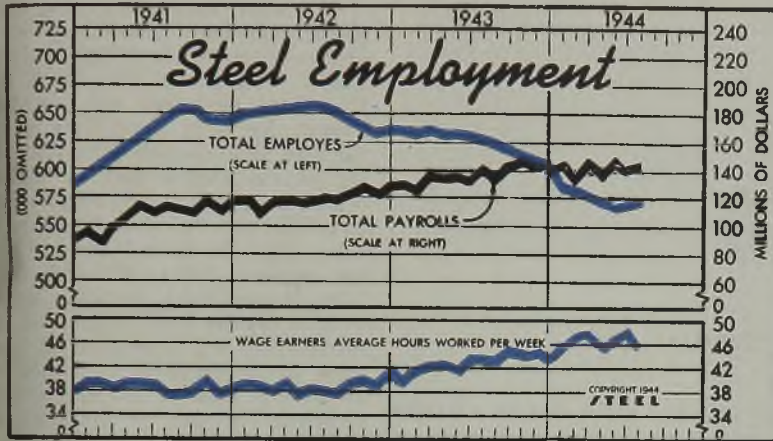
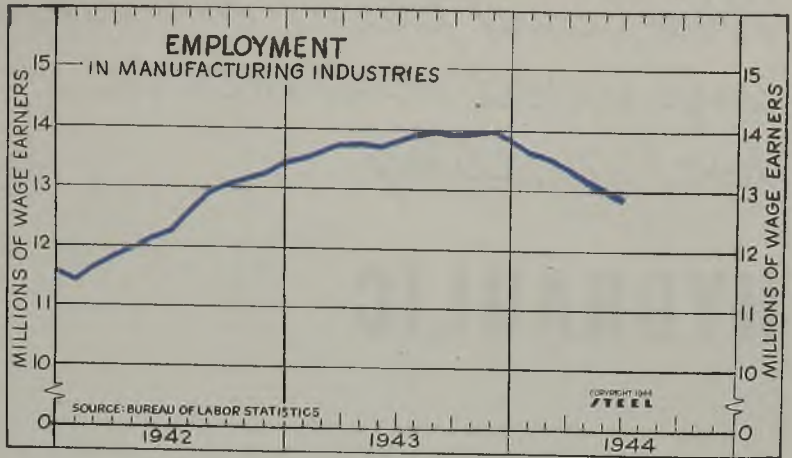
	Latest Period*	Prior Week	Month Ago	Year Ago
Freight Carloadings (unit—1000 cars)	900†	898	896	835
Business Failures (Dun & Bradstreet, number)	9	14	16	26
Money in Circulation (in millions of dollars)†	\$23,432	\$23,221	\$22,910	\$18,740
Department Store Sales (change from like week a year ago)†	+18%	+2%	+12%	+1%

†Preliminary. †Federal Reserve Board.

Factory Employment†
(000)

	1944	1943	1942
Jan.	13,669	13,503	11,456
Feb.	13,594	13,633	11,654
March	13,406	13,727	11,821
April	13,172	13,735	11,988
May	13,023	13,700	12,127
June	12,974	13,827	12,282
July	.....	13,911	12,564
Aug.	.....	13,990	12,869
Sept.	.....	13,935	13,079
Oct.	.....	13,965	13,166
Nov.	.....	14,007	13,267
Dec.	.....	13,878	13,474

†Source: U. S. Dept. of Labor.



Steel Employment

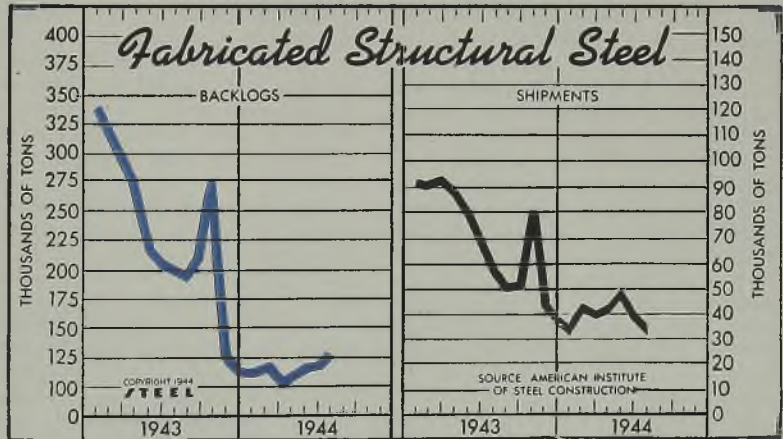
	—Employees— (000 omitted)			—Total Payrolls— (Unit—\$1,000,000)		
	1944†	1943	1942	1944	1943	1942
Jan.	583	637	651	\$141.8	\$129.7	\$118.8
Feb.	583	635	651	137.6	122.8	108.5
March	578	637	653	145.3	136.8	117.0
April	573	634	654	138.9	133.3	118.5
May	569	632	656	145.4	137.4	117.4
June	570	631	659	140.5	136.2	118.0
July	571	627	655	141.8	142.8	120.7
Aug.	.....	625	647	.....	139.9	118.7
Sept.	.....	620	641	.....	143.8	124.6
Oct.	.....	615	635	.....	144.9	126.6
Nov.	.....	611	632	.....	141.5	122.8
Dec.	.....	605	633	.....	140.2	129.3

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

Fabricated Structural Steel
(1000 tons)

	Shipments			Backlogs		
	1944	1943	1942	1944	1943	1942
Jan.	34.0	91.9	167.8	113.1	339.1	704.4
Feb.	41.7	90.8	164.6	117.6	321.0	706.7
Mar.	40.0	94.0	191.3	106.3	299.8	777.7
Apr.	42.2	86.6	187.2	111.2	272.5	772.4
May	48.0	78.9	184.2	116.3	220.6	843.8
June	39.6	68.4	182.7	122.7	207.1	869.8
July	34.0	56.8	189.9	125.4	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	.....	113.0	523.5

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)	\$8,042	\$8,639	\$8,868	\$6,905
Federal Gross Debt (billions)	\$211.2	\$211.2	\$210.5	\$148.3
Bond Volume, NYSE (millions)	\$34.2	\$24.9	\$30.5	\$29.2
Stocks Sales, NYSE (thousands)	4,725	3,311	5,641	3,292
Loans and Investments (millions)†	\$55,700	\$55,906	\$56,917	\$46,739
United States Government Obligations Held (millions)†	\$41,675	\$41,875	\$42,488	\$34,100

†Member banks, Federal Reserve System.

RICES

	Latest	Prior	Month	Year
STEEL's composite finished steel price average	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)†	249.6	250.3	249.9	247.5
Industrial Raw Materials (Bureau of Labor index)†	112.7	112.5	112.9	112.3
Manufactured Products (Bureau of Labor index)†	101.1	101.0	101.0	100.0

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

West Coast plant employs improved methods in heat treating.....

HYDRAULIC SYSTEM COMPONENTS

By G. ELDRIDGE STEDMAN

LABORING under certain economic obstacles, chiefly penalties in freight rates, certain young industrialists on the West Coast have come to recognize these hindrances as blessings in disguise. For example, there is much engineering thought in Los Angeles being ably directed to the development of precision products where the chief value is in the craftsmanship, products in which the selling price per pound of steel is unusually high. They intend to circumvent freight penalties by building into their products those nonmaterial values of accurate skill, engineering freshness, and functional design to attract profitable prices. Such values defy freight classification. Many such products are light enough to be "air-expressed" and important enough to be sent that way.

One Los Angeles manufacturer already in this picture is Adel Precision Products Corp., Burbank, Calif., whose president, H. Ray Ellinwood, has assembled a capable staff of over 100 engineers and a shop organization which numbers thousands and all of them working on the newest machines with the most recent know-how in precision work.

In experimenting with a unique lens focusing device, Mr. Ellinwood adapted its principle to a dual control mechanism that achieved important improvements in carburation. This led to the development of Adelite, a synthetic rubber material, for moderately resilient mountings such as blocks and clips for aviation hydraulic, fuel and oil lines.

In 5 years since Adel's origination in 1937, Mr. Ellinwood has construct-

ed a new office surrounded by a 40,000 square foot air-conditioned plant on a 10-acre site with a 1500-foot railroad frontage to produce a wide line of hydraulic valves, pumps and other hydraulic equipment for landing gear operation, opening and closing bomb-bay doors, landing flap control, cowl flaps, emergency exits, and general hydraulic control for practically every American fighting aircraft.

Mr. Ellinwood's executive and engineering policy is "design simplicity". He mirrors the new trend of industrial policy in this Los Angeles area in his remark to the writer: "It is our policy to present to the industry (aircraft) only those items which can provide definitely improved performance, reduced weight, increased reliability, minimum size and maximum ease of installation, combined with substantial reductions in overall operating costs." And Adel products have wide application in many other post-war markets.

The purpose here is to describe some of the heat-treating practices, with particular reference to corrosion resistant and spring steels, and to emphasize certain practices in thermionic induction hardening. These observations are based upon a visit to the Adel plant in Burbank and an interview with J. Lynn Reynolds, Adel's chief metallurgist, with an accredited engineering experience in mining, petroleum, aviation motors and hydraulics.

The heat-treat department is new, spacious and complete, lacking only in nitriding equipment which has been delayed for want of critical installation ma-

terials. Equipment in operation is shown in Table I on Page 144.

The corrosion resistant stainless steels in general use in this plant are types 416 and 440c. Type 416 is a high-strength medium-hardness corrosion resistant steel of 11.5-13.5 per cent chromium, 0.09 to 0.14 per cent carbon. Hardness as annealed is 80-94 rockwell B, and with a heat-treated hardness of 24-40 rockwell C. Type 440c is a general purpose, hardenable stainless steel. Upon quenching and tempering, it develops maximum hardness together with high strength and good corrosion resistance. It analyzes approximately 17 to 18 per cent chromium, 1.05 to 1.15 per cent carbon, and is heat treated to 55-59 rockwell C.

Specifications Depend on Service

All stainless steel heat treating is done under atmospheric control and with oil used as the quenching medium, using the Knapp HiSpeed for 416, the L & N Vapo-Carb for 440c, and the Hayes Electric for both. Tempering to high hardness is accomplished by first cleaning in the Detroit Rex or Blakeslee degreaser at 200 to 250 degrees Fahr., and then into the L & N Homo furnaces using the normal standard drawing ranges of 500 to 875 and 1025 to 1250 degrees Fahr., avoiding the 880 to 1020 degrees Fahr. range. All these specifications are dependent, of course upon service requirements of the part. Stainless is used in all parts with the exceptions of cam or lift shafts and springs.

Examples of heat treat in work at time of the visit were a batch of ten pieces weighing 3½ pounds and made of 416 stainless. The part was a fitting. Hardening temperature 1825 degrees Fahr., with 23-minute soaking time. Oil quench was followed by a 1-hour draw at 1065 degrees Fahr. resulting in a hardness of 25 to 32 rockwell C.

Another job was 100 pieces of stem

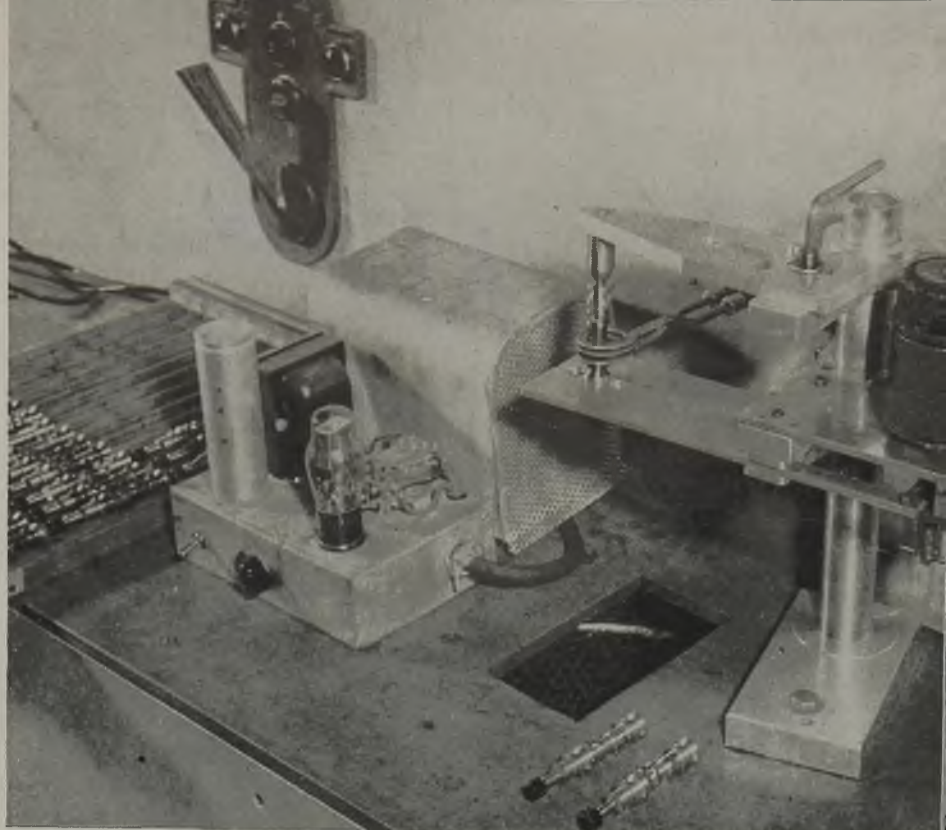


weighing 1 5/16 pounds and made of type 440c. stainless. Hardening temperature 1850 degrees Fahr., with a soaking time of 4 minutes (Vapo-Carb set at 30 drops, 1 minute), followed by an oil quench and subsequently tempered 1 hour at 400 degrees Fahr. with a resulting hardness range of 55 to 60 rockwell C.

The heat treatment of carbon and carbon alloy steels on low-stressed integral camshafts of SAE-X1020 is to carburize at 1650 degrees Fahr. for 0.030 to 0.040-inch depth of case with direct quench in oil. These are tempered or drawn at 350 to 500 degrees Fahr. for 1 hour to 55 to 59 rockwell C case, core to finish 22 to 35 rockwell C.

High-stress camshafts of SAE-4615 are carburized at 1650 degrees Fahr. for 0.030 to 0.040-inch case depth and direct quenched in oil, drawn at 400 to 500 degrees Fahr. for 1 hour producing 58 to 63 rockwell C case and 22 to 35 rockwell C core hardness. When small diameter handle ends, for example, exceed 30 rockwell C, they

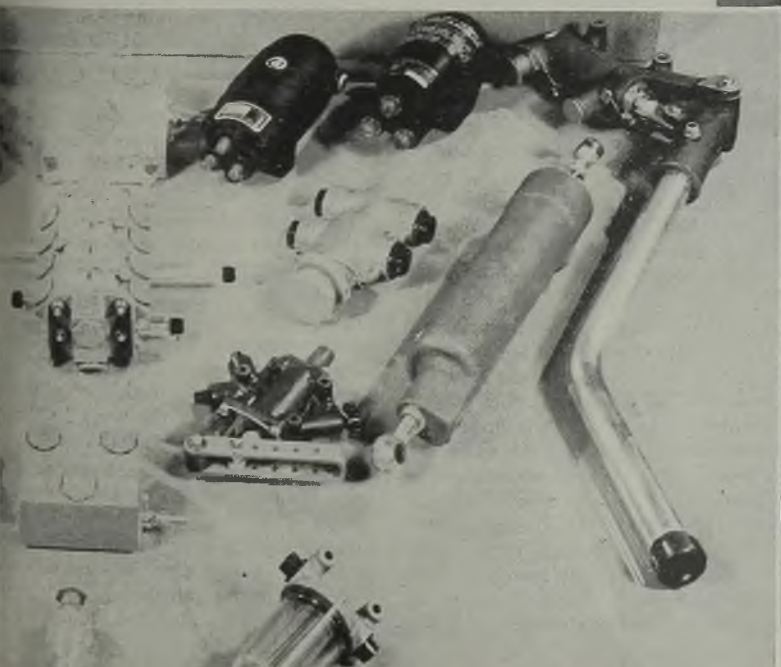
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(Above)—Induction heating setup employs electronic tube device to operate solenoid the instant heating power is shut off. Solenoid strips spring actuated split support under work, causing it to drop into quench tank located directly under work coil as shown here. Length of fall determines quenching cycle. Short fall quenches work in less than 1/10-second after up to temperature

(Right)—Spider carrying work is grounded to the carburizing pot electrically by a cable and clip connector, preventing secondary deposition of copper stop-off coatings. Work is suspended by wires

(Below)—By making small precision products, West Coast fabricators plan to overcome disadvantages in freight rates. Shown are typical parts produced by Adel Precision Products Corp. in line with this idea



METALLIC ARC WELDING ELECTRODES

By HAROLD LAWRENCE
Metallurgist and
Welding Engineer

Hard surfacing electrodes range in price from less than 20 cents to several dollars per pound but selection of more expensive types for many applications often is more economical. Welding cast iron will be discussed in STEEL for Sept. 25

ALTHOUGH the rapid growth of the metallic arc welding industry has led to a certain complexity when available electrodes are investigated, nowhere is the difficulty quite as great as in the field of hard surfacing electrodes. Here there are hundreds of analyses varying in cost from a few cents to several dollars a pound. Unfortunately the cost of the electrodes bears little relationship to the efficiency of use to be expected from them. For some applications electrodes costing less than twenty cents a pound are the best choice while in other applications electrodes costing several dollars per pound are actually the cheapest in the long run.

Hard surfacing is done for a multiplicity of reasons. Obviously hard faced equipment is longer lived in most services. Thus a machine or a part that has been given a proper wearing surface in those parts subjected to wear will last for a long while, making the cost of the equipment per hour of use considerably lower than would be found in a similar article constructed of ordinary machine steel notwithstanding the fact that this steel had been heat treated to optimum hardness.

Of course all plant maintenance de-

partments are set up to devise ways and means of preventing shutdowns and delays. These are costly not only because of lost production but also because of the labor required to replace parts. Hard surfacing frequently supplies an answer to this problem and should be kept in mind as rising labor costs place an increasing premium on continuity of production.

Hard facing of ordinary steels provides an economical combination which frequently lasts longer than a part wholly constructed of alloy steel. SAE-1045 steel has been very popular for providing a strong, tough base metal on which to apply a wear resistant overlay.

Another advantage of hard surfacing lies in its ability to salvage and reclaim parts that would otherwise be slated for the junk pile. In those industries where replacement of worn parts is an everyday occurrence, regular hard surfacing departments are in continuous operation providing a steady flow of rebuilt sections. And more often than otherwise the replaced pieces yield more service than the original member. This situation has led a large number of plants building equipment that is liable

to extreme wear to hard surface new parts so as to provide maximum life in the primary installation.

Power is saved when hard surfaced equipment is operated. This situation exists because the entire machine performs best when no parts have deviated from original trueness or sharpness as a result of lost or displaced metal. In digging and grinding machinery this is especially true.

In addition to the power saved there is a general level of increased efficiency. With a minimum expenditure of effort, peak performance is maintained when dies are square and sharp or when bearings perform with good alignment and least friction.

Hard surfacing enables operators to keep their machinery in good operating condition by maintaining the desired dimensions with low cost rebuilding. Most hard facing electrodes permit the application of small amounts of metal exactly where needed. Since these deposits are both smooth and sound, little machining or grinding to the required tolerances is necessary.

Furthermore hard surfacing provides considerable flexibility in its use. If but a few square inches of hardened steel is sought, that area and that area alone need be surfaced. This condition permits the use of ordinary steel for the whole section instead of necessitating many pounds of expensive alloys to do the work of a few ounces correctly positioned by welding.

For metallic arc welding it is convenient to arrange the available electrodes into six groups. This method is fairly popular in the trade although the first group contains many analyses for a wide range of services. A short description of each group and the reason for setting it up will be attempted before undertaking a more detailed analysis of the individual electrode types available in each.

Group A—Low Alloy: Many experts in the hard surfacing business feel that all electrodes containing less than 20 per cent of alloys should be considered together. Here all combinations of analyses from intermediate carbon unalloyed steel to those containing substantial amounts of chromium, manganese, silicon, nickel, molybdenum and other elements will be found.

Group B—Manganese Steel: Despite the fact that manganese steel electrodes contain less than 20 per cent of alloying elements it is felt that this group has enough distinctive characteristics to warrant separate treatment. Fundamentally it is often less hard than its other low alloy cousins but this condition is more than offset by the work hardening properties of the deposited metal.

Group C—High Alloy, Ferrous: Electrodes in this division contain more than 20 per cent of alloys with combination running slightly over 50 per cent. Essentially this group combines certain corrosion resisting attributes with good performance at elevated temperatures

where the low alloy types are liable to lose their hardness.

Group D—High Alloy, Nonferrous: Using alloys such as cobalt and tungsten in addition to the universal ingredient in almost all hard surfacing electrodes, chromium, this branch of the hard facing tree exhibits excellent re-

(Please turn to Page 166)

TABLE I—ANALYSES OF GROUP A WELD DEPOSITS FOR SPECIFIC USES

Use	C	Mn	P	S	Si	Cr	W	V	Mo
Chisels, Punches	0.80	0.70	0.03	0.04	1.30				
Oil Hardening, Non-Deforming Die Steel	1.00	1.20	0.03	0.04	0.30	0.50	1.00	0.30	
High Carbon, High Chromium Die Steel	2.30	0.50	0.03	0.04	0.20	13.00			0.50
Hot Work Steel, Tungsten Type	0.30	0.30	0.03	0.04	0.20	4.00	14.00	0.50	

TABLE II—TYPE OF HARD SURFACING MATERIAL

Manufacturer	Group A Low Alloy	Group B Manganese Steel	Group C High Alloy (Ferrous)	Group D High Alloy (Nonferrous)	Group E Carbides, Etc.	Group F Bronzes
Air Reduction Sales Co., 60 E. 42nd St., New York 17	Airco No. 91					
American Agile Corp., 5806 Hough Ave., Cleveland 3	Agile Pink Agile Dark Green Silver-Green Silver-Blue Silver-Yellow	Agile Violet Silver-Violet	Silver-Tan Silver-White Silver-Red Silver-Black			
American Manganese Steel Div. American Brake Shoe & Foundry Co., Chicago Heights, Ill.	Dieweld Economy Hardface Formface No. 219 No. 459	Nickel- Manganese Mo.-Mang.	Toolface			
Ampco Metal, Inc., 1745 S. 38th St., Milwaukee 4, Wis.						Ampco-Trode 16 Ampco-Trode 18 Ampco-Trode 20 Ampco-Trode 21
Champion Rivet Co., East 108th and Harvard Cleveland 5	Wear Devil "A" Wear Devil "B" Hard Devil	Tough Devil				
Eutectic Welding Alloys Co., 40 Worth St., New York 13	Eutectrode 2 Eutectrode 4 Eutectrode 6 Eutectrode 8					Eutectrode 28
General Electric Co., Schenectady 5, N. Y.	W-93					
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis.	P & H 110 Harcote Hartung	Harmomang Harnimang				
Haynes Stellite Co., Unit of Union Carbide & Carbon Corp., 80 E. 42nd St., New York 17		Hascrome	Grade 93	Grade 1 Grade 6 Grade 12 Hastelloy C	Tube Haystellite	
Hollup Corp., 4700 W. 19th St., Chicago 50	Sureweld H Sureweld H-1 Sureweld 459 Sureweld 217					Grade 20 Grade 20-B
Lincoln Electric Co., 12818 Coit Road, Cleveland 1	Hardweld 100 Hardweld 50 Wearweld Abrasoweld Faceweld No. 1 Faceweld No. 12 Toolweld 60 Toolweld 55	Mangan- weld "A" Mangan- weld "B"				
McKay Co., York, Pa.	Tool & Die	Frogalloy				
Metal & Thermit Corp., 20 Broadway, New York 5	Hardex 20 Hardex 25 Hardex 45 Hardex 60	Manganese Steel Manganese Steel SW				
Reid-Avery Co., Baltimore, Md.	Raco 82					
Stoody Co., Whittier, Calif.	Stoody Self-Hardening Stoody A.C.		Stoodite Silfram		Tube Borium Borod	
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.			Timang			
Universal Power Corp., 300 Euclid Ave., Cleveland 3	MCN 19 Toolarc "G" Toolarc "R"	Manganarc		AIW AIW-T AIW-DG AIW-I AIW-P		
Welding Equipment & Sup- ply Co., 223 Leib St., Detroit 7	Eureka No. 72 Eureka No. 1215 Eureka No. 8510 Eureka No. 70W Eureka No. 71M Eureka No. 75X					
Westinghouse Electric Mfg. Co., Pittsburgh, Pa.	Hardentough 2 Hardentough 3 Hardentough 5	Nickelmang				
Wilson Welder & Metals Co., 60 E. 42nd St., New York 17	Wilson No. 110					

BRIQUET



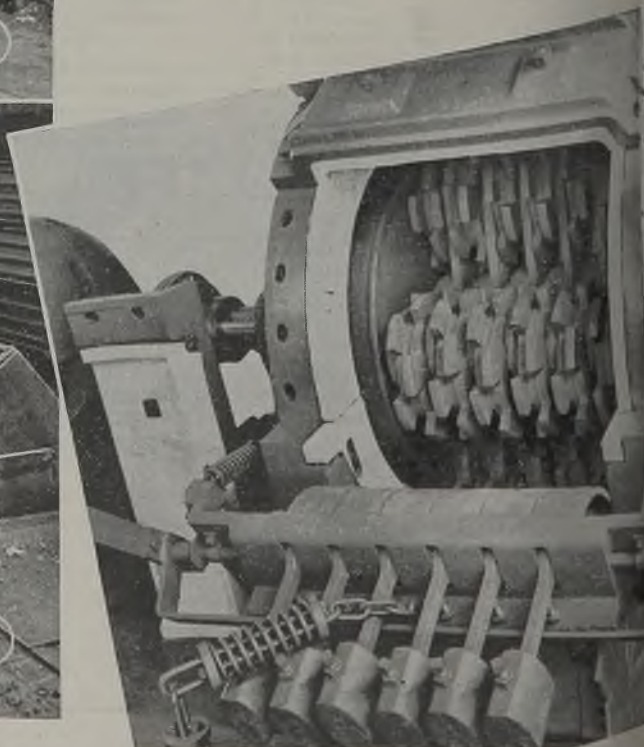
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2



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THE BRITISH have a word for it . . . "swarf". That is what they call all miscellaneous cuttings from turning, boring, drilling, milling, planing and other machining operations.

Proper disposal of this material becomes quite a problem in large plants with quantities of machine tools in continuous operation, for many modern machine tools throw out swarf like chaff from a threshing machine.

At the huge Warner & Swasey Co. plant, Cleveland, war demands resulted in an expansion of plant facilities to several times previous capacity, with ac-

Fig. 1—"Chip collector" removes turnings from lathe bed, first step in handling and reclaiming swarf. Note special shallow 4-wheel buggy that facilitates this collection

Fig. 2—Segregation is followed through by accumulating swarf in large steel skid boxes shown here. Power lift trucks move these skid boxes to briquetting department when they are full

Fig. 3—Chain hoist on overhead monorail bridge (Fig. 6) is used to dump skid boxes near hopper leading to crusher

Fig. 4—Crusher employs roller ring principle, rings carrying work against striker bars pivoted in front produce heavy impact and crushing action

UNG "SWARF"

at Warner & Swasey

All types of machine cuttings are returned to use by effective system. Briquettes of cast iron "borings" are used by plant foundry. Steel, other metals briquetted when market warrants

companying increase in problem of swarf disposal. Too, the necessity of segregation of some 20 different types of "scrap" complicated the picture still further.

Yet not only is swarf disposal unobtrusive and efficient, but much of it is briquetted for disposal at a profit over expense of preparation. If it costs \$3 per ton to briquette a certain material which will bring a \$5 premium when briquetted, the operation is done at a profit. Right there is the factor that determines whether or not briquetting is a paying proposition, for if the premium

offered for the briquetted material does not cover costs (plus a small profit), very few plants are going to adopt the process.

Cupola Stock: Since Warner & Swasey operates a foundry in a nearby town, all cast iron swarf is briquetted in a special setup devoted exclusively to the handling of cast iron. These briquettes are then used as melting stock when charging the cupola. The cast iron is briquetted and used in this manner because it makes most excellent charging stock and because it is available to the

foundry with practically no extra handling.

Before detailing the briquetting equipment and its operation, let's see where the material to be briquetted comes from and how it is collected.

As mentioned previously, we have no single word to denote all types of machine cuttings such as the word "swarf" used by the British. For simplicity, in labelling, Warner & Swasey practice is to use "turnings" to denote all types of steel cuttings, whether the material comes from drilling, turning, boring, milling, or some other operation.

Similarly, all cast iron chips are called "borings", regardless of whether they actually come from boring or from turning, drilling, milling, etc.

Nineteen Types "Scrap": Since "scrap" not only denotes swarf but also defective parts (which in turn are divided into those defective due to foundry or forge shop operations and those spoiled during machining), the actual classification system breakdown looks something like this:

SWARF:

- 1—Steel "turnings", nickel over 3 per cent.
- 2—Steel "turnings", nickel less than 1 per cent (no material with 1-3 per cent nickel)

Fig. 5—Briquetting machine is served by conveyor discharging into hopper on which controls are mounted. Vibratory feeder provides uniform feeding of material to briquetting machine. Motor and oil pump at lower right, oil reservoir upper right, electric vibratory feeder extreme left, bucket conveyor top left, electric controls upper center

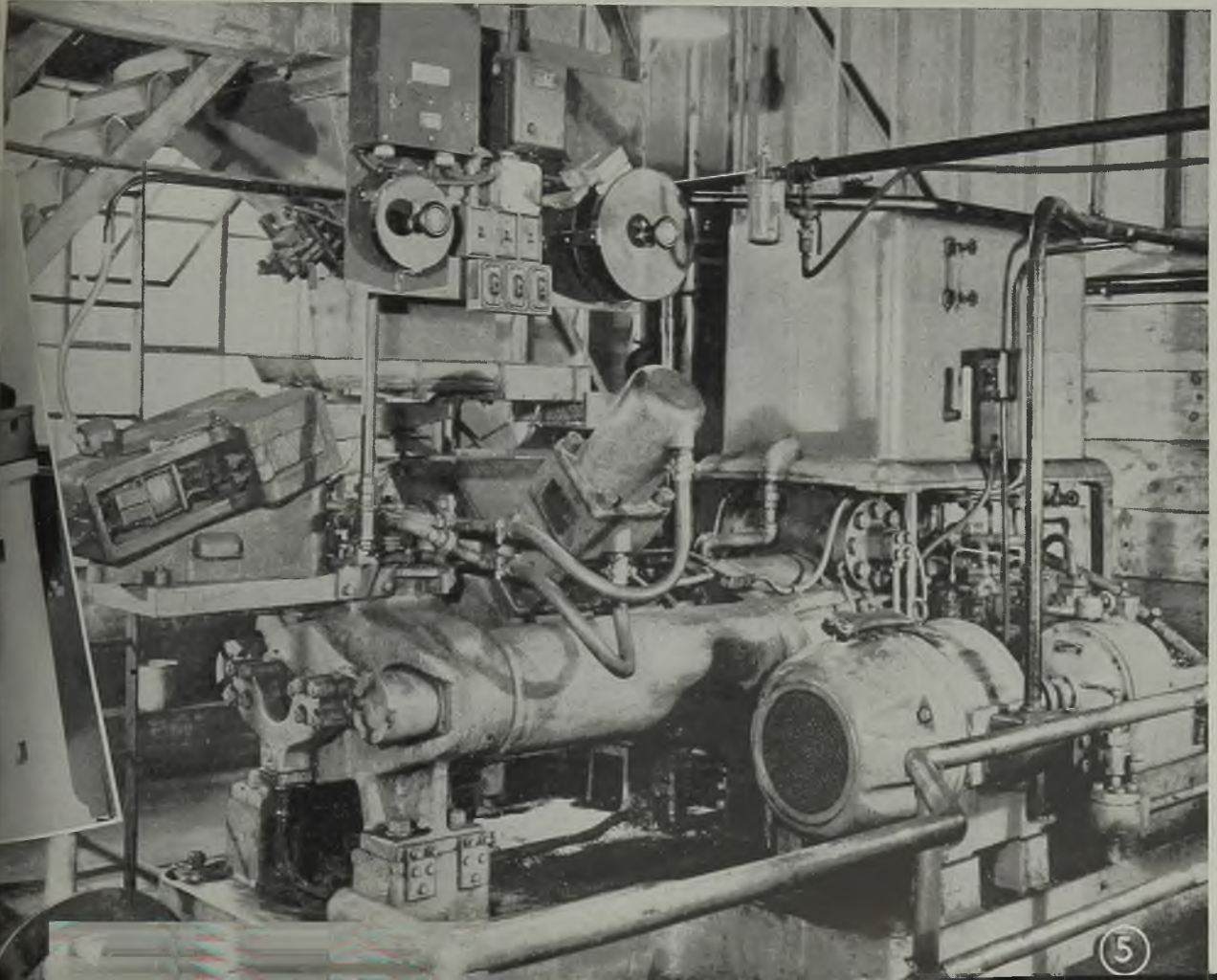




Fig. 6—Overall view of briquetting department shows pile of borings in foreground to be fed into hopper of crusher at left. Bucket conveyor carries crushed material to feed hopper of briquetting machine on balcony in background. Some briquettes can be seen in skid boxes near conveyor

from which they came. Others may be sold direct to scrap dealers. One manufacturer for whom Warner & Swasey machines parts has a standing order to ship all defective parts to him.

Collection of Swarf: This article is primarily concerned with swarf and its disposal. So let's start at the machine tool where it is produced and follow its collection and processing down through the briquetting operation. Machine tool operators do not remove swarf from their machines. At times they will push it away from the point of tool operation to prevent excess accumulation, but removal of machine cuttings is handled entirely by separate workmen called "chip collectors".

Each department is set up with its own men who sweep up cuttings that may drop on the floor. Then in each department there are men whose job it is to collect the swarf from the machine tools at regular intervals. They watch the machines and try to remove the cuttings before they accumulate to the point to where they might interfere with effective operation of the machine tool or when the job is changed, shall we say, from cast iron to bronze. In some departments, the floor sweeper and the "chip collector" is the same man. In larger departments, two or more men may be permanently assigned to each individual job.

Identification of Swarf: A simple but ingenious scheme is employed to pro-

vide positive identification of the steel swarf at the machine. Such identification is essential for proper segregation of steel turnings because they all look alike regardless of alloy content.

Each machine working on steel parts has the material identified by a colored washer which is fastened on a stud on the machine in a readily visible location. Each washer is painted in one of three colors—orange to indicate steel has 3 per cent nickel or more, blue if it has less than 1 per cent nickel, green to show straight carbon steel.

There is just one man in the entire plant on each of the three shifts authorized to change washers on the machine tools. This man knows when any job is changed and makes the corresponding change in the washer, when a different material is to be worked.

Chip collectors look for these washers and thus are able to keep material properly segregated during collection and delivery to scrap bins. All handling containers are identified by stenciled signs using the same marking system.

Chip collectors use small 4-wheel pushcarts (see Fig. 1) to carry the swarf from the machine tools to the scrap bins. In outlying departments where this would involve a considerable trip, the chip collectors deposit loads from their small pushcarts into large skid boxes, measuring approximately 48 x 24 x 36 inches deep. See Figs. 2 and 3. When full, these are picked up by one of the fleet of 30 power lift trucks that serve to move materials about the plant. The truck deposits the box at the scrap bins which are located at the extreme end of the plant.

Cast iron "borings" are all carried to a second collection center in another part of the plant. Here there is a second briquetting setup.

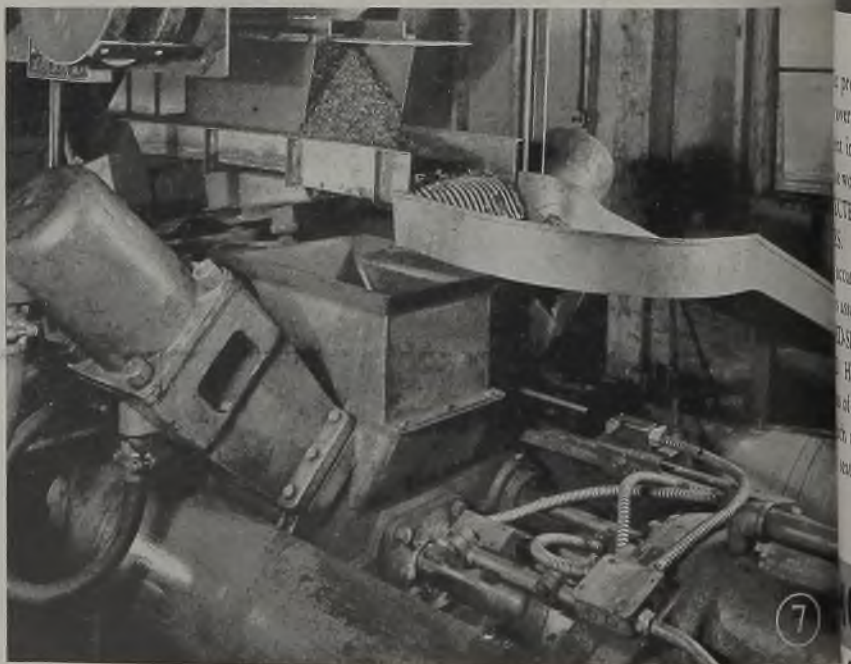
Crushing: First step in the briquetting

(Please turn to Page 178)

- 3—Steel "turnings", straight carbon types
- 4—Cast iron "borings"
- 5—Red brass chips
- 6—Yellow brass chips
- 7—Aluminum chips
- SOLIDS:
- 8—Steel bar ends containing nickel
- 9—Steel castings, foundry loss
- 10—Steel castings, machining loss
- 11—Forgings, forge shop loss
- 12—Forgings, machining loss
- 13—Cast iron parts, foundry loss
- 14—Cast iron parts, machining loss
- 15—Cast bronze parts, foundry loss
- 16—Cast bronze parts, machining loss
- 17—Cast aluminum parts, foundry loss
- 18—Cast aluminum parts, machining loss
- 19—Miscellaneous (structural shapes, pipe, etc.)

When Is "Scrap" Not Scrap? What becomes of parts scrapped? That is another story. But briefly, some are returned to the foundry or forge shop

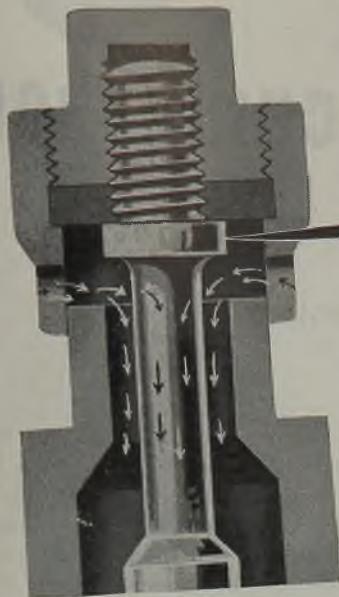
Fig. 7—Closeup of briquetting machine showing borings being fed through vibratory feeder; heavy screen catches oversize pieces which then fall down chute at upper right. Note angle cylinders driving compacting hammers, main ram, electric limit switches for automatic sequence operation. Briquettes fall out bottom of machine when ram is retracted



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Failures in ...

COLD-HEADED MACHINE BOLTS

By

HERBERT R. ISENBURGER

St. John X-Ray Service Inc.
Long Island City, N. Y.

CHARACTERISTIC failure of defective bolts studied was a separation of the head from the shank under comparatively slight tension of transverse impact. The regular and almost polished character of the exposed metal surface suggested that the defect causing the failure was a rupture within the head. Such rupture should be disclosed by X-ray examination.

The primary purpose of the X-ray examination was therefore to determine whether ruptures were present before breakage. A secondary purpose was to determine whether these ruptures always occurred in a particular zone or might take place anywhere in the head.

Before spending any time radiographing the bolts that had been submitted for the investigation, ten were selected at random and submitted to a breaking test by holding the head in a vise and striking the shank a sharp blow with a hammer. Two failed.

The rest of the set, 88 in all, were then numbered and, radiographed in order.

Fig. 1—(Circle)—Exograph of bolt showing rupture

Fig. 2—(Top, left)—Head of defective bolt near center. Gray areas with regular outlines represent dirt; irregular black spots as usual represent carbon

Fig. 3—(Center, left)—Head

of defective bolt at edge of rupture

Fig. 4—(Bottom, left to right)—Head of defective bolt at end of rupture

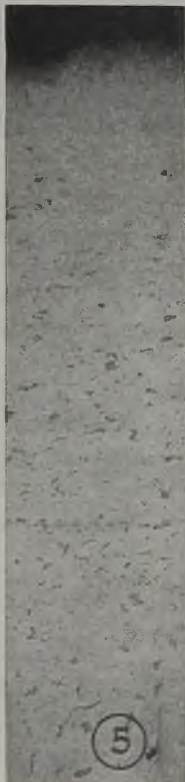
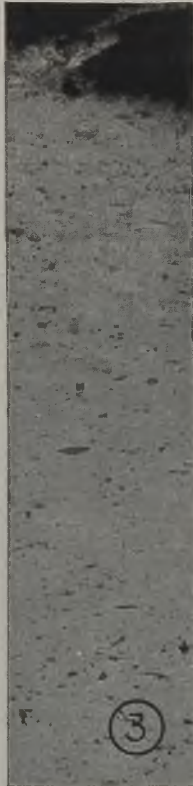
Fig. 5—Shank of defective bolt at edge of rupture

Fig. 6—Shank of defective bolt

at a point near end of the rupture

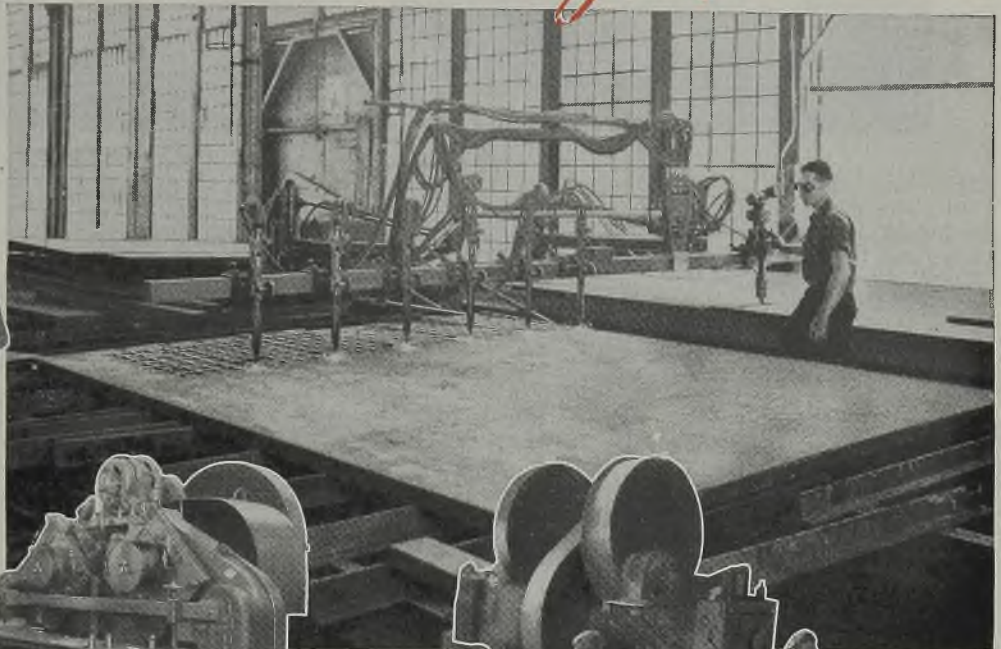
Fig. 7—Plane of union of head and shank of sound bolt near edge

Fig. 8—Plane of union of head and shank of sound bolt near the center

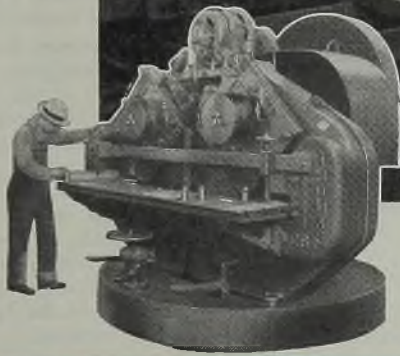




A look-in on our Modern Cutting Operations



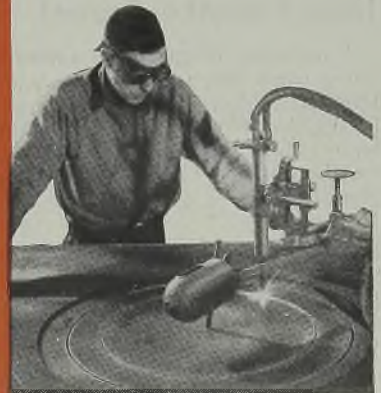
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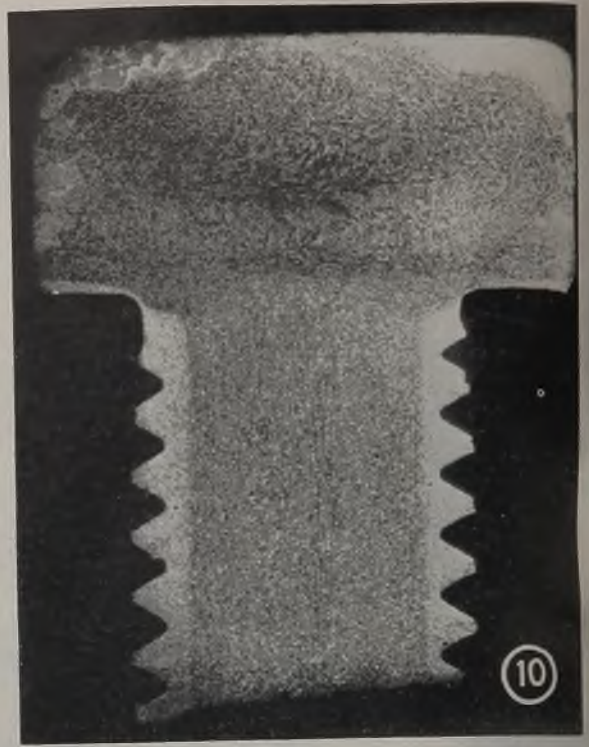
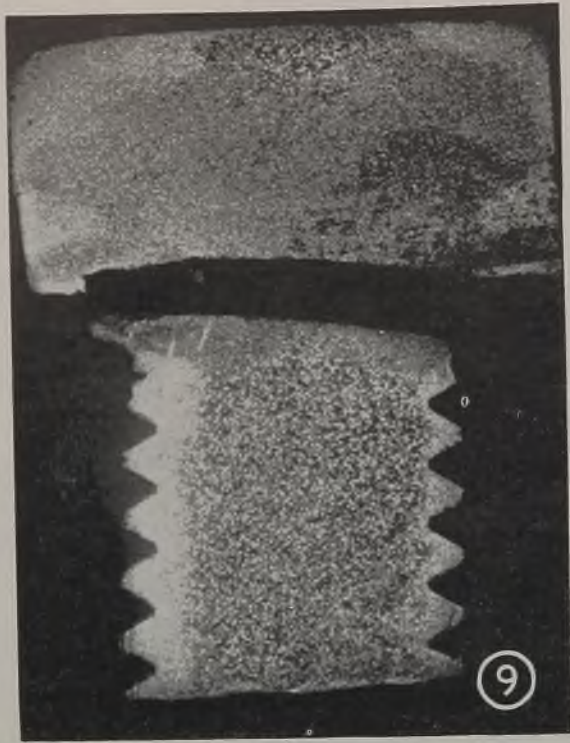


Fig. 9—Macrograph of defective bolt. Black region near righthand base of head is rust

Fig. 10—Macrograph of sound bolt

Several showed clear evidence of rupture just above the plane of union of head and shank, comprising an area somewhat larger than the cross-section of the shank. These bolts, when submitted to the breakage test, failed under very light blows.

An exograph of a typical defective bolt is illustrated in Fig. 1. The rupture is indicated by the slightly curved light line just above the end of the threads. This curvature is itself characteristic and is related to the mechanism by which the rupture is produced. Eight of the 88 bolts failed, making a total of ten out of 98, or about 10 per cent. All the ruptures were similar and similarly placed.

The X-ray examination thus showed the immediate cause of failure to be a rupture occurring in a restricted zone just above the junction of shank and head.

In order to discover the cause of this rupturing, two of the defective bolts and two sound ones were sectioned, polished, etched, and examined under the microscope. There seemed to be no particular

difference in the carbon content but the defective specimens were noticeably dirtier. Photomicrographs at 100 diameters magnification were made of typical areas. The ones covering a defective bolt are reproduced in Figs. 2 to 6. Two photomicrographs from a sound bolt are shown in Figs. 7 and 8.

The specimens were then repolished and etched to bring out the macrostructure. In all four cases this showed very clearly that the metal in the zone where rupture occurs is very heavily worked and that the strains here exceed those anywhere else in the head. Macro-photographs at 5 diameters magnification are depicted in Fig. 9 and Fig. 10.

The evidence indicates that failures of this kind are likely to occur whenever the wire consists of dirty steel, and that a comparatively small amount of dirt, if

it enters the zone of maximum working just above the shank, will start a rupture. This would account for the sporadic occurrence of defective bolts. The trouble might be overcome by modifying the manufacturing procedure so as to make the influence of a small amount of dirt in the steel innocuous.

It is important to note that the region in which maximum working and maximum strain occur during the upsetting process is contiguous to the region of maximum stress when the bolt is screwed home or tested as in the breaking test mentioned above. The region of maximum stress cannot be changed. It consequently is necessary to shift the region of maximum working and maximum strain deeper into the head, or to the top of the head where it will be entirely harmless.

Waterfall Salvages Huge Amount of Enamel

A miniature Niagara Falls carries off excess paint from spray guns at Willys-Overland Motors Inc., Toledo, to return 6000 gallons of reclaimed enamel monthly, or enough for 2400 Jeeps. In the 18 months during which the salvage program has been in operation, 75,000 gallons of enamel, approximately 97,500 pounds of vegetable oil, 60,000 pounds of phthalic anhydride and 30,000 pounds of glycerine have been recovered, according to William E. Paris, operations manager.

For the Jeep's full battle "makeup",

½ gallon of red primer and about 2 gallons of olive drab are required. Each car is painted by passing between manually operated spray guns and the waterfall. The falling water catches the excess paint spray and carries it into a wash system where it is removed from the surface of the water and sent to the laboratory for reprocessing.

Carbide Fly Cutter Increases Milling Speed

Changing from conventional milling with a multiblade highspeed steel shell end mill to climb cutting with a carbide fly cutter increased milling pro-

duction on the lug shoulder of a forged Ni-Chrome steel rocker used in aircraft engines from 30 to 110 pieces per hour with improved finish, according to Carboly Co. Inc.

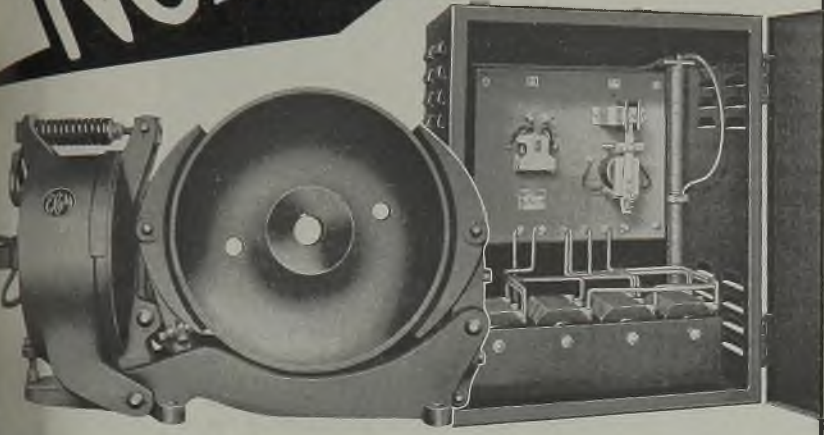
An old mill 2¼ inches in diameter previously used at low speed was converted into a fly cutter by tipping with single blade of Carboly No. 78 B. The angle was 10 degrees righthand and speed was increased to 550 square feet per minute, with a speed of 7 inches per minute and a maximum cut depth of ¼ inch. Rotation was reversed to climb milling. Production increased more than 300 per cent, with an average of 1500 pieces between tool grinds, the company's report indicates.

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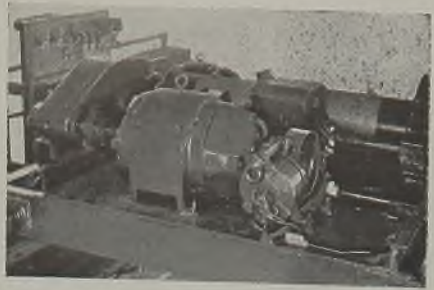
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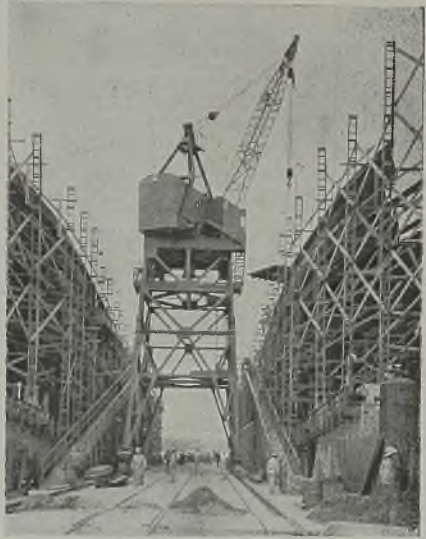
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To hold the trolley stationary when raising or lowering a load by this floor-controlled crane, another EC&M Type WB Brake is applied on the trolley-motor shaft. The trolley controller is of the manually-operated type, and for this application the rectifier is a separately mounted, enclosed unit as shown in the illustration to the left of this column.



The propelling drive on this whirler crane is operated by four a-c motors, one on each leg. On each motor is an EC&M Type WB Brake to hold the crane stationary not only when handling loads but to prevent movement by wind when the crane is not in use.

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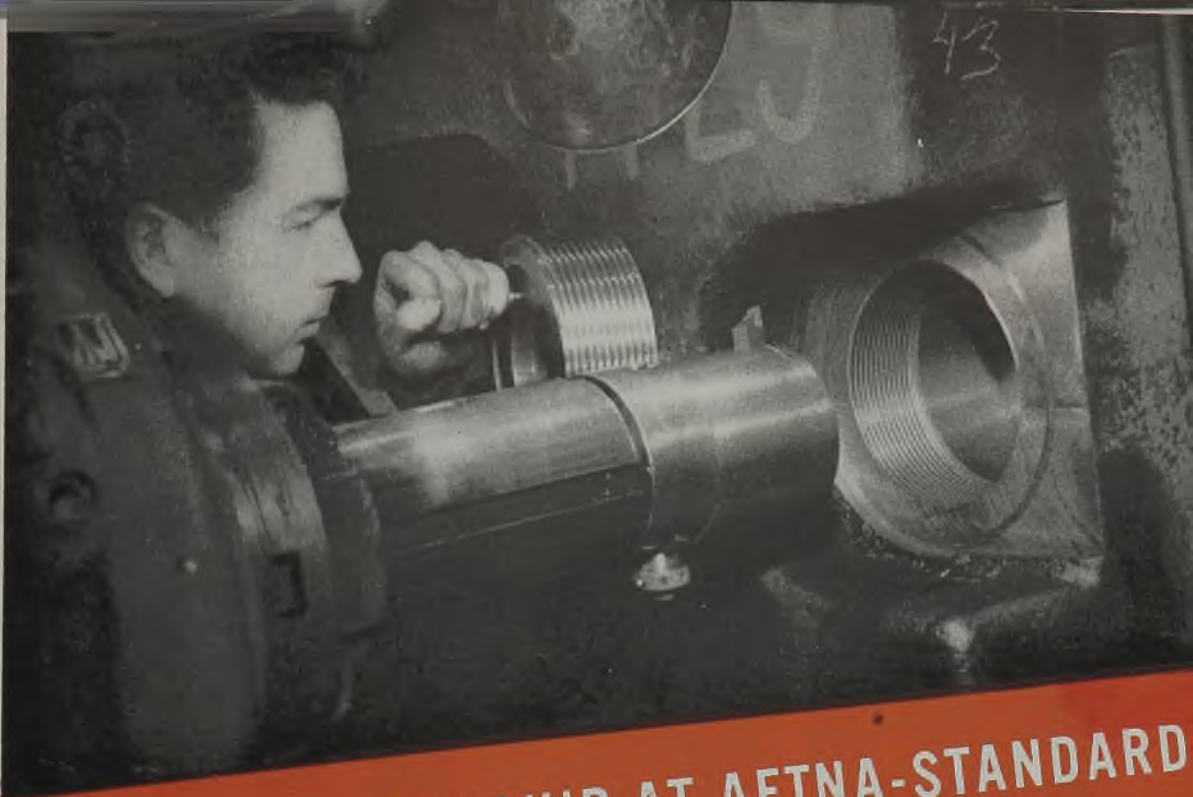
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F. H. DYKE
Secretary, A.I.S.E.

Monday, Sept. 25

9:00 A.M.

Registration

Chairman: J. D. Jones, Chief Engineer, Youngstown Sheet & Tube Co., Youngstown, O.

Vice Chairman: G. H. Rose, Assistant to Vice President, American Steel & Wire Co., Cleveland.

9:15 A.M.

Business Session

Chairman: C. L. McGranahan, Assistant General Superintendent, Jones & Laughlin Steel Corp., Pittsburgh.

Secretary: F. H. Dyke, Assistant General Manager Steel Plant, Wheeling Steel Corp., Steubenville, O.

9:30 A.M.

Electrical Division

Chairman: J. H. Miller, Electrical Superintendent, International Harvester Co., Wisconsin Steel Works, Chicago.

Vice Chairman: R. W. Graham, Electrical Superintendent, Bethlehem Steel Co., Lackawanna, N. Y.

"Characteristics of Crane Hoists," by M. A. Whiting and J. A. Jackson, Industrial Engineering Division, General Electric Co., Schenectady, N. Y.

"Selection and Maintenance of Magnetic Brakes," by A. E. Lillquist, Supervising

Engineer, Engineering Department, Cutler-Hammer, Inc., Milwaukee.

Symposium—"Communication Systems in Steel Plants." (Speakers to be announced).

1:30 P.M.

Mechanical and Welding Division

Chairman: F. C. Schoen, Plant Engineer, Midvale Co., Nicetown, Philadelphia.

Vice Chairman: T. R. Moxley, General Master Mechanic, Wheeling Steel Corp., Steubenville, O.

"Welding and Cutting in Steel Plant Maintenance," by S. D. Baumer, Steel Mill Representative, Air Reduction Sales Co., New York.

"Alloy Steel for Maintenance in the Steel Plants," by J. A. Rosa, Metallurgical Department, Republic Steel Corp., Massillon, O.

"Maintenance with Low Temperature Welding," by R. D. Wasserman, President, Eutectic Welding Alloys, Inc., New York.

1:30 P.M.

Operating Practice Division

Chairman: A. S. Glossbrenner, General Superintendent, Youngstown District, Youngstown Sheet & Tube Co., Youngstown, O.

Vice Chairman: R. H. Gelder, Works Metallurgist, American Rolling Mill

Co., Ashland, Ky.

"The Unitemper Mill," by M. D. Stone, Manager, Development Department, United Engineering & Foundry Co., Pittsburgh.

"Shearing Flat Rolled Steel," by F. E. Flynn, District Manager, Republic Steel Corp., Warren, O., and D. A. McArthur, Chief Engineer, Wean Engineering Co., Warren, O.

"The Place and Effect of Conveyor Equipment in Industry," by J. E. McBride, Vice President, Palmer-Bee Co., Detroit.

Symposium: "Cleaning of Steel for Subsequent Coating," (Speakers to be announced).

8:00 P.M.

Motion Pictures, selected subjects.

Tuesday, Sept. 26

9:00 A.M.

Rolling Mill Division

Chairman: Louis Moses, Superintendent, Rail Mill and Roll Department, Bethlehem Steel Co., Sparrows Point, Md.

Vice Chairman: F. G. Kredel, Superintendent Bar Mills, Republic Steel Corp., Cleveland.

"Salvaging Alloy Steel Rolls," by H. L. Watson, Jr., Superintendent, Special Products Department, Midvale Co., Nicetown, Philadelphia.

(Please turn to Page 140)

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Self-aligning ball and roller bearings on all high speed shafts were first made a part of crane design by Northwest and have always been standard equipment on Northwest Cranes. In Northwest design lies the assurance of the minimum in function losses and maximum delivery of power to the load.

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- Handle magnet for scrap, turnings and borings.
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Co., Warren, O.

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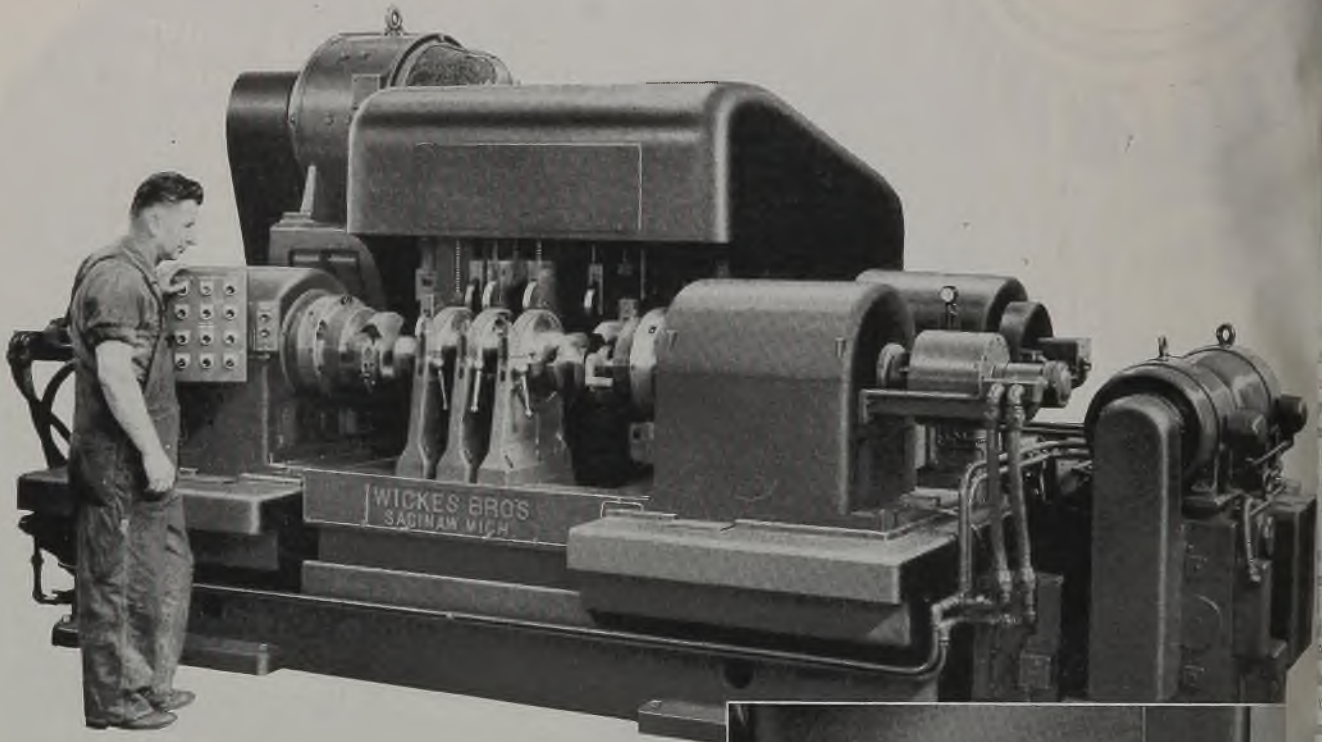
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Philadelphia.

turn to Page 11

WICKES MODEL MP-8 AUTOMATIC MULTIPLE CRANKPIN TURNING LATHE



Automatically Turns All Crankpins Simultaneously On Heavy Crankshafts

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



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

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

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

Helium Welding of Magnesium

By F. A. WASSELL
Welding Engineering Division
General Electric Co.
Schenectady, N. Y.



AN IMPORTANT factor contributing to the greatly expanded use of magnesium alloys is helium-shielded arc welding. This process eliminates the use of fluxes and permits the welding of practically all of the commercial alloys. It presents a flexible means of fabricating these light-weight high-strength alloys. The process utilizes standard types of direct-current welding machines. For welding of the lighter gages, up to about 3/16-inch, small welders of approximately 150-ampere capacity are used, but for the welding of the heavier gages or for high-speed welding, machines of about 300 amperes are required. Polarity is always reversed, with the electrode positive and the work negative. Straight polarity results in an unstable arc and excessive spatter.

Commercial helium of 98 per cent purity, as supplied by various gas companies, is sufficiently pure to give satisfactory welding results.

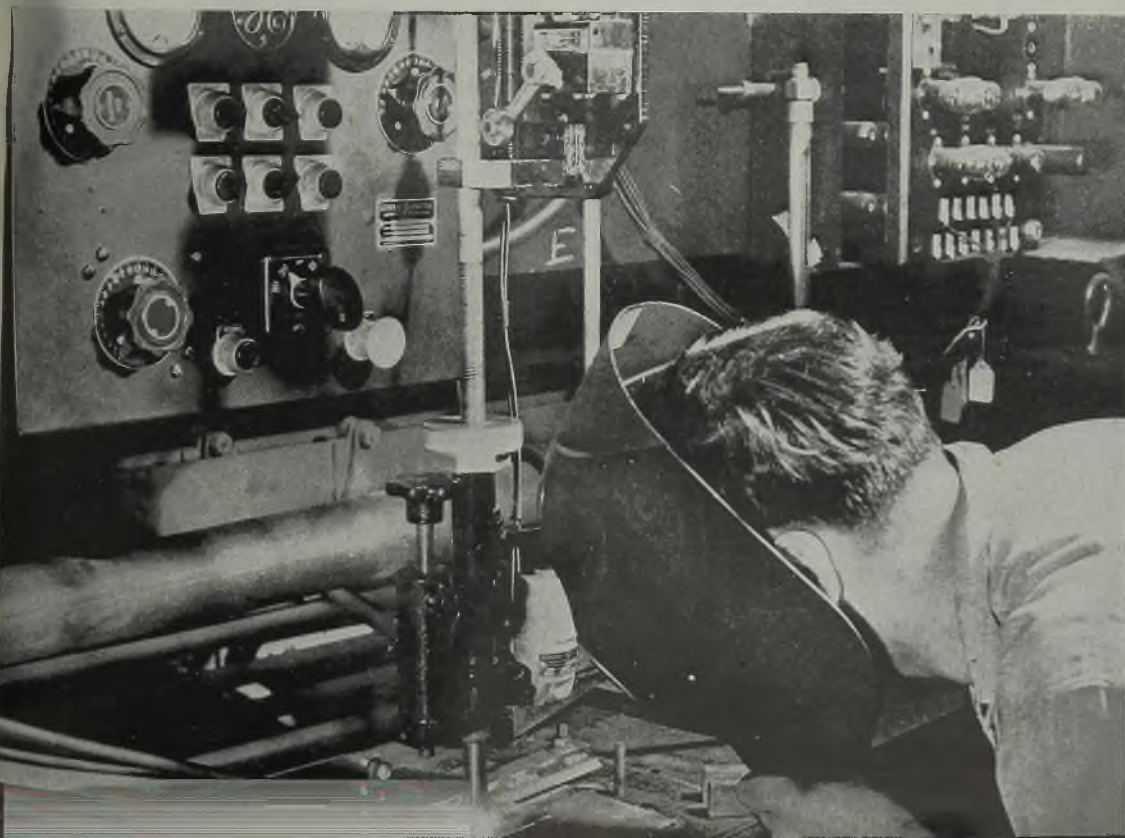
The process may be likened to carbon arc welding in that the arc is maintained between an electrode and the work, and any required filler metal is fed into the arc from the outside. The apparatus used consists essentially of a tungsten electrode and a gas nozzle or cup which surrounds the electrode. Helium is fed to the nozzle in such a way that it flows down around the electrode and out the lower end of the nozzle to completely envelop the lower end of the electrode and the work directly beneath it. The

arc, struck in this envelope of helium by touching the electrode to the work and quickly drawing it back a short distance, is maintained at the starting point for a period of time sufficient to establish a molten pool on the work. The end of the filler rod then is advanced to the arc which rapidly melts it down so that the filler metal flows into the molten pool.

When sufficient filler metal has been deposited, the rod and the arc are advanced to a point where more filler metal can be added to the molten pool. The welding progresses in this manner to form a continuous bead. In machine welding, the filler is fed into the arc at a uniform rate, depending on the welding speed, and produces a very

Fig. 1—(Circle)—Manual helium-shielded arc welding of light-gage magnesium

Fig. 2—(Below)—Automatic helium-shielded arc welder. Electronic control panel at right controls arc length. Slanting tube at lower left directs filler wire into arc



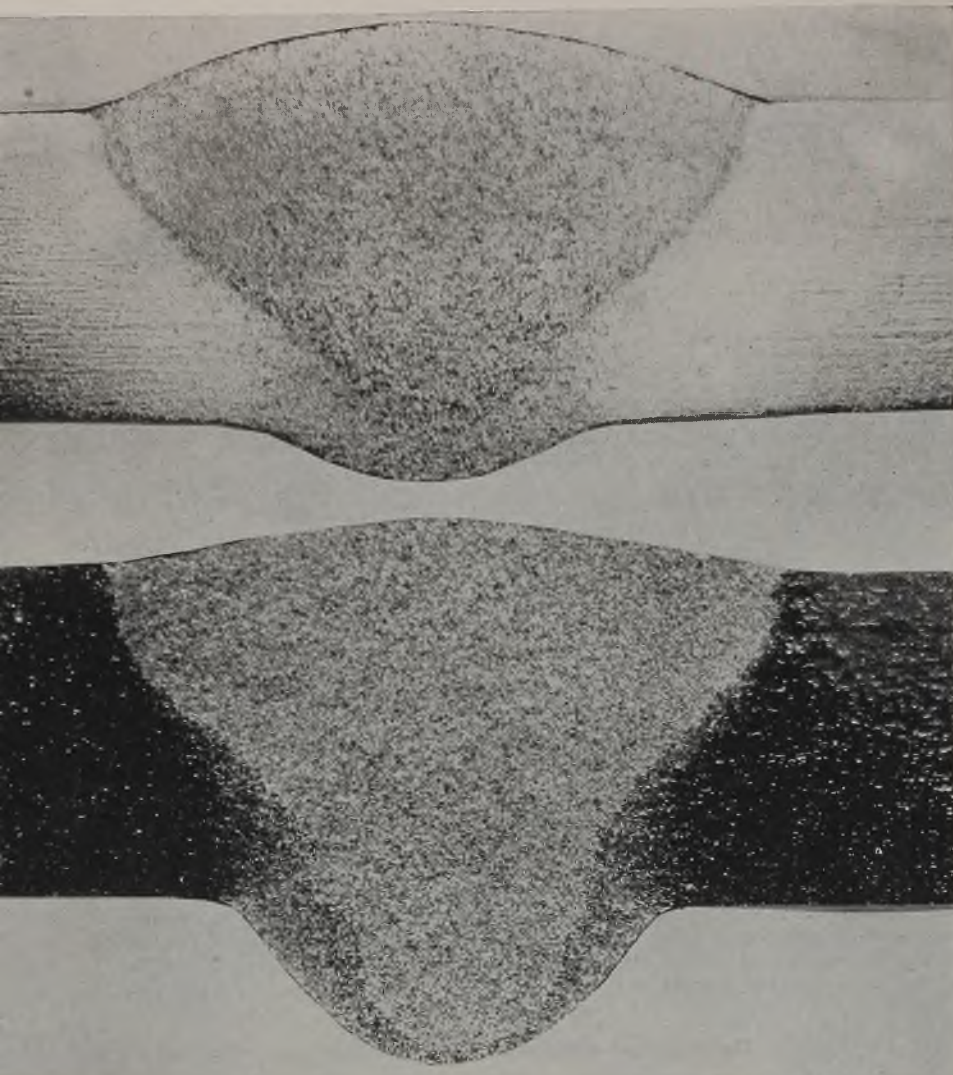


Fig. 3—Macrographs of helium-shielded arc welds on light-gage magnesium. Upper weld made without reverse bevel, lower with reverse bevel

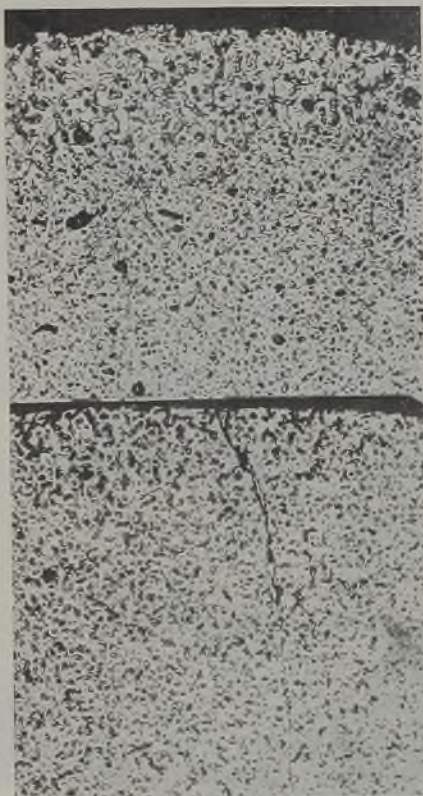


Fig. 4—Micrographs of roots of welds in Fig. 3. Weld below made without reverse bevel discloses crack at top. Weld above made with reverse bevel

uniform bead contour with barely perceptible ripples. Manual welding produces a less uniform bead contour for the reason that the filler metal cannot be fed as evenly into the arc by hand operation.

Fig. 2 shows an automatic helium-shielded arc welding equipment in operation. Shielded arc welding electrode holder shown in Fig. 1 is being used to weld two magnesium plates together.

For best results, the filler rod should be held at an angle to the work of not more than 30 degrees and preferably as near to zero as possible. When it is held at too steep an angle, the rod becomes very hot due to heat radiated from the arc and tends to melt off outside the area of the molten pool. This causes arc instability and results in a

bead of uneven appearance and poor fusion.

The electrode should be held as nearly perpendicular to the work as possible in order to direct the flow of helium so as to maintain the proper coverage of both the arc and the work. In hand welding, the electrode is usually inclined somewhat away from the vertical so that the operator may have a good view of the arc and of the weld pool. This angle of deviation from the vertical, however, should not exceed 30 degrees. In machine welding, the vertical position is maintained very easily.

Joint Preparation: Any of the standard types of joints, and modifications of them, can be used in this process. Good fit-up of the work is of primary importance, especially when light-gage metal are butt welded by the free drop-down method. The free drop-down method requires no backing, and filler metal is allowed to drop through to the underside of the work to form a reinforcing bead on the bottom of the weld. Variations of as little as 1/32-inch in the fit-up of the edges of the plates will cause metal to drop down unevenly, resulting in an uneven weld.

The need for clean surfaces in welding magnesium alloys cannot be overemphasized. Magnesium alloys are often given a protective coating by such methods as chromium pickling, but these coatings are not removed before welding, they introduce porosity and inclusions into the welds. Such coatings can be removed most effectively with a wire brush or emery cloth. Unpickled surfaces also should be cleaned before welding because magnesium oxidizes very readily and the oxides remain as inclusions in the welds and also under welding.

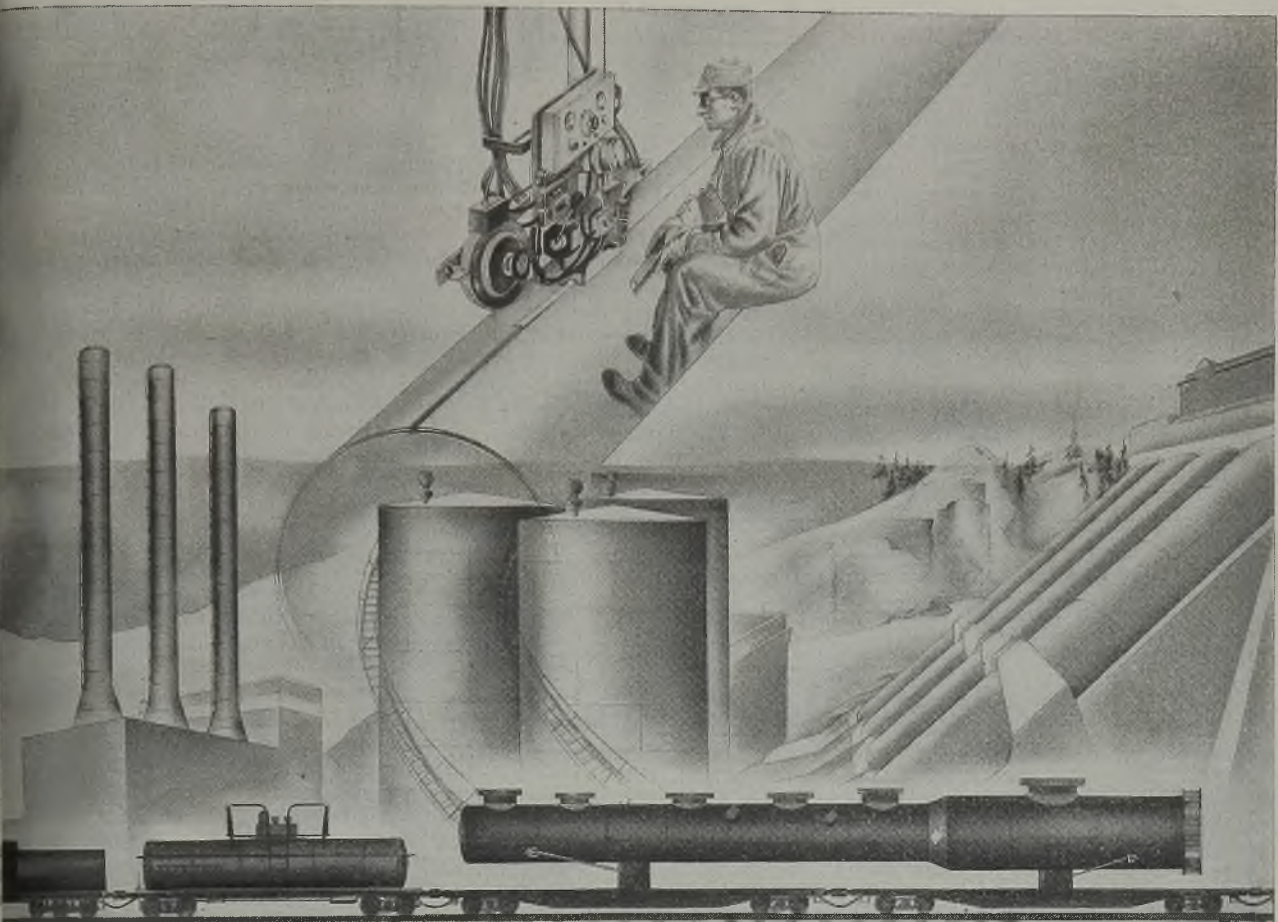
Backing plates can be used to shape the reinforcing bead on the bottom of butt welds. Good fit-up of the edges as in the free drop-down method is not required, for the backing plate limits the amount of metal which can drop down to form the bottom bead. While steel and copper backings have been used on butt joints, stainless steel backings seem to have some advantage at least in welding thin material.

Copper and steel backings tend to freeze the weld metal too rapidly, leading to cold shuts, wrinkles, porosity, and oxides in the bottom of the welds. The high heat conductivity also requires the use of correspondingly higher welding current. This is a disadvantage from the standpoint of power consumption.

It has been discovered recently, however, that the use of low heat conducting materials remedies this situation. Stainless steels having a heat conductivity of about one-third of ordinary steel have been found to be very successful as backing plate.

Light-gage stainless steel, with a backing groove formed in it and backed up with an asbestos board of some sort, is very effective as a low heat conducting backing. Asbestos should never be used next to the weld for it contains moisture which it evolves when heated.

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In every quarter of the globe are General American products—pressure vessels, tanks, fractionating columns, stacks, penstocks, and many more varied in description and function, but having one thing in common—GATX Know-How.

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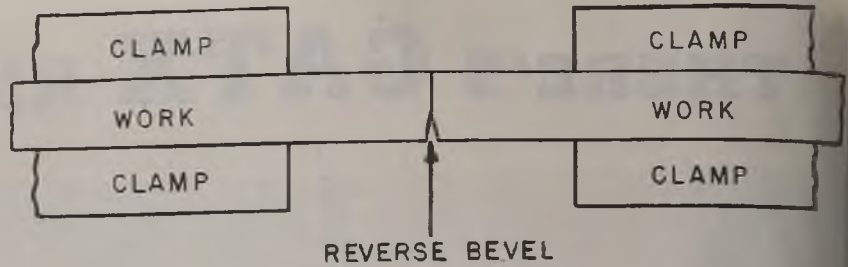
Plate & Welding Division

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Specialists in plate fabrication—manufacturers of pressure vessels of steel, alloys and aluminum—all classes of welding—process equipment of all types—chemical engineering laboratories and service—completely equipped field erection department.



Fig. 5—Reverse-bevel arrangement recommended for helium-shielded arc welding of magnesium. Drawing exaggerated to illustrate method



Water, as has been stated, causes extreme porosity in the weld.

Strength of Butt Joints: In the welding of magnesium alloys of $\frac{1}{8}$ -inch gage and lighter, some difficulty may be experienced in obtaining a high tensile strength due to a lack of fusion in the root of some welds. This lack of fusion at the root of the weld is evidenced by a fine line which upon microscopic examination proves to be the exterior of a crack extending into the weld. Tests have shown that welds with this crack have a low tensile strength. It is believed that this crack is the result of a tough refractory oxide skin which forms on magnesium. While the plate edges may appear to have been fused

all the way to the bottom of the joint, the oxide film seems to prevent the mingling of the metal at the root of the weld.

Apparently, some mechanical agitation would seem to be required to break up this film. If a very slight bevel is provided at the bottom edges of the plates, the edges will part from one another as they drop down to form the bottom bead. This allows molten filler metal to flow into the gap between the edges, washing them of the oxide, and forming

a solid homogeneous structure at the root of the weld. The elimination of the crack by this reverse bevel method has resulted in welds having 90 to 95 per cent of the ultimate tensile strength of the original material.

The macrographs and micrographs in Figs. 3 and 4 show the effect of the "reverse bevel" in eliminating the microscopic crack in welds on light gages of magnesium alloys. Fig. 5 shows a drawing of a reverse bevel, exaggerated for illustration purposes.

Universal joint spiders machined accurately at high production rate by bushing-guided tools in

Distinctive 4-Spindle Setup

HOLLOW milling and facing universal joint spiders is being accomplished with 100 per cent efficiency and at a high rate of production on a machine consisting of four standard end bases spaced 90 degrees apart and supporting twin-ram hydraulic units bolted to a special center base.

Piece to be machined is laid on center fixture where it is automatically locked and securely held by air

clamps while four spindles operating at right angles to each other machine the outside diameter and face shoulders of the spider's four trunnions. Spindles and work-holding fixture of this setup are shown in illustration.

Spindles are arranged with infinite speeds to machine various diameters. Each has a sleeve which rides on precision ball bearings. Sleeves are supported in brackets and held sta-

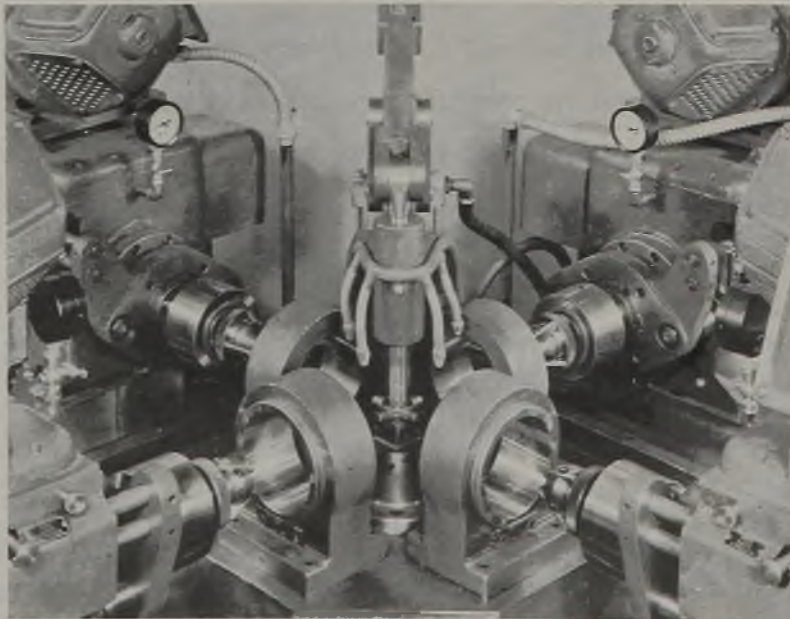
tionary while spindles revolve inside them. This eliminates possibility of galling which otherwise might occur through chips getting between revolving bearing surfaces.

Production of the machine, developed by LeMaire Tool & Mfg. Co., Dearborn, Mich., varies according to size of spiders to be machined. Rate is approximately 150 pieces per hour at 100 per cent efficiency for a trunnion with $\frac{5}{8}$ -inch diameter and length of $\frac{3}{4}$ -inch. One press of the control button activates all four spindles and, simultaneously, they move in rapid advance, followed by feed, dwell, and rapid return, all automatically. As the operation also finishes the shoulder at end of cut, tool momentarily dwells at that point to produce a smooth surface on shoulder face.

The same type machine can be arranged for boring, drilling, reaming, etc. In many cases, threading operations can be done in the same setup. It also is possible to have the machine perform different operations at each spindle, using an automatic or hand index table in the center.

This machine, and its work-holding and tool guiding elements, is typical of the American system of manufacturing as it has developed in the automobile industry—from which it has been widely adapted to mass production of war materiel. Things which have been worked out in the latter connection in the past 4 or 5 years will, in turn, still further speed up and increase the accuracy of machining parts for post-war motor vehicles.

Use of standard heads with integral drive and feed works not only has simplified design of this machine, but also gives it range of usefulness beyond that of a machine of inflexible type.



TOP-FLIGHT WELDS ON LOW-ALLOY STEELS

RACO 74 • RACO 64

SHIELDED-ARC ELECTRODES



WHEN you are making all-position welds on low-alloy high-tensile-strength steels such as Corten, Yaloy, Cromansil, Silten and Carbon-Moly Steels, use RACO 74 Shielded-Arc Electrodes . . . for flat and positioned-fillet welds on these Steels use its companion electrode, RACO 64.

It is only natural that RACO 74 and RACO 64 should give exceptionally good

results because, as with all RACO products, these electrodes are manufactured under the most modern conditions . . . finest quality materials . . . precision equipment . . . constant laboratory tests.

We shall be glad to send samples so that you may know, without cost, how well you will profit by using RACO 74 and RACO 64 henceforth.

CONFORM TO THE FOLLOWING SPECIFICATIONS:

RACO 74 Electrodes conform to the following specifications: A.W.S.-A.S.T.M. Specification A233-42T, Type E-7010; U. S. Navy Specifications 46E2 (INT) Class 1.

RACO 64 Electrodes meet the requirements of the following specifications: A.W.S.-A.S.T.M. Specification A233-42T, Types E-7020 and E-7030, U.S. Navy Specification 46E2 (INT) Class 2.

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It took two flat cars to carry this tremendous rubber-lined storage tank to its important war job. Weighing 35 tons, 11 feet in diameter, 57 feet long, it's completely lined with U. S. Permobond to prevent contamination of contents and corrosion.

Staff engineered by United States Rubber Company, U. S. Permobond Linings have long been compounded of natural rubber to meet requirements of specific jobs. Today our technicians are directing all their energies and years of knowledge to compounding Permopond Linings of synthetic rubber that will give comparable service. They have found certain synthetic rubber compounds to be readily adaptable for linings—also to exhibit excellent properties with respect to chemical resistance, corrosion, water absorption, and to have excellent dielectric and aging qualities.

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EXCELLENT BOND TO METAL. U. S. Permopond Linings are permanently bonded to the metal surfaces. Adhesion tests show that with Permopond Linings of synthetic rubber the bond is comparable to that formerly obtained with natural rubber.



RUBBER-LINED—RUBBER COVERED. This special fabricated pipe section is both lined and covered with Permopond. The new synthetic rubber linings and coverings are readily adaptable to complex shapes as well as all standard equipment such as tanks,

pipe and fittings, valves, etc. Each job is recognized as a separate, specific problem and is given the full attention of a staff of engineers and chemists who work with all five basic types of synthetic rubber and know the properties and characteristics of each

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.

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BONDING METAL PARTICLES

... by heat, without pressure

Study made by Laurence Delisle, research fellow of International Nickel Co. in Department of Powder Metallurgy at Stevens Institute and reported before the Electrochemical Society indicates particle size greatly influences bonding and density of product. In working with iron, copper and silver, finer sizes provide better bond and denser structure; particle shape affects extent of bonding. Cold working powder lowers temperature for bonding

PARTICLES of metal powders have the property of bonding to one another during sintering when they are heated above a certain temperature. The purpose here was to study the effect of various factors on the extent and nature of the bond formed when loosely packed metal powders are heated to different temperatures.

The variables considered have been:

- Temperature.
- Shape of the particles: Spherical and flaky.
- Size of the particles: coarse, medium, fine and blended.
- Metals: iron, copper and silver.
- Crystalline structure of the particles; annealed and cold worked particles.
- Composition: effect of carbon in iron powders.

Raw Materials: A series of specimens was prepared from carbonyl iron and also from electrolytic iron. Carbonyl iron powder particles sinter together easily even at relatively low temperatures. The electrolytic iron powder first used behaved quite differently: Bonding started at a higher temperature and, once started, it proceeded to a lesser degree. Both iron powders were free from the impurities, such as phosphorus, sulphur, slag, found in iron made by ordinary processes. But the two differed in their crystalline structure; their particle size and shape; their carbon, oxygen and hydrogen content. Some or all of these differences are probably responsible for the difference in behavior of the two powders. By modifying the properties of one of the powders so that it would acquire some of the characteristics of the other, we decided it should be possible to obtain similar results with both powders. Following this idea the powders were subjected to different treatments in an effort to give them common properties.

Carbonyl iron particles are made up of very small crystals that are not discernible under the microscope. The electrolytic iron powder which was first used was in an annealed condition and contained much larger crystals. Since the electrolytic iron powder in an annealed condition would be com-

posed of crystals smaller than those of the annealed powder, and in that respect would be more like the carbonyl powder specimens made of the unannealed electrolytic powder.

The particle size of the carbonyl iron powder is much smaller than that of the electrolytic powder. Fine fractions were separated from the original electrolytic powder to test the effect of particle size.

The carbonyl iron particles are spherical while the electrolytic iron particles we used are flaky. Specimens were made of the carbonyl iron powder which had been rendered flaky by ball-milling.

Carbonyl iron contains carbon, prob-

ably in the form of cementite. That impurity is most likely responsible for the cored and speckled appearance of the powder under the microscope. When the powder is heated in hydrogen to 500 degrees Cent. its particles become uniformly white, suggesting that the carbon has disappeared. The carbon probably reacted with the oxygen present in the powder, leaving particles free from oxide which sinter together at their points of contact. If the presence of carbon favors bonding on account of the reducing effect of that element, addition of graphite to electrolytic iron powder might induce bonding of the particles of the latter at the same temperature

Effect of sintering temperature on density. Note tendency to rise, fall and then rise again as sintering temperature is increased

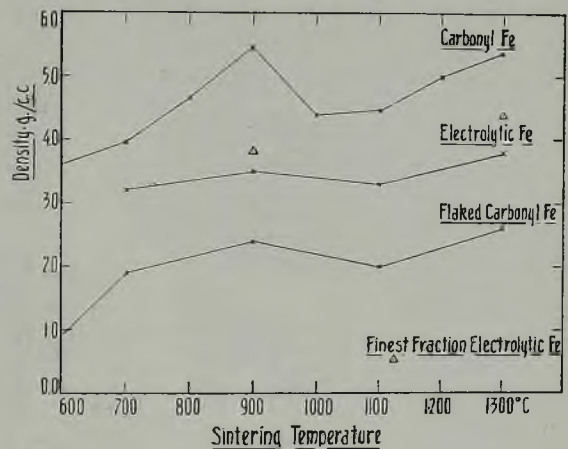
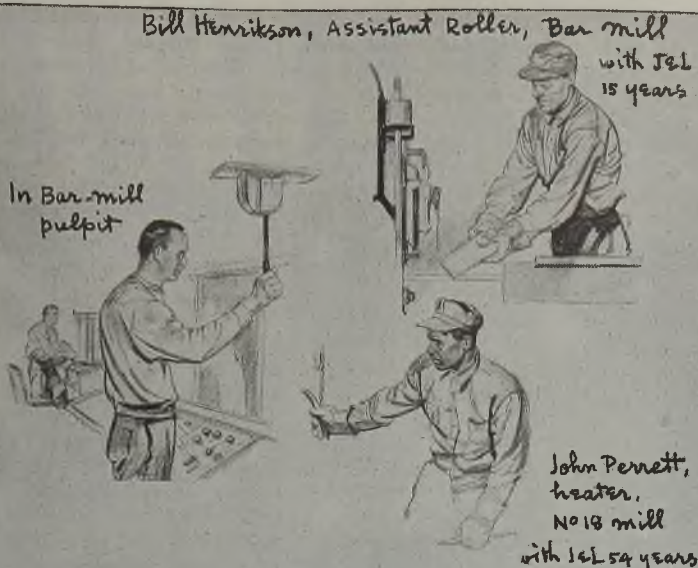


TABLE I—SCREEN ANALYSIS (200 GRAM SAMPLES)

Powder	Fraction	Weight (g.)	Apparent density	
			g./in. ³	g./cc.
Carbonyl Fe			52.4	3.2
Carbonyl Fe, flaked			7.0	0.48
Electrolytic Fe, annealed	+100	1.00		
	-100	+140	23.42	35.9
	-140	+200	42.79	34.9
	-200	+270	26.87	35.2
	-270	+325	23.75	35.2
	-325			39.0	2.4
Electrolytic Fe unannealed	Original powder		39.4	2.4
	+100	0.00		
	-100	+140	4.82	
	-140	+200	22.09	34.6
	-200	+270	30.20	34.9
	-270	+325	46.62	35.3
	-325		95.30	37.0
Original powder			36.9	2.2



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STEEL MILL MUSIC

Steel mill music is a thunderous, rumbling of overtones and undertones in a big, modern rolling mill that blend into a roaring symphony. To a visitor, it is just a deafening noise, but to the skilled crews that operate the mill it has a definite rhythm. If the workmen at their posts hear the faintest dissonance, each man is instantly alert to find out quickly what is causing the discord, as it may signal something amiss. Ears trained by years of listening to steel mill music can spot an off-beat in the great rhythmic noise as quickly as a conductor can spot one in a big orchestra.

World record for steel bars from any bar mill, 44,125 tons in one month, was rolled on the Jones & Laughlin No. 18 mill (see illustration) in January this year, a tribute to highly skilled workmen who operate it, and to J&L engineers who in 1931 pioneered in designing the new type mill.

A deep rose-red glow illuminates rolls, men and interior of this unique J&L 14-inch bar mill as red-hot billets being rolled into rounds, flats, hexagons, squares and special shapes speed through several stands of rolls on their way up and down and across the mill's great expanse (large enough to cover five football fields). This mill is so vast that as many as twelve steel sections are in process at one time — totaling at finish as long as $\frac{1}{2}$ mile — and so fast that time from billet to finished bar is less than two minutes.

Iron works on a flat boat is what the astonished citizenry along the Monongahela River in 1850 saw being pushed by a steamboat down the 60 miles from Brownsville to Pittsburgh. The iron works belonged to twenty-six year old B. F. Jones. He had purchased the plant with his earnings as a partner in a canal boat freight service. Young Jones dismantled his furnaces and mill and transported them to Pittsburgh, foreseeing the development there. This was the beginning of the Jones & Laughlin Steel Corporation, today fourth largest steel producer.

Conestoga freight wagons, and canal boats transported to eastern markets the puddled iron bars, flats, plates, shapes, bands, cold rolled iron bars, and cut nails that in the 1850's were the pioneers of a long line of J&L products to follow.

Stoutly Dutch-built in a valley in eastern Pennsylvania once occupied by Conestoga Indians, the blue and red Conestoga wagons with rakish, overshot canvas tops, were pulled across the rugged trails of the Alleghenies by 4- and 6-horse teams hauling freight.

Stogies, a popular smoke to this day in the Pittsburgh district, were long, thin, black cigars brought west from tobacco plantations in eastern Pennsylvania by Conestoga wagon drivers, who hauled back iron products. These stout smokes were called "Conestogie" cigars, soon shortened to stogies.

ROLLING STEEL FOR WAR YET READY FOR PEACE

Watching the white-hot bars of steel run the course of this modern continuous bar mill—going faster and faster, growing longer and longer—stimulates pride in war steel production in America and gives assurance of an abundance of steel for use in a world at peace.

For this unique J&L bar mill—as well as other bar mills throughout the industry — is as adaptable as steel itself; the strongest, most versatile metal. Without change of pace, the rhythm of its rolling took up the song of steel in battle: steel for planes, tanks, shells, ships and guns.

At war's end these mills will keep on rolling steel—without pause for conversion — steel bars for automobiles, for railroads, for industry, for farms — new and better steels for daily living and employment.

**JONES & LAUGHLIN
STEEL CORPORATION**

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR



as sintering takes place with carbonyl iron powder, although carbon would be in a different form in the two powders. Different proportions of graphite were added to fine fractions of electrolytic iron powder to test the effect of the reducing action of carbon on the temperature at which sintering begins.

Grain growth probably favors bonding. Grain growth can be induced in a metal by heating after severe cold working. Annealed electrolytic iron powder was severely cold worked so that grain growth would occur at a low temperature and specimens were made with that powder in an effort to determine the effect of grain growth on bonding.

Procedure, Sieving: The carbonyl iron powders were used as they were supplied. Screen analyses of the annealed and unannealed electrolytic powders were carried out on 200-gram samples. The fraction of the electrolytic iron powder passing through the 325-mesh screen was separated into two portions in a Federal classifier which operates by means of air currents subjecting the powder to centrifugal action. Different settings of the classifier were tried and the fractions obtained were examined

microscopically. Experimenting was continued until a setting was found that permitted the separation of a fraction containing particles practically all exceeding 20 to 25 microns in size. The remaining powder was made up mostly of particles ranging between a few and 25 microns with only a small proportion of particles coarser than 25 microns.

Apparent densities were determined with a Scott volumeter.

Mixing: Specimens were made of the finest fraction of annealed electrolytic iron to which 0.1 and 0.5 per cent Dixon graphite was added. Mixing was carried out in a rotating glass jar for 2 hours. The jar had been fitted with an iron coil to prevent agglomeration of the powder particles and to insure a more thorough mixing.

Cold Working: The annealed electrolytic powder was ball-milled for 15 hours and examined microscopically. It showed only a trace of cold working in the form of a few flow lines. Thin layers of the powder were then pressed between steel blocks in an endeavor to cold-work the particles. It is difficult to evaluate the pressure applied as the area

on which it was exerted was not completely covered with powder, but, it probably varied between 30 and 70 tons per square inch (42 and 98 kilograms per square millimeter). Microscopic examination showed that the particles had become flatter and had spread in two directions, that is, they had flowed under the application of pressure and had therefore been cold-worked.

Preparation of the Specimens: A fixed weight of the powders was poured in zircofrax or silica boats which were tamped lightly in order that the surface of the powder be fairly level. We thus tried to have the powder packed in the same manner for all the samples made of the same material. The boats were placed in a tubular electric resistance furnace in an atmosphere of dry hydrogen. They were heated to the sintering temperature, kept at this temperature for 3 hours, cooled in hydrogen.

Microscopic Examination: Pieces were sawed off from the specimens for microscopic examination. The samples from the more fragile specimens were soaked in sodium silicate for 24 hours, dried and mounted also in sodium silicate. Pieces cut from the mechanically stronger specimens were mounted in bakelite. For each specimen three sections at right angles were mounted. The mounted samples were polished and etched with 1 per cent nital.

Physical Tests: The remaining portions of the carbonyl iron specimens were shaped on a milling machine to give them rectangular faces. The density of the test pieces thus made was determined from their dimensions and weight. We had planned to measure the strength of these pieces by transverse testing. However, the specimens to which the test was applied were so ductile that they deformed without breaking under the application of the load and no satisfactory reading could be obtained. Nevertheless the test revealed an important property of the specimens, namely, ductility.

The electrolytic iron specimens were not shaped as above. Test pieces were cut from them for density determinations. They were weighed, then soaked in a metal varnish, dried, and weighed again in air and in distilled water. The varnish forms a very thin film on the surface of the specimens which has no appreciable thickness. The difference between the weights of the coated specimens in air and in water is therefore a measure of the volume of the specimens. From this volume and the weight of the uncoated specimens, the density can be computed.

Carbonyl Iron: In all cases the particles sintered together and the powder formed molded pieces. However, the specimens sintered at 300, 400 and 500 degrees Cent. were extremely fragile and could not be shaped into regular forms for testing.

Microscopic examination of the specimens resulted in the following observations:

(Please turn to Page 154)

TABLE II—APPARENT DENSITIES

Specimen Number	Powder	Sintering Temperature °C.	Density g./cc.
12	Carbonyl Fe	300	Too fragile to be machined
11	Carbonyl Fe	400	
3	Carbonyl Fe	500	
4a	Carbonyl Fe	600	3.6
4b	Carbonyl Fe	600	3.6
5a	Carbonyl Fe	700	4.0
5b	Carbonyl Fe	700	3.9
6a	Carbonyl Fe	800	4.5
6b	Carbonyl Fe	800	4.8
8a	Carbonyl Fe	900	5.5
8b	Carbonyl Fe	900	5.4
9	Carbonyl Fe	1,000	4.4
10a	Carbonyl Fe	1,100	4.4
10b	Carbonyl Fe	1,100	4.5
13a	Carbonyl Fe	1,200	5.0
13b	Carbonyl Fe	1,200	5.0
14	Carbonyl Fe	1,300	5.3
17	Electrolytic Fe, annealed	500	Too fragile to be handled
16	Electrolytic Fe, annealed	700	3.2
18	Electrolytic Fe, annealed	900	3.5
19	Electrolytic Fe, annealed	1,100	3.3
20	Electrolytic Fe, annealed	1,300	3.8
22	Electrolytic Fe, unannealed	700	3.1
21	Electrolytic Fe, unannealed	1,100	3.3
23	Electrolytic Fe, annealed finest fraction	900	3.8
24	Electrolytic Fe, annealed finest fraction	1,300	4.4
28	Electrolytic Fe, annealed finest fraction plus 0.1% C.	600	3.3
42	Electrolytic Fe, annealed, finest fraction plus 0.5% C.	500	Too fragile to be handled
	Electrolytic Fe, annealed, finest fraction plus 0.5% C.	700	3.5
39	Electrolytic Fe, cold worked	700	3.4
49	Carbonyl Fe, flaked	600	0.9
48	Carbonyl Fe, flaked	700	1.9
51	Carbonyl Fe, flaked	900	2.4
52	Carbonyl Fe, flaked	1,100	2.0
53	Carbonyl Fe, flaked	1,300	2.6

TABLE III—EFFECT OF PARTICLE SHAPE ON SHRINKAGE

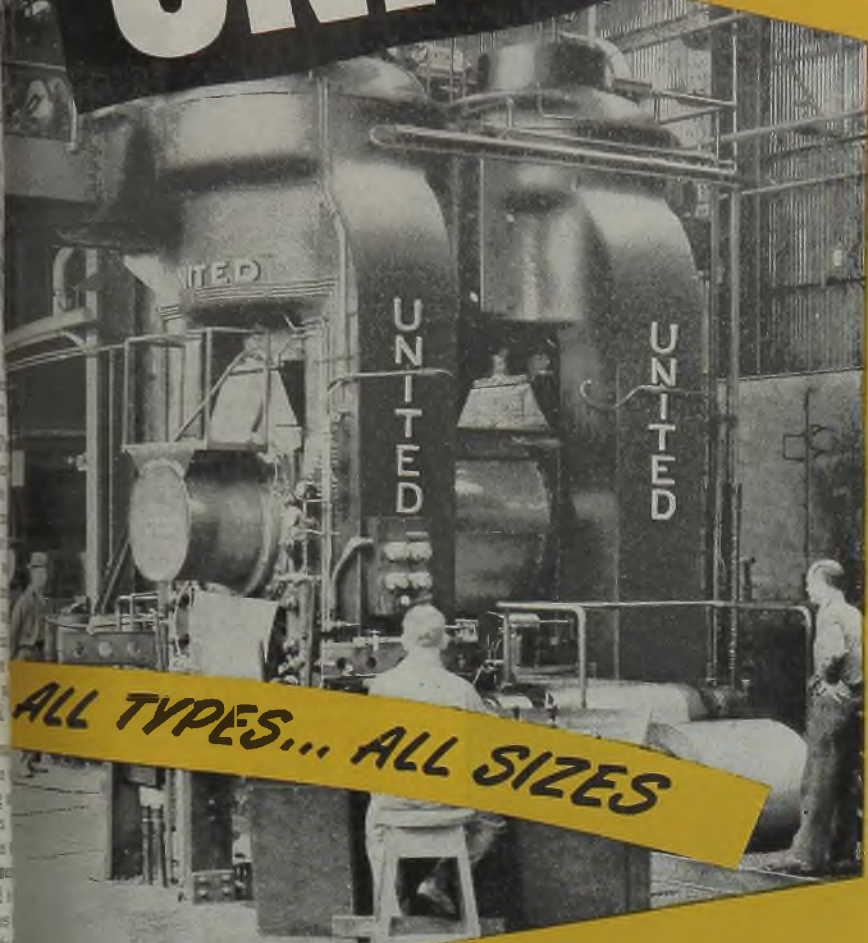
Apparent Density g./cc.	Carbonyl Fe original powder			Electrolytic iron		Carbonyl Fe flaked 0.4
	S. D.*	S. D./S. D.*	S. D.	S. D./A. D.	S. D.	
Temp.						S. D./A. D.
600° C.	3.6	1.1			0.9	2.1
700°	4.0	1.3	3.2	1.3	1.9	4.4
900°	5.5	1.7	3.5	1.5	2.4	5.6
1,100°	4.5	1.4	3.3	1.4	2.0	4.7
1,300°	5.3	1.7	3.3	1.6	2.6	6.1

* S. D. density of the specimen sintered at the temperature indicated.

A. D. apparent density of the unsintered powder. S. D./A. D. ratio of two densities.

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Cold Strip Mills



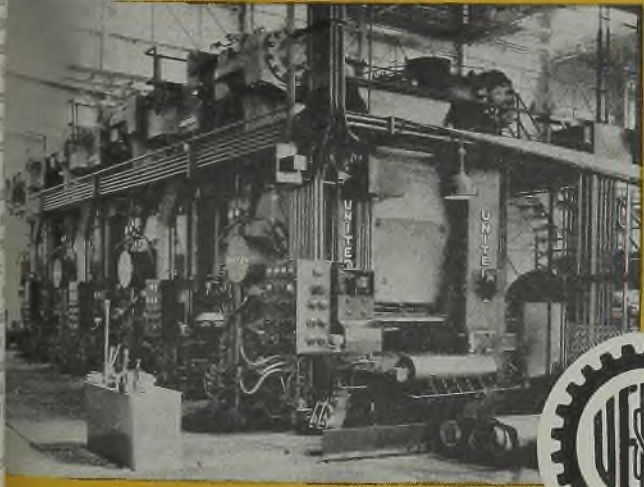
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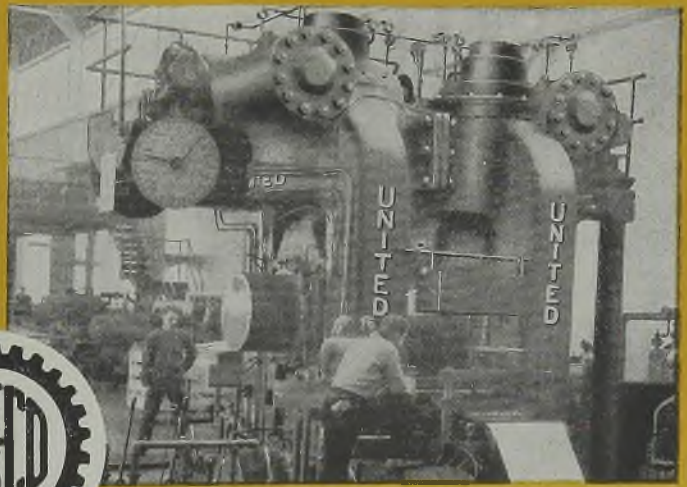
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*Coating Compounds Contribute
to Increased Production in...*

DRAWING WIRE

Wire baking operation for prevention of hydrogen embrittlement of metal is unnecessary when coils are subjected to boiling coating solution. Ability of compounds to adhere to the surface of the base metal is more important than the thickness of the film. Resume of some performances of coating compounds at wire mills and cold-drawn tube shops are presented in detail

ABOUT two years ago it was pointed out that coating compounds had been applied successfully only to ferrous wires, but that within the near future the more difficultly-drawable alloy wires would be successfully subjected to coating compound treatment. Today many alloy wires are being drawn more efficiently

and economically through the use of some type of coating compound.

By a coating compound, in the commonly accepted sense of the word, is meant a uniformly well-balanced and completely homogeneous blend of several ingredients (usually powdered in form) which, for ease of application, shall be

completely and instantly soluble in either hot or cold water. This compound shall be applied by either spraying on a wire coil or coils, or dipping the entire coil or coils into the coating compound solution. This wire-coating operation installed easily in any cleaning house setup, the only equipment necessary being an additional metal (preferred) wooden tub, and heated by either open or closed (preferred) steam coils.

The functions of an efficient coating compound are several, among which the following are the most important:

1. The coating compound acts in itself as a lubricant and also as a base carrying-agent for whatever lubricant, either wet or dry, which may be applied to the wire for subsequent drawing.

2. The coating compound, in the case of ferrous wires, can successfully replace the lengthy and, hence, costly sulphate operation still employed in many mills. A Philadelphia wire mill, specializing the drawing and production of high carbon shapes for lock-washer stock, formerly consumed as high as 60 minutes (with a working average of 45 minutes) of valuable time in building up a sulphate on the wire. Its method of intermittently water spraying the coils while subjecting them to air-oxidation was supplanted by simply dipping them for a minute or so in a tub of the coating compound and then proceeding with the wire-drawing operation. The time and expense of handling thus saved will go far toward reducing the final cost of a ton of finished rods.

3. The coating compound, in the case of ferrous wires, acts as an excellent rust-inhibitor and the film applied to the wire by the coating compound will prohibit completely the formation of rust for periods up to as long as 3 months by actual mill-practice test. One of the country's largest producers of rope wire commissioned a coating compound to prevent the rusting of coiled bundles of wire during storage. Conditions were deliberately made adverse. Coils were stacked in a shed, open on four sides with merely a roof as partial protection against the elements. This 3 month testing period was the wettest of the year and yet no rust was apparent at the conclusion of the test.

4. The coating compound, which for utmost efficiency should contain an extremely active wetting agent, is thus better able to penetrate deeper into the pores of the metal than the actual pic-



Fig. 1—Operator of a single-draft wire drawing machine using a micrometer to check the diameter of wire leaving die box