

National Tube's first piercing machine works on hot steel billet for "Big Inch." Page 64

# STEEL

The Magazine of Metalworking and Metalproducing

## SEPTEMBER 13, 1943

Volume 113

Number 11

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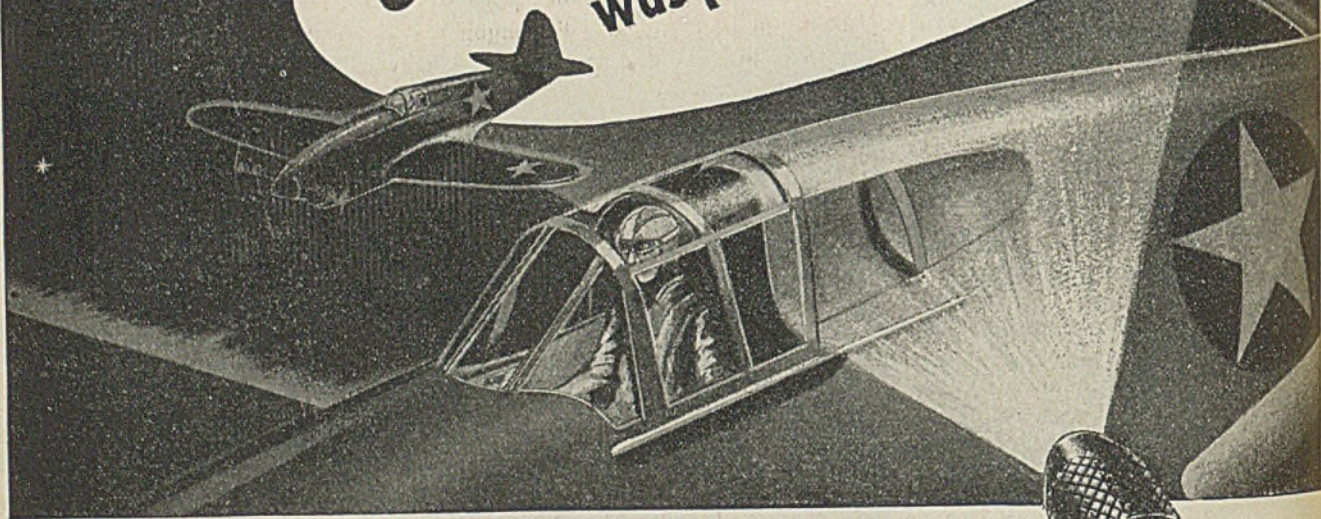
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**COCKPIT LIGHTING**  
 was put "ON THE BEAM"...



## thanks to Graybar's Procurement Know-How!

Reports from the fighting fronts, reaching a builder of one of America's pursuit ships, showed the need for a change in the cockpit lighting fixture, a small item, but one of vital importance in emergencies.

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## Destiny Waits on Congress

Members of the seventy-eighth Congress will reassemble Sept. 14, after a summer recess which afforded most of them ample opportunity to consult their constituents. Presumably the legislators go back to their Washington desks with a fair idea of what the home folks think about the way their government is being administered.

Also, they go back to problems of extreme importance. In the opening weeks of this session they will consider renegotiation of contracts, manpower problems and the possibility of a compulsory job allotment law, revision of patent office policies, termination of war contracts, problems of small business, economy in government expenditures, postwar planning, price controls, rationing, drafting of fathers for military service, taxes for individuals and corporations, labor relations problems, food production and distribution, subsidies or similar expedients, and numerous other matters of importance.

In many respects the agenda of Congress is the broadest and the most important in the history of the nation. The decisions of our lawmakers on many of the current issues not only will affect the conduct of the war and the drafting of peace terms, but they also will influence in a considerable degree the character of the nation's postwar economy. The very fact that Italy's unconditional surrender was announced less than a week before Congress reassembled should make every member sharply conscious of the postwar implications of his votes.

The agenda of Congress also is unusual in the extent to which so many of the issues to be debated have a direct bearing upon the future of American industry. High up on the list of legislation scheduled for early consideration are bills which will go a long way toward determining the status of private enterprise during the exciting decade ahead.

In view of the big stake which business has in the deliberations of this Congress, it is somewhat reassuring to reflect that in recent months the major trend in Washington has been definitely toward a better understanding of and a more sympathetic attitude toward the problems of business. The swing in Washington thinking and action has been from left to right.

If, as we firmly believe, this feeling on the part of most congressmen was further strengthened by their recent visits with their constituents, then we may expect legislation which in the main will be more beneficial to private enterprise than were many of the laws of the past decade.

---

**STRAIN BEGINS TO SHOW:** As an ex-railroader this writer has a wholesome respect for the superstition that train wrecks occur in series of threes. Following the accident to the Lackawanna Limited on Aug. 31, it was only natural to anticipate two more bad wrecks. The derailment of the Advance Congressional Limited on Sept. 6 was No. 2 and the wreck of the eastbound Twentieth Century Limited on Sept. 7 was No. 3.

Of course, these accidents to famous name limiteds were not the only wrecks during the 8-day

periods. Others, less serious, occurred on the Long Island, Erie, Pennsylvania, R. F. & P. and other roads. Scores of minor railroad mishaps occur which do not get front page publicity.

This prevalence of wrecks is not surprising. Considering the speed and volume of traffic, the condition of equipment and the problems of personnel, it is amazing that the roads have not had more disasters.

It now seems certain that in evolving our wartime domestic economy we have cut our allotment of ma-

terials and equipment to the railroads too drastically. We have ridden our luck too far. The roads should have more rails, cars and locomotives and replacement materials and parts immediately. —p. 67

**A STITCH IN TIME . . . :** Labor shortages are becoming so serious that the government is taking drastic measures to deal with them. Conditions on the West Coast are acute, especially in San Diego, Los Angeles, San Francisco, Portland and Seattle. It is estimated that 260,000 more workers are needed immediately in the aircraft plants and shipyards in these areas.

Government officials hope to ease the situation by means of the Buffalo plan, which combines controlled hiring with the balancing of production programs with labor supply. In some districts, this proposed remedy almost certainly will entail the moving of some plant operations to other localities.

It is hard to correct a manpower shortage once it has reached an acute stage. By acting promptly, local authorities in some eastern districts may yet avoid the difficulties now faced in the Far West. —p. 66

**SHIFT IN ALLOY STEEL:** A curious combination of the factors of supply and demand has caused WPB officials to appeal to the steel industry to shift alloy steel production from open-hearth to electric furnaces so as to release more open-hearth capacity for carbon steel.

The reasons for this request are, first, that electric furnace capacity has been increased so much in the past year that a substantial proportion of the steel of alloy grades now being made in open hearths can be accommodated in the electrics, and secondly, the demand for carbon steel exceeds the supply and the open-hearth capacity released by the shift of alloy steel can be utilized to good effect.

This move is so clearly a step toward a more effective use of facilities that producers and consumers will wish to co-operate as fully as possible. —p. 68

**MORE HARM THAN GOOD:** Now that the effect of the Truman committee's indictment of operations of the Wright Aeronautical Corp. plant at Lockland, O., can be viewed in retrospect, it is apparent that the committee's action did more harm than good.

In publicly reflecting upon the ability and integrity of one of the oldest builders of aircraft engines and of the Army Air Force, the committee has forced

officials and inspectors in numerous war plants to be super-cautious—or rather, to refuse to take responsibilities which in wartime are necessary if a high rate of production is to be maintained. The net result is that parts are rejected unnecessarily and that output has fallen off appreciably.

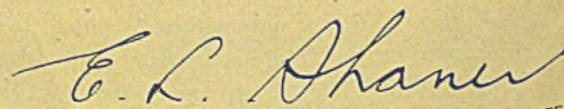
The question raised by this episode is not whether or not congressional investigating committees should investigate. Much good can come from investigations properly conducted. The pertinent question is how the committee interprets and utilizes the findings of its investigations. On this score, the Truman committee bungled badly in the Lockland case. —p. 82

**DRILLING SMALL HOLES:** A few years ago a young man working in the rayon industry became interested in the problem of drilling small holes in rayon fiber spinnerets. He knew that twist drills as small as 0.013 inch in diameter and Swiss drills down to 0.006 inch were obtainable, but he was seeking something of even smaller diameter.

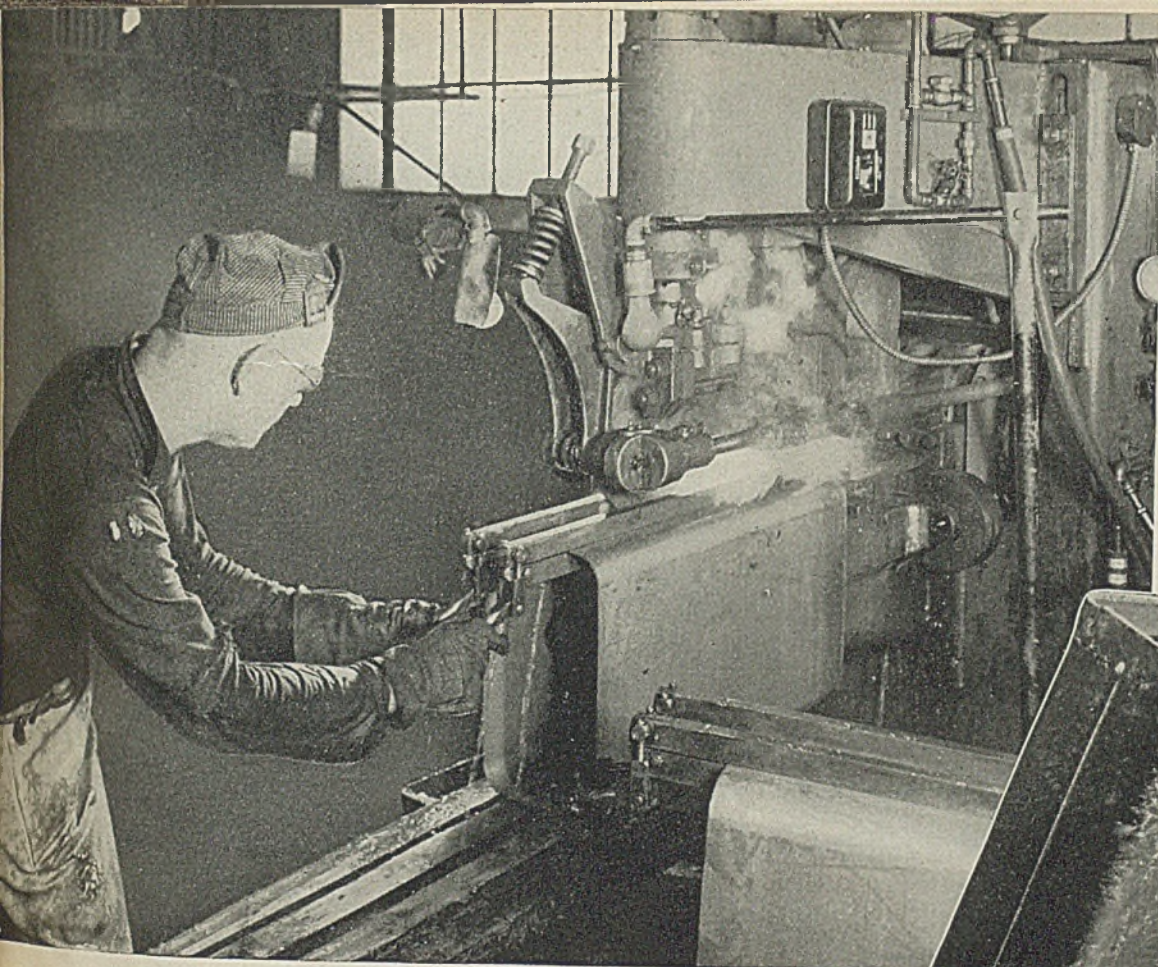
At first, working evenings in his bedroom, he experimented with the making of microscopic drills and other tools. As the work progressed, he moved his equipment to the family garage and engaged the services of two assistants. A year ago, his operations were transferred to a two-story building and his company now is manufacturing drills, reamers, countersinks and other tools of microscopic size on a full-fledged commercial basis.

Right now the chief demand for these tools is for drilling holes in injection nozzles for diesel engines and for machining parts for aircraft instruments. While most of the drills now being made are 0.0065-inch in diameter or larger, it is possible to make drills as small as 0.003-inch.

The availability of drills of microscopic dimensions means much to the war effort. Smaller holes in diesel engine nozzles increase horsepower and conserve fuel. After the war, microscopic tools probably will solve new peacetime machining problems. —p. 98

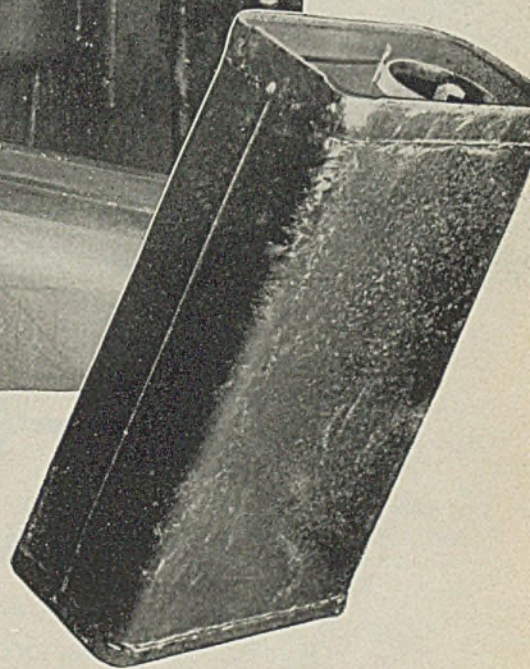


EDITOR-IN-CHIEF



*Longitudinal boom seams are secured before resistance welding.*

*Powder boxes must keep a fighting ship's powder dry.*



## How the Navy Keeps Its Powder Dry

Stored deep in the holds of Allied fighting ships are water-tight boxes—each containing 100 lbs. of powder. These powder boxes must withstand hard usage, stack easily and keep precious powder in condition for instant use by our fighting men. Thousands have been made of Inland hot-rolled pickled and oiled sheets.

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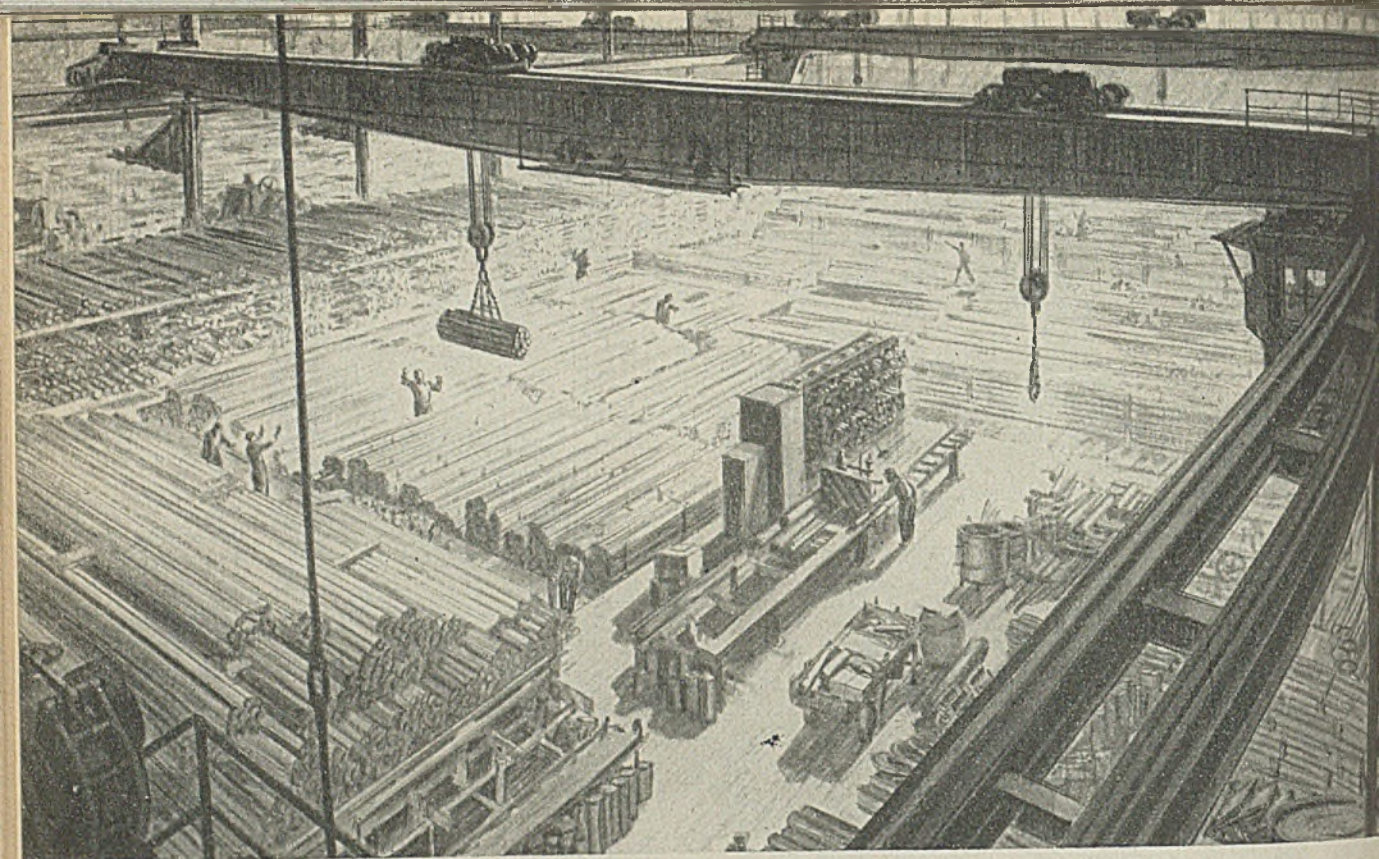
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# Wrecks Emphasize Equipment Need

*Wave of mishaps may necessitate reconsideration of steel allotments. Car program now calls for 30,000 units for domestic use during next three quarters*

of them. In peak seasons the WMC will aid the WFA in obtaining prisoners of war and foreign labor (Mexican) to aid in harvesting. Deferments granted farm labor will be checked.

10. Selective Service withdrawals from rated establishments will be related to employment ceilings and replacement possibilities, with adequate consideration for deferment of the key worker.

Registrants in critical occupations will receive "full consideration if they are working in high priority establishments." If they are not working in such establishments, but are qualified for such work, they will be referred to USES for placement when called by their local boards.

11. WMC will conduct campaigns not only to impress the war workers with the importance of their roles, but in an effort to convince the cities concerned with the important part they are playing in the war effort.

## Steel Earnings Down 8 Per Cent in First Half 1943

Earnings of steel companies in the first half of this year dropped 8 per cent below the corresponding period last year, and were 40 per cent less than earnings in a representative peacetime year such as 1937, according to the American Iron and Steel Institute.

In the six months net earnings of a group of companies representing 90 per cent of the industry's capacity totaled \$94,522,000 after all charges and before dividends. In the corresponding 1942 period substantially the same group of companies earned a total of \$102,743,000 and in 1937 the corresponding figure was \$159,054,000. Indicated return on investment in the first half was 4.9 per cent per year as against 5.3 per cent a year ago.

Sharp increase in payrolls was the major factor for the decline in earnings. For the first six months aggregate payments of reporting companies amounted to \$1,236,485,000, almost 30 per cent more than the total of \$969,955,000 distributed in the first half of 1942.

Taxes provided by the companies in the first half amounted to \$335,178,000, somewhat less than tax provision in the corresponding period of 1942. Dividends paid stockholders amounted to \$69,372,000 against \$72,846,000 a year ago.

## Instrument Makers Oppose Cut in Preference Rating

Proposed reduction in priority ratings for key components of industrial instruments would be detrimental to the industry, members of the Industrial Instrument Advisory committee agreed at a meeting with representatives of War Production Board in Washington recently. The proposed basic rating assigned to industrial instruments is AA-2X.

EXCESSIVE use of worn and inadequate equipment coupled with human laxity under wartime tension has contributed heavily to the recent wave of rail accidents in the opinion of many railroad and steel officials.

Four major factors are believed to have contributed to the wrecks: (1) Inadequate allotments of steel and other materials for equipment; (2) excessive use of equipment to handle the heaviest traffic load on record; (3) inadequate repair and maintenance because of the press of traffic; (4) inadequate and inexperienced manpower.

In many quarters it is thought that the wrecks, especially the Pennsylvania and New York Central tragedies, may lead to a reconsideration of steel allotments to the carriers to prevent further catastrophes.

The prevalence of wrecks was not surprising to railroad officials and steel men. As early as last spring, Joseph B. Eastman, director of the Office of Defense Transportation, warned a House appropriations committee that transportation equipment was being driven so hard and that so few replacements were available that it was quite possible that the entire system might collapse "like the one-horse shay".

Last week he warned that the carriers are facing a manpower shortage and now are getting many "green hands."

Shirley N. Mills, safety director for the Interstate Commerce Commission, reported that 8209 rail accidents occurred during the first six months of 1943, a 30 per cent increase over the comparable 1942 period. This was attributed to the fact that more and longer trains are being operated at greater speeds.

War Production Board officials have recognized this situation to some extent by liberalizing allotments of materials for car and locomotive programs. A large amount of the new equipment, however, is for export.

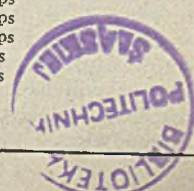
The domestic carbuilding program for the fourth quarter and the first two quarters of 1944 at present calls for about 10,000 cars a quarter. In addition the Army and lend-lease are ordering about 40,000 units. The bulk of the Army cars, which include 7600 56-ton flat cars for Russia, are to be delivered during the fourth quarter and first three months of next year.

Domestic car awards so far this year have lagged behind previous recent years. For the first eight months, awards were only 16,992, compared with 24,030 in the first eight months of 1942 and 103,902 in the comparable 1941 period.

Carbuilders are not at all certain where the steel for the new units is coming from. On plates, sheets and bars, mills generally are booked through the remainder of the year.

## Fourth Quarter Domestic Car Allocation

Chicago & Alton	500 hopper	American Car & Foundry Co.
Chicago & Alton	500 box	Pullman-Standard Car Mfg. Co.
Atchison, Topka & Santa Fe	400 box	Pullman-Standard Car Mfg. Co.
Baltimore & Ohio	150 hopper	Bethlehem Steel Co.
Central of Georgia	150 box	Pullman-Standard Car Mfg. Co.
Chesapeake & Ohio	620 hopper	American Car & Foundry Co.
Chicago & North Western	250 flat	Pullman-Standard Car Mfg. Co.
Chicago, Burlington & Quincy	600 hopper	Company shops
Chicago & North Western	100 flat	Pullman-Standard Car Mfg. Co.
Chicago, Milwaukee, St. Paul & Pacific	200 box	Company shops
Chicago, Milwaukee, St. Paul & Pacific	400 hopper	Company shops
Clinchfield	300 hopper	American Car & Foundry Co.
Denver & Rio Grande Western	500 gondola	Pressed Steel Car Co.
Great Northern	500 box	Company shops
Illinois Central	300 hopper	Company shops
Indiana Harbor Belt	575 box	Despatch shops
Lehigh Valley	250 gondola	Bethlehem Steel Co.
Lehigh Valley	400 hopper	Bethlehem Steel Co.
Midland Valley	25 hopper	American Car & Foundry Co.
Missouri Pacific	550 hopper	American Car & Foundry Co.
Norfolk & Western	500 hopper	Bethlehem Steel Co.
Norfolk & Western	500 hopper	Virginia Bridge & Iron Co.
Reading	600 hopper	Company shops
St. Louis Southwestern	200 box	Company shops
St. Louis-San Francisco	100 box	Company shops
Virginia Railway	600 hopper	Company shops
Wabash	175 box	Company shops
Wabash	50 gondola	Company shops
Wabash	25 hopper	Company shops
Ann Arbor	25 box	Wabash shops
New Jersey, Indiana & Illinois	50 box	Wabash shops
Total	9645	



# Switch to Electric Steel Sought To Release Open Hearth Capacity

*War Production Board directs greater alloy steel load to electric furnaces in move to utilize more open hearths in production of carbon steel, requirements for which now are in excess of supply*

STEEL buyers are being urged to use electric furnace alloy steel instead of the open hearth variety, to release open hearth capacity for production of carbon steel, for which requirements are in excess of supply.

The Steel Division, War Production Board, has begun to work out with claimant agencies and producers means for effectuating this changeover.

In an appeal to the steel industry last week, John T. Whiting, director, Steel Division, pointed out that electric furnace capacity has been so greatly increased this year a large proportion of alloy steel now produced in open-hearth furnaces can be switched to electric furnaces. Electric furnace capacity has jumped from 150,000 tons a month in 1940 to 328,000 tons this July. By the end of this year, the estimated monthly capacity will be 471,000 tons, Mr. Whiting pointed out.

"Electric furnace alloy steel ingot capacity was approximately 150,000 tons per month when the heavy demands for this product came with the beginning of the defense program in 1940," said Mr. Whiting. "Planes, munitions and other material of modern warfare require the use of alloy steel to meet the most exacting specifications and many contractors and subcontractors preferred and specified electric furnace steels. It soon became clear that the capacity for this steel was far short of meeting the projected requirements of the armed services.

"The problem was attacked vigorously from two directions. A great expansion program was launched to provide additional electric furnace facilities to meet the growing demands of the war program. At the same time, an industry-wide and extensive metallurgical campaign was undertaken, in collaboration with the armed services, to develop suitable alloy steels which could be made in open-hearth furnaces and which would use a minimum amount of critical alloys. These steels were designed to supplement the electric furnace alloy steels until such time as the new electric alloy steel capacity could be installed.

"In 1942 the expansion program permitted an average monthly production of 276,000 tons of electric furnace alloy steel ingots, and 328,000 tons in July of this year. The program will be completed by the end of 1943 and then the monthly capacity will be 471,000 tons. Thus, we will have tripled our electric furnace alloy steel capacity in a period of three years.

"Concurrently production of alloy steel in open-hearth furnaces was increased at a rapid rate. The average monthly production for this grade of steel in 1940 was 306,000 tons; in 1942 it was 664,000 tons, reaching a peak production in March of this year of 934,000 tons.

"All the electric furnace capacity of the country must be used for producing a large part of the alloy steel now being melted in open-hearth furnaces so that the open-hearth furnace capacity so released can be used to produce increased tonnages of carbon steel. This will aid substantially in meeting the carbon steel requirements of the claimant agencies. These requirements are now well in excess of the supply. I realize that these tonnages will dislocate certain existing arrangements and cause some difficulties.

## New Technical Groups Appointed

*American Iron and Steel Institute seeks to improve production practice to end output will be increased without adding to existing facilities*

FOR the purpose of developing ways and means for increasing steel production without adding to existing facilities, four additional technical committees have been named by the Committee on Manufacturing Problems of the American Iron and Steel Institute.

Such problems as how to improve the yield per heat of finished product, how to reduce time in producing open hearth and electric steel and how to better coke oven production in such a way as to improve blast furnace practice and thus obtain more tons of pig iron and, in turn, more tons of steel, are on the agenda for discussion by these committees.

The four technical committees are on blast furnace practice, coke oven practice, electric furnace steelmaking and open-hearth steelmaking, respectively. H. W. Johnson, Inland Steel Co., Chicago, is chairman of the blast furnace committee. Other members are: B. C. Butler, Pittsburgh Steel Co.; Harold Cope, American Steel & Wire Co.; J. S. Ferguson, American Rolling Mill Co.; R. A. Field, Jones & Laughlin Steel Corp.; G. W. Hewitt, Wheeling Steel Corp.; C. F. Hoffman, Bethlehem Steel Co.; and T. H. Kennedy, National Tube Co.

### PEAK PAYROLLS

Monthly payrolls of the steel industry climbed to a new peak during July, totaling \$142,769,000, more than five million dollars above the previous peak of \$137,404,000 paid out in May, according to the American Iron and Steel Institute.

Steel employment continued to decline during July, total employes during the month being 627,000, compared with 631,000 in June and 655,000 in July, 1942.

Wage-earning employes averaged 115.5 cents per hour in July, highest on record.

Wage earners worked an average of 43.5 hours per week in July against 43.3 hours in June and 38.4 hours in July, 1942.

"The reversion from open-hearth to electric furnace alloy is so clearly in the best interest of the overall war program and essential to the fullest utilization of steel producing facilities, that I urge all steel consumers and producers to co-operate to the fullest extent possible."

Also R. A. Lindgren, Wisconsin Steel Co.; C. E. Mathis, Interlake Iron Corp.; H. E. McDonnell, Weirton Steel Co.; J. H. Slater, Republic Steel Corp.; H. A. Strain, Carnegie-Illinois Steel Corp.; B. M. Stubblefield, Youngstown Sheet & Tube Co.; and I. F. Wolfgram, Alan Wood Steel Co.

The coke oven committee is headed by R. W. Campbell, Jones & Laughlin Steel Corp., Pittsburgh. Other members are: Harold Cope, American Steel & Wire Co.; E. G. Cox, Tennessee Coal, Iron & Railroad Co.; E. J. Gardner, Inland Steel Co.; L. A. Kraemer, Pittsburgh Steel Co.; E. A. Lee, National Tube Co.; P. C. Mayfield, Alan Wood Steel Co.; H. E. McDonnell, Weirton Steel Co.; H. A. Strain, Carnegie-Illinois Steel Corp.; B. M. Stubblefield, The Youngstown Sheet & Tube Co.; C. E. Underwood, Bethlehem Steel Co.; J. W. Unroe, Wheeling Steel Corp.; M. D. Wald, Republic Steel Corp.; and Frank Wilkes, The American Rolling Mill Co.

S. D. Gladding, Bethlehem Steel Co., Bethlehem, Pa., is chairman of the electric furnace committee. Other members are: W. J. Beuchling, Couverweld Steel Co.; Wilbur Bischoff, Timken Steel & Tube Division, The Timken Roller Bear-



ing Co.; H. A. Darlington, The Youngstown Sheet & Tube Co.; B. H. DeLong, Carpenter Steel Co.; and L. L. Ferrall, Rotary Electric Steel Co.

Also C. R. FonDersmith, The American Rolling Mill Co.; H. W. McQuaid, Republic Steel Corp.; C. A. Scharschu, Allegheny Ludlum Steel Corp.; A. L. Sonnhalter, Crucible Steel Co. of America; and F. L. Toy, Carnegie-Illinois Steel Corp.

Heading the open hearth committee is E. A. Schwartz, Republic Steel Corp., Cleveland. Other committee members are: E. D. Buchanan, National Tubing Co.; C. Denlinger, Bethlehem Steel Co.; R. C. FonDersmith, The American Rolling Mill Co.; A. F. Franz, Alaf Wood Steel Co.; C. A. Kellogg, Continental Steel Corp.; and W. C. Kitts, Pittsburgh Steel Co.

Also L. A. Lambing, Jones & Laughlin Steel Corp.; J. H. McElhinney, Wheeling Steel Corp.; A. P. Miller, Inland Steel Co.; S. M. Newbrander, Weirton Steel Co.; E. H. Schwartz, Wisconsin Steel Co.; A. L. Sonnhalter, Crucible Steel Co. of America; F. L. Toy, Carnegie-Illinois Steel Corp.; C. E. Williams, American Steel & Wire Co.; and W. H. Yeckley, Youngstown Sheet & Tube Co.

### Shipyards Deliver 164 New Cargo Vessels in August

The Maritime Commission last week announced the nation's shipyards delivered 164 cargo vessels totaling 1,697,400 deadweight tons during August. Since Pearl Harbor American shipyards now have delivered nearly 18,000,000 deadweight tons of shipping and an additional 9,000,000 tons probably will be delivered by January, 1944.

Contracts for construction of 156 additional vessels were announced last week. Eighty-six new type small cargo vessels will be built by six companies on the Great Lakes and West Coast. Known as the CI-M-AV1, the vessel is 320 feet long, diesel propelled, and about 4000 ton. Contracts also were awarded for

friction between Secretary of the Treasury Morgenthau and the Joint Committee on Internal Revenue Taxation. The latter, directed by Colin Stamm and supported by congressional tax leaders, has been insisting it be supplied information by the Bureau of Internal Revenue while Morgenthau insists that all information be funneled through him. Congress, still resentful over the Treasury's attitude during the Ruml plan debates, may use its subpoena powers to obtain the desired information, and the feud may develop into a first-class Washington mess.

In addition to acting on postwar plans to assist the domestic economy, Congress also can be expected to give serious consideration to our postwar relations with other countries, particularly in regard to trade and military considerations.

construction of 70 vessels including six C-type and 64 special type by the Maritime Commission.

### August Steel Production Tops That During July

Steel ingot production in August totaled 7,562,125 net tons, according to American Iron and Steel Institute. This is an increase of 185,892 tons over July output but is short of the all-time peak of 7,670,187 tons produced in March this year.

Open-hearth steel output during the month was 6,669,944 tons, 98.3 per cent of capacity; bessemer, 484,957 tons, 94 per cent of capacity; electric steel, 407,224 tons, 97.1 per cent of capacity. For the industry as a whole output amounted to 97.9 per cent of capacity.

Calculated weekly output for the month was 1,707,026, there being 4.43 weeks in the period.

Owing to new capacity figures as of July 1, percentages have been revised showing open-hearth steel output in that month at 96.2 per cent of capacity, bessemer at 90.6 per cent, electric steel, 94 per cent and total for the industry, 95.7 per cent.

## Steel Output at New Peak Level

*Ingot operating rate up half point to 99.5 per cent; on tonnage basis output sets new record*

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week advanced one-half point to 99.5 per cent of capacity; year ago the national rate was 98 per cent; two years ago 96.5 per cent.

Ingot production last week slightly exceeded 100 per cent figured on basis of theoretical open-hearth plant capacities, which takes into account a factor for necessary furnace repairs. STEEL's compilation is based on the number of open-hearth units in operation, and weighted in relation to their size. On a tonnage basis output last week established a new all-time record.

Chicago and Youngstown were the only steel centers to record a decline last week; gains occurred in the Pittsburgh, Wheeling, Birmingham, St. Louis and New England areas.

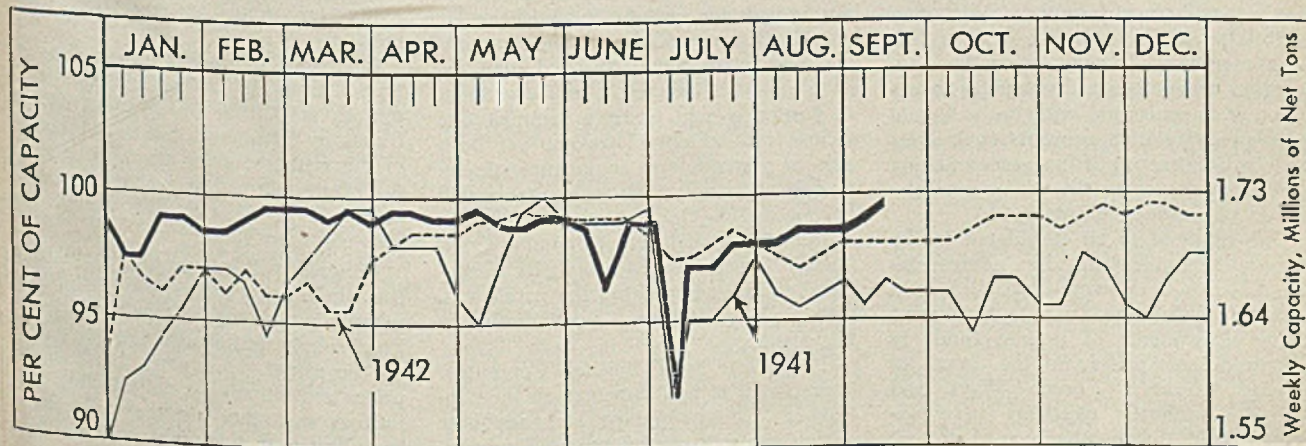
Blast furnace operations at Buffalo were off six points to 88 per cent as Hanna Furnace Corp. shut down one of four active furnaces for relining. Wickwire Spencer Steel Co. will blow out a blast furnace early next month.

Steelmakers at some centers are expressing renewed concern over coal supplies.

### Carnegie Steel Sets New Output Record in August

Steelmakers of Carnegie-Illinois Steel Corp. shattered all past records for production in August. The company's furnaces achieved an all-time high output for one month, producing 1,962,631 tons of ingots, 19,000 tons better than the best previous record.

COMPARATIVE STEEL INGOT OPERATIONS





CARL VINSON  
Chairman, House Naval Affairs  
Committee



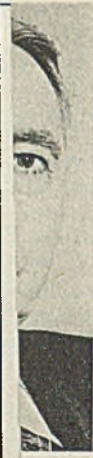
Chair,  
Affairs Committee

## Steel Sought Hearth Capacity

ts greater alloy steel load to elec-  
e more open hearths in production  
ts for which now are in excess of

"Concurrently production of alloy steel in open-hearth furnaces was increased at a rapid rate. The average monthly production for this grade of steel in 1940 was 306,000 tons; in 1942 it was 664,000 tons, reaching a peak production in March of this year of 934,000 tons

Committee



Chairman,  
Special Senate  
Investigating Committee



HARRY S. TRUMAN  
Chairman, Special Senate  
Investigating Committee

# PROGRAM BROADEST IN HISTORY

*Renegotiation, contract termination, postwar public works, price control and rationing, taxes, government expenditures, manpower and demobilization of servicemen among problems on agenda*

WHEN the seventy-eighth Congress reassembles Sept. 14 after its summer recess it will start to gallop in all directions at once.

This is said not in any disparaging way—for the seventy-eighth Congress is turning out to be the best in a good many years. It results from the fact that the legislative program of this Congress is the broadest in history.

Hearings will be held simultaneously by numerous committees and subcommittees concerned with the formulation of numerous laws of great significance to the country's manufacturers and businessmen.

First emphasis will be on revision of the contracts renegotiation law. The full House Ways and Means Committee last Thursday began hearings on this subject, to be carried on by subcommittees after the line of approach has been charted. The committee will break down the whole subject of contracts renegotiation. It will try to formulate a definition as to what comes under the head of "excessive profits." It proposes to find out whether renegotiation discourages incentive. It is concerned with the extent to which renegotiation prevents contractors and subcontractors from accumulating financial reserves to tide them over the period of postwar adjustment.

One proposal to be considered in the renegotiation hearings, by Representative Charles S. Dewey (Rep. Ill.), is a revision of the tax laws to encourage heavy investments of private funds in industrial enterprises in the hope of earning a profit. Some Ways and Means Committee members have expressed fears that continuance of present

tax rates, while justified during the war due to heavy government purchases, would put grave difficulties in the path of employment in the postwar era.

Among immediate hot subjects is the drafting of pre-Pearl Harbor fathers. Numerous congressmen are very emphatic on this subject. The debate is sure to include many references to compulsory labor legislation. Two senators who last spring were opposed to the idea of a compulsory labor law have come back with changed minds as a result of what they learned during the recess. On the whole a compulsory labor law, however, is not seen as an immediate probability. Congress is not expected to take action to lengthen the 40-hour work week.

### May Attack Patent System

Another series of attacks on the American patent system is almost sure to be made at some time during the coming months. All of them will be aimed at setting up some sort of a federal licensing system. Hearings of the Kilgore Committee will start Sept. 15 and will be watched with interest. The Department of Justice is said to have formulated a vicious bill which it has not yet been able to persuade any congressman to introduce. It is not likely these attacks will be successful. On the other hand, the Kettering National Patent Planning Commission is expected to submit its recommendations on improving the patent system in plenty of time for deliberation in this session.

The Senate Small Business Committee is preparing to hold hearings on the subject of making prompt and adequate settlements with contractors and subcon-

tractors whose contracts have been or will be terminated or cut back. Other Congressional committees and subcommittees also will touch on this vital subject. The idea is to get machinery set up now that can be applied effectively immediately after the close of the war to prevent widespread bankruptcy and financial embarrassment. The agreement among the armed services that they already possess legal authority to guarantee "V" loans to such contractors and subcontractors will be studied to make certain that this plan will work. Representatives of the armed forces will be questioned to ascertain whether specific additional legislation will be needed. Various bills, such as S. 1268, that have to do with this problem, will be studied.

Major attention will be given in both houses to the matter of preparing plans for public works projects to afford employment after the war. This may include a federal works program, and state and municipal programs, with federal financial aid. The studies are being conducted in co-operation with a number of government agencies, particularly the Army Engineers. The intention is to get the public works matter out of the idea stage and have plans and specifications ready for immediate execution when needed.

One subject that will receive close attention from the Truman and other committees is that of investigating alleged frauds by contractors and other sabotage of the war production effort. The air is full of unconfirmed reports that the headlines will bristle with such charges before the snow flies.

Congress will lose no time scrutinizing the whole price and rationing setup and present indications are that the Office of Price Administration again will be placed on the carpet. Just what it will do on prices and rationing is not yet clear. The farmers and other pressure groups have their fingers in this pie. Gasoline ration

ing will be the subject of a lot of questioning. A lot of attention will be given to food. General feeling among Congressmen is that the problems of food, prices and rationing now are being handled ineptly and that it should be possible to inject some horse sense here.

Congress also can be expected to look into the manpower problem which now is being handled with a particularly notable degree of ineptitude. The United States Employment Service almost certainly will be investigated for the impracticable way in which it recently sought to relieve that Southern Pacific railroad's labor shortage. It took 2200 easterners west from St. Louis but lost all but 510 of them to other industries before the party even reached the West Coast. Three weeks later only 104 of these easterners still were working for the Southern Pacific. The Brynes order to West Coast manufacturers arbitrarily to employ all persons assigned to them by the USES, without regard as to their qualifications, will come up for debate.

High on the Congressional priorities list is the formulation of plans for orderly demobilization of our fighting forces. Both the Army and Navy have been devoting a lot of study to this and already have laid the groundwork for a general plan. The "subsistence farm" idea is a part of this plan. Ex-servicemen would receive federal aid in purchasing small farms which they would farm part-time, the idea being that they thus would be free to earn money in other employment.

There are many angles to the subject of demobilizing the forces. Among them is the fact that 9000 men already are being mustered out of the service each week; they will number around 500,000 by the end of 1943. Many thousands now are recuperating in hospitals and shortly will be returning to normal life in large numbers; a million men will be mustered out in 1944. Congress wants these men, lacking an arm or a leg, to have jobs at good pay; they do not want them to serve as watchmen or work in other jobs in which opportunities for advancement are lacking. Current thinking is that private industry will have to get used to the idea of furnishing good employment to crippled men. This side of the problem incident to demobilization is the current responsibility of the Veterans Administration, Washington.

What Congress will do about taxes cannot yet be clearly foreseen. A rather leisurely procedure in drafting a new tax law was indicated until recently, with likelihood that a sales tax might be drafted, and with small increases in income taxes on corporate and individual incomes. However, Economic Stabilizer Vinson, who enjoys great prestige in Congress by reason of his sound tax record as a former member of the House Ways and Means Committee, is preparing to bring heavy pressure for the full increase of \$12 billions in the tax load. He is working actively with the Treasury Department.

The tax situation is complicated by

friction between Secretary of the Treasury Morgenthau and the Joint Committee on Internal Revenue Taxation. The latter, directed by Colin Stamm and supported by congressional tax leaders, has been insisting it be supplied information by the Bureau of Internal Revenue while Morgenthau insists that all information be funneled through him. Congress, still resentful over the Treasury's attitude during the Ruml plan debates, may use its subpoena powers to obtain the desired information, and the feud may develop into a first-class Washington mess.

In addition to acting on postwar plans to assist the domestic economy, Congress also can be expected to give serious consideration to our postwar relations with other countries, particularly in regard to trade and military considerations. There is mounting apprehension that if Congress does not go on record with its views, that if it permits the President to make international arrangements, another impasse such as that which developed after World War I may occur. Many Congressmen have strong views about retaining many of our present outlying military establishments in various parts of the world.

#### May Reduce Expenditures

Congress is expected to prosecute further its efforts at reducing government expenditures. One leading member, John Taber (Rep., N. R.), says savings effected earlier this year were only a flea bite and that there will be many additional reductions in the appropriations for the year 1944-1945. Now that we no longer are on the defensive anywhere in this war, there will be more critical views about the huge military expenditures. Both the Army and Navy will be handled somewhat less gently when they are questioned about huge inventories of various war materiel which have been built up.

Best reason for believing that a lot of important legislation will develop after the termination of the summer recess is that a great deal of the spade work already has been accomplished. Congressmen have been able during the recess to arrange their thinking in a more orderly way than was possible in the hectic days before recessing. They have had an opportunity to ascertain what is in the minds of the people back home.

#### Bolt, Nut and Screw Pricing Procedure Revised by OPA

Manufacturers have been given an option by the Office of Price Administration to use maximum price regulation No. 136 (Machines and Parts and Machine Services) in pricing special bolts, nuts, screws and rivets produced complete, or in their first operation, on hand or automatic screw machines. This permission does not result in any change in the price level as determined under regulation No. 147 (Bolts, Nuts, Screws and Rivets).

## Defeated Nation Needs Supplies

*Peninsula's history one of insufficiency of iron, steel, coal, oil and many nonferrous metals*

ECONOMICALLY and industrially, capitulation of Italy is no bargain.

The peninsular nation is sadly lacking in critical raw materials, such as coal, oil, iron ore, copper, tin, nickel, magnesium, and rubber.

These materials, as well as food, must be supplied the defeated nation, if the United Nations are to realize any considerable benefits from the country's industrial machine.

Italy's munitions production industry has depended on Germany for supplies to large extent.

Italy's pig iron production in 1938, the last year for which figures are available, amounted to only 864,536 metric tons, and steel ingot output to 2,307,392 metric tons. Iron ore production seldom has exceeded 1,000,000 tons a year. Bauxite, sulphur, lead, mercury and zinc supplies have been sufficient.

Complete control of the Mediterranean will permit shipment of vitally needed battle scrap from North Africa. Lacking iron ore, this probably will be a big factor in the country's steel output.

Condition of Italy's war plants following intensive Allied bombing attacks and possible demolition by retiring German forces remains a question mark.

No immediate changes in the war production program in this country was expected to result from the surrender, although some speculation arose over further cutbacks in the tank program, which already has been reduced by 40 per cent.

#### Bureau of Mines Launches Search for War Materials

Bureau of Mines has launched the most extensive exploratory program ever undertaken in the United States and Alaska for war materials. It is financed under a \$3,900,000 congressional appropriation item. The work is separate from two other exploratory programs which are being conducted simultaneously by the bureau—the investigation of raw material sources for steel and the projects designed to increase aluminum production.

Crews of the bureau will make examinations of industrial diamond areas of Arkansas, and of coal fields of Nevada and Oregon, and will conduct a search for quartz crystals and more than a dozen other minerals, including copper, asbestos, zinc, mercury, tungsten, vanadium, beryllium, and other pegmatites, corundum, molybdenum, manganese, tin, iron, chromium, bismuth and nickel.

# WINDOWS of WASHINGTON

## Fight "Featherbedding"

THE MARITIME Commission is conducting a campaign to "get greater production per worker" at all shipyards and ship component plants. One of the prime aims is to do away with union "featherbedding." The unions are proving co-operative and have rescinded these rules in some cases for the duration. In one yard 39,000 linear feet of welding is being produced daily compared with the previous average of 20,000 feet. This has come about by putting tack welders on production welding; tack welding now is being done by riggers, shipfitters and other workers.

## Tires—Well, Maybe?

Outlook for tire production is getting better according to the Office of the Rubber Administration. As a result of priorities recently granted the tire manufacturers shortly will be getting a lot of new equipment including 84 Danbury mixers. It takes longer to mill synthetic than natural rubber. Too, since Pearl Harbor the tire manufacturers have been making many rubber products other than tires, also other types of tires than they had been making. The present program is aimed not only at continuing full production of all rubber military requirements but also "large" production of "passenger car, truck, bus and farm tires."

## Peacetime Switch

The petroleum industry looms as a big postwar market for processing equipment of different kinds. During the war, largely incidental to its experience in preparing to produce synthetic rubber, the petroleum industry has developed new chemical methods by which it can make products of considerable variety—products that should have a large demand in time of peace. The petroleum industry is expected to be more of a "manufacturing" industry after the war; gasoline and fuel oil no longer will be the "be all" products and the oil companies are not expected to resume promotion of these products on the big scale of the past.

## More Small Implements

A retired business man and successful farmer who is studying subsistence farming for senators from the farm states believes this practice would cause numerous industrial repercussions.

In the first place he thinks manufacturers have been designing agricultural machinery more for the large farm than the small farm. He believes there will be a big market among the small farmers for small, inexpensive tractors—as an example. He believes there will be a big market among the farmers for a type of motor vehicle not now available—something between the low-priced automobile and a gasoline-driven bicycle. He

also looks for a big demand from subsistence farmers for safe, low-cost airplanes, perhaps of the helicopter type.

"Current thinking," he says, "is that there will be a lot of these subsistence farms—maybe in the neighborhood of 1,000,000."

## Continual "Brown-Out"

Sept. 15 is the date set for beginning the "brown-out" period of reduced illumination. This is one phase of a broad conservation program to be set in motion

### PRODUCTION GRIPES

Here are the chief "gripes" among key men in the war production program:

They resent the feeling on the part of the public that the war is "in the bag".

They are irritated over the failure of many contractors to maintain promised delivery schedules. Too many contractors give excuses and alibis for delays.

They are irritated by hearing business men complain our military production schedules are "too big".

They are resentful over the large amount of speculation as to the fall of Germany through a crackup in morale. Actually, they point out, we have only begun our offensive; the hardest part of the fighting still lies ahead.

They also are resentful over hearing people in key war jobs say they are tired.

"Yes," says one of these men, "we are all tired, our fighting men become wearied to exhaustion. But that is no excuse for letting production lines slow down. Only by throwing the greatest possible weight of ammunition against the enemy will we keep our casualties at minimum and shorten the war."

in the coal, oil, transportation, electric power, natural gas, manufactured gas, water and communications industries. It is estimated 75,000,000 lamp bulbs and 4,000,000 tons of coal annually will be saved alone through the "brown-out." It also will make more tungsten wire filament available for the radio and radar programs; some molybdenum used in light bulbs will be saved.

## Much To Be Done

More than 90 per cent of the Army's eleven billion dollar construction program here at home has been completed, according to Maj. Gen. Eugene Reybold, Chief of Engineers. On the other hand, construction work abroad to serve military purposes is on the increase.

## OES Bewildered

One of the problems now under study by the Office of Economic Stabilization is that of wage differentials in different industries and trades in the same community. They are held accountable for a vast amount of labor turnover. At Seattle, for example, the Boeing plants are losing a lot of people to the shipyards because of the higher pay in the yards. An attempt has been made to cure this situation by establishing an incentive wage plan but so far the management and the workers have been unable to work out a solution.

## Army's New Need

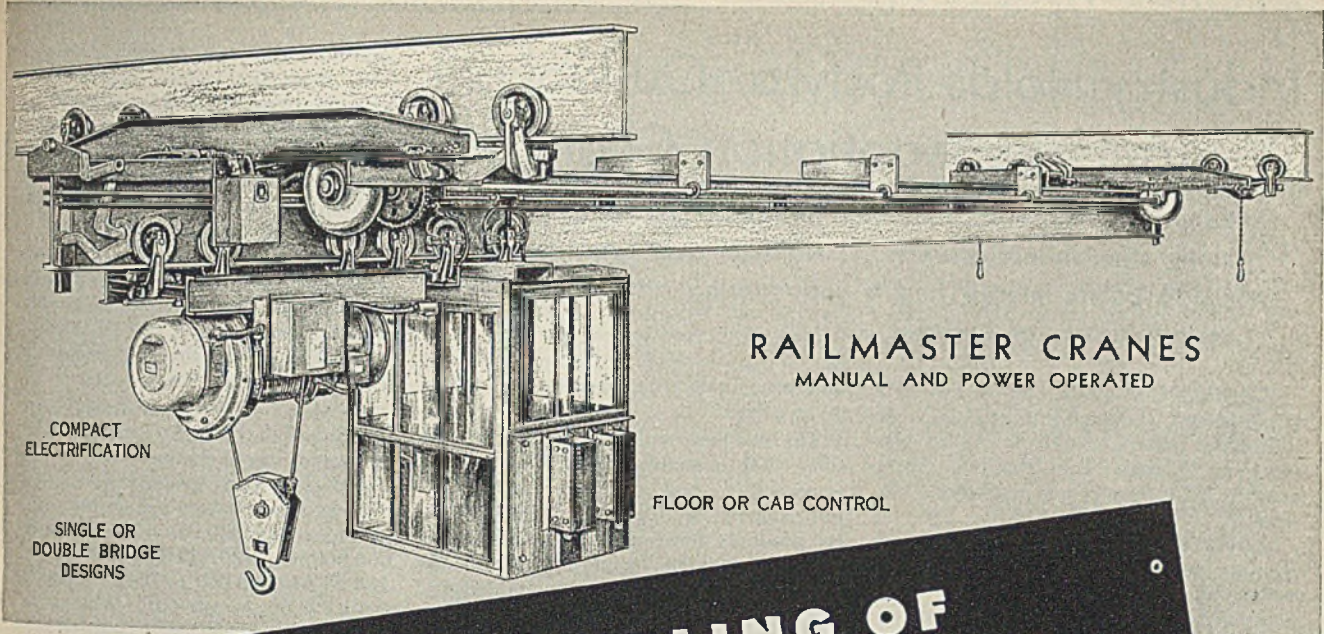
Critical situation is developing in road-building machinery now that our armed forces have started to invade enemy-held countries. Current indications are new production will come to some \$800,000,000 for 1943 of which 92 to 93 per cent will be shipped overseas. The machinery in heaviest demand comprises cranes, shovels and tractors. It also includes a lot of road rollers, air compressors, concrete pavers and mixers, snow removers and trench diggers. About 25 per cent of export shipments consists of repair parts. Not much of the roadbuilding equipment going abroad is expected to come back to this country.

## Speeds Settlement

One of STEEL's readers asks whether the War Department's Procurement Regulation No. 15 will result in any change in the present policy of recognizing advertising expenditures as allowable costs under government contracts. The answer is "no." Procurement Regulation No. 15 is merely an instrument for speeding up the settlement of contracts that have been terminated or cut back. Army and Navy accountants will continue to be guided by the instructions and definitions in the famous green book entitled "Explanation of Principles for Determination of Costs Under Government Contracts."

## Turnings Remelted

Full consumption of machine shop turnings now has been brought about. One reason is production of such scrap is considerably smaller than anticipated. Early this year it was estimated production in 1943 might go as high as 4,000,000 tons of carbon steel turnings and 2,000,000 tons of alloy turnings. Production now is at the rate of 3,500,000 tons of carbon and 750,000 tons of alloy steel turnings annually. There is no problem at all with carbon steel turnings; they are melted in blast furnaces, open-hearth furnaces and electric furnaces. Their consumption is helped by the fact a large percentage of this scrap is crushed and degreased. It is estimated approximately 250 crushers are in operation today, mostly in generating plants, but some in consuming plants and in dealers' yards.



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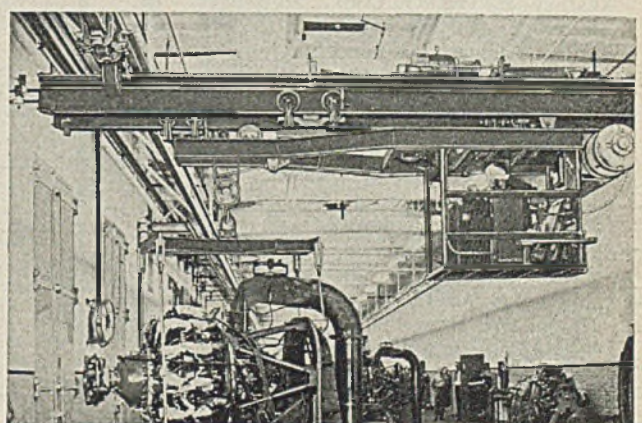
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# Industry Holds Postwar Outlook Warrants Renegotiation Changes

*Pamphlet cites unusual situation of tool builders in contrast with many other manufacturers. . . Holds present procedure inimical to public interest and is endangering future existence of certain classes of business*

"RENEGOTIATION, as at present administered, threatens the machine tool industry's postwar survival," states the National Machine Tool Builders' Association in a pamphlet published last week.

Stating it approves the principle of eliminating excessive profits, as well as review of contracts, the industry objects to present renegotiation procedure, claiming if these methods are persisted in they will deprive tool companies of earnings needed to weather a postwar machine tool depression.

In a statement accompanying the pamphlet, a committee of the association consisting of A. G. Bryant, Cleerman Machine Tool Co., Chicago; James Y. Scott, Van Norman Machine Tool Co., Springfield, Mass.; and Joseph L. Trecker, Kearney & Trecker Corp., Milwaukee, states: "In the firm belief that the procedure followed in renegotiating war contracts is contrary to the national interest during either war or peace and is unnecessarily endangering the future existence of certain classes of business, we are asking the Congress and the interested departments of the executive branch of the government to give consideration to our position.

"We speak only for this industry, although conscious that there are many others similarly interested."

In presenting the pamphlet the committee asks for earnest consideration of the following subjects:

1. Recognition of the special problems of machine tool and comparable industries as manufacturers of items that will be used in the war only temporarily and will for many remaining years saturate the postwar market.
2. Recognition of the variable excess profits tax burden which falls more heavily upon the industry because of the greater expansion required in comparison with normal output.
3. Recognition of the need for retention of earnings to provide cash reserves to maintain postwar employment, research and development of product.
4. Recognition of the principle that only earnings after taxes, rather than before taxes, should be reviewed.
5. Recognition of the need to exempt from renegotiation that part of the life of a machine which is not expended in the war and which will thus be engaged on peacetime work.

The pamphlet points out that in actual experience the Price Adjustment Board is at once prosecuting attorney, judge

and jury, and to a large extent writes its own law.

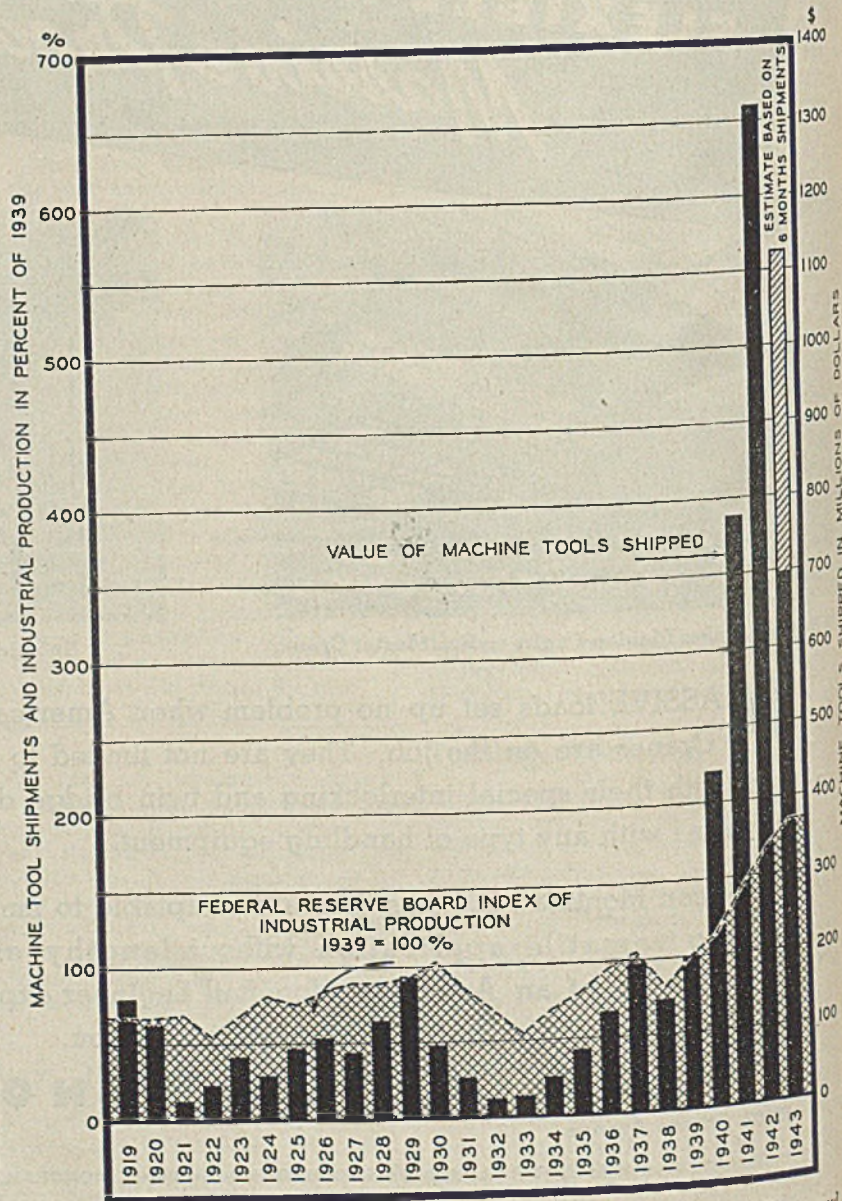
The machine tool industry consists of some 300 companies which in prewar years seldom had combined annual output valued as high as \$200,000,000. Its products have a long life, in some cases being kept in production for 30 years or more. The curve of output,

therefore, is a story of sharp, high peaks and broad, low valleys, and in such an industry reserves must be set aside during the "peak" years to carry through the "valley" years, the pamphlet declares.

Pointing out that by the middle of 1939 American tool builders had expanded their plants and were training thousands of new men to supply the needs of the United Nations, the industry says entrance of the United States into the war found the tool builders ready for the job before them.

By Jan. 1, 1942, according to the pamphlet, the industry had invested all of its earnings of the preceding five years—and more—in expanded plants and facilities. Machine tool output was stepped up from \$200,000,000 in 1939 to \$400,000,000 in 1940, \$775,000,000 in 1941 and \$1,320,000,000 in 1942. Peak of or-

PEAKS AND VALLEYS OF MACHINE TOOL DEMAND



Tremendous variations in machine tool shipments as compared with general industrial production are depicted in this chart

ders was reached in March, 1942, and peak production was passed in January, 1943. Beginning in February, 1943, output could be permitted to decline gradually, so that by midsummer new machine tool orders ran less than a quarter of the volume the industry was required to build in the preceding year.

"In short," states the pamphlet, "the industry's war job, as concerns the building of machine tools, is almost finished and the industry is even today headed for another of its traditional valleys."

The industry anticipates a great dilemma when war production ceases, declaring American metalworking plants will have installed and ready for operation on their floors more than five times as many new and modern tools as they had in operation in 1929. In the ten years preceding 1939 average annual output of the industry was about 25,000 machine tools. By contrast, in the three years ending in 1943, machine tool builders will have produced about 700,000 machines.

Over 85 per cent of these tools produced for the war are of the same type as those in everyday peacetime use. Because of improvements in design and materials, these tools will be capable of use for 15 years or longer.

#### "Too Many Machine Tools"

"In short," state the tool builders, "even if our domestic economy should be maintained at top levels during postwar years there are now more machine tools ready and available in America than could conceivably be needed to turn out all of the products required for peacetime purposes for a long time to come."

In the opinion of the committee the outlook for postwar machine tool markets is practically non-existent.

To engage in research and development, redesign, and introduce new models, will take money—money which the tool builders are striving to retain from earnings of the war production period.

Herein, it is held, lies the crux of the machine tool builders inability to agree with the findings of the Price Adjustment Boards. It is contended that the tool builders should be permitted to retain a larger share of their earnings than is required to be retained by companies whose postwar markets are being built up to new highs through the war period. The Price Adjustment Boards, according to the pamphlet, have proceeded to apply renegotiation indiscriminately throughout the entire war production picture. The tool industry, it says, does not object to the theory of recovery of excessive profits, but it disagrees with the Price Adjustment Boards on the amount of profits to be returned, holding a portion of these profits represent earnings that under other circumstances than war would have been made over the next 10 years or more.

Relative expansion in the machine tool industry has been far greater than in most other industries, it is said, and the excess profits tax exacts a proportionately

(Please turn to Page 164)

## Plan for Speedy Reconversion

*War Production Board reported considering three proposals aimed to amply finance industry's transition from war to peacetime production*

THREE proposals which will place ample funds in the hands of war contractors reportedly are under consideration by the War Production Board to aid speedy conversion from a wartime to peacetime economy, Stanley F. Teele, deputy director, Procurement Policy Division, WPB, told a meeting of the Chicago Association of Commerce recently.

Most difficult problem faced is how to free the working capital war contractors have tied up in war production in order that they may be able to get peacetime production under way. Mr. Teele said that dismissal pay for workers, which would tide them over until conversion had been accomplished, probably will be considered part of the cost of the contract in final settlements with the government.

First of the three proposals discussed by Mr. Teele was the plan whereby an automatic advance by the government of 75 per cent of the amounts owed to contractors for materials already produced but not yet delivered or paid for would be made.

He estimated that industry might have claims of from \$12,500,000,000 to \$19,000,000,000 against the government. Immediate payment of three-fourths of these claims subject to final settlement at a later date would release a great amount of capital for reconversion.

The second proposal outlined by Mr. Teele was government loans to contractors, either directly or in the form of guarantees for bank credit, based upon the payments still owed to them by the government on war orders.

Final proposal under consideration by the WPB, Mr. Teele said, is the outright government purchase of the rights subcontractors have against prime contractors with the price limited to 90 per cent of estimated value of the contracts. This would be practically impossible Mr. Teele told the group. In its place an appeal system should be set up whereby subcontractors may appeal to a government agency if not satisfied with the settlement received from a prime contractor, he declared.

### Women Constitute 83% Of New Workers Hired

Women constituted 1,525,000, or about 83 per cent, of the 1,833,000 net total of new workers employed by American factories between April, 1942, and June of this year, states Secretary of Labor Perkins.

In June nearly 2,000,000 women were working in plants producing aircraft and other basic war materials and products.

Factories turning out uniforms, tents, and other secondary war products were employing 1,454,500 women at that time.

## Urges Postwar Conversion Plan

PROMPT adoption of policies in relation to the conversion from war to peacetime production, which will permit such transitions to be accomplished within the framework of free enterprise at a minimum of dependence upon government loans and prolonged governmental controls, is being urged by the Illinois Manufacturers' Association.

The association's Committee on Industrial Participation in Postwar Planning, headed by Russell G. Creviston, Crane Co., Chicago, states that such policies are essential if extensive dislocation of industry and widespread unemployment in Illinois are to be avoided.

The committee has organized a subcommittee which already is working upon detailed plans to be submitted to Congress and to the various war procurement agencies with recommendations on the subject of conversion. John F. P. Farrar, president, Chicago Metal Hoe Corp., Maywood, Ill., has been named chairman of the subcommittee.

### Study Shows Few Companies Plan To Scrap War Plants

Survey recently completed by the National Industrial Conference Board reveals that about 63 per cent of the nation's manufacturers have reached definite decisions about using some part of the newly created war plant facilities for peacetime production.

The study brought out the fact that many of the manufacturers are planning to scrap some of their older facilities and use some of the newer buildings and equipment. Companies planning to utilize the new war plants are those producing heavy machinery, metal products, automotive, food and construction materials industries. Some companies reported they hope to make suitable arrangements to purchase some or all of the government facilities under their supervision.

Largest percentage increases in war production facilities were registered in heavy machinery, machine tool, automotive, and electric equipment industries. Two of three companies surveyed had expanded plant capacity with expansion ranging from 5 per cent to 600 per cent.

# 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

## U ORDERS

**ELECTRIC SERVICE LINES:** Use of certain sizes of composite electric conductor is permitted for the construction of rural lines which qualify under terms of order U-1-c, as amended. Small additional amounts of copper also may be used in line construction where this will result in eliminating the need for additional transformers. (U-1-c)

**TEMPORARY UTILITY FACILITIES:** Construction of temporary utility facilities now is permitted under terms of supplementary order U-1-g. Such extensions must be dismantled within 90 days and the materials returned to inventory. (U-1-g)

## INSTRUCTIONS

**STEEL FORGINGS:** Steel forgings sold by a warehouse are controlled materials, regardless of whether they were produced by a steel producer or by a forging shop. Warehouse orders for forgings must be accompanied by form WPB-2333 (formerly CMP-11). Forgers who receive such warehouse orders may place purchase orders for steel required to fill them or to replace inventory used to fill them, by the same procedure. However, in such cases, the forgers' orders must be identified by the allotment symbol "WH". Such orders shall be considered authorized controlled materials orders.

**LEAD:** Report of lead inventory, consumption, production and requirements must be returned on or before Sept. 16 in order that the October allocations of lead may be completed in time for October delivery. This report is made on form WPB-95 (formerly PD-66A).

## L ORDERS

**INDUSTRIAL MACHINERY:** Provisions governing food processing machinery, printing and publishing machinery, and woodworking, sawmill and logging machinery have been removed from order L-83 (Industrial Machinery). Limitation orders now covering these types of machinery are: L-292, food processing machinery; L-311, logging, lumber and wood products machinery; and L-226, printing and publishing machinery. (L-83)

**HAND TRUCKS:** Provisions restricting use of rubber in the manufacture of hand trucks and other handling equipment have been removed from order L-111. However, the amount, type and use of rubber is still governed by rubber order R-1. Portable dough troughs and other specified portable food handling trucks designed for use by the Army or Navy, and laundry truck tubs for use aboard ship when purchased by or for the account of the Army or Navy also are exempted from manufacturing restrictions. (L-111)

**STRUCTURAL STEEL SHAPES:** Shapes under 3 inches have been eliminated from the definition of "structural steel shapes" under schedule 4 to order L-211. These are considered "bar size" shapes and are no longer part of this schedule. Neither does it cover so-called "special sections." April 1, 1943, specifications as to approved sizes and shapes have been substituted for the earlier ones of May 11, 1942. Delivery of stock shapes is now allowed when orders contain no definite specifications. (L-211)

**WRENCHES AND PLIERS:** Manufacture of certain types of wrenches, pliers and nippers for the ultimate consumer now is permitted through amendments to schedules II and III of order L-216. Prohibition on manufacture for a producer's inventory or for a distributor's inventory or shelf stock is continued. (L-216)

**DAIRY MACHINERY AND EQUIPMENT:** Dairy machinery and equipment may be manufactured in a greater number of sizes than heretofore under terms of order L-292 as amended. The order also changes the quota for meat processing machinery from a unit to a gross ton basis; and each manufacturer is limited to producing, for civilian use, the amount of equipment requiring 50 per cent of the annual average gross tonnage of controlled materials he used in 1939, 1940 and 1941. Purchase orders for replacement equipment may be filled under CMP regulation No. 5, if the equipment costs \$250 or less and under CMP regulation No. 5A if it costs \$100 or less. Users of packing house equipment apply for authorization of purchase orders on form WPB-3155 instead of PD-1A. (L-292)

## M ORDERS

**RHODIUM:** Provision requiring the filing of specific report forms has been eliminated from conservation order M-95 (rhodium). (M-95)

**SILVER:** Use of foreign silver in manufacture of brazing alloys and solders is prohibited. However, manufacturers may complete processing of any foreign silver already in process, or use up one month's supply of the total foreign silver which was on hand on July 29. Stocks on hand may be delivered to any users for end products not appearing on list B of the conservation order. (M-199)

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Electric Service Lines Equipment	U-1-c
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### Price Regulations

Adjustable Pricing	Sup. Order 53
Automotive Parts	No. 452
Copper, Lead, Zinc	Nos. 15, 69, 81
Manganese Ores	No. 248

## P ORDERS

**IRON AND STEEL:** Producers of iron and steel now may procure capital replacement items up to a value of \$2,500 by MRO procedure. Order P-68 has been amended to incorporate the CMP regulation No. 5 procedure with the necessary variations. Periodic reports of MRO used by the iron and steel producers must be made. Restrictions on receipt of MRO materials are set at 120 per cent of the dollar value of 1942. Extraordinary maintenance and repair, such as relining blast furnaces and rebuilding coke ovens (or capital replacements in excess of \$2,500) must be specifically authorized and will be given authorization and priorities assistance on a special application form. (P-68)

**PLUMBING AND HEATING REPAIR EQUIPMENT:** Authority to re-rate orders for plumbing and heating repair and replacement equipment from A-10 to AA-5 without notice or certification from the customer has been granted to the plumbing and heating industries. (P-84-a)

**PETROLEUM PRODUCTS HANDLING EQUIPMENT:** Individuals who own or rent equipment for handling petroleum products for their own private use have been granted a preference rating of AA-5 and a controlled materials allotment symbol of MRO-P-98-e for the purpose of maintaining or repairing worn-out parts of such equipment. A method is provided for using preference ratings and controlled materials allotments to get materials and repair parts to keep this equipment in good working order. Administration of the order has been delegated to Petroleum Administration for War. (P-98-e)

## PRICE REGULATIONS

**ADJUSTABLE PRICING:** Uniform adjustable pricing provision, which permits sellers to make sales on the basis of prices in effect at the time of delivery, has been incorporated in the following price regulations, covering building materials: Nos. 40 (Builders Hardware and Insect Screen Cloth), 45 (Asphalt or Tarned Roofing Products), 96 (Domestic Fuel Oil Storage Tanks), 100 (Cast Iron Soil Pipe and Fittings), 175 (Rough-rolled, Figured Wire and Heat Absorbing Rolled Glass), 208 (Vitriol Clay Sewer Pipe and Allied Products), 234 (Cement), 236 (Heating Boiler Convention Parts), 261 (Contract Sales of Finishing Builders' Hardware), 272 (Cast Iron Boilers and Cast Iron Radiation), 276 (Asphalt Tile), 311 (Locks and Lock Sets), 382 (Wide Mouth Glass Containers). Under the new provision, a seller may increase his price to the maximum price in effect at time of delivery. However, it does not permit upward adjustment after delivery unless authorized specifically by OPA. When it is necessary to promote distribution or production, and when there is pending a request for change in ceiling prices, OPA may authorize an upward adjustment over prices in effect at the time of delivery, if such action will not interfere with the purposes of the Emergency Price Control act. (Supplementary order 53)

**COPPER, LEAD AND ZINC:** Price regulations No. 15 (Copper), No. 69 (Primary Lead), and No. 81 (Primary Slab Zinc) have been amended to permit a person to sell copper, lead or zinc at ceiling prices plus the value of the drawback certificate to the purchaser. The regulations are clarified to state clearly that an importer may buy and bring copper, lead or zinc into this country at a delivered cost to him not exceeding the ceiling price plus the import tax or duty on the metal. On copper there is an import tax of 4 cents a pound; on pig lead, 1 1/16 cents per pound of contained lead; and on slab zinc, 7/8-cent. Maximum price for electrolytic copper is 12.00¢ a pound, delivered Connecticut valley, in carload lots; for common pig lead, 6 1/8¢ a pound, delivered New York, in carload lots; and for primary slab zinc, prime western grade, 8 1/8¢ a pound plus freight from East St. Louis to the buyer's receiving point.

Amendments to the lead and zinc regulations, in additional changes, free from price control all purchases of these two metals by the Metals Reserve Co. Purchases of copper by MRC already are exempt. (Nos. 15, 69 and 81)

**MANGANESE ORES:** Sellers of manganese ores have been authorized to use Atlantic basing points in sales calling for delivery in the east of the Mississippi river and north of the Ohio river. Maximum price for manganese ore from Atlantic basing points is 90 cents per unit (22.4 lb. of contained manganese). Locations: Norfolk, Philadelphia, or New York plus freight. The Gulf basing point ceiling price is 85 cents per unit, f.o.b. Mobile or New Orleans, plus freight. (No. 248)

**AUTOMOTIVE PARTS:** Manufacturers of automotive parts have been granted additional time (until Oct. 1) in which to furnish their customers with required price lists, catalogs and notices of resale maximum prices. Price regulation No. 452, which controls manufacturers' prices, requires the manufacturers to furnish this data to their customers by Sept. 30.



and a notice that their suggested resale prices, established as the ceiling prices for wholesale and retail sales in price regulation No. 453, have become automatically the maximums. The extension of time was contained in amendment No. 1 to regulation No. 452. Regional offices are authorized to process notices containing proposed new list prices and new non-list prices for rebuilt parts, and requests for exemption from the necessity of establishing new lists for rebuilt parts, and to approve or disapprove such notices and requests. (No. 452)

## British-American Combined Conservation Group Formed

William L. Batt, vice chairman of the War Production Board, has announced formation of a Combined Conservation Committee which will work with the Combined Production and Resources Board and the Combined Raw Materials Board.

In February an Anglo-American Conservation Committee was set up in London jointly by the Harriman Mission and the British Ministry of Production. The Combined Conservation Committee reporting to the combined boards (CPRB and CRMB) forms the American counterpart of the Anglo-American committee in London.

The purpose of the combined committee is to correlate the conservation work done in Great Britain and the United States and by the active interchange of information on conservation measures developed in the United States, Canada and the United Kingdom, to bring about maximum saving of materials in the three countries.

The Conservation Division of WPB has worked for several months on an informal basis with the London committee; the formation of the Combined Conservation Committee provides an organization which will carry on this work.

A few instances of accomplishments to date will illustrate the wide field to be covered: At the request of the Combined Raw Materials Board the London committee initiated a study of the use of Inconel in the United Kingdom. As a result, the British were able to reduce 1943 requirements by more than 20 per cent.

As a result of information supplied to the London committee by the Conservation Division of WPB the use of brass for the bases of electric light bulbs made in Britain was discontinued in favor of steel.

The London committee prepared a report on the use of monel metal in the United Kingdom which showed that the British had found alternative materials for some of the uses of which monel metal is put in the United States.

Howard Conoley, director, Conservation Division, WPB, is chairman of the combined committee, and a deputy chairman is to be appointed by the British side of CPRB. The committee's membership provides representation of interested agencies of the governments of the United States, Canada, and the United Kingdom concerned with the procurement and use of materials necessary to the United Nations' war effort.

# Special Formula for Pricing Steel Flanges May Be Used Until Nov. 1

*Three-month extension is granted in order that needs of shipbuilding program can be met. . . Will permit continued production on a subcontracting basis by persons formerly engaged only in flange distribution*

SPECIAL formula for pricing cast steel flanges, forged steel flanges, and flanges made from steel plate, may continue to be used by qualified manufacturers until Nov. 1, Office of Price Administration announced last week.

Use of the special formula, which was provided in amendment 6 to order A-1 of maximum price regulation 188 (Manufacturers Maximum Prices for Specified Building Materials and Consumer Goods Other Than Apparel) on June 7, 1943, was to have terminated Aug. 31.

Need of continued production on a subcontracting basis by persons formerly engaged only in flange distribution, requires the extension of the special pricing program in order that the needs of the shipbuilding program can be met.

Under the special formula, manufacturers are able to price the flanges automatically by applying an 11 per cent markup over the cost of manufacturing each flange. The formula may be applied only where following conditions exist:

1. The sale is made for the ultimate use of the United States government or any agency thereof;
2. Sale is made prior to Nov. 1, 1943;
3. The sale is made by a person who did not engage in the manufacture of such flanges prior to Jan. 1, 1943, and
4. The sale is made by a person who subcontracts one or more of the following operations required to produce a flange: casting, forging, cutting, machining, drilling and spot facing.

The extension was contained in amendment 12 to order A-1 price regulation 188; effective as of Aug. 31.

## Changes in File and Rasp Specifications Proposed

Changes in order L-216 to permit the manufacture of certain additional files and rasps for the export market were suggested at a meeting of the Industrial File Industry Advisory committee with representatives of the Tools Division, War Production Board, in Washington.

Members of the committee asked that consideration be given to a proposal to permit the manufacture of various types of files for export that do not appear on schedule V, annexed to order L-216. This request was based on the fact that the files required in certain foreign countries differ from those used in this country.

As a means of reducing the number of sizes of steel that would have to be rolled for files, committee members also sug-

gested further simplification pertaining to file dimensions. Instances where slight changes in file dimensions would bring about this result are half-round files and rasps, hand files, and pillar files. A proposal was also taken under consideration by the Tool Division to revise the provision of schedule V on the length of files for ignition coils.

## WPB Facilitates Transfer Of Aircraft Materials

Types of aircraft materials and parts which may be transferred from the inventory of one aircraft manufacturer to another have been broadened considerably by the War Production Board.

This action was contained in an amendment to directive 16, which places in the hands of the Aircraft Scheduling Unit, Wright Field, Dayton, O., authority to effect transfer of aircraft inventory items.

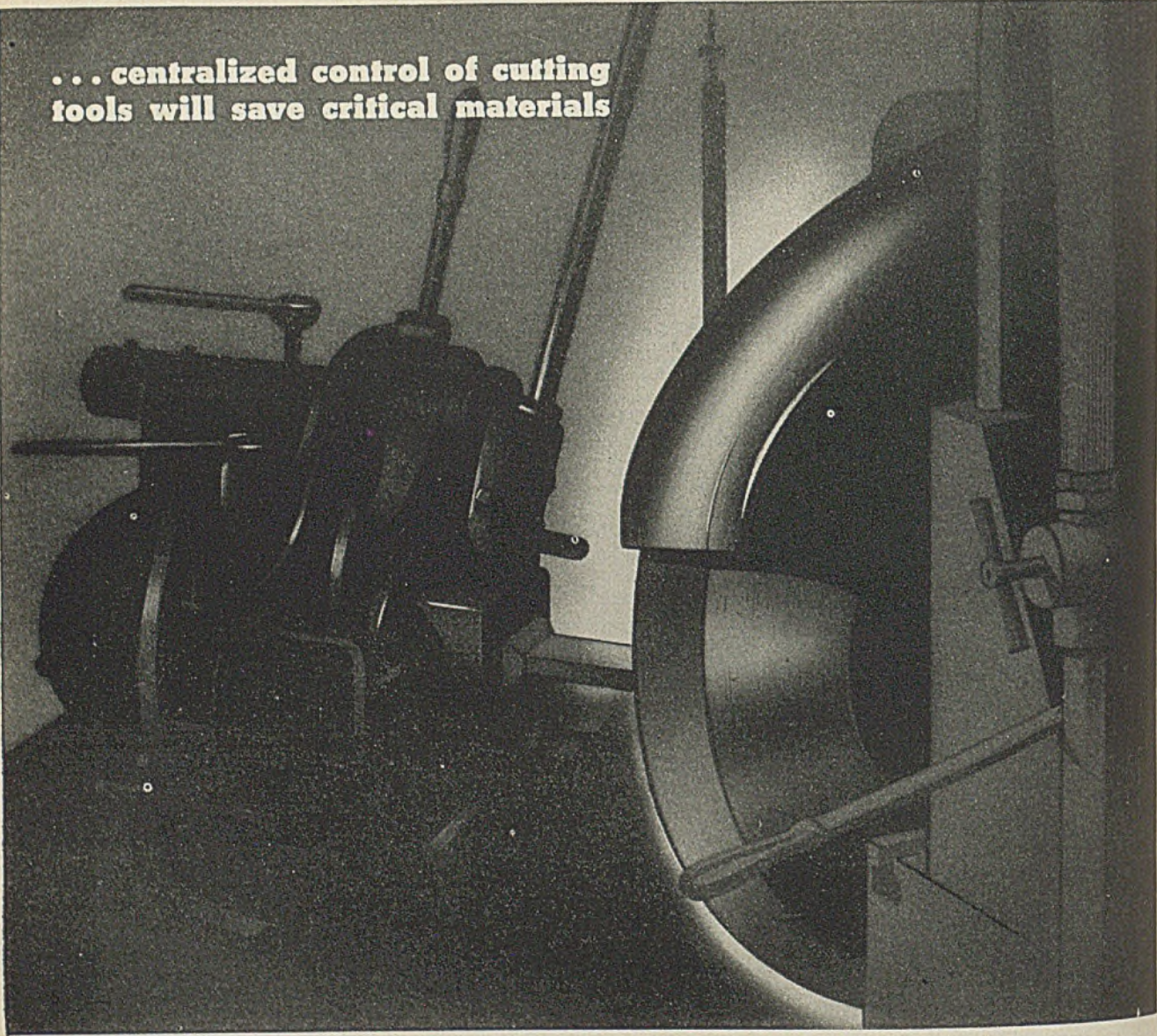
The original directive was designed to speed the production of airplanes by making it possible to transfer quickly certain items from inventories of one manufacturer to another. It also removed from the effects of priorities regulations 1 and 13 approximately 400 plants primarily engaged in aircraft production and placed them under control of the Aircraft Resources Control Office and the Aircraft Production Board. Through them, the Aircraft Scheduling Unit is given the duty of redistribution of idle and excess inventories of controlled materials.

Among the types of items added by the amendment are: swaged cable terminals, certain aircraft valves and fittings, flexible conduits, switches and circuit breakers, self-locking nuts, resistors, certain bearings, and other items.

## WPB May Re-Unite Entire Steel Division

WPB is giving consideration to moving the Ferroalloy Branch of the Steel Division to the Social Security building with the main Iron and Steel Branch. If this is finally decided on it will be the first time since the early days of the war effort that the whole Steel Division has been together. Andrew Leith is chief of the Ferroalloy Branch. John T. Whiting is director of the division while Norman W. Foy is deputy director.

**... centralized control of cutting tools will save critical materials**



*Information supplied by an Industrial Publication*

The unnecessarily high casualty rate of single point cutting tools is a phase of speeding up production that needs close attention from management.

One remedy that offers great possibilities is the establishment of a system of centralized tool control.

Such a system would have the obvious advantage of coordinating three most important factors—design, operation and maintenance of cutting tools.

To be effective, design should be based on a knowledge of actual operating requirements, including material being cut and the machine on which the tool is to be used.

Speeds and feeds should be selected from the point of view of economical tool life instead of rate setting. Then operators should be prevented from running tools to destruction, thereby eliminating the necessity for trying to salvage tools that are worn beyond all semblance of their original form.

All worn tools should be redressed in the tool crib by machine according to the drawing. Operators should not be allowed to redress tools by hand to the angles they assume the tool originally had.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.



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**Incentive pay plan heads for showdown in contract negotiations between General Motors and UAW. Establishment of scientific program requires large expenditure of personnel, time and money**

**DETROIT**

INCENTIVE pay plans, based on production standards properly evaluated from time study analysis, are rapidly heading for a showdown in discussions between union and management in the current General Motors contract negotiations. As suggested here last week, the UAW-CIO promptly rejected a proposal made by GM that the union lend its support to the institution of such incentive plans as a means of boosting production from 10 to 25 per cent without increasing manpower; in fact the union categorically rejected all 16 proposals made by the corporation concurrently with the incentive suggestion.

The incentive method of pay was branded by Walter P. Reuther, UAW vice president presumed to speak for the GM locals, as leading to a vicious speed-up, cutting of rates, destruction of labor morale, etc.—all utterly poppycock; and he countered with the proposal that the incentive pay plan be made the subject of a debate between himself and C. E. Wilson, GM president. He was probably harking back to the favorable appearance he made in his last debate with Wilson on the late lamented Reuther plan for stepping up war production.

But he did not succeed in throwing General Motors off the scent of what may likely prove to be a hurdle the UAW will never clear—the easily proved desirability of an incentive system, both for workmen and for management.

**"Time For Work, Not Words"**

"This is the time for work, and not for words," GM spokesmen countered in a statement, adding "the corporation expects to explore carefully the question of incentive pay in its current negotiations with the union, and it hopes to arrive at a satisfactory solution that will increase production and result in better utilization of the available manpower. Failing to do so, the problem will be submitted to the National War Labor Board for hearing. Fortunately, such hearings are now open to the press and the public."

The cold, hard facts are simply these: Years of experience have demonstrated the effectiveness of a proper incentive plan in increasing production. When all workers engaged in the same or similar work are paid the same amount of money, regardless of how much they produce (basic union philosophy) there is a tendency for the production of many individuals to drop down to the level of that of the poorest worker. The average or superior workmen who are physically, mentally and temperamentally capable of doing more work feel that there is no proper reward or recognition for such extra work. General Motors' position is

that it would like to reward employes in proportion to their effort and production, and not have them feel that when they produce more work they are being relatively penalized for their interest in their work or for their patriotism.

One principal difficulty in setting up an equitable incentive plan these days—and Reuther might have been a lot smarter if he had centered on this point—is the inordinate length of time and amount of work required to set up production standards which are fair to both men and management. Six months is not too long a period in which to expect such a job to be accomplished efficiently. But

**DEPOT TO CHRYSLER**

In furtherance of the policy of the Ordnance Department in turning over management of ordnance depots to private corporations, the Anniston, Ala., depot has been reorganized as the Anniston Warehouse Corp., subsidiary of Chrysler Corp. General manager will be E. C. Row, veteran Dodge and Chrysler executive. The depot's work includes rebuilding and repair of ordnance equipment.

with rapidly changing war production needs, an unending flow of design and engineering changes, it becomes next to impossible to develop the necessary time studies and translate them into sound standards before the whole production picture is upset and new studies required.

Importance of unbiased and scientifically built standards cannot be emphasized too strongly. Hundreds of checks on detailed operations by not one but half a dozen trained observers must be correlated and charted before any semblance of a reputable standard can be established. The entire system must be painstakingly explained and "sold" to workmen, union stewards, foremen and other supervisory personnel.

In war, time is steadily running out and it is barely possible that the personnel, time and money which must be expended on incentive systems in many cases may not be worth the candle when measured against output.

A typical case of what happens to a poorly-planned incentive system is that of a small machine shop near Detroit, where the owner decided he would institute incentive pay and figured out what he thought were fair standards. Immediately some of his machinists began earning \$250 and \$300 a week. They could hardly believe their eyes and were

unanimous in agreeing incentive systems were swell. But the owner realized this could not go on very long, so he introduced some new standards which knocked down his machinists' earnings to around \$125 a week, still a fair figure. The payoff came when the machinists decided the boss was running a sweatshop and incentive systems were the bunk and quit en masse.

On the other hand, after some two or three years of preliminary study, a wage incentive system in operation at the Ecorse plant of Murray Corp. of America, and now an integral part of the union agreement with the company has raised both wages and "average performance" of workmen better than 20 per cent, and has solved the problem of meeting the competition for labor of other plants in the district.

**Train Union Stewards**

This plan was developed with the assistance of Stevenson, Jordan & Harrison, management engineers, who at the very start suggested training five union stewards in the technique of making elemental time analyses and setting up production standards. There are 11 basic principles in the Murray incentive bonus system as it now operates:

1. Guaranteed base rate for all workers, for the hours they actually work.
  2. Guaranteed standards regardless of how high employe earnings rise.
  3. Standards established to permit the average operators to perform at 100 per cent at a normal nonincentive pace—and, when working at an incentive pace, to earn at least 18 per cent in excess of standards over an entire shift period.
  4. Standards established in accordance with a time study procedure manual—a copy of which is supplied to every employe.
  5. Worker's right to challenge standards through recourse to their union time study stewards.
  6. Incentive pay calculated on a daily basis, or, when more than one job is completed within the day's work period, on each individual job.
  7. Protection against delays beyond the control of the employe.
  8. Incentives established on an individual basis whenever possible, and grouped only when the nature of the operations makes this necessary.
  9. Protection against unusual delays in establishing standards on new jobs.
  10. Incentives published on a standard hour basis. For all increased effort over and above normal, the worker receives the entire benefit in the form of increased earnings. Increased employe effort is not shared with the company.
  11. Incentive payments for indirect or nonproductive workers, based on fair and equitable incentive allowances.
- Key to the entire system is obviously a fair definition of "standard normal performance," taking into account such considerations as condition of equipment, nature of production job, personal needs, etc. The standard is developed by time

study observations of many different workers by several time study observers, then translated into elemental time standards. For three months prior to the start of the incentive plan, average performance based on the finally developed standards was 95 per cent. By the end of February of this year it had increased to 103 per cent, and by the end of May to 115 per cent, where it now stands. Failure to move higher is explained by the fact that equipment in general is old and new equipment cannot be obtained; also personnel changes have become increasingly frequent, with some women now taking over jobs formerly handled by men.

The Ecorse plant has been and still is devoted almost exclusively to production of automotive frames, the passenger car type prior to February, 1942, and now truck and jeep frames. Thus the operations are of a fairly standardized character, susceptible to repeated study and analysis. The incentive bonus system covers 758 productive and nonproductive employes, 483 of the former and 275 of the latter. It is now in process of being extended to cover 55 supervisory personnel as well.

Nonproductive workmen—crane operators, press room laborers, car loaders, hoist operators, stock chasers, truck drivers, packers, and a number of other classifications—receive one-half of the combined weekly performance in excess of 100 per cent for the productive departments they serve, plus 5 per cent when their weekly base wage is equal to or less than the established nonproductive standard, plus 0.5 per cent for each per cent saved on the established weekly nonproductive standard. Die setters, inspectors, employes on reoperation, sweepers, scrap cutters and rivet sorters likewise benefit, but on the basis of a percentage of plantwide performance in excess of 100 per cent.

The vast amount of work required in preparation of production standards is readily apparent from a reading of the 103-page manual issued to employes.

To facilitate exchange of information about new problems of employe health and safety arising from increasing employment of women and rehabilitated war veterans in automotive industry plants, a medical panel, comprising factory staff physicians, has been organized by the Automotive Council for War Production. The group's initial action, already under way, is the co-operative study of questions relating to causes of dermatitis, medical standards governing employment of women, special problems of handicapped workers, industrial fatigue and the use of vitamin pills. The panel currently includes seven physicians, but will be expanded to 12.

## Bell Aircraft Division Moving to Burlington, Vt.

Ordnance division of Bell Aircraft Corp., Buffalo, N. Y., manufacturing about 40 different types of gun mounts and adapters for aircraft and naval use, is moving to Burlington, Vt., Carl L. Lozon, division manager, has announced. Additional space for expanding production will result.

Beginning in February of this year, Bell Aircraft searched the country for facilities in a community with an adequate labor supply, and Burlington was the ultimate choice. Negotiations for the site chosen—formerly occupied by the Queen City Cotton Mill—began June 7 and were completed recently with the turning over of the property by the DPC. Considerably more than 250,000 square feet of floor space will be available.

A large number of key employes will

move from the Buffalo area to Burlington by mid-September, and it is anticipated that "several thousand" Vermont craftsmen also will be hired.

Bell Aircraft's ordnance work goes back approximately five years to the time when the company was faced with the problem of mounting the flexible 50-caliber machine guns in the YFM-1, or Airacuda plane. Because no gun mount then available would successfully do the job, Bell developed and built its own.

Although production figures are restricted, growth of the ordnance division can be traced from the one type of mount virtually handmade, five years ago, to the present when many hundreds of mounts and adapters in about 40 different types are being turned out every week for fighter planes, bombers, etc.

A lightweight plastic and aluminum aircraft flooring has been developed by engineers of the Glenn L. Martin Co., Baltimore. Made from laminated phenolic sheet reinforced with aluminum alloy strips, the flooring weighs approximately ¼ lb. a square foot less than other types of flooring of equal strength and carrying capacity.

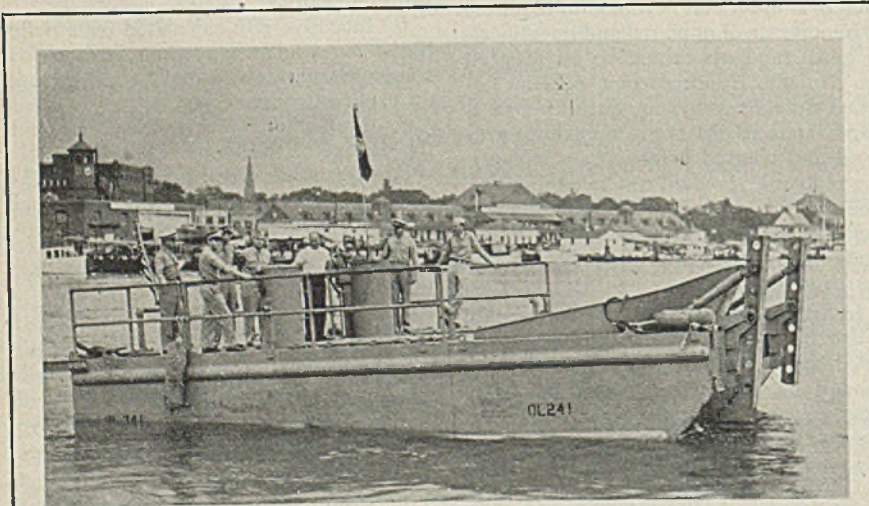
## Control Over Bills of Materials Centralized

Centralized control over Bills of Materials has been established by the War Production Board, with the purpose of eliminating duplicate requests for bills which have been made by various claimant agencies, acting independently as they have in the past, Walter C. Skuce, director of the WPB Controlled Materials Plan Division, said recently.

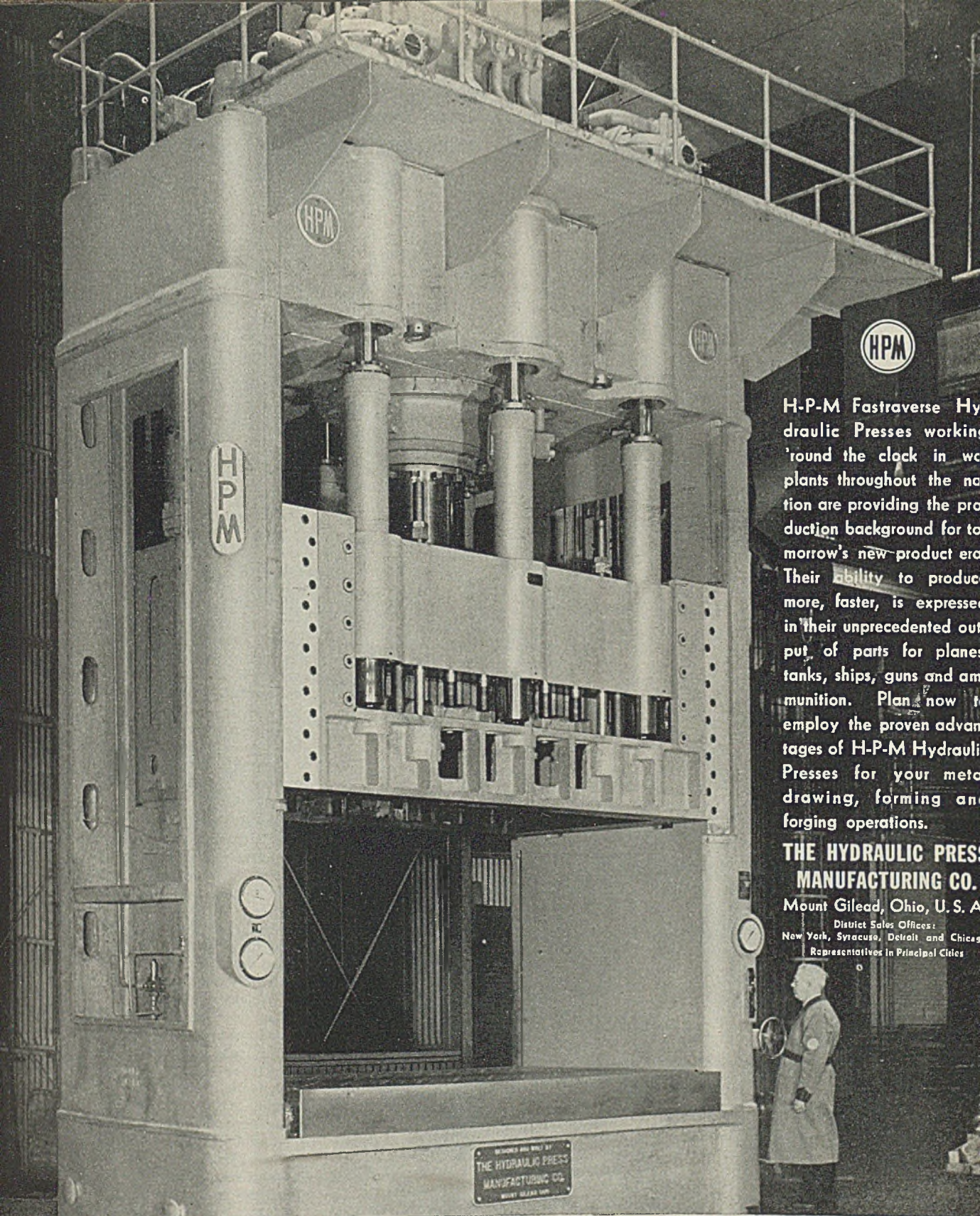
"At the same time," Mr. Skuce said, "rules regarding requirement of materials data have been modified, eliminating the possibility that manufacturers will be called upon to furnish Complete Detail Bills of Materials. In any case where a Complete Detail Bill is required, it will be compiled in Washington from bills available in the various claimant agencies and WPB industry divisions as listed in the central bills of materials index file."

This central Bills of Materials index file will index all bills on class B products and certain class A products which have been obtained by the industry divisions and claimant agencies. Through this index, all bills, except those on highly confidential military items, will be available to any WPB industry division or claimant agency.

Claimant agencies and industry divisions are now instructed to contact the central index file before requesting prime consumers to submit a Bill of Materials on an end product. If a bill is available on the items, the request will not be made. If a bill is not available, the claimant agency will request material information on the class A items involved and a listing of the class B items in the unit terms shown on the official Class B Product List.



**MARINE TRACTOR:** Equipped with two pontoons in the bow for buoyancy, this vehicle has been designed by Chrysler Corp. for the Army Transport Corps. The steel craft is driven by two 8-cylinder engines, carries two gasoline tanks each with 800-gallon capacity, and burns 12 gallons of fuel an hour at a cruising speed of 14 miles an hour. Acme photo



H-P-M Fastraverse Hydraulic Presses working 'round the clock in war plants throughout the nation are providing the production background for tomorrow's new product era. Their ability to produce more, faster, is expressed in their unprecedented output of parts for planes, tanks, ships, guns and ammunition. Plan now to employ the proven advantages of H-P-M Hydraulic Presses for your metal drawing, forming and forging operations.

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# WING TIPS

*Truman committee indictment of Wright Aeronautical Corp.'s inspection methods retards aircraft engine production. Wisdom of such investigations by political group, lacking technical knowledge, questioned*

WHEN senators start telling the world how and how not to build airplane engines, they are venturing into pastures where the bull is apt to be loose, and where they may wind up looking very foolish. Witness the efforts of the inquisitorial Truman committee and its public socking of the Wright Aeronautical Corp. plant at Lockland, O. Their charges constitute a serious reflection on the integrity of one of the oldest aircraft engine builders in the business, as well as upon the honesty and sincerity of the Army Air Forces.

More than this, though, the Truman indictment of Wright had the immediate effect of paralyzing production at the Cincinnati plant which was up well into four figures monthly and better than 70 per cent of the projected peak. It has now dropped an estimated 85 per cent to a level of a few hundred engines a month. The explanation: Supercautious inspection, both by company and air force inspectors, induced by fear of further public condemnation by the Truman committee. Parts are being rejected—or, more accurately, no one will take the responsibility for approving them—because of such vague things as a "poor complexion" on the metal or other vague and unmeasurable defects.

Obvious result is a serious clogging of materials flow since it is geared to a high production rate, an appalling congestion

of inspection departments and test facilities with parts and engines and a vast degree of idle productive manpower because of the inspection bottleneck.

More than this, the Truman investigation has had its effect in many other plants building airplane engines, where inspection has tightened up inordinately. Corollary effects on morale of all workmen, to say nothing of the boys flying our military airplanes, can well be imagined. And it requires no great stretch of the imagination to perceive how the various charges of the Truman committee investigating aircraft could be of distinct "aid and comfort" to the enemy.

## Lack Technical Knowledge

If any private individuals, or business papers, for example, had come out with an exposition such as the 30-page Truman report, they would doubtless be hauled before the highest military tribunals and drawn and quartered. Yet a Senate committee, staffed by men who know little or nothing of the technical phases of manufacturing or aviation engineering, can broadcast incriminating charges unmolested, and bask in the publicity that follows. It can go so far as revealing the identification of new designs of military planes which industry publications are prevented from even mentioning. Thus, the Truman report discusses the Douglas SB2D Navy dive

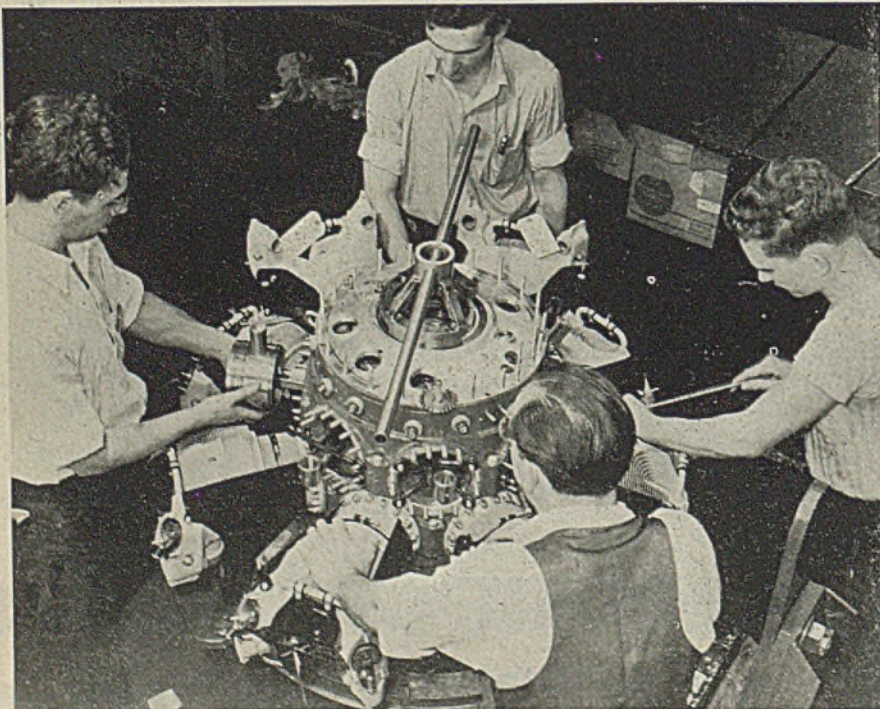
bomber, the Grumman F6F Hellcat fighter, the Vought Sikorsky TBV torpedo bomber, the Douglas A-26 attack bomber for the Army, and the Northrop P-61 night fighter for the Army.

Nowhere in the entire world are airplane engines built with the care and precision, and subjected to what appears at times a senseless number of tests and inspections, as in U.S. plants, including Wright Lockland. Inspection of incoming materials, parts in process, completed parts, by both company and army inspectors, a "green" test after assembly, complete teardown and inspection by both groups of inspectors, another test run, and a penalty run where a failure may occur during preliminary tests—all this to build an engine which may see only a few hours of service in the air. Probably half the cost of an aircraft engine at least must be charged to inspection and test.

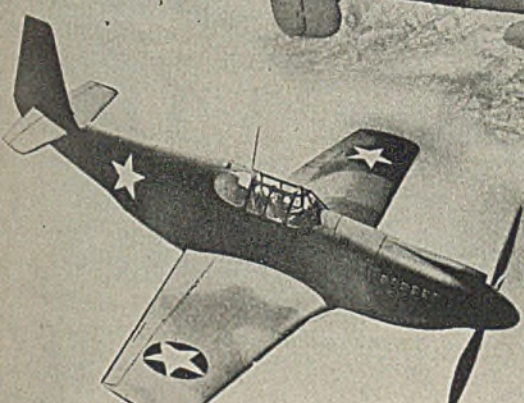
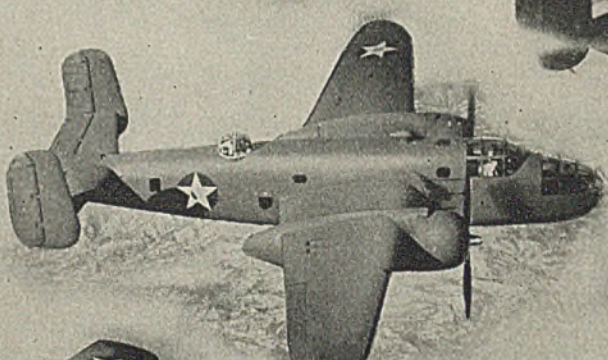
Naturally in all this detailed examination and testing, substandard parts are at times detected. There would be something wrong with the inspection if they were not. But such substandard parts are not necessarily scrap parts; they usually can be salvaged by reworking. However, it seems to be the contention of the Truman committee—and this is the crux of the whole affair—that whenever such a part is discovered, the entire engine should be broken up with sledge hammers and consigned to the scrap heap. The committee, with all its able legal talent, seems utterly incapable of comprehending the difference between the terms "scrap" and "salvage." Someone should buy Mr. Truman a dictionary.

Why Wright's Lockland plant should have been singled out for attack by the committee probably will never be known. It seems reasonable to assume that any other engine manufacturing plant could have been selected and with sufficient probing, cross-examining and vivisection could have been made the subject of a similar withering blast by the committee. It is barely possible that failures of some big Wright engines on the West Coast earlier this year—failures which were proved not to have been the result of defective parts but more likely of design deficiencies—were the needle which persuaded the committee to move in on Wright. Ostensibly, of course, the investigation was brought on by charges of a minor inspector that "leaky" castings were being dipped in a "pink liquid" to seal them, universal practice in sealing aluminum and magnesium castings.

Lockland is one of the largest engine plants in the country, new from the ground up, with the latest types of equipment and materials handling. It was managed, until the recent blowup, by W. W. Finlay, Wright engineering expert who holds a doctor's degree from M.I.T. and who began his industrial career at the age of 14 in a tool shop in England. He instituted a number of novel ideas in personnel relations at the plant which appeared to be paying dividends. One was according employees the privilege to



*Inspection, testing, teardown, re-inspection and re-testing constitute a major share of the cost of an airplane engine, which averages around \$10 per horsepower*



*More*

**BOMBERS and  
FIGHTERS.**



*are on their way with NEW*

*Speed Nuts*

Every day bombers and fighters are assembled with more and more SPEED NUTS. The increased use of SPEED NUTS rolls them off the line faster and lightens them for added useful load. These approved self-locking aircraft nuts grip the screws with a DOUBLE SPRING-TENSION LOCK that resists vibration for the life of the plane.

The tons of metal conserved with the use of

SPEED NUTS is almost impossible to calculate. And the man-hours assembly time saved runs into millions. Over 1500 shapes and sizes including many new ones just released. Approved for most all non-structural attachments by U. S. Army Air Forces and Navy Department Bureau of Aeronautics. Also used on trucks, jeeps and tanks. Write for our new book No. 185, illustrating some of our very latest developments.

**TINNERMAN PRODUCTS INC., 2039 Fulton Road, Cleveland, Ohio**

IN CANADA: Wallace Barnes Co., Ltd., Hamilton, Ontario

IN ENGLAND: Simmonds Aerocessories, Ltd., London



**FASTEST THING IN FASTENINGS!**

smoke anywhere in the plant or offices except in a few restricted areas where fire hazards made it unsafe, these being marked off by colored lines on the floor. Unexpected result of this "smoke anywhere" policy was that there was less smoking in general than in plants where the practice is prohibited and where employes have to sneak off to restrooms and washrooms to "grab a smoke." Even in offices where men and women were permitted smoking privileges, tobacco consumption decreased, probably just because there was no rule against it. Human nature is that way.

Employment of negroes has progressed somewhat further at Lockland than at other midwest war plants. One reason is that as the plant expanded, the available labor supply dwindled and negroes were about the only remaining employables. They were hired, carefully schooled and numbers of them upgraded to machine operation and even subforemen. Difficulty of accomplishing this in a plant located on the Ohio-Kentucky line can be appreciated.

As in most cases where a congressional investigating committee digs up what it believes is proof of malfeasance either in public office or in a private corporation, someone's head had to roll into the basket in the Wright case. So, first the Army Air Forces shook up its inspection crew and replaced the chief. Then Mr. Finlay was relieved of his post and he was replaced by a Wright vice president from Paterson, N. J. Reshuffling of company inspectors also fol-

lowed, in all probability setting the plant back six months on its production path.

It is somehow strange that such gestures of appeasement are considered necessary. After all, here is a pioneer builder of aircraft engines, with a newly equipped plant embodying all the best ideas of skilled experts in the metal-working field, supplying engines to a finicky customer, the Army Air Forces, who with the vast research and testing facilities of Wright Field at its beck and call, should know just about all there is to know about airplane engines. Yet a small committee of legislators and investigators drops in and after a probe which could hardly have been thorough blackballs the plant!

### Go Peddle Fish Elsewhere

At first glance, it would appear the thing to do is approximately this: Tell the committee to go peddle its fish somewhere else; that if the best manufacturing brains and the best military brains in the country cannot build a good airplane engine, then certainly no Senate committee can. Inspection and shop practices are outside the province of the Truman committee; the final test is performance of engines in the field of combat, and an Army Investigating Board found no discrepancies in engines shipped from the plant even during the period of alleged faulty inspection.

Instead, however, there is the usual head chopping and personnel shifting, plus some guarded admissions of laxity here and there.

Investigations of government business are healthy things in their proper sphere. In time of war, a certain amount of tact is called for, together with a realization that what on the surface looks to be reprehensible may in fact be only common practice. The aircraft program has received a distinct setback, thanks to the Truman committee.

Another patent remuneration plan in the aircraft industry has been instituted by the Vultee Field Division of Consolidated Vultee in California. The plan contrasts in some details with that recently announced by Glenn L. Martin Co., Baltimore. Under the Vultee setup employes sign invention agreements as they are hired, and similar agreements are being signed by employes now on payrolls. The agreement provides that the company will attempt to obtain patents on any invention it deems worthwhile, at no expense to the originator.

Cash awards as well as royalties are provided for the inventor. An employe receives \$10 if an investigation determines his idea has merit and is patentable; an additional \$40 if a patent application is made, and another \$50 if the patent is granted.

Additional compensation received from sale of the invention or any part of it, or from any royalties resulting from licensing of the invention, will be paid to the employe on a sliding scale—30 per cent of the first \$1000, 25 per cent of the second \$1000 and 20 per cent of any additional amount. Proceeds from the patented invention will be paid to the employe throughout the life of the patent, whether he continues to work for the company or not. In the event of the inventor's death, royalties will be paid to his heirs.

### Reports Peak Unemployment Not To Exceed 6,000,000

Sudden and successful termination of the European and Japanese phases of the war in 1944 would not cause unemployment to rise above a peak of 6,000,000 in that year, according to *Postwar Service*, issued by the International Statistical Bureau.

Spring and fall cutbacks in production and demobilization of 3,000,000 men by December 1944, will result in re-employment in some of the labor starved industries, A. W. Zelomek, president of the organization, declared. This will prevent unemployment from reaching the alarming estimates of from 12,000,000 to 15,000,000.

He also pointed out that the drop in employment will be taken up to some extent by the shortened work week. About 4,000,000 people are expected to be re-absorbed by industry due to work force retirements. An employment increase of 2,500,000 is expected to occur by December, 1944, in agriculture, transportation, utilities, trade, finance, self-employment, mining and domestic jobs.

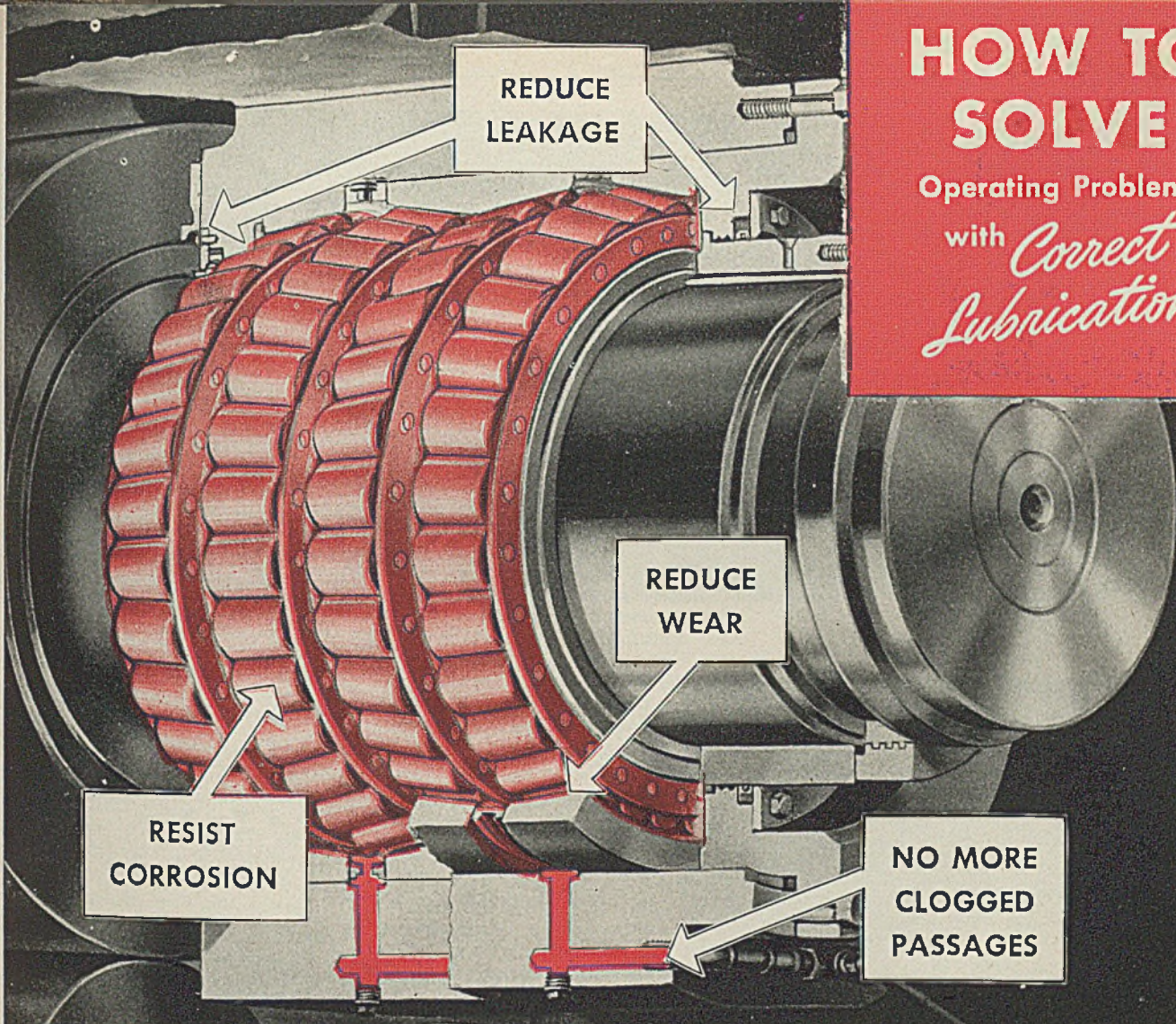


**HANDLING AIRCRAFT FORGINGS:** Gas-electric lift truck picks up a pallet of 160 alloy steel cylinder barrel forgings from yard storage at the Melrose Park, Ill., plant of Buick Motor Division, to move them into the machining department where each 30-pound forging loses about two-thirds of its weight before installation in a Pratt & Whitney 18-cylinder aircraft engine. In the background are some of the exhaust stacks from the engine test cells at the plant. Note blowers on each stack to provide forced draft, necessary since engines in cells drive generators and not propellers which would provide the desired air circulation



# HOW TO SOLVE

Operating Problems  
with *Correct Lubrication*



## Brand New Type Grease Ups Steel Mill Output!

HERE'S A NEW GREASE that was designed expressly for steel mill service — Gargoyle Sovarex L Grease. *There is no other grease made that combines all its properties!*

This grease has been extensively tested in service in some of U.S.A.'s largest steel mills. Where it was used formerly experienced wear disappeared. Machine outage time was materially reduced. Production increased.

The importance of this new grease to the steel industry cannot be overemphasized.

### GARGOYLE SOVAREX L GREASE HAS THESE IMPORTANT ADVANTAGES:

1. Maximum resistance to softening at high temperature. *Result:* reduced leakage.
2. Resists water. Oil film stays put. *Result:* resists corrosion... prevents wear.
3. Resists separation. *Result:* oil lines and passage are not clogged... bearing failures from this cause prevented.
4. High consistency index. *Result:* permits easy feeding with temperature variations.
5. Extra load carrying ability. *Result:* maximum protection against wear.

SOCONY-VACUUM OIL COMPANY, INC.— Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. White Eagle Div. • Wadhams Div. • Magnolia Petroleum Company • General Petroleum Corporation of California



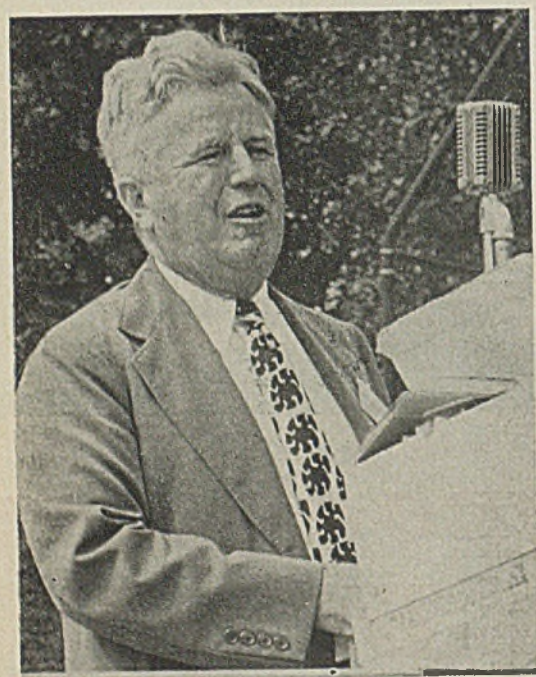
**USE SOVAREX L GREASE**



*Chicago Wheel & Mfg. Co. was honored at plant ceremonies (above) held in Chicago when the Army-Navy "E" award was presented by Col. C. J. Otjen. Presentation of employe merit pins was made by Lt. Comdr. E. R. Smith*

*President G. H. Niemeyer, left, Handy & Harman Co., Bridgeport, Conn., announces to employes that the company has been honored with a third Army-Navy "E" award*

*Below, a general view of the Army-Navy "E" ceremony of the United States Spring & Bumper Co., Los Angeles, held last month*



### Additional Plants Granted Army-Navy "E" Awards

Additional industrial plants have won Army and Navy awards for outstanding performance in production, Under Secretary of War Robert P. Patterson and Under Secretary of Navy James V. Forrestal, announced. They are:

- Cape Ann Tool Co., Pigeon Cove, Mass.
- Cayser Mfg. Corp., Buffalo, N. Y.
- Criterion Machine Works, Beverly Hills, Calif.
- Crown Fastener Corp., Warren, R. I.
- R. J. Ederer Co., Chicago.
- Electrical Connectors & Mfg. Co., Milwaukee, Wis.
- General Motors Corp., Aeroproducts division, Vandalia, O., and Delco Appliance division, Rochester, N. Y.
- Haber Screw Machine Products Co., Chicago
- Hamilton Mfg. Co., Two Rivers, Wis.
- Hathaway Mfg. Co., New Bedford, Mass.
- Heller Brothers Co., Newcomerstown, O.
- National Enameling & Stamping Co., Milwaukee, Wis.
- Remington Arms Co. Inc., Salt Lake City, Utah.
- G. F. Richter Mfg. Co. Inc., Queens, N. Y.
- Strong, Cobb & Co. Inc., Cleveland.
- Tulsa Winch Mfg. Co., Tulsa, Okla.



## Sets Up Group On War Housing

*Westinghouse Electric & Mfg. Co. establishes advisory and consultation service*

CENTRALIZED advisory and consultation service for architects, engineers, pre-fabricators, builders and home owners has been established by Westinghouse Electric & Mfg. Co. with the creation of a "Better Homes Department".

Manager of the new department will be Irving W. Clark, since 1934 associated with housing and household equipment activities at the Westinghouse Electric Appliance division, Mansfield, O. Headquarters of the new department will be in Pittsburgh, it was announced by B. W. Clark, vice president in charge of sales.

Immediate function of the new department will be to co-ordinate company's activities in helping to house war workers. The ultimate objective will be to develop postwar housing markets for the company's products.

The new department will serve as an information center to report on housing equipment production and research carried on in several manufacturing divisions of the company.

## National Metal Congress' Plans Nearly Completed

Extensive plans and preparations are being completed for the National Metal Congress and the war conference displays which are to be held under the auspices of the American Society for Metals at the Palmer House, Chicago, Oct. 18-22.

C. H. Mathewson, professor of metallurgy, Yale University, will deliver the Campbell Memorial Lecture. A number

of technical papers will be presented during the congress.

Theme of the war production sessions will be increased production of war products, conservation of materials, and postwar conditions. Many manufacturers are planning to display light equipment, blueprints, diagrams, charts, and other items to assist their technical and manufacturing staffs in the conferences.

Associations participating in the congress are the American Society for Metals, American Institute of Mining and Metallurgical Engineers, American Welding Society and Wire Association.

## Chemists Hold Fourth War Conference at Pittsburgh

Fourth National War Conference, the 106th meeting of the American Chemical Society, was held in Pittsburgh Sept. 6-11 with about 4000 scientists and industrialists participating.

Some of the subjects discussed at the meeting were manpower problems in the chemical industry, food supply, methods of increasing the productivity of the nation's farms, petroleum research, synthetic rubber, aluminum in the war, vitamins and proteins, industrial hygiene, pilot plants, plastics, fertilizers, and research management in small laboratories.

Other discussions dealt with biological chemistry, analytical and micro-chemistry, cellulose chemistry, chemical education, colloid chemistry, gas and fuel, industrial and engineering chemistry, technology, and physical chemistry.

Dr. P. K. Frolich, president of the society, spoke on "Petroleum—Past, Present and Future".

## Iron and Steel Engineers Complete Convention Plans

The largest and most comprehensive technical program ever scheduled will be held in connection with the thirty-ninth

annual engineering conference of the Association of Iron and Steel Engineers.

The meeting will be held in Pittsburgh, Sept. 28, 29 and 30, according to F. E. Flynn, president of the association and district manager, Republic Steel Corp., Warren, O.

In keeping with wartime conditions, the conference has eliminated social events and exhibits as in previous years.

## BRIEFS . . .

W. K. Millholland Machinery Co., Indianapolis, Ind., has been appointed sales agents in Indiana, southern Ohio and northern Kentucky for the Watson Stillman Co., Roselle, N. J.

Phelps Dodge Copper Corp. announces it will shortly equip and operate for DPC a large extrusion plant for production of aluminum and magnesium tubes, shapes and rods.

Buffalo Foundry & Machine Co. has purchased the industrial kettle business of the Sowers Mfg. Co. of Buffalo whose plant and equipment was offered for sale at public auction.

Caterpillar Tractor Co., Peoria, Ill., announces that production of diesel tractors for military purposes will be increased substantially.

Sylvania Electric Products Inc. announces acquisition of its fifteenth manufacturing plant, a steel and brick structure in Warren, Pa., which after conversion will be devoted to production of assembly parts for radio tube, lighting and electronic products.

American Gas Furnace Co., Elizabeth, N. J., announces that Elmer C. Cook and Fred J. Schweizer, formerly sales manager and service engineer of the company, have resigned to form the Cook-Schweizer Co., Elizabeth, N. J. They will do commercial heat treating work.

## —They Say:—

"Restrictions on the creative genius and productive powers of the American business man and industrialist are infinitely more dangerous to our American way of life and much more likely to cause anemic markets than any other type of regulation. Wartime co-operation and mutual respect between government and industry may be born of necessity but we must see to it that it lasts over into the peace period."—Emil Schram, president, New York Stock Exchange.

"Let us have no more attempts by theorists and planners to use the war as a means of converting our representative democracy to a paternalistic, bureaucratic socialism. The record of the last few years shows that this country doesn't need to be made over."—Raymond E. Baldwin, governor of Connecticut.

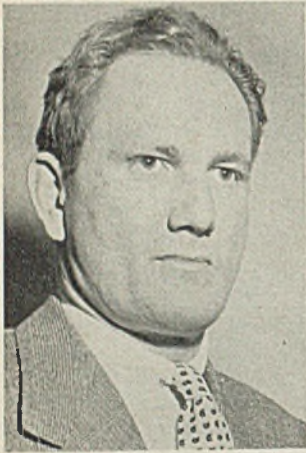
"Foreign and domestic demand indicates that postwar

business will attain record proportions. The necessary controls, however, must be applied with discretion and understanding. There must be no ceiling upon the successful promotion of business enterprises if we are to achieve full re-employment of the men in the armed services."—Lawrence Ottinger, president, United States Plywood Corp.

"The question of reserves for postwar transition is perhaps the most important single problem now confronting the aircraft industry. Even the most ardent enthusiast cannot see anything but a shrinkage of business in the period immediately following the war."—Francis A. Callery, vice president, Consolidated Vultee Aircraft Corp.

"We in the United States shall continue to rely upon private initiative to supply us with the vast bulk of goods and services which are essential to the well-being of our people."—Secretary of Labor Perkins.

# MEN of INDUSTRY



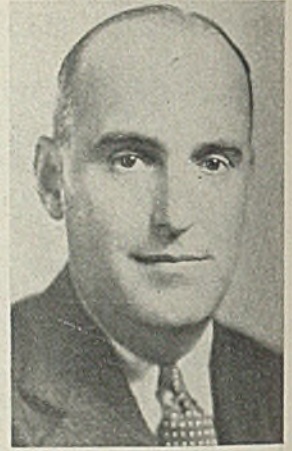
R. J. MINSHALL



WILLIAM HEIDGERD



ROBERT T. KELLER



B. M. HORTER

R. J. Minshall has been appointed president, McCulloch Engineering Corp., Milwaukee, succeeding Robert McCulloch, founder of the corporation who is resigning as president to undertake a new development. Mr. McCulloch will continue as a director and consultant. Assisting Mr. Minshall, who is also president of Pump Engineering Service Corp., Cleveland, is James P. Stewart, assistant general manager.

John W. Murphy has been named manager of sales, rails and accessories, Bethlehem Steel Co., Bethlehem, Pa., succeeding Howard E. Stoll, who has retired after 31 years as manager of rails and accessories sales. Mr. Murphy has been with Bethlehem since 1923, serving in the Boston and Baltimore sales offices, and later acting as assistant manager of sales.

I. G. Wilcox, former superintendent of parts manufacture, Rockwell street plant, Bell & Howell Co., Chicago, has been appointed general superintendent of the company's Larchmont avenue plant, same city.

Paul Mayfield, former director of sales, Naval Stores department, Hercules Powder Co. Inc., Wilmington, Del., has been appointed assistant general manager.

T. Claude Ryan, president, Ryan Aeronautical Co., San Diego, Calif., has been elected president of the Aircraft War Production Council Inc., succeeding LaMotte T. Cohu, chairman of the board, Northrop Aircraft, Hawthorne, Calif. Courtlandt S. Gross, president, Vega Aircraft Corp., Burbank, Calif., has been named vice president.

F. B. DeLong has been appointed vice president and general manager of sales, Columbia Steel Co., West Coast subsidiary of United States Steel Corp., Pittsburgh. Mr. DeLong formerly was vice president in charge of sales in the Los Angeles district. He succeeds J. R.

Gregory, who has been made vice president of sales, Geneva Steel Co., newly formed United States Steel subsidiary at Geneva, Utah.

William Heidgerd, former director of purchases, Parsons Co., Traverse City, Mich., has joined Follansbee Steel Corp., Pittsburgh, as district sales manager for the Michigan territory with headquarters in the Stephenson building, Detroit. Previously Mr. Heidgerd had been associated with Jones & Laughlin Steel Corp., and United States Steel Corp., Pittsburgh, in sales capacities.

I. T. O'Brien, for 14 years general production manager, Chrysler Corp., Detroit, has been promoted to special representative on the staff of Herman L. Weckler, vice president and general manager. H. J. Dunn, former assistant to Mr. O'Brien, has been named general production manager and W. A. Stickle has become assistant to Mr. Dunn.

Herbert A. Goodwin, for the past 15 years advertising manager, Continental Can Co., New York, has been named director of sales development.

Jacob Betz has been elected chairman of the board, Mollenberg-Betz Machine Co. Inc., Buffalo, and Harold J. Mollenberg has been elected president, succeeding his father, the late Henry J. Mollenberg.

R. C. Cosgrove, vice president and general manager, Manufacturing division, Crosley Corp., Cincinnati, has been named chairman of a special committee on postwar planning, Radio Manufacturers' Association.

Edward G. Bern, general manager, Hughes Aircraft Co., Culver City, Calif., and John W. LeDuc, head of the company's cargo section, have resigned.

Charles W. MacLean has been appointed manager of the school service department, Westinghouse Electric &

Mfg. Co., East Pittsburgh, Pa., succeeding R. E. Williams, who will devote his full time to technical and research activities. Mr. MacLean has served as an educator in New York state secondary schools for the past 12 years.

Robert T. Keller has been appointed works manager, Chrysler Tank Arsenal, Detroit, succeeding M. J. Leonard, who is being detailed to another war job in the corporation. Mr. Keller will serve directly under E. J. Hunt, operating manager of the Arsenal.

B. M. Horter has been named purchasing head for Cutler-Hammer Inc., Milwaukee, succeeding F. S. Wilhoit, who has retired after 41 years of service.

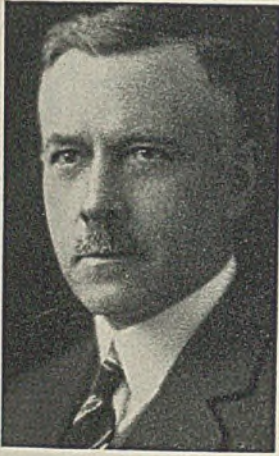
E. F. Schiele, former sales manager and member of the board, Massey-Harris Co., Racine, Wis., has joined the general sales department of J. I. Case Co., Racine.

A. P. Lancaster has been appointed manager of industrial relations, Hawthorne works, Western Electric Co., Chi-

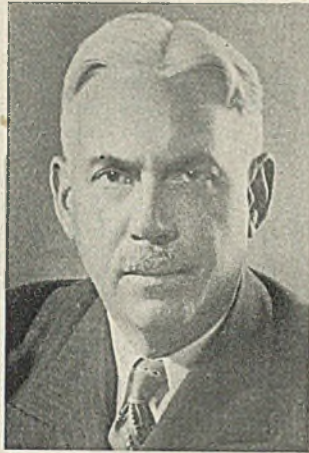


ROBERT R. RHODEHAMEL

Who has been named general sales manager, National Acme Co., Cleveland, as reported in STEEL, Sept. 6, p. 87



HARRY G. PORCH



T. H. WICKENDEN

ago, succeeding C. W. Bergquist, who retired Sept. 1 after 48 years with the company. Mr. Bergquist is a past president of the National Safety Council.

Harry G. Porch, manager of sales since 1900 in the Boston office of Lukens Steel Co., Coatesville, Pa., retired Sept. 1 after 48 years of continuous service with Lukens.

A. H. Dettwiler has been elected vice president and secretary of the Cuyahoga Spring Co., Cleveland. Mr. Dettwiler has been associated with the Cuyahoga company for the past 25 years, recently as purchasing agent. John H. VanUum, president, has also taken on the duties of treasurer of the company.

Joseph Birbaum, vice president, Milwaukee Stamping Co., has been elected a director of the Milwaukee County bank.

J. C. Argetsinger, vice president, general counsel and secretary of Youngstown Sheet & Tube Co., Youngstown, O.,



HARRY T. WORTHINGTON

Who has joined Beardsley & Piper Co., Chicago, as general manager, noted in STEEL, Sept. 6, p. 86.

has been appointed to the Ohio Postwar Commission by Gov. John W. Bricker. The Commission is studying plans for an extensive "after-peace program" for Ohio.

T. H. Wickenden, since 1931 assistant manager, Development and Research division, International Nickel Co. Inc., New York, has been appointed manager, to succeed the late Albion James Wadhams. Mr. Wickenden is a member of the American Society of Mechanical Engineers, the Society of Automotive Engineers, American Institute of Mining and Metallurgical Engineers and the American Society for Metals. H. J. French, who is serving temporarily in the Steel division, War Production Board, has been named assistant manager of the division. Mr. French has been in charge of alloy steel development since 1932. He is president of the American Society for Metals.

J. W. Burdick has been appointed assistant district manager, Springfield, Mass., office, Allegheny Ludlum Steel Corp., Pittsburgh, and J. T. Purtell has been named salesman in the Springfield district.

C. A. Hartman, previously foundry superintendent, Harrisburg Machine Corp., Harrisburg, Pa., has joined the metallurgical and engineering service staff of Meehanite Metal Corp., New Rochelle, N. Y.

E. A. Garber has been named president of Northwest Magnesite Co., Pittsburgh, succeeding P. P. Moseman, who is retiring Oct. 31. C. A. Sargent, formerly superintendent of mines, succeeds Mr. Garber as vice president and general manager.

Albert G. DeGraff has been named resident manager in Philadelphia for Austin Co., Cleveland, succeeding J. C. Childs, retired.

Thomas K. Pierce, former general manager, Dominion Plywoods Ltd.,

Southampton, Ont., has been appointed assistant general manager, Duramold division, Fairchild Engine & Airplane Corp., New York.

OBITUARIES . . .

Leon S. Moisseiff, 70, leading authority on bridge construction and consulting engineer, died Sept. 3 at Belmar, N. J. Mr. Moisseiff was a life member of the American Society of Civil Engineers, and also a member of the American Society for Testing Materials, American Railway Engineering Association, American Welding Society, Alloy Steel Commission and the Structural Steel Welding Committee. He was a consulting engineer in the construction of the George Washington bridge, New York.

Harry L. Williams, 80, one of the founders of Hickman, Williams & Co., Chicago, died Sept. 2 in Holland, Mich. Mr. Williams served as president of Hickman, Williams from 1913 until 1918 when he retired from active business.

John Bennett, 68, consulting engineer in this country and England for more than 40 years, and a former vice president of Stevens & Wood Inc., an engineering firm, died recently in New York.

A. L. Gustin Sr., 65, founder and president, Gustin-Bacon Mfg. Co., Kansas City, Mo., died Aug. 28 in that city.

Harry C. Tillotson, 76, founder and president, Tillotson Mfg. Co., Toledo, O., died there Sept. 1. The Tillotson carburetor was one of the first workable carburetors developed in the United States.

W. O. Ingle, 68, vice president and treasurer, Consolidated Machine Tool Corp., Rochester, N. Y., died Sept. 2 after a short illness. Mr. Ingle was widely known in machine tool circles.

J. C. Bench, 69, superintendent of all mechanical departments at the Minnequa steel plant, Pueblo, Colo., Colorado Fuel & Iron Corp., Denver, died Sept. 3 after 55 years with the company.

C. W. Waterman Sr., vice president in charge of sales, McNally Pittsburgh Mfg. Corp., Pittsburgh, died in Chicago recently.

Hugh A. Todd, New York state representative for Hanson-Van Winkle-Munning Co., Matawan, N. J., died recently in Rumson, N. J.

Franklin D. Johnson, credit manager, Joseph T. Ryerson & Son Inc., Buffalo, died Aug. 28 in Prospect Point, Ont.

Nelson Blount, 64, retired inventor and research worker for Bell Laboratories, New York, died Aug. 30 in Morris Plains, N. J.



# NORTHWEST HITCHES ITS BRIGHT INDUSTRIAL STAR

*Wartime expansion in electric power, steel, metals, aircraft, shipbuilding and diversified manufacturing provides basis for ambitious hopes for economic development of the area in the postwar world*

TIME and again announcement has been made of someone advocating construction of an iron and steel plant in the Pacific Northwest. Plans often included a blast furnace and rolling mills. Frequently electric furnace pig iron came into the picture. Some say there is an adequate supply of iron ore; others state the supply is scattered with transportation facilities lacking.

Lately sponge iron processes have been discussed as the logical starting point. G. E. Murphy, president, Portland Spar Co., Portland, Oreg., recently proposed to the War Production Board construction of a northwest steel plant at a cost of \$24,365,000. The plant, which would require an estimated 24,000 tons of critical materials, would produce 170,000 tons of pig iron, 200,000 tons of ingots, 75,000 tons of structural steel and plates and 60,000 tons of merchant products, annually. An engineering report showing that Oregon and Washington have more than ample deposits of iron ores of quality especially suitable for making high-grade alloys, was submitted to the board. Use of Bonneville power was contemplated.

Experimental work on sponge iron production is being done at Cascade Locks, about 50 miles east of Portland, Oreg.

In the light of mixed opinion, however, there are certain facts that stand out concerning the failure to launch an integrated steel plant in the Pacific Northwest. For example, past projects have not been engineered properly, tentative investors have been of the conservative type, and those promoting projects in the area have had insufficient knowledge of the iron and steel industry. Consequently, projected plans for an iron and steel industry in the Seattle-Portland area have not made much headway.

Hydroelectric power facilities, however, may change the entire complexion of this region.

Beehive coke was made in the state of Washington as early as 1880 but production ceased in 1936. One by-product plant—the Seattle Lighting Co.—operated 20 Klonne-type by-product

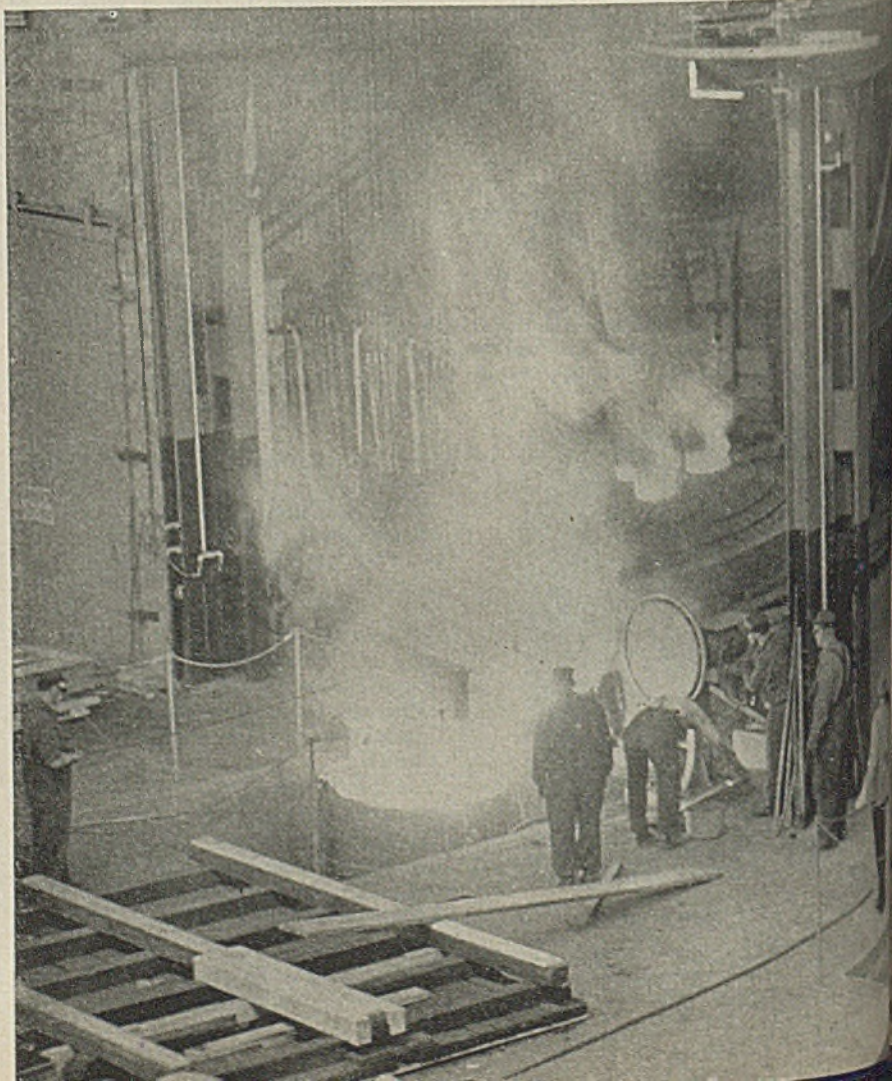
ovens primarily for gas from 1917 to 1937. No coke was made from 1937 to 1941.

The only important coking coal resource along the Pacific Coast is in Washington, according to Joseph Daniels, professor of mining and metallurgy, University of Washington, Seattle. This state possesses large resources of coal of various ranks and grades suitable for the need of modern industry, he states. Many of these are not as good

quality as coals from mines in the East.

The major production of coking coals is found in the Wilkeson-Carbonado-Fairfax district of the Pierce county field. The beds contain high ash and generally are more difficult to mine and clean. However, Washington coals have been used successfully for various needs, and demands of consumers over nearly a century indicate that they have a place in the field of fuel utilization.

In 1941, the Wilkeson Products Co.



# WAGON TO

By JOHN D. KNOX

Steel Plant Editor

erties required by the metallurgical industry.

Meanwhile the ovens are scheduled largely on domestic coke. Later, they will be charged to produce the originally planned grades of low-ash, low-sulphur, and low-phosphorus cokes. These will be taken by the Ohio Ferro-Alloys Corp. making ferrochrome; the Olin Corp., making pig aluminum; and the Pacific Carbide & Alloys Co., making calcium carbide—all at Tacoma; the Electro Metallurgical Co. making ferroalloys at Portland, Oreg.; the Seattle Gas Co., Seattle, for water gas generators; and Bethlehem Steel Co., Seattle, for recarburizing.

Metallurgical charcoal now is being made in Tacoma at the new plant of Coast Carbons Inc., which obtains its supply of wood from nearby lumber mills.

The Pacific Carbide Co., subsidiary of the Stewart-Oxygen Co., has just completed a carbide plant with a capacity of 70 tons per day. It also has a plant in Portland with a capacity of 20 tons per day. This product is used to make acetylene for the shipyards in the area.

Tacoma area has 11 small shipyards and one large yard—that of the Seattle-Tacoma Shipbuilding Corp., which is allied with the Todd interests in New York. The yard turns out an auxiliary

aircraft carrier every two weeks for the British. These carriers accompany convoys and have been effective in submarine warfare. They also are used in carrying fighter planes across the seas. About 28,000 men are employed locally in the shipyards.

The Olin Corp., E. Alton, Ill., owner of the Winchester Arms Co. and the Western Cartridge Co., is operating the 40,000,000-pound aluminum plant at Tacoma, turning out a product 99.75 per cent pure. The plant was designed by Asbjorn Sjolie, a Norwegian, who has built plants in China, Spain, Manchuria and other countries.

The Hooker Electrochemical Co. is making aluminum chloride in a new \$250,000 addition at its plant in Tacoma. The product finds its way into high octane gasoline.

### Power Output Vast

Cheap power and an adequate supply contributed largely in getting five aluminum reduction plants, three ferroalloy plants, two calcium carbide plants and one magnesium plant to locate in the Pacific Northwest. Some idea of the vast quantity of power available from the Grand Coulee and Bonneville stations in the Pacific Northwest can be had from the following comparison:

Station	Annual output kilowatts
Niagara Falls .....	1,200,000
Boulder Dam .....	1,300,000
Tennessee Valley .....	1,900,000
Columbia River .....	2,700,000*

\*Representing present capacity. Completion of future dams and stations will bring total capacity to 13,000,000 kilowatts.

The aluminum plants are located at Portland, Oreg., and at Vancouver, Longview, Tacoma and Spokane, Wash. Some are company-owned; others are financed by the government but privately operated. The five plants have an annual production of 596,000,000 pounds of aluminum pig which is equivalent to 25 per cent of the nation's output. In addition, a 4-high continuous mill has been built at Spokane, Wash., with annual capacity of 24,000,000 pounds of sheet aluminum, as well as a magnesium reduction plant with annual output of 48,000,000 pounds.

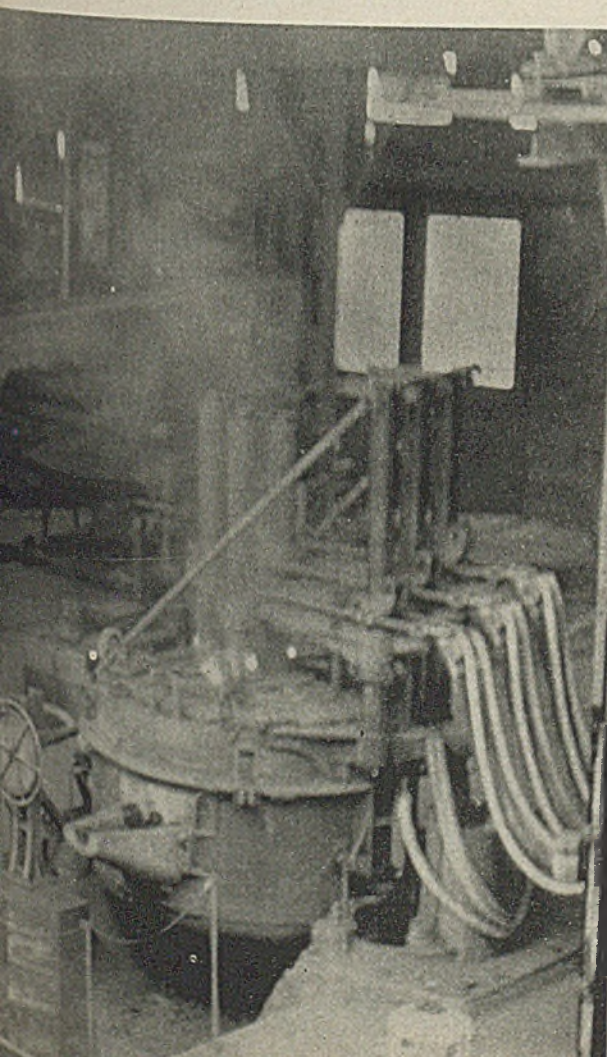
Large deposits of magnesite located in northeastern Washington are available for the manufacture of magnesium. Investigation of aluminum-bearing clays for possible use in manufacture of aluminum is being made in Washington.

Considerable promise is held for the electrometallurgical industry on the Pacific Coast because of cheap power originating from government-owned power stations on the Columbia river. No area in the east offers such low power rates at Tidewater as those in effect at Seattle and Portland. In fact, there is no setup in the world that can match power conditions in the Pacific Northwest.

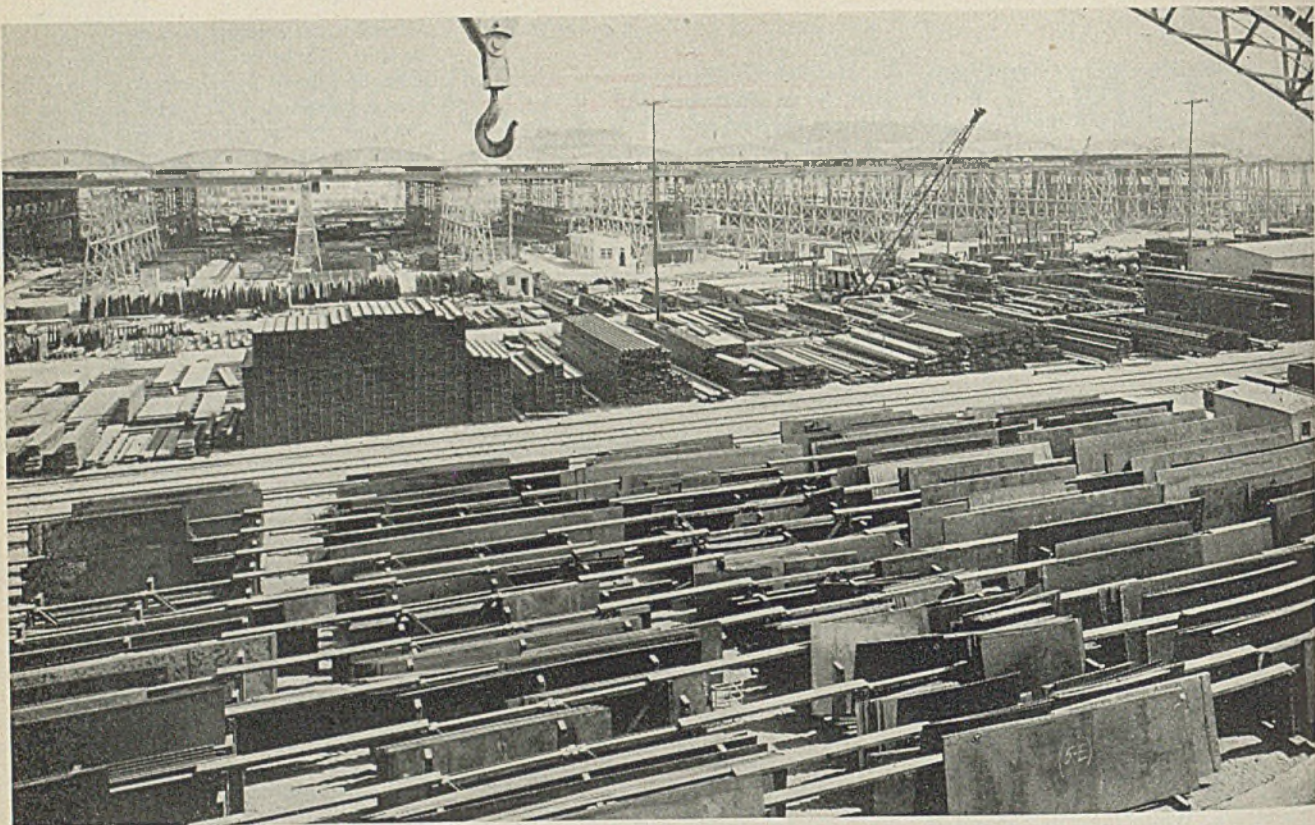
Cheap power along with an ample sup-

created a greatly needed coke industry in Tacoma, Wash. The Northwestern Improvement Co., a subsidiary of the Great Northern railway, undertook development of a coal mine at Wilkeson to provide the coking coal. A battery of 17 Curran-Knowles ovens with a coking capacity of 75,000 tons annually was built at Tacoma and now is in operation on a limited scale pending coal production on the original contemplated scale. Surplus gas is piped about 1000 feet to the plant of the Tacoma Gas Co.

Three different types of coke are contemplated. No. 1 grade containing about 10 per cent ash, No. 2 plant with 12 per cent ash, and No. 3 grade containing 14 per cent ash. While the ash content is higher than in Eastern cokes yet the Washington fuel has the physical prop-



*New melt shop of the Pacific Car & Foundry Co., Seattle, Wash., area. Melting equipment includes two 25-ton electric furnaces*



*Sectional view of steel yard of Oregon Shipbuilding Corp., Portland, Oreg.  
The covered assembly shop is shown in background*

ply of scrap from shipyards has led many to voice the opinion such a setup is ideal for establishment of a steel industry on a modest scale in the Pacific Northwest. In fact, such a start has been made at Portland, Oreg., where the Oregon Electric Steel Rolling Mills Inc. recently completed a plant. The melt shop has two 15-ton Lectromelt furnaces with annual output of 60,000 tons. Scrap is obtained from nearby shipyards at an average price of \$13.50 per ton. The rolling mill department includes a 20, 14 and 9-inch train which was purchased from the General Cable Co., Baltimore, and a Morgan cooling bed. Merchant bars and shapes are products of the mill.

Electric melting capacity at plants in the metropolitan area of Seattle also has been stepped up. The Isaacson Iron Works has installed two 25-ton Lectromelt furnaces with annual capacity of 72,000 tons of forging ingots and Northwestern Steel Rolling Mills Inc. one Lectromelt furnace for ingot production. Incidentally, this latter company which has been making electric furnace steel since Jan. 1, 1927, has the cheapest power cost of any electric furnace shop in this country. Its rate is 4 mills per kilowatt hour for all current used during December, January and February of each calendar year and 3 42/100 mills per kilowatt hour for all current used during the months of March to November, both inclusive.

At Renton, Wash., about 12 miles south of Seattle, the Pacific Car & Foundry Co. installed two Lectromelt furnaces for production of steel castings. Incidentally, this company has just completed one of the most modern foundries on the Pacific Coast.

Wide aisles, modern lighting, large heat treating furnaces with pyrometric control and modern foundry equipment are some of the features of this steel foundry whose output is devoted to war materials.

Open-hearth steel output of the Seattle works of the Bethlehem Steel Co. has been boosted to 177,000 tons by the recent addition of a 40-ton furnace which gives the company a 5-furnace shop. This is the only open-hearth steel plant in the Pacific Northwest. The furnaces operate on a charge of 90 per cent scrap and 10 per cent pig. Products of the plant include structural shapes, universal plates, splice bars and tie plates, and merchant and concrete bars.

#### Not Over-Expanded

Potential scrap requirements of Pacific Northwest consumers this year including Isaacson, Pacific Car, Oregon Electric Steel, Bethlehem, Northwestern Steel Rolling and electric steel casting furnaces in Washington and Oregon amount to 410,000 tons. In addition gray iron foundries in the entire Northwest area are currently consuming at the rate of about 72,000 tons annually.

Growth of the iron and steel industry in Seattle has been considered healthy. No effort has been made to over-expand producing facilities. Major shops have been converted over to war production to take care of demands from shipyards, and manufacturers of aircraft and tanks. The most substantial and highly important expansion programs have been in heavy forgings for ship propellers and

drive shafts, and in the cutting and machining of heavy gears.

Some plants formerly engaged in the manufacture of refrigerator freight cars and other heavy transportation equipment, turned their producing facilities over to the manufacture of 30-ton tanks. After the war, operators of these plants are considering converting their shops back to peacetime pursuits, having in mind manufacture of various types of machinery, trucks and truck trailers, and railroad equipment.

Mention of Seattle in late years invariably has brought to mind the "home of the Flying Fortress" which is giving such a good account of itself in the war. Boeing officials are looking for great advancement after the war in the field of commercial aircraft. And because of the wide experience of this company in the manufacture of clipper ships and other large aircraft, many industrialists believe this company will play an important role in the large-scale development of commercial aircraft when the war ends. Already studies are being made on cargo and clipper planes. The Boeing company has two plants in Seattle, one employing more than 30,000 workmen and the other about 16,000.

Seattle as a shipbuilding area claims 44 large and small yards. After the war many of the shipbuilding executives are planning to share in the work of building up and servicing our merchant marine.

Seattle has become a more predominant manufacturing city as indicated by the number of employes working in



the manufacturing and mechanical industries. Approximately 100,000 people are identified with these industries or 40 per cent of the total employment in Seattle. This is double the number in normal times.

The federal census in 1940 gave the Seattle metropolitan district a population of 452,839; by January 1943 it was estimated to be 580,000. This increase is cited merely to strike home the fact that the Pacific Northwest is undergoing drastic change. It is the story of shifting population. People from the hinterland have come to coastal cities by the thousands and they have no intention of returning to their former homes when conditions become normal.

The general manager of one of Seattle's steel plants is authority for the statement fully 90 per cent of the employes who have become identified with his company within the past two years are either purchasing homes or are planning to take up permanent residence in Seattle. An executive of another industrial plant nearby used this same percentage in connection with newcomers at his plant. And such intentions on the part of various migrants is by no means applicable solely to this section; the feeling is general all over the Pacific Northwest.

The importance of this shift in population, therefore, must not be minimized for it represents a change from an agricultural people to a people now making a livelihood in industry. They are becoming an industrial folk.

All along the coast there is a modest real estate boom in most communities. Many city folk are going into retirement leaving the larger towns to war workers, with the result there are many residences changing hands. The so-called beach communities are becoming small, self-sustaining towns in their own rights. The presence of Coast Guard and Army groups has strengthened the self-sus-

tained position. Some of the service men have moved their families to the coast to stay permanently.

That is why industrialists view the future of the Pacific Northwest with great optimism. The influx of Americans in that area promises markets and this in turn means spinning factory wheels. So that considerable demand for goods has been transferred from the hinterland to the coastal cities and this may compel underbuilt industrial areas to spread their wings—all of which means more steel.

Consideration also is being given to various countries whose shores are washed by the Pacific ocean and whose after-the-war purchases appear highly promising. Millions of these people in far off places have seen American soldiers set up their make-shift stoves in these out-of-the-way places and will desire similar comforts. Then, too, industrialists up and down the coast feel that the trail of destruction in the Far East will call for a large amount of manufactured goods.

#### China Promising Market

Industrialists on the coast feel that the United States has the opportunity to co-operate with China—not exploit it—after the war. The door is open for us to take iron ores, chrome, tungsten, etc., from the Chinese and give finished goods in exchange. But the opinion also is voiced that Russia is poised like a big question mark. One of the questions to be answered is, "How extensive is Russia's industry back in the Urals and what postwar plans has she to capture Chinese trade?"

Intense thought is being given to trade in the Orient in the postwar era. Before the war the machinery business and the iron and steel market in the Far East were controlled either directly by the Germans or indirectly by German money. Plans are being considered to forestall any move on the part of the

Germans to recapture this business. Some have gone so far as to suggest that not only plants be moved to China but operating crews as well. Some plants in the Pacific Northwest while built for present wartime needs were also erected with an eye to the future economic pattern so that transfer from the coast to China can be consummated with a minimum of confusion.

Then there is Alaska which, many believe, holds considerable economic promise in the postwar picture. The opinion is gaining weight that the wealth in this part of the country is untapped and the possibilities untouched. Once our people get a glimpse of that land from the recently built highway they will experience a pull to take up residence there. Pacific Coast industrialists expect a great expansion in Alaska and plans are being considered to build large barges and tugs to handle shipment of goods in that direction.

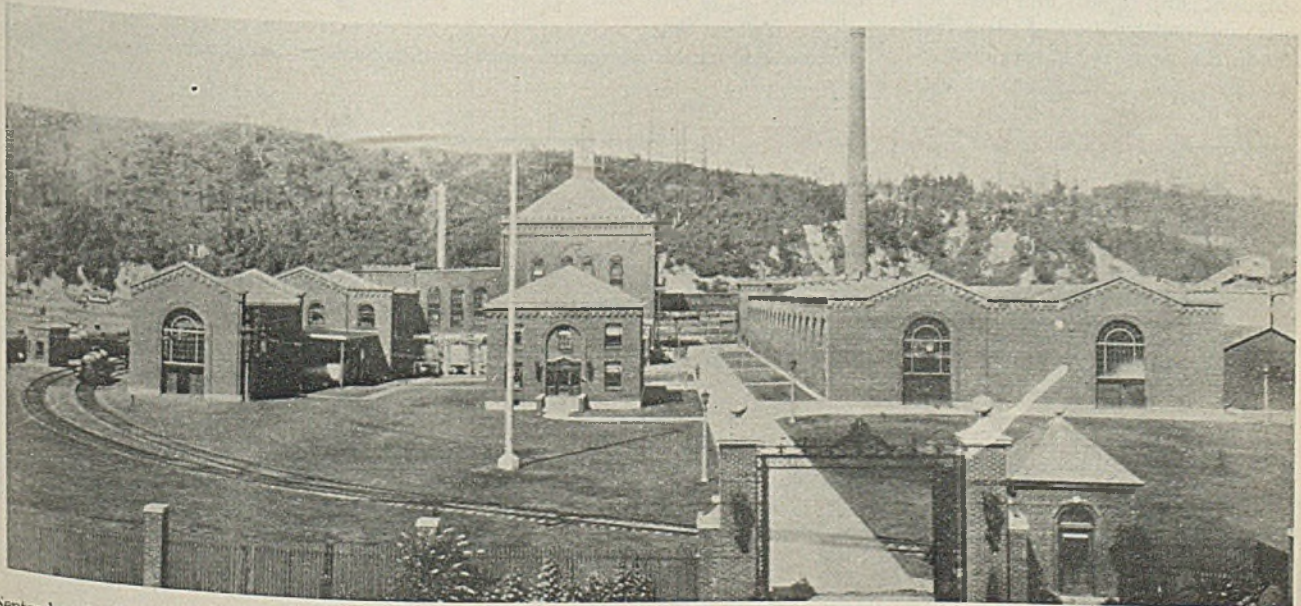
Postwar plans also include a large fleet of vessels for taking care of coastal trade as well as off-shore shipments westward. Shipyards are available for building such a merchant marine and steelworks and rolling mills at Fontana, Calif., and Geneva, Utah, soon will be sending out material in demand by shipbuilders. Moreover, it is felt that bulky materials, such as lumber, and other products can be shipped to the Far East and cheap scrap brought back from the battlefields for consumption in basic open-hearth furnaces located close to the Pacific coast.

Ivan Block, chief, Market Development Section, Bonneville Power Administration, Portland, Oreg., in speaking before the Progressive Business Men's Club



*Plant of the Hooker Electrochemical Co., Tacoma, Wash. Recent expansion provided facilities for making aluminum chloride*

*(Please turn to Page 166)*



September 13, 1943

## Going Getting Tougher as Operations Near Capacity

WHILE the various industrial production indexes continue to fluctuate from week to week, reflecting developments closely related to prosecution of the war, as a general thing the trend holds upward though advances are being scored with increasing difficulty as facilities more nearly attain capacity operations.

Shortage of manpower is probably the most critical problem now confronted. Material shortages continue a factor hampering output in some directions, but under Controlled Materials Plan, raw material supply problems are less of a handicap retarding operations than formerly was the case.

Steel output rose a half point to 99 per cent in the latest weekly period. Consumption of electric power again established a new high, and output of bituminous coal increased 27,000 tons on a daily average basis.

Seasonal shutdowns for inventory cut automobile and truck production in the week ended Sept. 4, but normal rate of assembly has now been resumed.

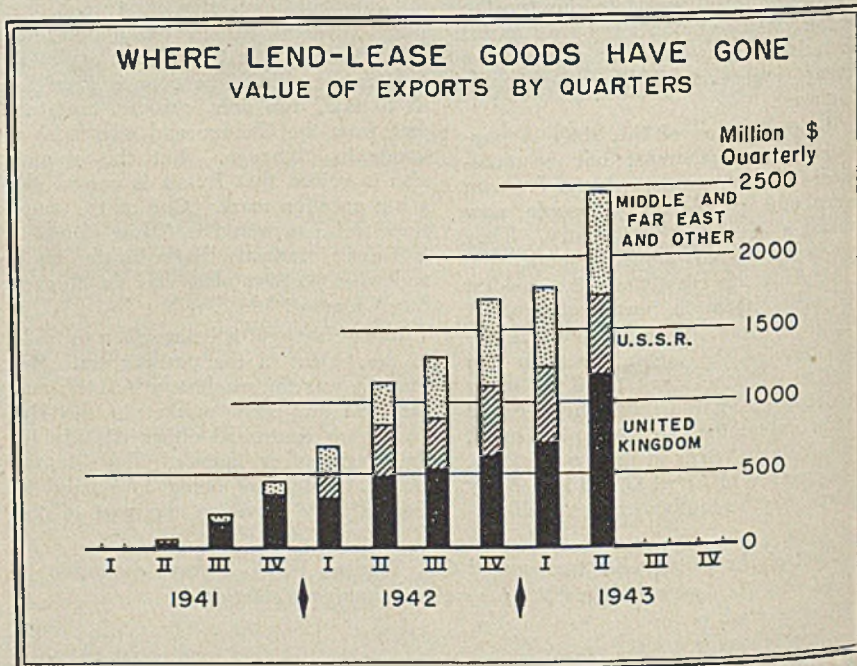
**LEND-LEASE**—Report to Congress shows \$14 billion spent for lend-lease operations since the act was passed slightly over two years ago, or approximately 12 per cent of the nation's war cost thus far. For the year ended June 30, lend-lease needs absorbed 17 of every 100 American bombers, 25 of each 100 fighter planes, 22 of every 100 light tanks, and 36 of every 100 medium tanks. Russia has received more lend-lease planes from us than any other nation.

A breakdown of the \$14 billion in lend-lease items is as follows: Munitions, 50 per cent; industrial products, 21 per cent; food and other agricultural products, 14 per cent; shipping, ship repairs and other services, and construction of plant facilities in this country, 15 per cent.

Lend-lease requirements are constantly shifting. For example, about 250,000 tons of finished and seminished steel purchased for Russia had to be redistributed to other lend-lease countries, for two reasons: The shipping space was needed more urgently for the Soviet Union's food cargoes, and the Russian army's shift to the offensive lessened the need for a large consignment of barbed wire included in this order.

**FOUNDRY EQUIPMENT**—Sales of foundry equipment and of gears hit their wartime peaks in the spring of last year. Foundry equipment orders, while declining from the high totals of early 1942, during the current year have held reasonably near an index figure of 400. Compared with a year ago the trend in gear sales has recorded a substantially better showing than that of foundry equipment orders.

**COKE PRODUCTION**—Quick recovery from the effects of the recent coal strike is evidenced by the July daily average by-product and beehive coke output of 189,889 net tons, an increase of 3.9 per cent over the June figure. By-product coke held by producers on Aug. 1 totaled 866,253 tons, or 23,722 tons more than at the start of July. Stocks of coking coal at by-product plants Aug. 1 were sufficient for 28 days' needs at the July consumption rate.



## FIGURES THIS WEEK

### INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity).....	99.0	98.5	98.0	98.0
Electric Power Distributed (million kilowatt hours).....	4,326	4,322	4,240	3,583
Bituminous Coal Production (daily av.—1000 tons).....	2,013	1,986	1,983	1,917
Petroleum Production (daily av.—1000 bbls.).....	4,235	4,106	4,202	3,682
Construction Volume (ENR—unit \$1,000,000).....	\$40.6	\$41.6	\$41.2	\$217.8
Automobile and Truck Output (Ward's—number units).....	15,350	20,055	20,130	16,865

\*Dates on request.

### TRADE

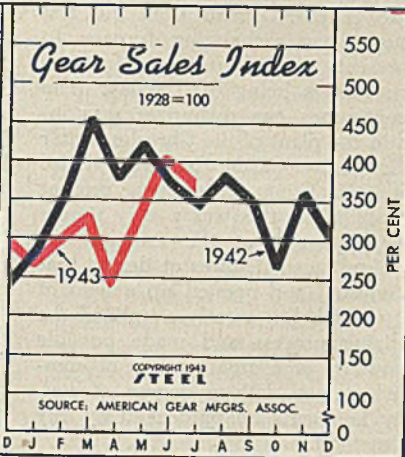
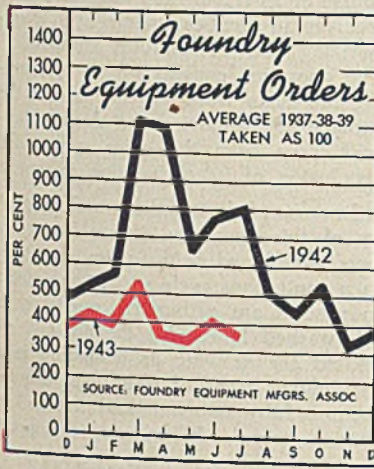
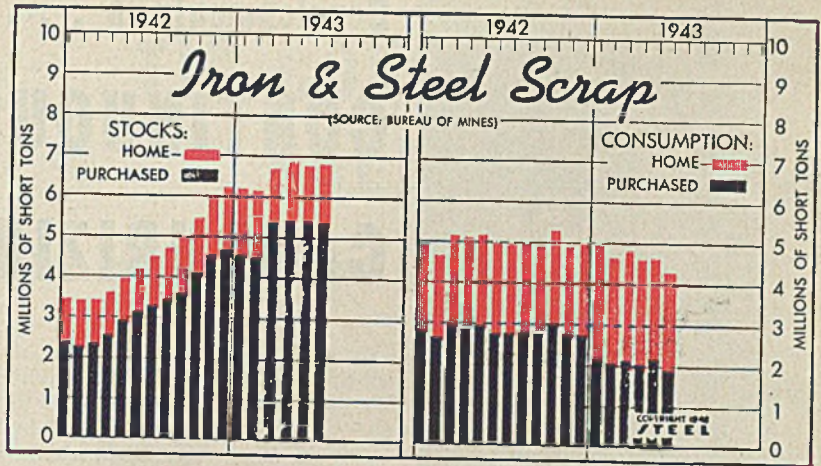
Freight Carloadings (unit—1000 cars).....	897†	904	890	814
Business Failures (Dun & Bradstreet, number).....	45	45	50	141
Money in Circulation (in millions of dollars)†.....	\$18,571	\$18,303	\$17,706	\$13,250
Department Store Sales (change from like week a year ago)†.....	+15%	+4%	+20%	-3%

†Preliminary. †Federal Reserve Board.

**Iron and Steel Scrap**  
Bureau of Mines

(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan. ....	6,233	3,503	5,031	4,956
Feb. ....	6,209	3,455	4,680	4,708
Mar. ....	6,850	3,460	4,787	5,221
Apr. ....	6,918	3,532	4,642	5,156
May ....	6,905	3,972	4,723	5,225
June ....	6,916	4,297	4,493	5,000
July ....	.....	4,579	.....	5,006
Aug. ....	.....	4,780	.....	5,015
Sept. ....	.....	4,993	.....	4,955
Oct. ....	.....	5,530	.....	5,342
Nov. ....	.....	6,078	.....	4,930
Dec. ....	.....	6,274	.....	5,037
Total ...	54,503	.....	60,551	.....

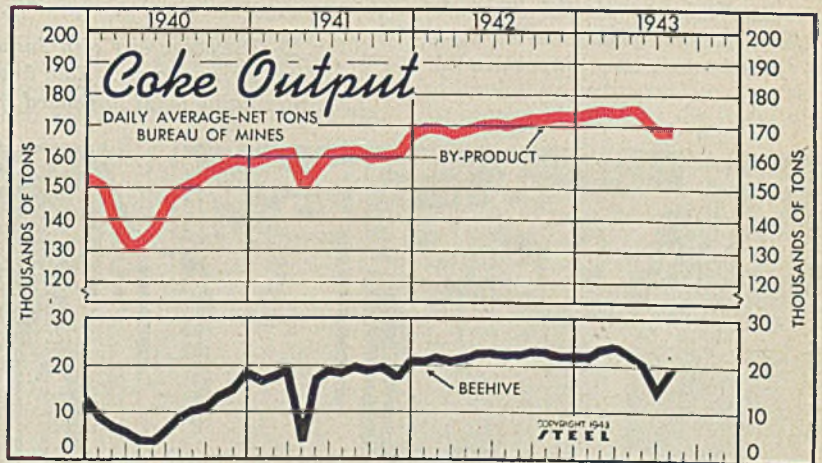


**Foundry Equipment and Gear Sales**

	Monthly Average (1937-38-39=100)		Index (1928=100)	
	1943	1942	1943	1942
Jan. ....	429.8	532.7	268	288
Feb. ....	399.5	567.9	303	353
Mar. ....	562.7	1122.4	334	455
Apr. ....	362.7	1089.3	240	378
May ....	348.9	653.6	342	421
June ....	413.6	774.0	401	373
July ....	379.4	800.8	374	344
Aug. ....	.....	510.8	.....	340
Sept. ....	.....	446.4	.....	351
Oct. ....	.....	540.6	.....	263
Nov. ....	.....	338.8	.....	359
Dec. ....	.....	382.5	.....	306
Year .....	.....	646.7 Ave. ....	.....	355

**Coke Output**  
Bureau of Mines  
(Daily average—Net tons)

	By-Product		Beehive	
	1943	1942	1943	1942
Jan. ....	174,044	168,508	21,440	20,874
Feb. ....	175,107	168,414	23,991	21,771
Mar. ....	175,051	167,733	24,369	21,032
Apr. ....	175,857	168,960	22,932	21,843
May ....	174,240	170,187	21,270	22,571
June ....	168,735	170,593	14,055	22,487
July ....	169,936	170,400	19,953	22,300
Aug. ....	.....	171,443	.....	22,333
Sept. ....	.....	172,110	.....	23,106
Oct. ....	.....	172,211	.....	23,148
Nov. ....	.....	173,029	.....	22,106
Dec. ....	.....	173,163	.....	22,000
Average .....	.....	170,549	.....	22,122



**FINANCE**

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions) .....	\$7,740	\$7,446	\$8,612	\$6,882
Federal Gross Debt (billions) .....	\$148.0	\$147.6	\$144.4	\$86.3
Bond Volume, NYSE (millions) .....	\$30.4	\$28.6	\$61.8	\$45.4
Stocks Sales, NYSE (thousands) .....	2,579	2,698	4,714	1,546
Loans and Investments (millions)† .....	\$46,719	\$47,040	\$46,822	\$34,504
United States Government Obligations Held (millions)† .....	\$34,209	\$34,574	\$32,287	\$20,564

†Member banks, Federal Reserve System.

**PRICES**

STEEL's composite finished steel price average .....	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)† .....	246.8	246.9	244.2	231.0
Industrial Raw Materials (Bureau of Labor index)† .....	112.8	112.7	114.0	100.8
Manufactured Products (Bureau of Labor index)† .....	100.0	100.0	99.6	99.2

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

Developments in . . . .

# CONTINUOUS GAS CARBURIZING

By R. J. COWAN  
Surface Combustion  
Toledo, O.

IT IS A LONG road from the first continuous gas carburizing furnace to the present multiple-row radiant-tube furnace that is being used today. The first continuous gas carburizer was installed in the plant of the Chrysler Motor Car Co., New Castle, Ind., the latter part of 1931. Compared with the present type installation, this was a very simple furnace, although at the time it was built it embraced features of design that were unusual and opened up a field of activity which has greatly simplified the carburizing process and made possible the handling of a great variety of complicated shapes with a degree of uniformity in results unapproached by any other method.

The continuous gas carburizer of to-

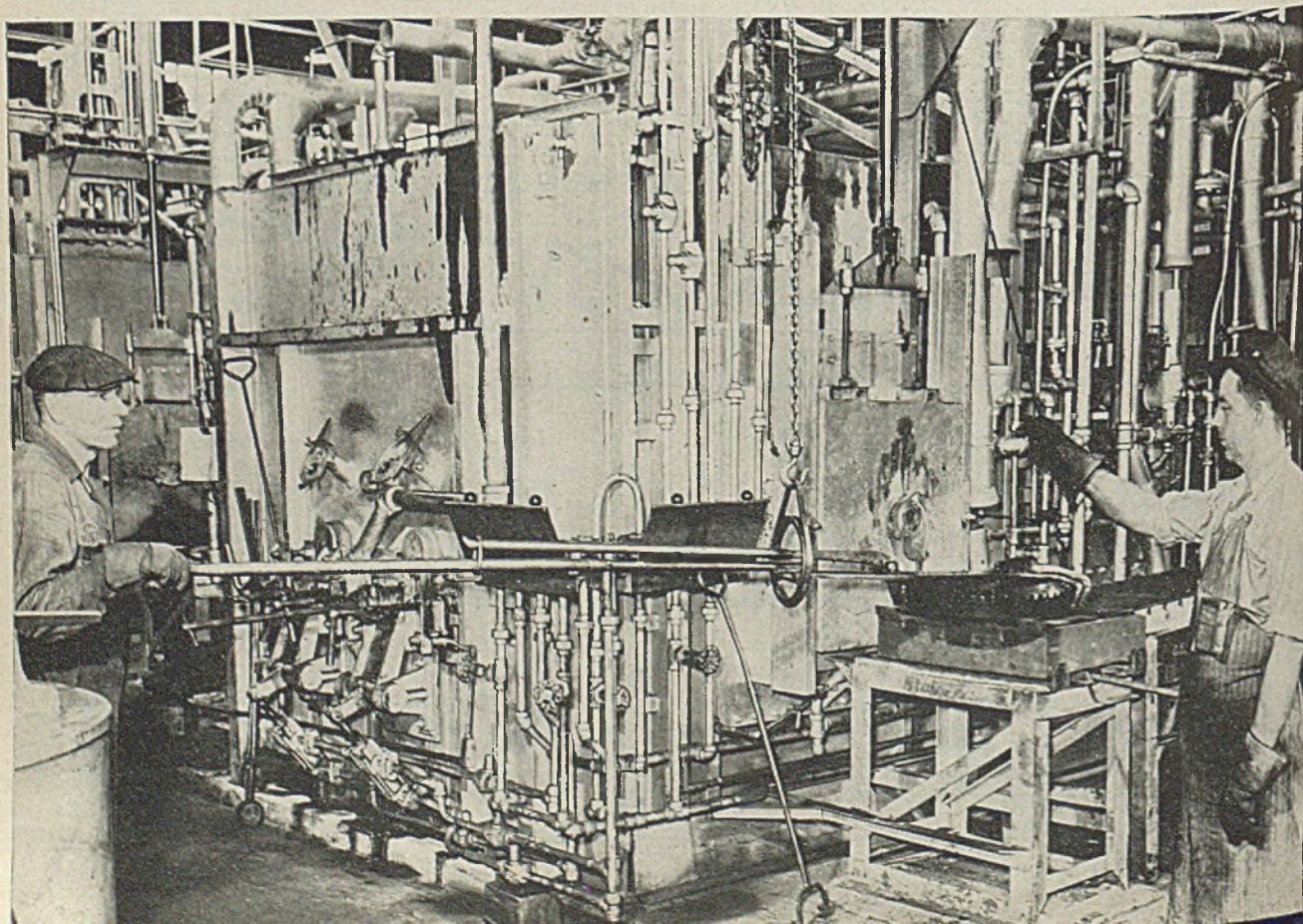
day retains the carburizing simplicity of the early installation in that the steel is moved progressively through a chamber filled with gas so that during the course of its travel each successive piece receives an identical treatment in a carburizing gas of uniform composition. The operation consists simply of charging the clean work into one end of the furnace and removing the clean carburized piece from the other end at the conclusion of its carburizing treatment.

Because of the simplicity and uniformity of this operation, it has frequently been combined with other operations in a continuous cycle so that the pieces in process are carburized, quenched in oil, washed to remove the oil, and heated for drawing or tempering in a continuous series of operations. Equipment is fully automatic and arranged so that the trays and fixtures which support

(Please turn to Page 118)

Fig. 1—Radiant tubes in furnace shown in Fig. 2 are arranged to operate under suction so any tube failures only draw gases from furnace rather than forcing gas into work chamber. Note in each of the four burners here that an eductor is inserted in the discharge leg of each burner. Idea is to draw gas-air mixture through burner and radiant tube in parallel lines of flow, producing uniform or diffused combustion throughout

Fig. 2—Discharge end of a Surface Combustion radiant tube furnace for gas carburizing ring gears. Note how work is handled from furnace to quenching press using tongs suspended from overhead hoist and using roller conveyors



# TIN-CONSERVING SOLDERS

## An account of some Canadian investigations

VARIOUS solder manufacturers have been called upon to develop alloys free from tin or having low-tin content, which can be used to replace former lead-tin alloys for soft soldering or tinning applications.

The tin-lead alloys are outstanding in the scope of their usefulness. They may be used for joining the majority of common metals ranging from the high-melting copper alloys down to the low-melting tin alloys. Also, the tin-lead alloys can be handled by quite simple techniques; they do not oxidize rapidly when molten, and they withstand corrosion extremely well.

It is too much to expect, therefore, that any one alloy will be found that will be suitable for all applications to which the tin-lead solders were normally put. The first alternate alloy which was investigated to replace tin-lead was silver-lead. The most suitable of this series is the eutectic composition 97.5 per cent lead, 2.5 per cent silver at 304 degrees Cent. In comparison to the widely used 50 tin 50 lead solder which has a solidus at 177 degrees Cent. and a liquidus 211 degrees Cent., it may be observed there is a tremendous temperature difference. This may not be a detriment, depending on the particular job under consideration. However, the fact that the silver-lead alloy has such a relatively high melting temperature limits the number of applications for which it is suitable.

It was seen very early in investigations that the standard fluxing agents as used

by the soldering trade were not suitable for utilization with the silver-lead solders. Again it was the high temperature required that caused this difficulty. The flux would either vaporize or carbonize before the solder had reached its flow point, thereby losing all the benefits which are generally expected of a fluxing medium.

It has long been a recognized fact in the solder business that tin is an excellent wetting agent for other metals. It is obvious that solder cannot join two pieces of metal unless it wets those pieces. Pretinning for soldering, and especially for joining bearing backs and lining metals, has long been considered as good technique. It has also been realized that with a solder, the lower the tin content becomes, the more important becomes the pretinning and the fluxing. A solder low in tin makes it essential that the surfaces to be soldered must be more carefully prepared. This may also be stated in another way; that is, the more perfectly the surfaces to be soldered are prepared, the lower the tin content of the solder may become.

Before zero tin may be reached in a solder, considerations of flow and wet-

ting power may be replaced by questions of tensile strength, elongation, impact strength, hardness and other properties. In the majority of cases, however, these mechanical properties are of minor importance, whereas flow and wetting power are of universal importance to every soldering operation.

In every soldering operation there are four main considerations—kind of metals to be soldered, how the soldering is accomplished, the composition of the solder, the flux composition.

Then once the joint has been made, it may be called upon to exhibit certain properties such as tensile strength, shear strength, capillary rise of solder in joint, corrosion resistance.

The strength of a soldered joint is directly dependent on the thickness of the solder employed. For maximum strengths the solder thickness should not be less than 0.003-inch nor greater than 0.005-inch. The time of heating also bears a direct relationship to the strength of a soldered joint, but this factor is less important than solder thickness. Nevertheless, it was found that increased time of heating tended to produce intermetallic compound layers in the solder which decreases the strength of the joint.

**Developments in Fluxes:** Reference has already been made to fluxing during soldering operations. This cannot be stressed too strongly, for the flux used on a job is as important as the solder itself for the production of a satisfactory product. The chief purposes of a flux are to protect the metal against oxidation, to remove dirt and oxides from the metal, to increase the wettability of the metal by the solder and thereby increase the flowing characteristics of the solder, to make a stronger and better soldering job.

As already stated, the old types of fluxes were quite ineffective with the silver-lead solders. This was due to the high flow temperature of the silver-lead alloy.

This particular problem has been very satisfactorily solved. Table I showing the actual results of tests using both the old type and the new type of fluxes will verify that satisfactory fluxes have been developed for use with the silver-lead alloys. The test used in this investigation was known as "the spread of the drop test". This is carried out by placing a known weight of solder on a flat iron sheet, suitably fluxing the sheet and applying heat to the underneath side. When the iron sheet has become hot,

(Please turn to Page 128)

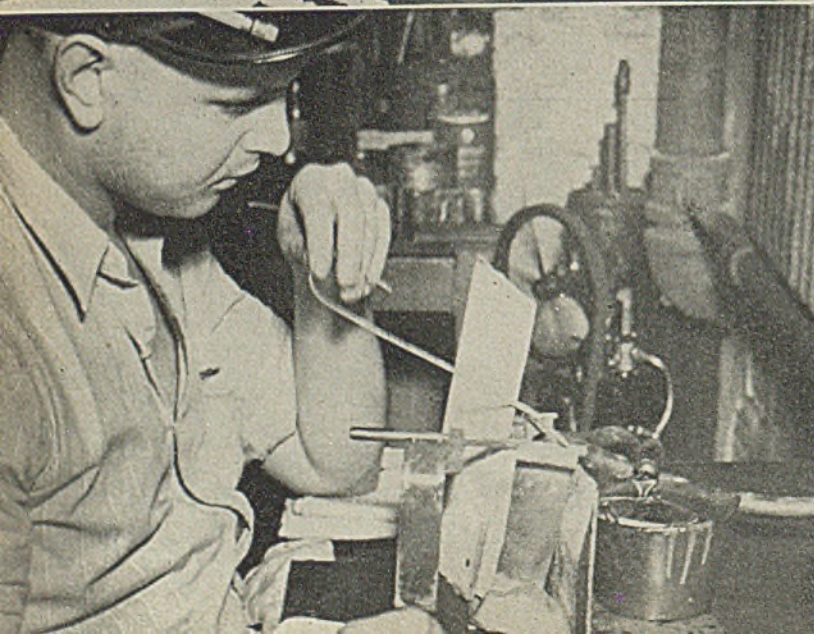
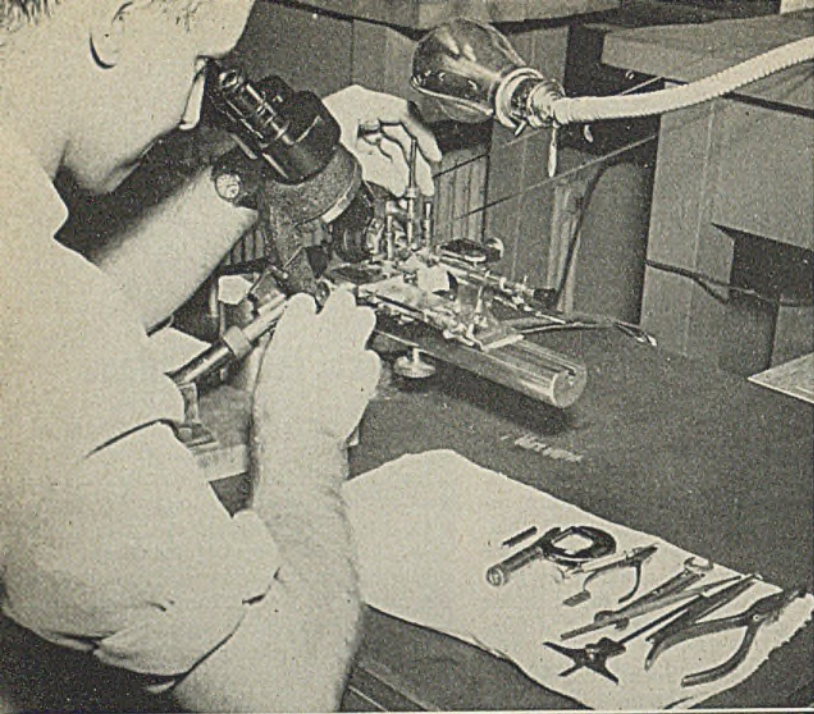
From Canadian Metals & Metallurgical Industries.

TABLE I—Results of Tests Using Old and New Type Fluxes

Solder Composition	Old Type Flux		New Type Flux	
	Area in. <sup>2</sup>	Per Cent. of 50/50 Area	Area in. <sup>2</sup>	Per cent. of 50/50 Area
50/50 Tin-Lead	4.0	100	4.0	100
40/60 Tin-Lead	4.5	113	4.55	113
5/95 Tin-Lead	3.1	78	3.2	80
1/99 Silver-Lead	0.54	14	8.5	213
2/98 Silver-Lead	0.37	9	4.9	105
2.5/25/97.25 Silver-Copper-Lead	2.6	65	5.2	130
4/96 Silver-Lead	0.37	9	4.9	123

TABLE II—Tests on Alternate Solders

	50/50 Tin-Lead lb./in. <sup>2</sup>	Cadmium-Lead lb./in. <sup>2</sup>	Silver-Lead lb./in. <sup>2</sup>	Tin-Silver-Lead lb./in. <sup>2</sup>
Shear Strength (Steel)	7,658	7,777	4,580	6,375
(Brass)	7,529	8,039	4,490	6,300
Tensile Strength (Steel)	9,480	12,160	5,610	7,540
(Brass)	14,852	16,766	8,850	11,974
Spread—Unit Volume	100 per cent.	85 per cent.	60 per cent.	80 per cent.
Specific Gravity	8.91	10.81	11.29	10.16
Corrosion 3 per cent. Na Cl per cent Loss Weight				
100 Days	0.292	0.134	0.893	0.194
Liquidus *F.	414	470	580	520
Solidus *F.	359	460	576	485
ALLOYS:				
Tensile Strength	lb./in. <sup>2</sup> 8,160	lb./in. <sup>2</sup> 8,720	lb./in. <sup>2</sup> 4,850	lb./in. <sup>2</sup> 6,750
Elongation	16 per cent.	15 per cent.	12 per cent.	16 per cent.
Brinell Hardness	12.7	13.1	9.7	13.



# MICROSCOPIC PRECISION TOOLS

.... indispensable in war,  
may lead to entirely new  
industrial techniques and  
products

DEVELOPMENT of methods for microscopic, precision machining of metals and other materials may lead to entirely new industrial techniques and new products.

Imagine the possibilities which exist for drills which will make perfectly round holes down to 0.003-inch in diameter in any material with the exception of the tungsten carbides and diamonds! And, holes may be lapped in the latter two materials.

Already, microscopic drills, now being made for diesel engine builders, are proving of incalculable aid in the war effort. By actual block tests, it has been found that practically infinitesimal variations in the sizes of holes in diesel engine fuel nozzles will result in a difference of several hundred horsepower in power output of large marine engines as well as a marked difference in fuel economy. Use of several small holes in place of a single larger hole provides the advantage of completely atomizing the fuel.

Back of these developments is the work of J. A. Cupler II, a young chap in his early thirties, who already has es-

Top to bottom, left—

Fig. 1—Bearing sleeves 0.025-inch long and 0.035-inch in diameter are machined to exacting limits with one setup on this converted jeweler's lathe

Fig. 2—"Rough" cutting the blade for 0.0065-inch drill. Overall drill length is  $\frac{5}{8}$ -inch, blade length 0.04-inch

Fig. 3—This heat-treating setup flame hardens microscopic drills with minimum distortion. It comprises a gasoline torch converted to burn gas and air and an oil quench "tank"

established a name for himself in Army, Navy and industrial circles. He started his business career with the Celanese Corp. of America in Cumberland, Md., where he became cognizant of the increasing necessity for microscopic tools since the rayon industry itself is engineered around the small holes in rayon fiber spinnerets.

Mr. Cupler observed that American-made twist drills could be had in sizes only as small as 0.013-inch and did not hold up too well. Further, due to the war, it was becoming increasingly difficult to obtain Swiss drills which could be had in sizes down to 0.006-inch. Consequently, he decided to go into the microscopic tool business for himself, first working nights in his bedroom and later setting up a full-fledged operation in the family garage with the aid of two or three assistants. One year ago, he moved into the two-story building in Cumberland now occupied by his company, the National Jet Co.

#### Foresees Wide Diesel Use

In looking ahead, Mr. Cupler is willing to predict that most trucks on the road within a year after the war is over will have diesel engines; further, that within seven years, diesel engines will be well accepted as the standard motive power for passenger cars.

Another development already under way is a new hypodermic syringe without a needle which can be used by any inexperienced individual. The injection is forced into the flesh through a minute hole in a disk at the end of a syringe by a charge in the barrel which is released by a small trigger.

By way of pointing out the further possibilities for the small hole, Mr. Cupler has designed a nozzle for an ordinary commercial oil burner with only two small parts, including a strainer, the oil being injected through five 0.006-inch holes. It functions as well as a conventional nozzle now used, which has five parts.

As an example of microscopic machine work now being done, the National Jet Co. is making bearing sleeves which are only 0.025-inch in length and have an outside diameter of only 0.035-inch. Several hundred of these are shown in the small capsule in Fig. 4.

The machining operations are performed on the small lathe in Fig. 1. Both ends are chamfered and one end countersunk to 0.005-inch. The inside diameter must be concentric with the outside diameter. Wall thickness is 0.019-inch. Inside diameter is checked with 0.0153 and 0.0154-inch go and no-go gages. Finish, of course, must be perfectly smooth.

Manufacture of these sleeves is just part of the work now being done on precision instruments for war machines. Fuse parts with holes ranging from 0.02 down to 0.008 and 0.007-inch are

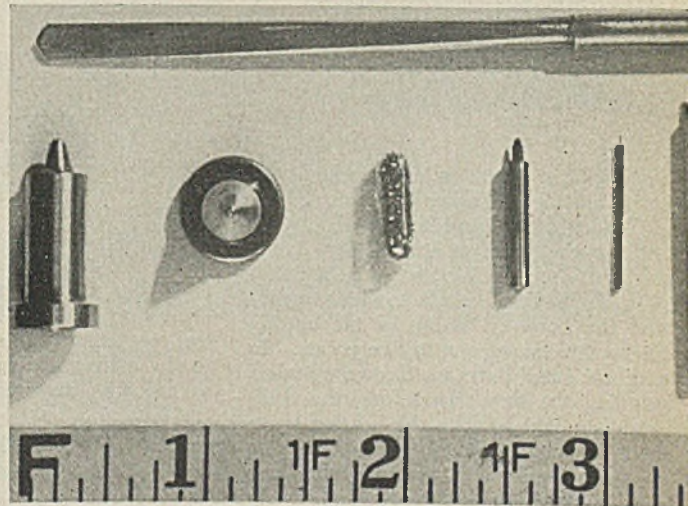
regular production items, along with control instruments for aircraft and special applications.

The methods employed by the National Jet Co. in making exceedingly small tools, such as drills, punches, reamers and end mills, have few parallels in American industry, as may be visualized when it is pointed out that many now being turned out are smaller than a human hair!

Production of drills well illustrates the procedures followed but, first it must be explained that these drills are of the pivot type which antedate the twist drill and are sometimes referred to as flat or fishtail drills. And, the small 0.0059-inch drill, second from right in Fig. 4, has the same general shape and is machined just as accurately as the "large" 0.182-inch drill shown at top of this illustration.

Bulk of the National Jet Co.'s production is in standard drills in sizes ranging from 0.003 to 0.020-inch, all ma-

Fig. 4—Small 0.0059-inch drill second from the right has same general shape and is machined to same accuracy as the "large" 0.182-inch drill at top of illustration. Also shown, left to right, are two diesel engine jets; bearing sleeves in the small capsule; a reamer and, at extreme right, a counterbore radius tool



chined from a tungsten-molybdenum-vanadium alloy drill rod 0.04-inch in diameter purchased in 3-foot lengths and cut into 3/8-inch blanks. In other words, all drills in the range noted are standard as to shank diameter and overall length. Length of the cutting blade in each case is held to seven times the diameter of the shank. The company also produces drills in tungsten and tantalum carbides for use in penetrating refractory and other extremely hard materials.

These minute drills are machined to meet the individual requirements encountered in drilling various types of material. Cutting edges of drills for steel have less rake than those for working with brass, as may be expected. In addition, the undercut at the shank end of the cutting blade is less. Usually, drills for steel and general purposes have a point angle of 135 degrees, and 118 degrees for soft materials. Clearance angles are respectively 8 and 15 degrees. Tolerances in all cases are held within the unbelievable limit of 0.0001-inch.

It also is interesting to note that 20-

power binocular microscopes are incorporated as part of each machine because of the microscopic character of the work. Machines are all improvisations, many being revamped jewelers' lathes. No source has been found so far, either, for standard machines or heat-treating equipment required.

Production of 0.0065-inch drills will be described as this is a typical size for piercing diesel engine jets. The drill blanks, as previously noted, are 3/8-inch long and 0.040-inch in diameter. The cutting blade, first, is rough cut to 0.0067 to 0.007-inch. This operation, shown in Fig. 2, appears simple enough to the casual observer. Blanks are picked up individually with a pair of tweezers, placed in the tiny lathe chuck, turned down to size and placed side-by-side in a small tray in which they are conveyed to the heat-treating department. Actually, the operation requires skilled operators with a delicate sense of touch and an accurate eye for gaging

measurements under the 20-power glasses.

Following the rough cut, the drills are flamed hardened by a method which, according to Mr. Cupler, violates all principles involved in heat-treating small parts. The heating unit is a gasoline blow torch converted to burn natural gas and compressed air. The flame is directed against a small trough at an angle from below so drills dropped in the trough one-by-one are heated without contact with the flame. When the drills reach 1875 degrees Fahr. as determined visually by a trained operator, they are pushed off into an oil bath, as will be observed in Fig. 3. There is practically no distortion of the tiny blades.

The drills then go to the drill makers who "polish" the cutting blades to exact size, using superfinishing stones mounted on flexible shafts. During this operation, the drills are held in the vertical head machine shown in Fig. 6. The flats, cutting edges and the undercut at the base of the shank for chip clearance are all finished to exact size under the expert eyes of trained op-



*Fig. 5—Drill dimensions are checked against a scale on the eyepieces of the 200-power microscope. Rejections, even under 0.0001-inch tolerances, are unbelievably small*

is turned so that the thickness may be checked between the flats at the tip, midway between the base and the tip and at the base. The 0.0065-inch drill should measure 0.0022 to 0.0024-inch at the tip, 0.0035 to 0.0040-inch at mid-point and 0.0059 to 0.0065-inch at the base.

#### "Knack" Required To Use Drills

The distance from the extreme point of the drill to the base of the cutting point is checked against lines of predetermined length on the microscope eyepiece. Even the rake angle can be visually checked by turning the drill so that this rake angle lines up with lines on the scale which may be set at a fixed angle. During the checking operation, the drills are held in a small fixture at a predetermined distance from the end of the microscope, as will be noted by referring to Fig. 5.

No article about these small drills would be complete without explaining something about their functioning in service for, in the hands of an inexperienced operator without the proper equipment, they would be quite useless.

The secret of working with these small tools lies in properly controlling the drilling pressure. In fact, exact control of drilling pressure has as much to do with attaining accurate hole size as does the diameter of the drill itself.

Application of too much pressure causes the drill to "lead off" because the cutting blade springs. It, also, causes "bell-mouthing" at the entrance to the hole, generates unnecessary heat and produces undue torque, all of which add up to reduced drill life as well

as lack of accuracy in finding work.

Another important point to be emphasized is that the drill must run absolutely true in its drill press chuck. Even slight wobble is likely to cause the drill to break at the base of the shank and in any event makes it impossible to drill a hole accurately to size.

A typical operation, that of drilling holes in diesel engine fuel injectors, is shown in Fig. 7. It will be noted that a counterbalancing arrangement on this little sensitive drill press makes it possible to feed the drill to the work with a very light touch and with a reciprocating motion. The drill cannot be fed steadily as in the case of large sizes. Only enough pressure is applied on each stroke to make the point bite into the metal, generally less than one ounce per square inch. Obviously, the pressure and timing of the strokes can vary depending upon the type of material in process.

#### Minute Drill Press

Mr. Cupler has designed a fully automatic drill press which incorporates a micrometer control. This device, in connection with a series of worms, sprockets, cams, etc., provides automatic reciprocation of the drill spindle. The resulting automatic "step-feed" provides a stroke of one three-thousandths of 0.001-inch per stroke. This stroke may be varied according to the material being penetrated and depth of hole.

Mention already has been made that any material may be drilled with the exception of carbides and diamonds. For the purpose of complete clarification, it should be pointed out that certain other drilling operations are not practicable, such as on tool steels after hardening.

For plastics, it probably would be more advantageous to use tantalum carbide drills because of the abrasive character of plastics, although alloy steel drills with a heavy rake may be used.

The palladium-platinum alloys also are

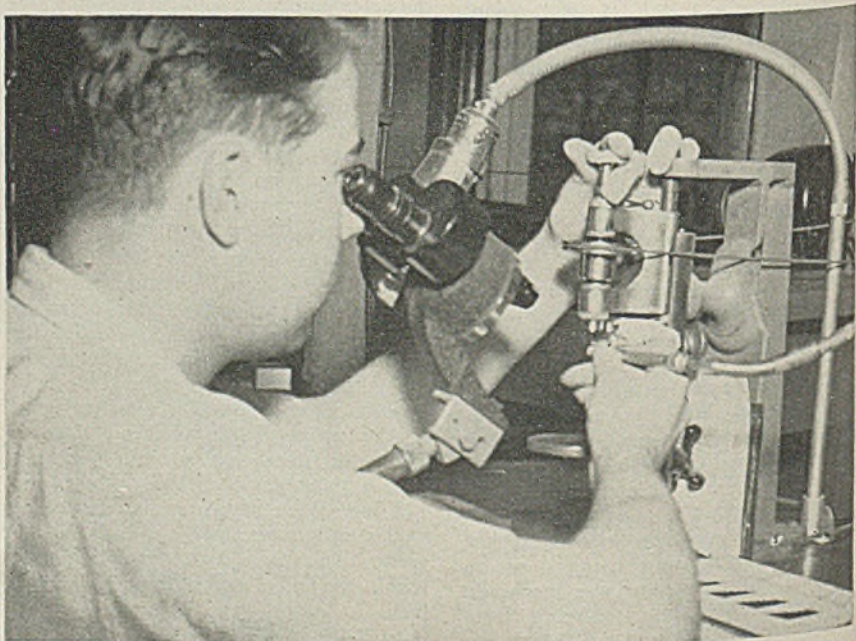
erators. Drill diameters are checked with a micrometer and other dimensions later are checked by inspectors.

Since the work must be fully visible during the machining operation, it is impossible to use a coolant which means that the hardness rating of the cutting blades is reduced one to five points. In addition, small burrs are thrown up when grinding the flats. Therefore, the drills are again sent back to the heating-treatment department to restore hardness to an average of 62 to 63 rockwell. The cutting edges then are re-honed to remove the burrs and the drills are ready for inspection.

Inspectors use 200-power microscopes. Eyepieces are filled with accurately graduated scales which are superimposed upon the magnified image of the drill, thus allowing "comparator" measurement. Each division on the scale is calibrated to 0.0002-inch. Drills are first checked for diameter at the cutting tip; next for diameter midway between the base of the shank and the cutting tip; and finally at the base of the shank. In the case of an 0.0065-inch drill, the measurement at the base is held to a minimum differential of 0.0005-inch. In other words, the base cannot measure less than 0.006-inch. Length of the blade then is measured to determine whether it conforms to customer specifications. The average blade length for this drill is 0.04-inch.

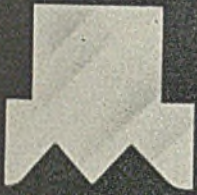
After the length is measured, the drill

*Fig. 6—Drill flats and cutting edges are ground within limits of 0.0001-inch with superfinishing stones hand-guided by expert operators*





## TEN TYPICAL REVERE INDUSTRIAL EXTRUDED SHAPES



22 Section for Air Tight Gasket Seal



18 Section for Wire Connector Part



7 Section for Finger Automatic Gear Shift Mechanism



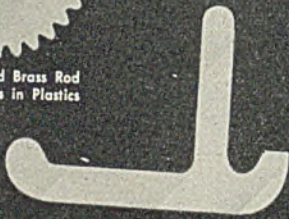
31 Rod with Six Lugs machined in Screw Machine



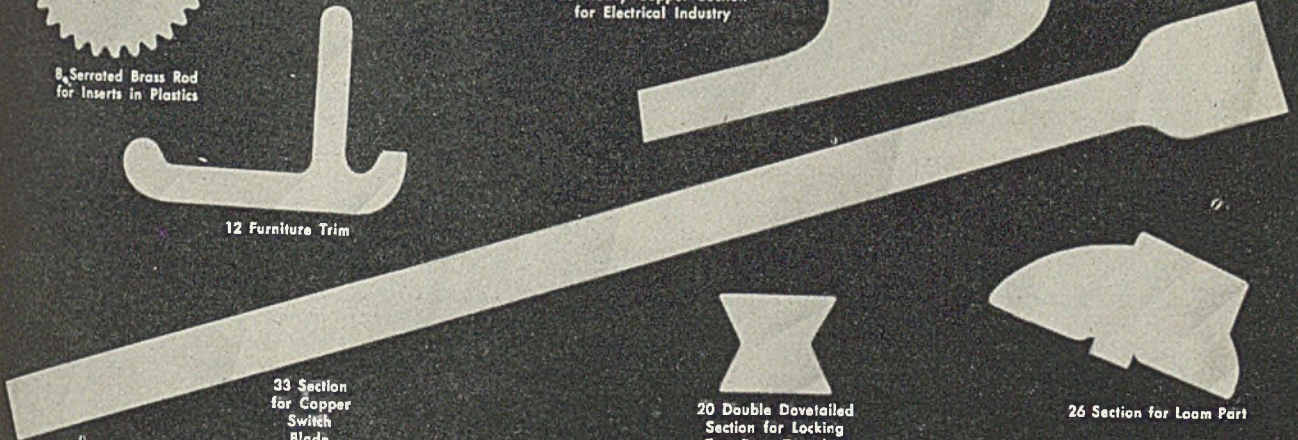
8 Serrated Brass Rod for Inserts in Plastics



25 Heavy Copper Section for Electrical Industry



12 Furniture Trim



33 Section for Copper Switch Blade



20 Double Dovetailed Section for Locking Two Parts Together



26 Section for Loom Part

# How REVERE INDUSTRIAL EXTRUDED SHAPES Can Speed Production • Cut Down Costs

On some not-too-distant tomorrow, you'll be going again full-blast.

Take Time by the forelock. Investigate today the uses of Revere Industrial Extruded Shapes.

They are made by forcing pre-heated metal through a die of the profile desired. The particular shaping of the die offers wide opportunity for developing *unique* shapes and contours.

### A Versatile, Readily-Machined Process

The process is extremely versatile, producing cross sections of unusual form which, in many cases, can take the place of simple forgings, sand or die castings.

Revere Extruded Shapes are readily machined, easily transformed into clean-cut, finished products. With special holders or chucks, odd-shaped sections may be fed, in

long lengths, into turret lathes or screw machines where they can be turned or drilled as readily as concentric rods. Their pre-shaped cross-section may eliminate many subsequent milling or broaching operations.

**Result:** A considerable saving in Tool, Metal and Finishing Costs—an overall saving of time, money, worry—and scrap!

In fact, the use of Revere Industrial Extruded Shapes offers possibilities so numerous that their limitations are determined only by the ingenuity of the user. Available in different alloys and sizes *as well as different shapes*.

Send us a sample or a fully dimensioned profile of your product and we'll definitely let you know if Revere INDUSTRIAL EXTRUDED SHAPES can help cut down your costs and speed production.

**FREE** We'll be glad to send you for your files our complete brochure for further details on Revere Industrial Extruded Shapes ...included also, is much additional information on Revere Copper and Copper alloys and their indicated use in various mechanical industries.

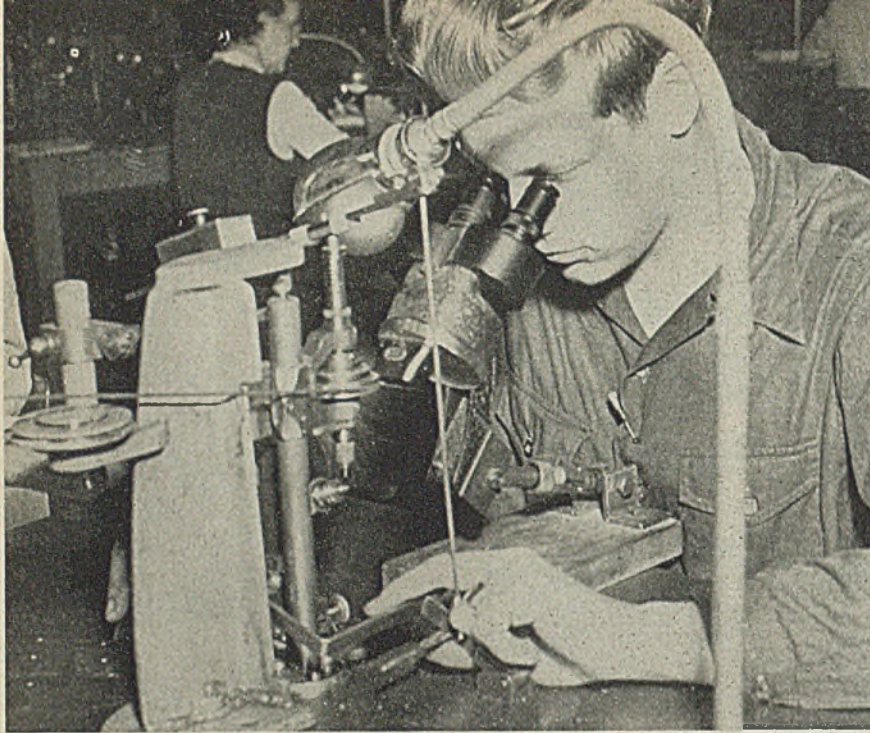


# REVERE

**COPPER AND BRASS INCORPORATED**

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York 17, N. Y.



*Fig. 7—Drilling holes in diesel engine jets requires precision equipment and the deft touch of a skilled operator*

treacherous to machine since these metals are so dense that the drills absorb all the heat.

Hard spots in certain types of tool steel nozzles constitute a problem. Blanks generally are turned out on automatic screw machines. This operation, along with drilling the center hole, work-hardens the material unevenly. Now, the practice is either to anneal these pieces after machining or to employ tantalum or tungsten carbide drills which will cope with the hard spots.

So far, the field of microscopic, precision machining has been barely touched, in the opinion of Mr. Cupler. A number of developments already have passed beyond the development stage, one of which, incidentally, is associated with television. Others are expected to make their appearance when the country returns to peacetime activities.

## Spaghetti in the War! Speeds Vital Production

Uncooked spaghetti is now being used to speed the manufacture of electronic tubes used for war communications!

Seventy-five per cent of the time required to assemble certain tube filaments at the Westinghouse Lamp Division now is being saved by the novel war substitute discovered by William A. Hayes, a young electronics engineer. Not only time, but also steel is being conserved by the discovery.

A stick of spaghetti placed inside a tiny wire coil supports the coil while it is being welded, states D. D. Knowles, manager of electronics engineering. Formerly a piece of steel was used as a support but it was difficult to remove. On the other hand, spaghetti can be burned out in a flash. The method is instrumental in producing 50 per cent more filaments and, at the same time, allows assembly operators to spend part of their time on other production jobs.

To explain the procedure involved—wire filaments for many tubes are coiled in shape of a small spring,  $\frac{3}{4}$ -inch long. When each coil was being welded to the rest of the tube mechanism, a steel piece about as thick as a 7-penny nail was inserted inside the spring coil to support it and keep it in accurate alignment. The steel piece had to be split with a saw before inserting it in the coil. Without the split, the piece was difficult to remove after the welding operation because of tendency of the coil to tighten around it. Sometimes removing the steel piece jarred the coil and it had to be realigned.

In trying to break the bottleneck, Mr. Hayes tried spaghetti. After the filament is welded, electric current is passed through the coil to remove any impur-

ities in the metal. This also burns up the spaghetti in a flash—the same flash eliminating the removal problem. Formerly the operation required about 5 minutes. By using spaghetti, the job now is handled in a quarter of that time.

According to Mr. Hayes, his idea didn't take final shape all at once. He visited the spaghetti manufacturer and found out how accurately it could be produced with regard to exact size. He found that spaghetti can be made with fair precision and is strong enough not to break if handled carefully; it even can be machined on a lathe. For the first experiments, a stick of spaghetti was placed on a lathe and was machined to the correct diameter. The spaghetti maker now uses a die to enable him to produce sticks the correct diameter for the tube operation.

## Dravo Develops Connectors For Nonmetallic Ductwork

A method for assembling nonmetallic ducts for heating and ventilating to conform with restrictions now in force on metal for such purposes, and to meet requirement for noncorrosive ductwork is reported by Dravo Corp., Pittsburgh.

The method, or the Lumm panel connector, as the development is called, basically consists of three members which can be formed of gages of metal depending on the perimeter of the duct required. Of the three members, one makes up the lineal corners of the ducts, one forms a flange frame for one end and the other is used to form a frame for the opposite end. Panels are secured by clips placed on 12-inch centers. Clips are shaped to permit the nonmetallic panels to be fitted snugly between them and the basic member.

According to Dravo, this form of as-

sembly forms a frame of unusual rigidity, reducing pulsation and offering a strong structural anchor for hanging ducts by straps from roof construction. In the interior of the duct, the flattened clips are the only metal exposed. Replacement of panels can be made without removing a complete section.

## Approval of Industry Sought on Furnace Standard

A proposed commercial standard for solid-fuel-burning forced-air furnaces, TS-3536a, is being circulated to the industry for acceptance, according to the National Bureau of Standards, United States Department of Commerce, Washington.

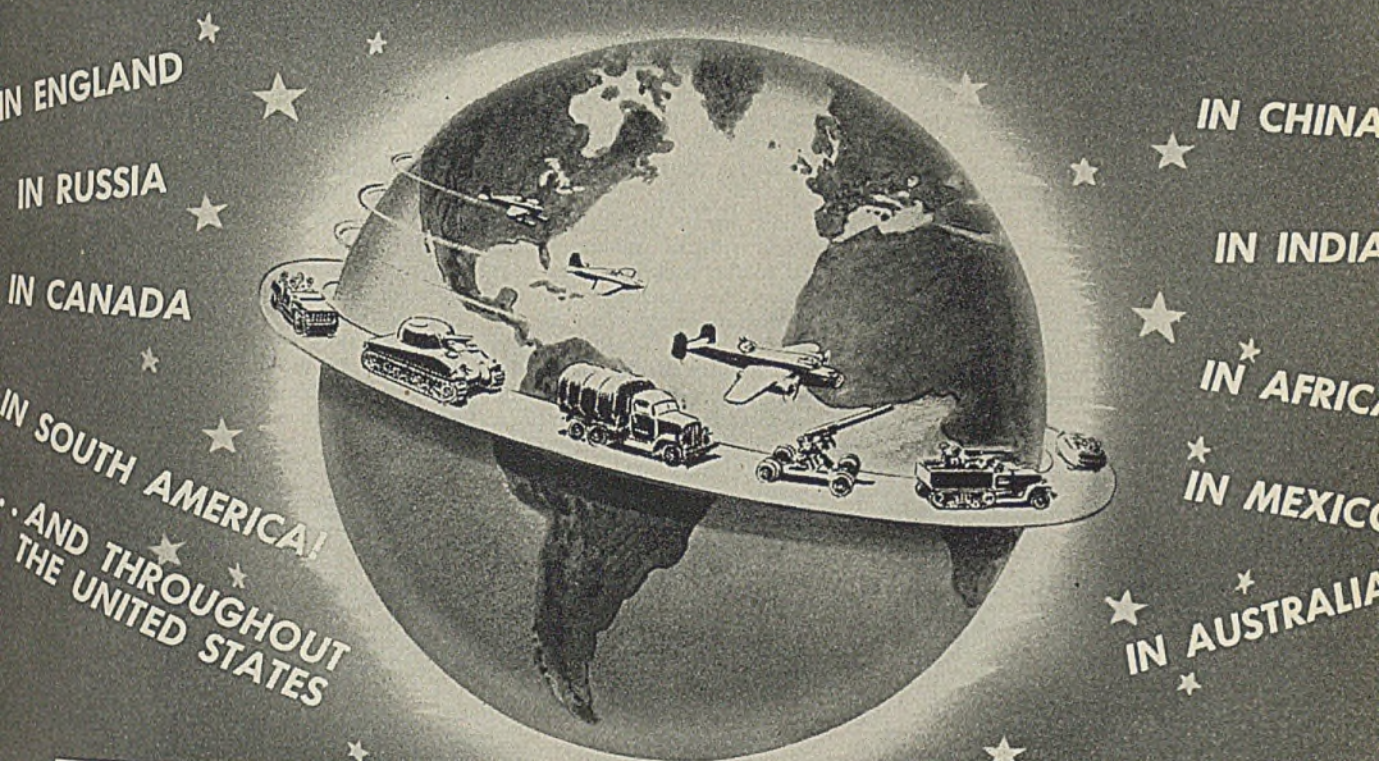
Proposed standard is being circulated to producers, testing laboratories, distributors, and users of solid-fuel-burning furnaces in order that it may become more widely effective through establishment as a commercial standard.

## Turns Out Huge Right-Angle Reduction Drive

In filling a production order recently, Cone-Drive Division, Michigan Tool Co., Detroit, turned out a 97½-inch outside diameter drive, believed to be the highest capacity right-angle reduction drive gear ever produced. Its capacity, it is said, is equivalent to a 161-inch outside diameter worm gear.

The gear and pinion were produced on standard generating machines, a feature being that backlash was held in production to a maximum of 0.003 to 0.005-inch. Reduction ratio of the gearset is 192 to 1, while the pinion diameter is 7 inches.

# Stepping Up... and Keeping Up the STEEL CUTTING PRODUCTION of the United Nations



WITH the outbreak of war in 1939, the Allied Nations—abruptly cut off from Germany as a principal source of supply for carbides—diverted the full flood of their carbide demands to the United States.

Fortunately, American industry had established—as far back as 1928—its own independent sources of supply. These American suppliers were ready to meet the emergency with a background of 10 years' experience in the development, manufacture and application of this urgently needed material. They had the skill, the equipment, and a generous margin of reserve capacity.

To the hard pressed Allied Nations—struggling to offset the tremendous output of a German war production long since toolled with carbide by official decree—went tons of American carbides in steadily increasing quantities. Foresight and preparedness enabled American carbide manufacturers to fill this urgent need and at the same time meet the pyramiding demands of domestic industries.

Today, you will find carbides a factor of vital importance in stepping up and keeping up the production of not only the United States but also such countries as England, Russia, Australia, Canada, China, India, Mexico and many others among the United Nations.

The full extent to which carbides are being used in the cause of victory is difficult to visualize. Carboly Company production alone, for example,

is at an annual rate 45 times greater than that of any pre-war year. Monthly production of carbides—formerly measured in pounds—can today be expressed in tons—many tons per month! Yet the average carbide tool contains but a fraction of an ounce of carbide at the cutting edge—and a single tool during its usable life machines hundreds of parts for the implements of war. Particularly important is the use of carbides for cutting steel—a major field of use for Carboly tools. (More than 60% of the Carboly Cemented Carbide produced today for machining purposes is for cutting steel.)

A high order of performance—so high as to have been once considered incredible—is now commonly expected, and obtained, with carbides. Such things as increases in output of 3 to 1, lengthened tool life of 10 to 1, finish cuts that eliminate arduous grinding, machining of former "non-machineable" alloys, reductions of 25%, 50%, 75% in machining costs—results such as these are every-day occurrences in war production today.

This widespread use of carbides in war, indicates a new era of production economy when normal commerce returns. Manufacturers who have converted to carbides to meet the present emergency will then have at their immediate disposal an economic weapon of unusual advantage in seeking world markets.

**Carboly Company, Inc., Detroit, Mich.**

Authorized Distributors: Canadian General Electric Co., Ltd., Toronto.

Foreign Sales: International General Electric Co., Schenectady, N. Y.



# CARBOLOY

TRADEMARK



TITANIUM TUNGSTEN CARBIDES

# AIRCRAFT DIES

... made in one-fourth the time and at only 35 per cent of cost of conventional methods

BY PRODUCING blank and pierce dies for the aircraft and other industries from templates of the parts themselves, Algoma Products, Detroit, reduces the cost approximately 65 per cent and does the job 300 per cent faster. This method eliminates the need for special die design and also simplifies making alterations when they are needed.

Instead of the usual complex, time-consuming and costly milling operations, the dies are contour-sawed from chromium molybdenum steel, filed, sheared to size, hardened and welded to inexpensive back-up plates. One-third of the critical alloy steel re-

quired in conventional dies is thus conserved. Individually replaceable pierce punches of hard-drawn tool steel are pressed into the blank die and matching holes drilled in the blank punch for piercing holes in the part.

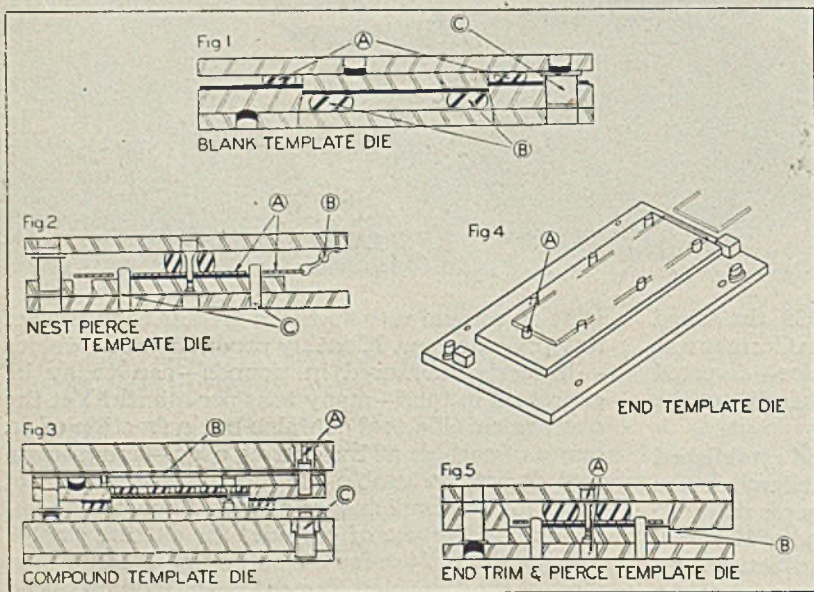
The dies are self-stripping and self-ejecting. Small rubber blocks cemented to the back-up plates near the edges of the punches and in the blanking die are compressed on the down stroke, and in returning to shape on the up stroke, strip the punches and eject the part from the die. See accompanying illustrations. Where a large number of pierce

punches are required, a thin aluminum alloy plate is cemented over the rubber blocks to equalize the stripping pressure.<sup>1</sup>

All punches and dies are heat treated to withstand continuous production service. Blank punches are cyanide hardened, blank dies flame hardened at the cutting edges, and pierce punches hardened and drawn to 40-42 rockwell C.

Punch and die are kept in alignment by two guide pins of different diameters in one portion of the die and matching holes in the mating part. The different diameters prevent incorrect assembly of the dies in the press. Such dies are suitable for use in single, compound or progressive operations, and are adaptable to blanking and piercing sheet stock or stock sheared to width of the part. In the latter case, individually removable nest pins are inserted in the face of the die to locate the work.

Typical dies being produced by Algoma process. Note: Rubber blocks for stripping at Fig. 1A, for ejection of work from die, Fig. 1B; alignment guide pins of different diameters to prevent incorrect assembly, Fig. 1C; thin aluminum plate to equalize stripping pressure, Fig. 2A; chain supports, Fig. 2B; inserted work-locating nest pins, Fig. 2C; die-to-shoe mounting capscrews, Fig. 3A; spring supported dowel pins to push off slugs, Fig. 3C; separate back-up plate for punches in large size dies, Fig. 3B; stop pins for one-end cut-off, Fig. 4A; inserting punches, Fig. 5A, produces end-trim-and-pierce die; die can be made to trim both sides also, Fig. 5B



## Milling of Compressor Beds Cut by 60 Per Cent

One of the factors responsible for boosting the output of compressors furnished for the production of high-octane gasoline, synthetic rubber, synthetic ammonia and other essential war materials at the plant of Copper-Bessemer Corp., Mount Vernon, O., is a huge 131-ton milling and boring machine. Driven by nine separate motors, the machine is said to cut milling and boring time of compressor beds by 60 per cent.

The machine is being used currently to mill and bore large motor-driven compressor beds, and also to machine the big bed castings for 10-cylinder compressor engines. A 40 per cent saving in time has been effected on each compressor bed, and over 62 per cent saving in time

in machining each compressor engine according to corporation officials.

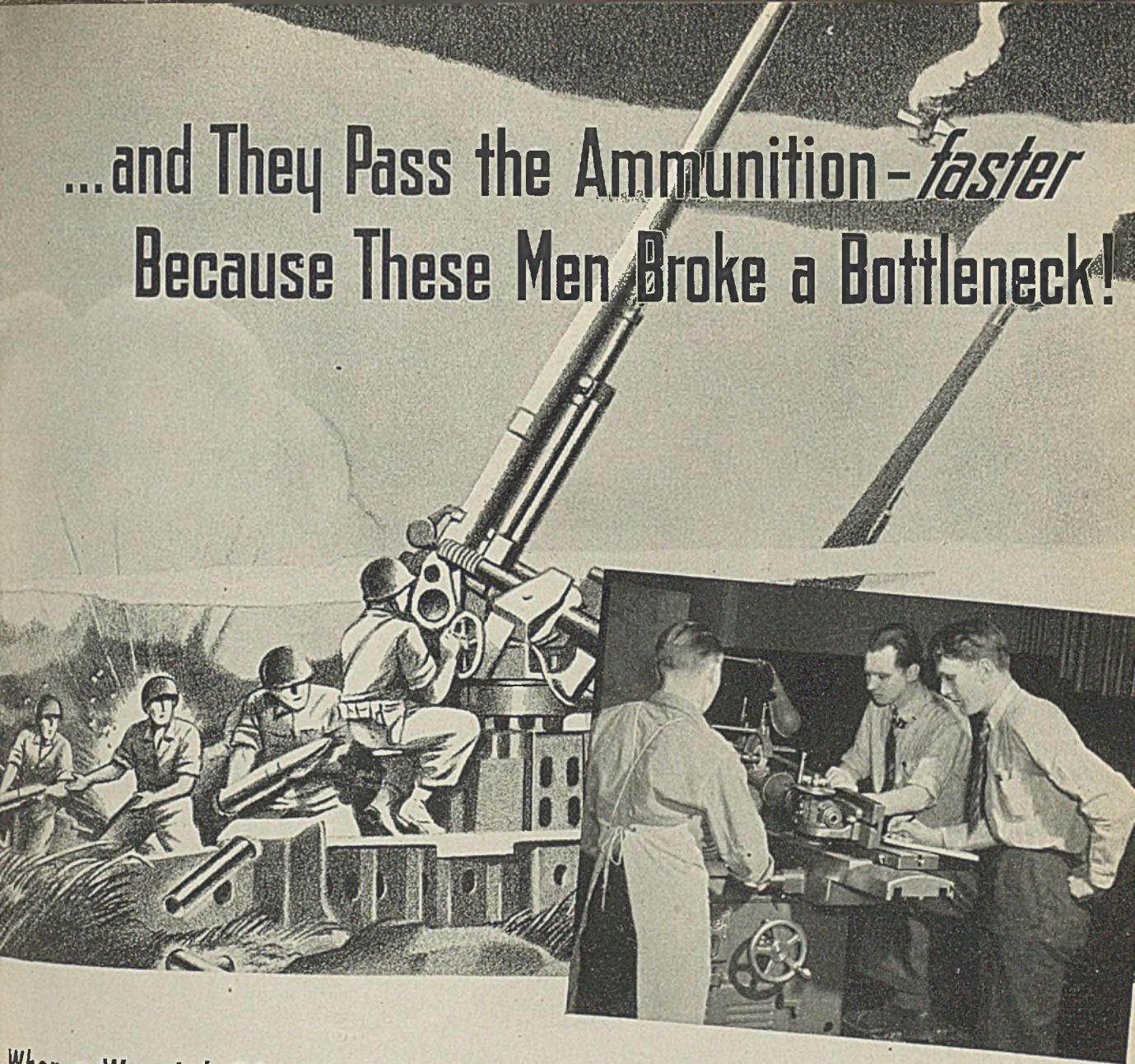
Flexibility of the machine's speed permits a wide range of operations—from drilling a 3/4-inch hole at a speed up to 240 revolutions per minute to boring a 30-inch cylinder at 2 revolutions per minute. Handling of the precision work is facilitated by means of a compact, portable control panel containing 13 switch buttons governing every movement of the machine. With this arrangement, the operator can stand at any point along the work-piece to observe and control the actual operations as they take place. In milling a 32-ton compressor bed, for instance, he can move this weight to within 0.001-inch of a required setting by merely pressing a button.

Precision of the machine is exemplified in the allowable variation of the bed of the unit which is only 0.003-inch in

the entire 26-foot length of its horizontal surface. The sensitivity of the machine was indicated when shop engineers found that one of the two vertical columns supporting the bed was nearer to an open door than the other, and therefore subject to a different temperature, thus causing a variation in the accuracy of the machine. This condition was corrected when both columns of the machine were maintained at the same air temperature. An idea of the machine's size is afforded by the fact that 350 cubic yards of concrete were necessary to form the foundation. Its nine separate motors range from 1/3 to 20 horsepower. The machine table measures 98 inches wide by 26 feet long.

It was pointed out by the company that the addition of this equipment not only speeds its own war work, but aids other plants in emergencies.

# ...and They Pass the Ammunition—*faster* Because These Men Broke a Bottleneck!



## When a War Job "Can't be Done"—the Cutting Tool Industry Does it!

You never hear much about the work it's doing. But without America's highly specialized cutting tool industry, America would be *without* a big edge over an alleged "super" race.

For here's a significant fact: cutting tools give life to machine tools . . . machine tools that build Axis-blasting guns, shells, tanks, planes.

Yes, and total war brought totally new and serious problems to the cutting tool industry. Production demands skyrocketed to new peaks — and so did shortages of two critical elements: manpower and materials.

Such tremendously expanding operations naturally gave rise to engineering problems of grave complexity.

Overcoming such obstacles required the mustering and all-out concentration of the initiative, experience and brainpower of the cutting tool industry's best minds.

A revealing example of that cooperation is pictured above. Here . . . Barber-Colman cutting tool experts are shown developing a special cutter. In a similar manner, UNGROUND thread milling cutters were developed —*within tolerances of only 5/10,000ths of an inch*—for threading high-powered shells.

That was the Army and Navy specification that *had* to be met. Perform-

ance like that was formerly attainable only through time-consuming and laborious grinding operations. A bottleneck, yes, but Barber-Colman engineers found a way to break it. Production of Axis-smashing ammunition was enormously stepped up.

From now until victory, of course Barber-Colman facilities are aimed at only one objective: helping to win that victory. When the war is won look to Barber-Colman engineering to make short work of peacetime production problems, too!

## Barber-Colman Company

GENERAL OFFICES AND PLANT • 204 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

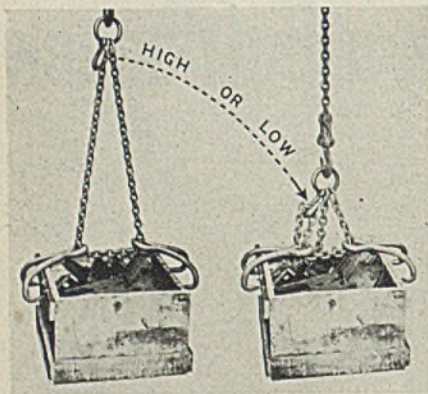
Complete Cutting Tool Service • Engineering • Manufacturing

Hobs • Milling Cutters • Roamers • Special Tools • Sharpening Machines

# INDUSTRIAL EQUIPMENT

## Grab for Varied Loads

Heavy crates, boxes, bundles or other heavy objects are easily handled by means of a new grab announced by

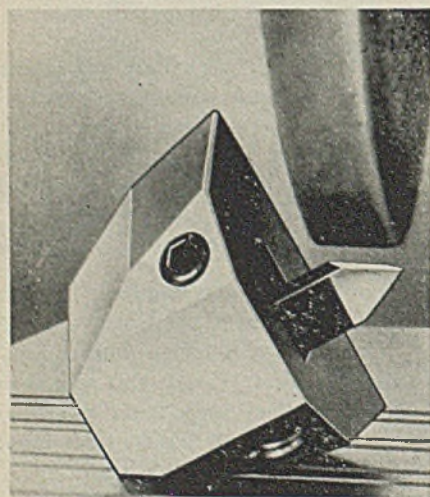


Palmer-Shile Co., 796 South Harrington street, Detroit. Loads of almost any shape can be manipulated by the unit.

The grab is adjustable to either high or low ceilings. Its hooks are of heavy forged steel and have a spread of 16 to 48 inches. These are supported by  $\frac{3}{8}$ -inch chains. Weight of the grab is approximately 30 pounds.

## Grinding Fixture

Grinding of both 60 and 29-degree threading tool bits with extreme precision is the feature of a new grinding fixture recently announced by Robert H. Clark, 3424 Sunset boulevard, Los Angeles. The fixture has no graduated scales or moving parts. The machinist merely slides the bit into the holder, tightens a setscrew and places the fix-



ture on the grinder work table, properly positioned for the thread angle desired.

Design of the fixture makes it especially adaptable for use with a magnetic chuck, although it easily can be clamped to the work table. The tool

bit holders will hold securely round or square tool bits of all sizes from  $\frac{1}{8}$  to  $\frac{5}{8}$ -inch for cutting both right and left-hand threads. Correct side clearance is provided, and all bits may be ground with or without rake on the cutting face.

The fixture may be used on any surface grinder or cutter grinder. It is being offered in two standard sizes, each of which takes all tool bits within  $\frac{1}{8}$  to  $\frac{5}{8}$ -inch range. One model is designed for the mechanic's tool kit; the second performs exactly the same work but is a heavy duty shop model.

## Foot-Operated Press

Ferracute Machine Co., Bridgeton, N. J., is offering a new model No. FO2 foot-operated press for forming, cutting, piercing, riveting, stamping and other light operations. A kick of the pendulum lever operates the ram of this ma-



chine while the weight of the lever alone returns the ram to the initial position.

The unit has a ram pressure near the bottom of the stroke of 2 tons. Stroke of ram is 0 to  $1\frac{1}{2}$  inches. The throat of the machine, center of ram back to frame, measures  $4\frac{1}{2}$  inches. The diameter of the bed is  $8\frac{1}{2}$  inches, and the hole through the bed is 3 inches in diameter. The press is being offered for bench mounting or as a floor model with a cast pedestal.

## Heat-Treating Unit

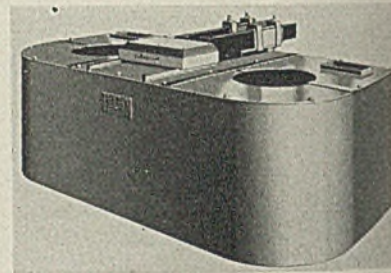
Three pots feature the new type 230 high-speed heat-treating unit introduced by A. F. Holden Co., New Haven, Conn. Of these pots Nos. 1 and 3 are removable and interchangeable, permitting several different baths to be used in the same furnace unit.

Pot No. 1 features a temperature range of 1400 to 1800 degrees Fahr. It is for preheating high-speed tools, carburizing, silver soldering, heating water and oil-hardening steels as well as alloy

steels such as high-carbon, high-chromium or stainless types.

Pot No. 2 with a temperature range of 1900 to 2350 degrees Fahr. is for hardening all types of high-speed steels, copper brazing and heating forgings.

No. 3 is used in quenching high-speed tools from the hardening temperatures, tempering, nitriding, blueing

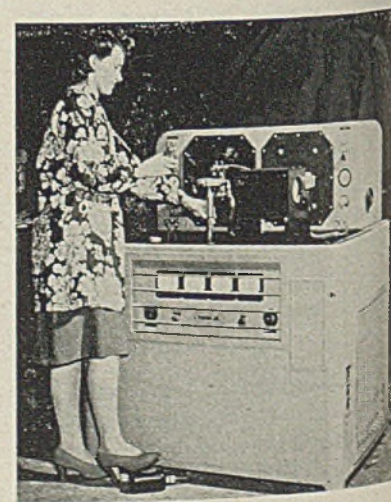


and for descaling forgings and similar parts. It features a temperature range of 1000 to 1400 degrees Fahr.

Some advantages of the heat-treating unit are: No scale at any temperature; tools hardened with minimum diameter change, minimum distortion and one-third less time for subsequent finishing operations.

## Induction-Heating Machine

Suited to a wide range of induction-heating applications, the new flexible 15-kilowatt Tocco Junior induction-heating machine announced recently by Ohio Crankshaft Co., 3800 Harvard avenue, Cleveland, can be adapted to brazing, annealing, heat treating, heating for forging and surface hardening of small and medium-size parts. A compact 9600-cycle high-frequency unit, the machine is capable of providing continuous opera-



tions around the clock with minimum maintenance and care.

Featured in the unit is a 20-horsepower motor-generator set that maintains accuracy of heat control at all times. Inductors for brazing carbide tips are designed to treat more than one

(Please turn to Page 137)

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

# SOUTH BEND LATHES

For **UNIFORM ACCURACY**



**9" SOUTH BEND  
ENGINE LATHE**

**BUY  
WAR  
BONDS**



War production demands uniform accuracy. Loss of time or the waste of scarce strategic materials because of variations in machining cannot be tolerated. There is no place in our war production plan for equipment that cannot be relied upon to maintain required tolerances.

Sound design and careful workmanship give South Bend Lathes the dependable precision that assures uniform accuracy. Built by skilled craftsmen who take pride in their work, they are capable of maintaining split-thousandth tolerances on all work within their

capacity. Their unvarying performance speeds production on the most exacting machine operations and assures perfect interchangeability of parts and units.

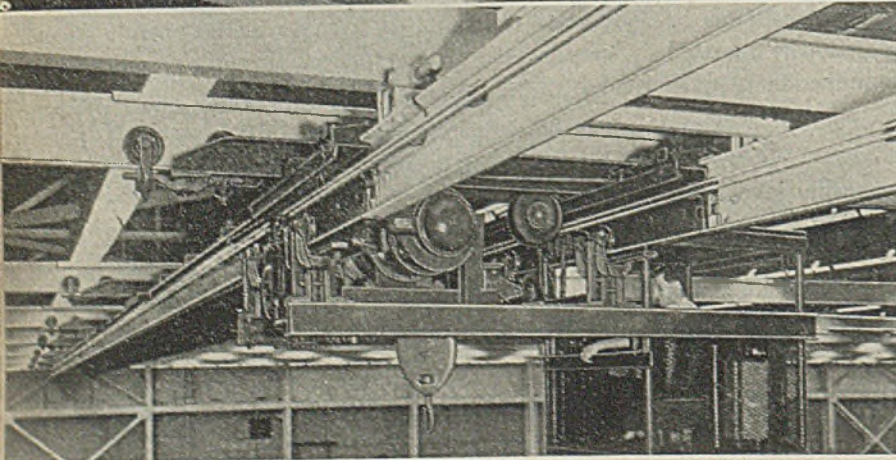
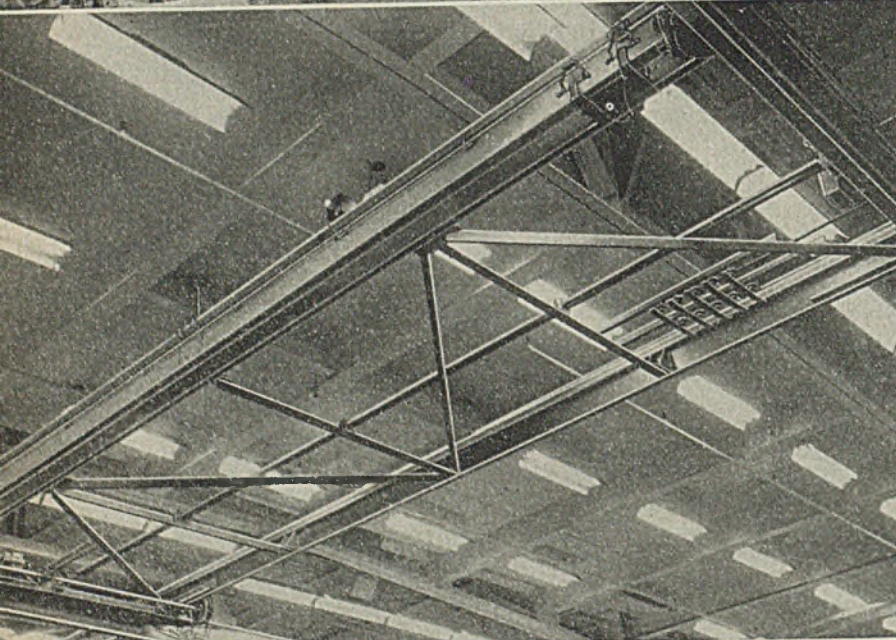
There is a South Bend Lathe for most war production requirements. The Engine Lathes are made in 9", 10", 13", 14½", and 16" swings, with bed lengths from 3' to 12'. The Toolroom Lathes are made in 10", 13", 14½", and 16" swings, with bed lengths from 3' to 8'. The Turret Lathes are made in 9" and 10" swings, with 3½' bed lengths. These lathes are described in Catalog 100C which will be sent upon request.



**SOUTH BEND LATHE WORKS**

SOUTH BEND, INDIANA • LATHE BUILDERS FOR 36 YEARS

# Overhead



APPLICATION of specially designed monorail cranes, using two bridges for carrier travel, had its inception in the aircraft industry, particularly in the Boeing, Consolidated and Martin bomber plants.

Handling materials and subassemblies in these huge plants involves a twofold problem. First, the areas over which materials and parts must be moved are so large that the conventional over-riding bridge crane is automatically eliminated. The girder depth necessary to span such areas would have added several feet to the building height and tremendously increased the cost of such long structures. Second, the method of assembly, necessarily spread over these large areas, requires crane type equipment capable of hooking on to a load at any point in the entire area.

To handle this job, twin bridges on trolley-mounted trucks were designed for travel along multiple runways with cab-carriers operating between the bridges. This, in effect, closely resembles a moving railway when looking along the length of a long twin bridge.

These underslung cranes, as well as the cab-carriers, are propelled by means of wheels with inflated pneumatic tires pressing against the bottom of the runways. Wheels are driven through a squaring shaft with sprocket and chain to

*Top to bottom, left—*

*Fig. 1—This 3-ton bridge crane operates in bay over subassembly area; can be run on shuttle crane shown in Fig. 2 which allows transfer of this bridge crane to other bays in this area*

*Fig. 2—Shuttle crane shown here allows units like that shown in Fig. 1 to be transferred to other bays. Shuttle operation is controlled from crane cab through sliding shoe conductors*

*Fig. 3—Special expansion joint inserted in craneways at each of building expansion points allows  $4\frac{1}{2}$  inches of variation yet furnishes smooth uninterrupted travel for crane wheels*

*Fig. 4—How two 5-ton twin bridge cranes interlock for operation as a single 8-truck unit. Operator is running cab carrier unit over the twin bridge from the service spur shown in Fig. 6*



# Railways

## Speed Bomber Parts Handling at Willow Run

electric motor. Drum controls for all movements are contained in the cab. Maximum speed for all units except the hoist are approximately 300 feet per minute.

At the Ford Willow Run plant, dozens of these overhead railways, of various lengths and capacities, travel throughout the assembly areas on more than 29 miles of crane tracks. Seven separate systems are included in this trackage covering the various departments.

One of the problems first encountered in the Ford plant was in the sub-assembly area involving the movement of short-span cranes to run between the bays, Fig. 1. Loads on these cranes required transfer throughout the department in the course of production, and then to either of the main assembly lines.

In order to achieve this cross travel yet at the same time retain the overall coverage of crane equipment, American MonoRail engineers designed a shuttle unit, Fig. 2, which acts as a travelling craneway. With it, a short-span crane and its load can be transferred to any other set of runways between bays in the system. This eliminates hook transfer, permitting an operator to pick up a load and deposit it anywhere within the system.

### Interlocks Aid Load Transfer

Perfect alignment of shuttles and cranes to accomplish such transfer is made possible by means of electrically-operated interlocks. These interlocks are operated from the cab by means of small drum controllers. The operator lines up his crane at the interlock connection. When the crane registers accurately, the interlock baffle is raised by a cam on the connecting track and at the same time closes a limit switch circuit which then enables the operator to use the drum controller. This insures connection only at the proper point.

The crane is then run across to the connecting tracks on shuttle or regular craneway. Shuttle cranes are propelled by the same rubber-wheel drive described above.

Runways for the short-span 3-ton cranes in the sub-assembly areas are cantilevered several feet into the main assembly area covered by 5-ton cranes, thus furnishing hook transfer between these areas.

Over each of the main assembly lines are eight crane tracks extending the length of the building, about 2800 feet. In order to maintain constant alignment, special slotted joints are inserted at each expansion point in the building. See Fig. 3. These joints provide for 3 inches of expansion, yet furnish smooth travel for crane wheels at all times.

Along each side of the eight craneway tracks travel 4-truck cranes, Fig. 4, of 5-ton capacity which can be latched together to operate as a single unit. This also permits one crane to pass another

and move a load over the entire area without hook transfer. The two long assembly areas are linked together at strategic points by interlocking cross-over tracks so that cab-carriers can transfer from a crane on one assembly line to a crane on the other.

Covering the length of the preparation area is a 320-foot crane or travelling railway, Fig. 5, operating on 17 runways. This crane also serves as a cross-over connection between craneways in adjacent areas for through passage of carriers between departments. It is probably the longest crane of its type ever built. It is propelled by rubber wheels under each runway, powered by two electric motors through a single squaring shaft. Special expansion features were necessary to assure alignment with interlock-

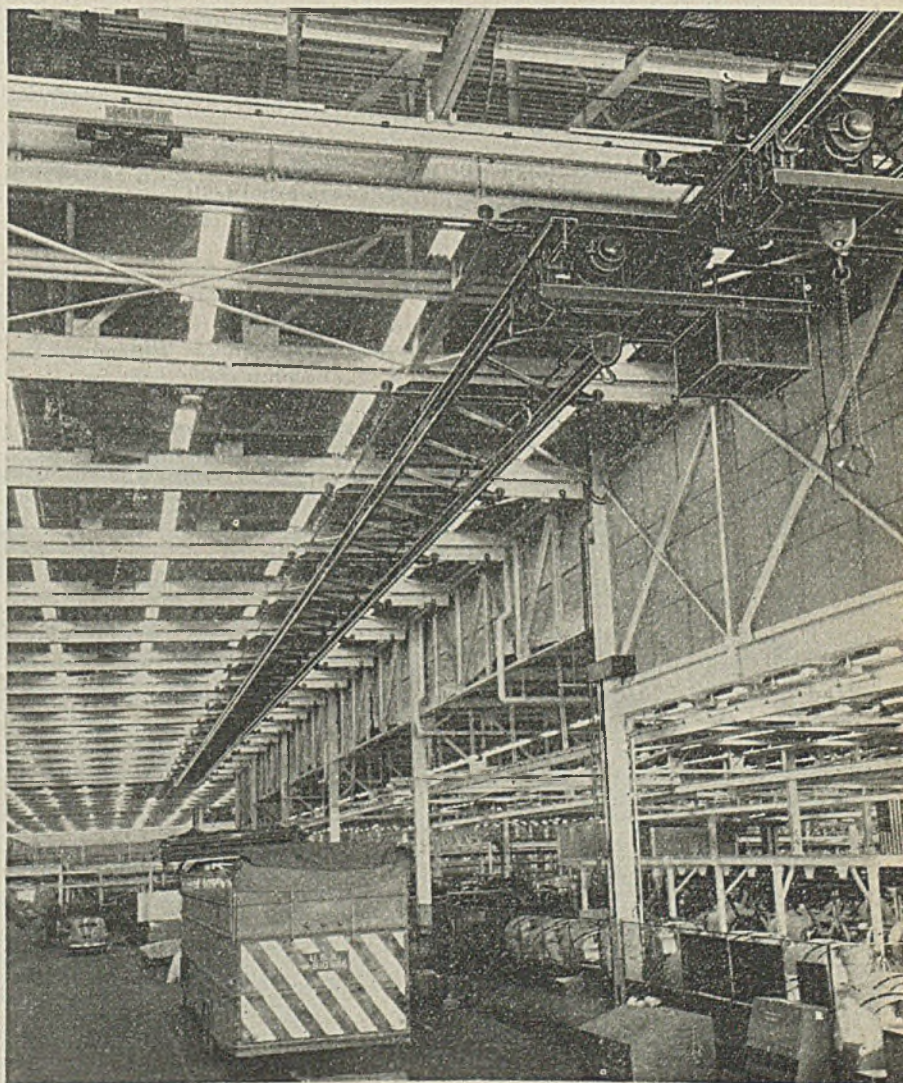
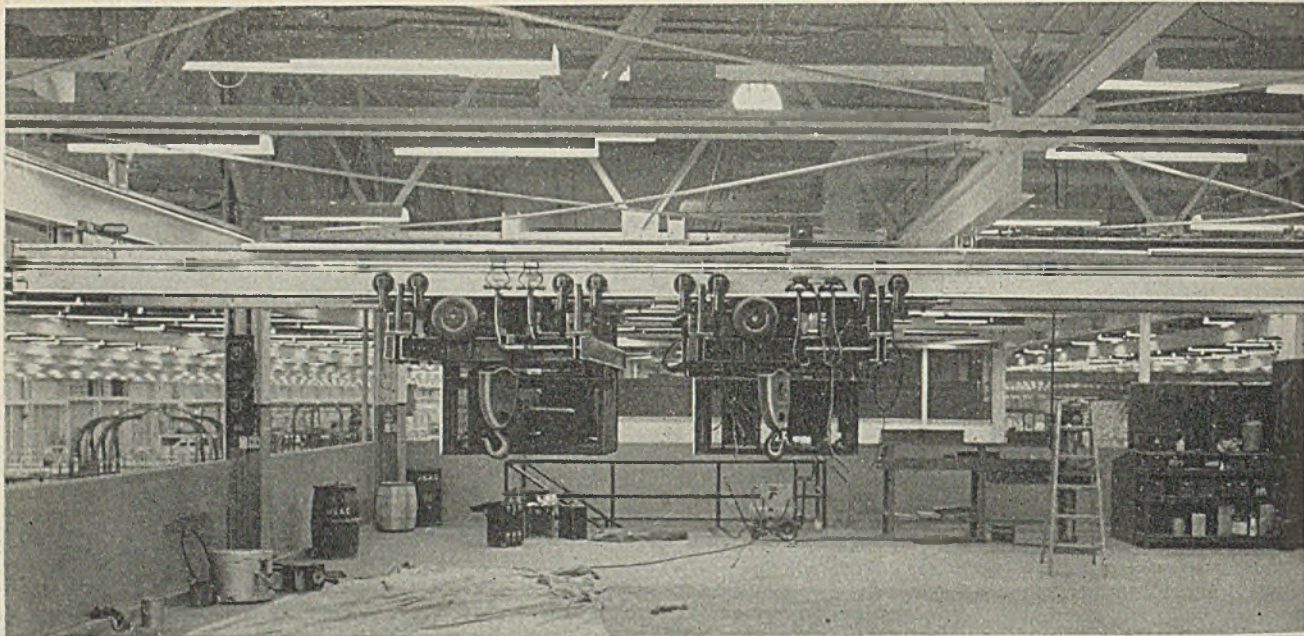


Fig. 5—A 320-foot twin bridge crane in shipping area travels on 17 runways by means of 2-motor drive through square shaft operating rubber wheels under each runway. To assure correct interlocking with other cranes at each end, special provision for expansion is built into long crane



*Fig. 6—Spur tracks at third level between assembly areas connect with interlocks at both ends to engage with cranes allowing cab carriers to be run in for service and repair*

ing cranes at one end of this long crane. Expansion mechanism is operated by a crank so that adjustment can be made by operator in the cab.

Undoubtedly the most outstanding feature of the Ford installation is the facilities for servicing the cranes as well as maintenance of lights and other overhead equipment. Over the third level of the mezzanine section separating the main assembly areas hangs two spur tracks, Fig. 6, which have interlock connections for cranes in both areas. Carriers are run on these spurs for easy access to all parts for repair or replacement. Special maintenance cars, Fig. 7, propelled by a cab-carrier, can be moved on crane bridges

throughout the system to replace lights or service overhead facilities.

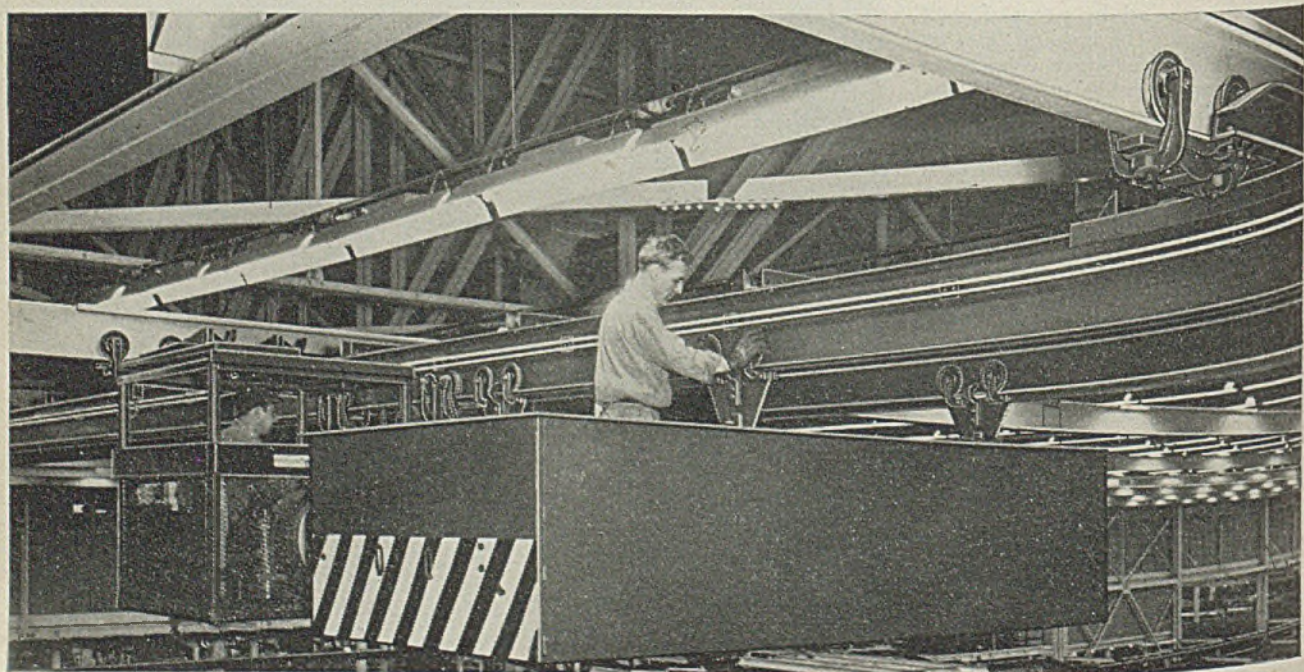
Regardless of the extent and complication of this overhead railway system, it was found practical to train women as crane operators. Controls for all movement of cranes, shuttles, interlocks, hoists and carrier drives are mounted in the cabs, plainly marked and requiring little manual effort. The entire system was designed and built by the American MonoRail Co. of Cleveland, in co-opera-

tion with Albert Kahn, Associated Architects & Engineers Inc. of Detroit.

It is extremely difficult to show exactly how flexible this handling system is without presenting a detailed floor plan of the entire plant. However, it can be said that the more than 29 miles of crane tracks and seven separate systems included provide facilities to move work as desired about the entire plant. One really has to see this system in operation to appreciate its unusual features.

Its importance, however, lies not only in its extreme flexibility but in the extraordinary manner it makes every bit of floor space available for fabricating operations.

*Fig. 7—Service car attached to cab carrier can be transferred to any part of plant. Car is attached to cab carrier operating on a crane bridge. By means of interlocks and cross-overs, this car can reach any area desired to service crane, light fixtures or other portions of the superstructure*





## Exide Ironclad ease of handling means increased dependability

Complex equipment is all right in its place, but today, Industry has a big job on its hands. Tools which are simple and easy to handle, save time, money, and materials. That's why Exide Ironclad Batteries, long known for their durability and dependability, are playing such an important part in the industrial war of movement. They shorten the training periods of new workers. They save materials through their long life . . . and most of all they do a big job and do it well!

### ANY WORKER CAN FOLLOW THESE EASY MAINTENANCE STEPS . . .

Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.

Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.

Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.

Record water additions, voltage, and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long life built into every Exide Battery. Ask for booklet Form 1982.

1

**High Power, More Production:** To get the most from any battery-powered electric vehicle, its battery must deliver good voltage, hold that voltage high, and be ready for emergency demands with a giant surge when needed. Exide Ironclads do just that.

2

**Long Life, Saves Materials:** Rugged Exide Ironclads are built to last, and save vital materials by getting maximum use from everything that goes into their making. When you buy an Exide you definitely—Buy to Last and Save to Win!

3

**Easy Maintenance Saves Labor:** Exide Ironclads are kept charged by the simplest method ever devised. With the Exide Charge Control Unit there's nothing to do but connect the battery to the charging source and turn a knob . . . a job the greenest worker can handle.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia  
Exide Batteries of Canada, Limited, Toronto



**Exide**  
IRONCLAD  
BATTERIES

BACK THE ATTACK WITH WAR BONDS • LET'S OVER-SUBSCRIBE THE 3RD WAR LOAN

September 13, 1943

MARKED progress in the hydraulic descaling of hot-rolled steel by the so-timed spray system—that is, by the impingement of high-velocity water sprays upon the heated metal as it advances through the successive scale breaker and finishing sections of the continuous mill—has brought to light, not only the basic requirements for successful applications of this high-speed method for complete removal of scale from strip, plates, sheet bars, merchant bars and seamless tubing as and while the stock is being rolled, but certain troublesome complications, as well—complications that have at times seriously interfered with satisfactory output and quality standards.

The descaling action consists essentially in cracking-off, or loosening the scale from the sound metal by sharp thermal contraction and the physical shattering of the loosened scale and its removal by the impinging force of the water jets—both processes effected simultaneously without over-cooling the steel. Since descaling is independent of and distinct from the cooling of the steel being rolled, which later involves low-pressure water-cooling of the stands of rolls, an extremely exacting thermal balance is involved, little difference existing between the coefficients of contraction of the objectionable scale and of the sound metal. The question of water pressure, likewise, is critical, as well as the quality of the water employed and, since the objectionable scaling is progressive, the location of the high-pressure sprays is highly important.

From 4 to 12 gallons of high-pressure filtered water per minute per inch width of slab or stock surface have been found necessary in practice. The advisable quantity depends upon the type of mill, width and weight of slab, speed of mill, i.e., time consumed by the slab in passing through rolls or stands and between successive stands—the number of slabs in transit at the same time, location and number of spray points and volume of spray. The water pressure may range from about 600 to 1300 pounds per square inch, or even higher in some instances.

#### Intricacies of Operation

Selection of water pressures, location of sprays, etc. at some of the mills where hydraulic descaling is now being used most successfully, and strip of highest quality produced at reasonable pumpage expense, with accompanying low maintenance cost, will provide excellent firsthand evidence of the intricacies of modern descaling practice. At one of the more prominent Ohio mills, the water pressure at the spray nozzles is close to 1000 pounds per square inch. At another of the important mills in the same general locality, the hydraulic pressure employed is 200 pounds higher, while in the tin mill of a steel plant in the Chicago district the spray pressure is built-up to some 1300 pounds per square inch. Each of these installations is typical of methods which have been approved for hydraulic descaling.

Take the 1200-pound application as an example. This is in connection with a 12-stand 98-inch strip mill employed for a variety of work and the pressure selected was established only after extensive investigation of specific requirements for obtaining satisfactory (scaleless) surface finish within the safe pressure range of available piping materials and standardized pumping equipment. Studies were made of the water demand on various rolling schedules, limiting the velocity of flow arbitrarily in any portion of the high-pressure system to some 24 feet per second

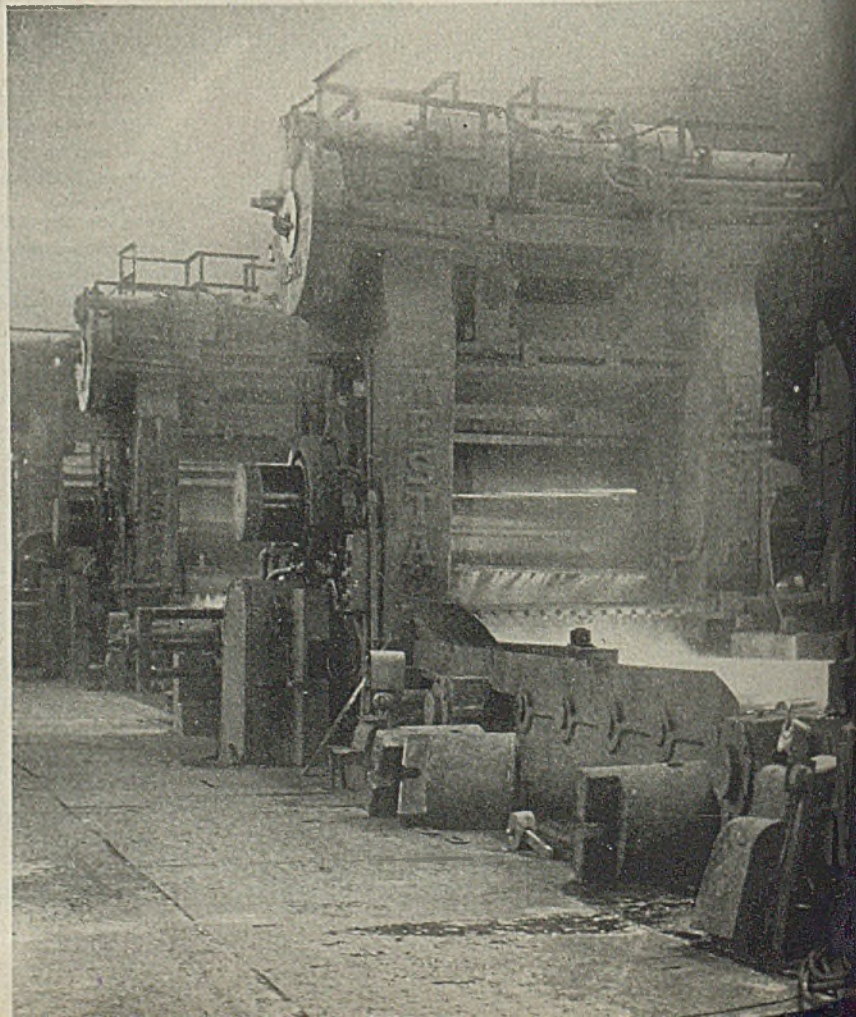
and avoiding all abrupt changes in direction of flow in the vicinity of high-velocity lines.

Spray nozzles then were located on the delivery side of the No. 1 scale breaker, at the entry side of No. 2 roughing stand, entry side of No. 3 rougher, entry side of No. 4 rougher; at the delivery side of No. 2 scale breaker, on entering the finishing mill section, and on the delivery side of No. 5 finishing stand. Nozzles on the No. 1 scale breaker, 16 in number, are six special 1-inch Republic Steel Corp. devices spaced 8 inches and directed against the top of

# DESCALING STEEL

## By Spray System

By REGINALD TRAUTSCHOLD  
Engineering Consultant  
Passaic, N. J.



the heated slab from a maximum distance of 17½ inches and ten ½ x 1/16-inch spray nozzles on 4½-inch centers directed against the under side of the slab from a distance of 9½ inches. Sixteen ½ x 1/16-inch spray nozzles are used on each of the Nos. 2, 3 and 4 roughing stands on 6-inch centers, 12 inches above and below the forming sheet. The nozzles are mounted at an angle of some 15 degrees against the direction of slab flow to effect efficient loosening and removal of the scale.

Sprays on the No. 2 scale breaker consist of a double battery of twenty

½ x 1/16-inch spray nozzles on 4½-inch centers mounted 9¼ inches above and below the slab. The nozzles also are inclined at 15 degrees against the advance of the formed sheet. Sprays on the No. 5 finishing stand are seldom used, the descaling sprays at the No. 2 scale breaker ordinarily removing the last trace of scale forming on the cooling sheet.

The nozzles at each stand are provided with closing-caps, to adjust the overlapping spray spread to the width of the strip rolled avoiding unnecessary pump-age and conserving filtered water. When rolling a 94-inch sheet, the maximum

peak demand for high-pressure descaling water has been about 2500 gallons per minute and the maximum average demand 1500 gallons.

Substantial water supply is normally furnished by one or another of three De Laval duplex centrifugals, each of 1200 gallons per minute capacity, with one of the other pumps serving as a standby or reserve unit. Each pump assembly consists of a 2-stage low-pressure booster pump charged from a 13,000-gallon surge-pipe protected, tank reservoir of filtered water, from which every trace of abrasive material has been carefully removed, and a 7-stage high-pressure centrifugal. The combined pump unit, mounted on a common sub-base, is connected by a flexible coupling to a 1200-horsepower, 1800 revolution per minute, 3-phase, 60-cycle, 2300-volt induction drive motor.

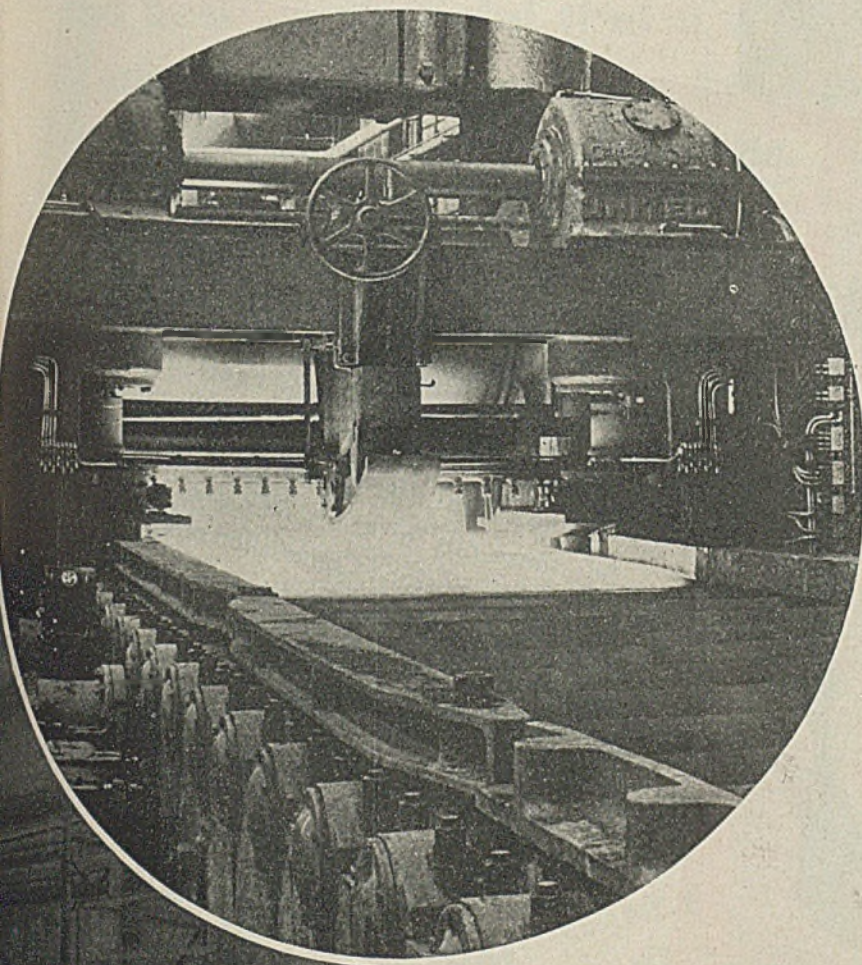
The pump control circuit is so interlocked with the control of a motor-operated gate valve in the discharge line of each pump unit that, while closing the valve automatically when the current is off, the pump can only be started when the gate valve is open. Also, a trip on the oil circuit breaker is interlocked with the pressure switch on the pump suction and with a temperature switch on the balance pipe of the pump, opening the circuit breaker immediately in cases of suction drop, below an established minimum, and when there is an increase in temperature in the balance pipe, above a predetermined limit.

#### Emergency By-Pass Valve Provided

Each pump also is provided with a solenoid-operated air valve that opens an automatic by-pass valve to the filtered water tank. This self-acting device functions if and when for any reason the motor current drops below that corresponding to the shut-off load on the pump.

The discharge from the pumps passes direct to the main header serving the various descaling stands and also, through an automatic safety shut-off valve, to a hydropneumatic accumulator of 4000 gallons capacity that under normal operating conditions is kept about one-third full of water under full system pressure by a 3-stage air compressor, with inter and after-coolers, operated under manual push-button control. The regulation of the accumulator safety valve is automatic, however, effected through the agency of a special liquid-level controller and recorder with high-level contact arranged to close a warning signal light circuit and low-level contact to close, likewise, the light circuit by opening the circuit on a solenoid air valve. Thus, the safety valve is instantly closed whenever the water level is low and in case a break should occur in the hydraulic lines or any failure in the operation of the pump, air supply or electric current.

Another special detail of this installation is worthy of mention, and that is, the low-pressure filtered water-filling connection made below the descaling spray valves, to maintain the piping and spray headers beyond the spray



*Above—Spray nozzles for high-pressure water are shown above the hot steel. Courtesy, Republic Steel Corp.*

*Left—No. 4 roughing stand, 79-inch train, equipped with high-pressure sprays. Courtesy, Youngstown Sheet & Tube Co.*



# Look

The best test of any soaking pit is what it does in action. For 17 years the one-way-fired pits built by Surface Combustion have been doing a job in American steel mills. Witness the many pits bought by one big steel company, shown on the opposite page. More and more as engineers have seen these pits at work in their own mills they have come to rely upon them exclusively.

See these pits in action. Talk to the men who run them. Surface Combustion one-way-fired soaking pits operate on any commercial fuel. They're built to take punishment and to give service.

**Simplest Construction**

**Greatest Capacity**

**Most Efficient Firing**

**Best Heat Distribution**

**Lowest Maintenance**

SURFACE COMBUSTION • TOLEDO, OHIO



# SURFACE

# at the **Facts!**

The best testimonial that a steel mill can give a manufacturer is to come back time and time again for more of the same pits.

## HERE'S THE RECORD OF ONE OF AMERICA'S BIG STEEL COMPANIES

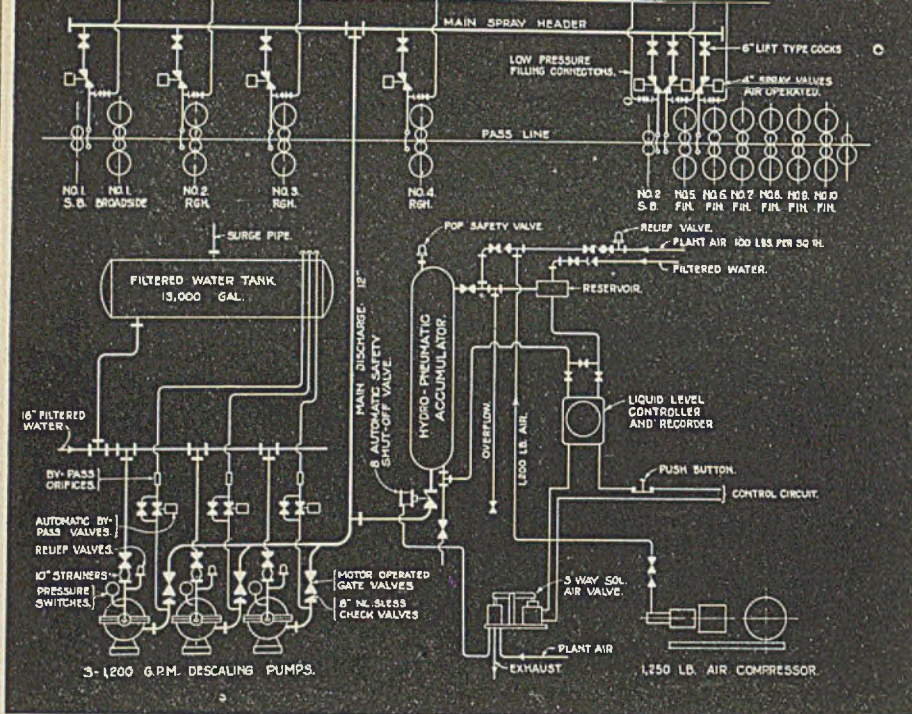
DATE ORDERED	LOCAL PLANT	NUMBER OF SURFACE COMBUSTION PITS ORDERED
DEC. 1927	PLANT A	5 PITS
MAR. 1929	PLANT B	4 PITS
MAR. 1929	PLANT C	7 PITS
NOV. 1931	PLANT D	4 PITS
DEC. 1936	PLANT A	4 PITS
NOV. 1940	PLANT B	5 PITS
JUNE 1942	PLANT E	24 PITS
JAN. 1943	PLANT A	3 PITS

**TOTAL 56 PITS**

SC Gas and Oil Fired Equipment For Every Industrial Need:  
 FORGING, NORMALIZING, ANNEALING, HARDENING,  
 DRAWING, HEATING, CARBURIZING, NITRIDING,  
 SPECIAL ATMOSPHERES. FOR DRY BLAST USE SC  
 KATHABAR MOISTURE CONTROL SYSTEMS.

# COMBUSTION

Layout of descaling system serving 4-high continuous mill



tent lowering of descaling effectiveness was eventually traced to a baffling clogging of the spray nozzles, despite the fact that the carefully filtered descaling water was physically clear and free from suspended matter on entering the filtered water tank serving the descaling pumps. Analysis of the water showed that clogging was caused by a combination of microbiological slime growths and bacterial corrosion in the lines leading to the jets—that no amount of care in filtration could exclude completely from the filter effluent.

Suitable chlorination of the water supply destroyed the slime-forming and corrosion-causing bacilli correcting the condition. The water treatment restored the descaling efficiency of the system promptly and arrested both corrosion troubles and the slime growths.

The microbiological hazard is not uncommon. Numerous varieties of water-borne organisms pass through the filter bed and under favorable conditions attach themselves to pipe lines and tank surfaces, in joints and water traps. Here they propagate and rapidly multiply to form filamentous growths and jelly-like accumulations which entrap any minute particles of rust and dirt that may be present. A matrix builds up, often of inorganic appearance, that not only restricts the free flow of water but may break up and clog passages. Any tendency to corrosion troubles is intensified, further aggravating effective scale removal.

Modern descaling practice is exacting, yet the intricacies are clearly susceptible to control and the major requirements of finished steel plates for present-day markets—that of surface finish of the highest quality—can now be realized speedily and dependably at reasonable cost by a well-engineered hydraulic descaling system. The complete removal of all blemishing scale from the hot strip can be effected advantageously as it is rolled on the mill.

valves full of water between spraying periods. The safeguard consists of a relatively low-pressure filling line paralleling the main header and connected into each high-pressure spray stand. The object is to protect the spray nozzles and connecting piping against the hammerlike crushing impact, on valve closing, of suddenly released water traveling at a rate of better than 16 miles per hour.

Naturally, all pipe fittings are of extra-heavy welded construction and at each spray valve there is a connection with a straightway lift-type cock with a balanced piston-type air-pilot-operated spray valve for the avoidance of line shocks and regulation of speed of valve manipulation, providing uniform acceleration or deceleration as desired. The spray valves are controlled manually in the pulpits or on the tables through flag switches operating 4-way solenoid air valves placed close to the spray valve.

Sensitive thermal balance entailed in a successful hydraulic descaling system of this kind is well demonstrated in the

case of the spray installation at the tin plate mill in the Chicago district, where the satisfactory hydraulic pressure is some 1000 pounds per square inch higher or 8 1/3 per cent. The increase is made necessary by the lighter weight strip rolled and the descaling of which limits the amount of water that can be employed without too rapid cooling of the lighter mass of heated metal. Efficient surface scale loosening is effected with less water and the heavier impact pressure aids both in breaking-up the loosened scale and its removal.

Spent descaling water, which of necessity is 100 per cent makeup water, mixing with the low-pressure roll cooling water escapes to the scale pit, where it settles and can be reused after passing through mechanical strainers for roll cooling purposes but decidedly not as descaling water. In fact, the quality of the filtered water used in the sprays is of the utmost importance.

At one mill where a system of descaling by the spray system had been installed, loss of production and persis-

watched to 2 minutes and the torch removed after which the accumulator pump was allowed to operate an additional 2 minutes to accumulate all the fumes and vapors. Even before the comparison of vaporization was made, a reduction in fumes and smoke was noticeable to the eye on the work which was undergoing the treatment.

## Reamers Are Ground from Hardened Steel Blanks

Barber-Colman Co., Rockford, Ill., now is in production on a line of ground-from-the-solid reamers ranging in size from 0.050 to 0.500-inch and guaranteed to cutting accuracy within plus 0.0002 and minus 0.000-inch. These are for use on fine precision work demand-

ing smooth finish, work such as aircraft parts, guns, instruments and small textile machinery details.

The reamers, each of which is engineered for the particular job it is to do, are made from hardened steel blanks, centerless ground to the specified cutting diameter, then fluted by grinding longitudinally from the solid. The method avoids hardening distortion and precludes minutely "dubbed" cutting edges. Diameter having been established within tenths before grinding the flutes, no measuring across the flutes is considered to be necessary.

Cylindrical cutting lands are usually smooth, and the fine finish in the flutes, which are shaped in each case to suit the material to be cut, insures maximum cutting ability, free flow of chips and long life for the tool.

## Welding Fluid Reduces Effects of Fumes

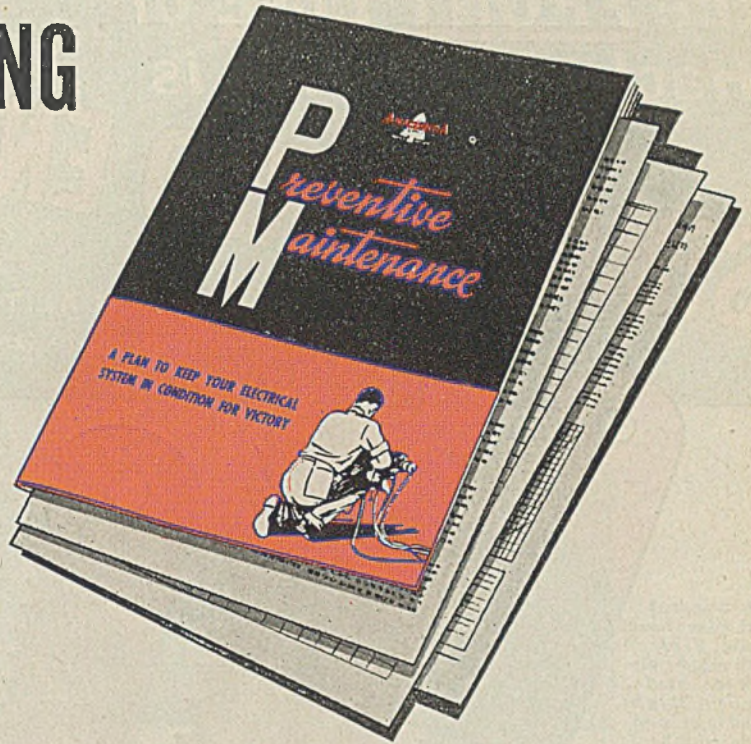
Welding fumes and vaporization of zinc can be materially reduced at least 30 per cent by the application of No-Spat, its manufacturers, the Midland Paint & Varnish Co., Cleveland, reported recently. A comparison of the vaporization showed untreated galvanized iron after each 2-minute test weld vaporized 0.107-gram of zinc. While on the galvanized iron treated with No-Spat only 0.074-gram of zinc was vaporized, according to the company.

To make the test, one series of samples was treated with welding fluid, while the other series was untreated. A welder using an oxyacetylene torch did the actual welding work. Each weld was stop-



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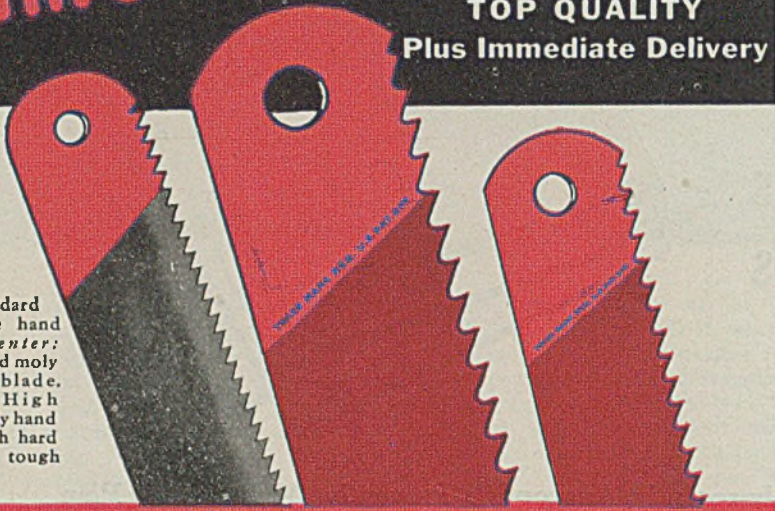
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**Gas Carburizing**

(Continued from Page 96)

the work in its travel are returned to the charging end of the furnace. In reality the man who charges the furnace also unloads it at the same end at the completion of the series of operations subsequent to carburizing. A number of installations like this now are in operation.

In addition, it has been found desirable in some instances to use these furnaces for a variety of different parts, requiring cases of different depths. This has been made possible by the development of a multiple-row furnace, so arranged that the "pushing" time of each row may be adjusted to produce any desired case depth. In this way, each of the rows may be operating together or independently of each other.

It may be interesting at this point to review the course of development that has taken place in these units since the time of the early installation. Only in this way will it be seen how logical this development has been and how the various matters of importance which have come up have added in their solution to the knowledge of the general art of carburizing.

*Handicaps To Efficient Gas Carburizing:* It is impossible in an article of this kind to consider in detail all of the interesting matters which have come to light in the operation of these units. These have been for the most part matters of operating procedure connected with handling the work in such a manner as to obtain best results. In this respect, they are associated with local plant operations and the parts being handled.

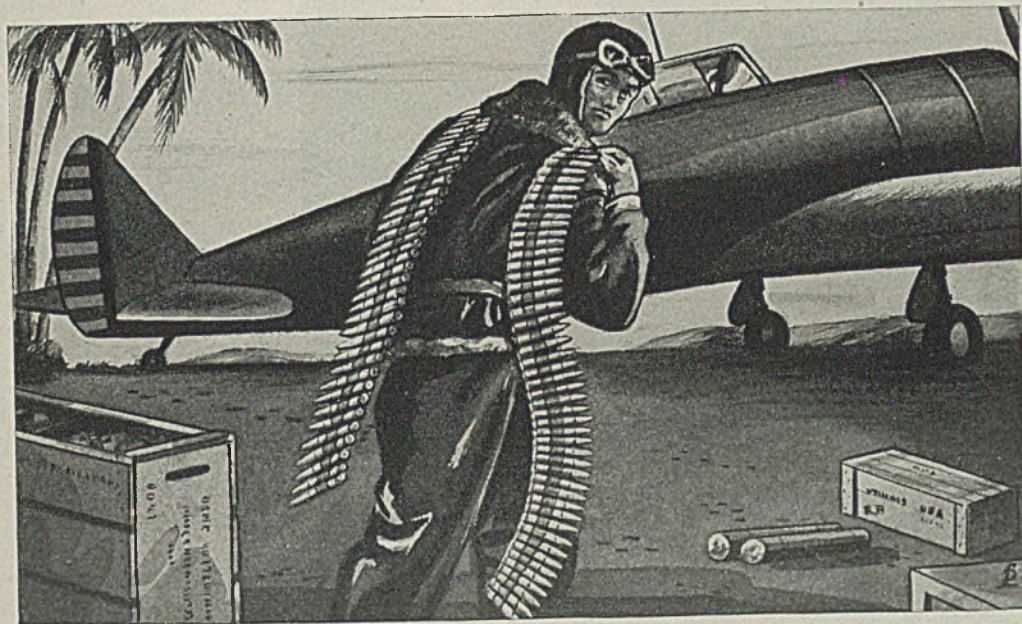
However, there are a number of matters which turned out to be definite limitations of the process as originally devised and which have been successfully overcome in the present day installations. These limitations which have shown themselves throughout the years as definite handicaps to be overcome may be listed as follows and will be considered in this order:

- A—The alloy problem.
- B—Carbon deposit on the work.
- C—Richness of the atmosphere.
- D—Carbon content of the case.
- E—Size of muffle.

*A—The Alloy Problem:* This may best be considered under two different heads—first, as affecting the alloy of the trays and fixtures and, second, as affecting the alloy muffles. There was considerable difficulty in the early days with the trays and fixtures used for supporting the work in its travel through the furnace. These tended to fall apart after being in use for some time and frequently failed within the furnace, thereby causing an upset.

Such trays were usually made of an alloy containing 35 per cent nickel and 15 per cent chromium, which is the same alloy that is being used today for the same purposes with entire satisfaction. Examination of the alloy at that time revealed that the trouble was not in the alloy itself but in the metal cast-

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The substitution of steel shell cases for brass is one of the major accomplishments of American ingenuity in the present war. Details of drawing, annealing, finishing, etc., have been successfully worked out in plants and Government Arsenals where these problems were not entirely new.

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ing technique, which permitted shrinkage areas within the body of the casting not apparent from the outside. When these castings were subjected to repeated carburization as they were used over and over again in continuous operation, these shrinkage areas became filled with graphitic carbon which continued to build up until it had developed a pressure within these areas that was greater than the strength of the metal at the carburizing temperature.

As a result, eventually a kind of explosion took place within the tray, forcing it apart with a sort of cauliflower appearance in the fracture. It should be noted especially that the kind of carburizing gas used in these days was very rich in hydrocarbon. These gases penetrated the shrinkage areas which seemed to catalyze their breakdown so that the resulting carbon tended to build up in these areas to such pressures that rupture occurred.

#### Contrasting Carbon Buildup

The action of these gases on the carburizing muffle seemed to be different. Carburization occurred in such a manner that the face on the inside of the muffle in contact with the carburizing gas reached a very high carbon value, but the outside face being exposed to the gases of combustion used for heating was subjected to a carbon removal process which caused the outside surface to be low in carbon while the inside surface was high in carbon.

In reality the thing that was occurring was that the carbon which entered the muffle on the inside was diffusing slowly through the structure and being removed at the outside during the course of normal operations, apparently limiting the carbon buildup in the interior face. This action did not seem to affect the life of the muffle nor was there ever any time so far as is known when a muffle failure occurred in a manner similar to that of the trays and the fixtures just described above.

The early muffles tended to fail by pulling apart at the joints. Different types of construction were used. Sometimes they were bolted; sometimes they were bolted and welded, but the remedy seemed to be principally in maintaining the muffle under pressure at all times so that the push of the work moving through the muffle was resisted by springs at the discharge end of the muffle, the arrangement being designed to keep the structure under compression at all times. In this way, the muffle life has been materially increased so that at present this does not constitute a large item of expense.

*B—Carbon Deposit on Work:* In some of the early installations, especially where butane or propane was used as the carburizing gas, there was some difficulty connected with the form of the free carbon deposited on the work during carburizing. In some cases, the carbon was present as free carbon or soot, which seemed to have no deleterious effect upon carburization but made the work dirty



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Action is the keynote from the moment your order comes in. Our wartime set-up concentrates on mounted points and grinding wheels 3" in diameter and under.

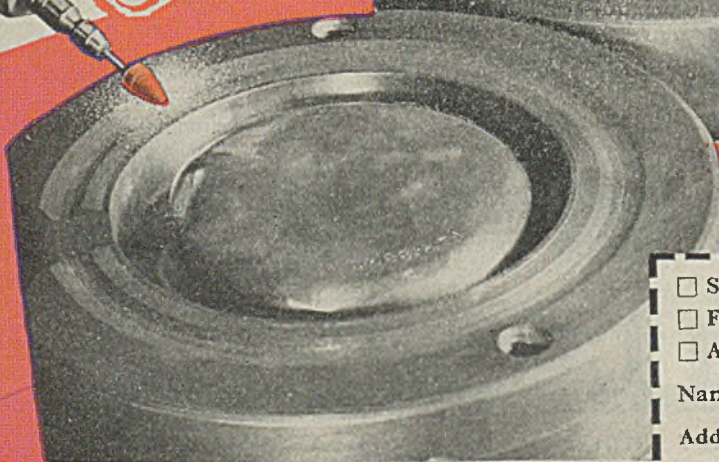
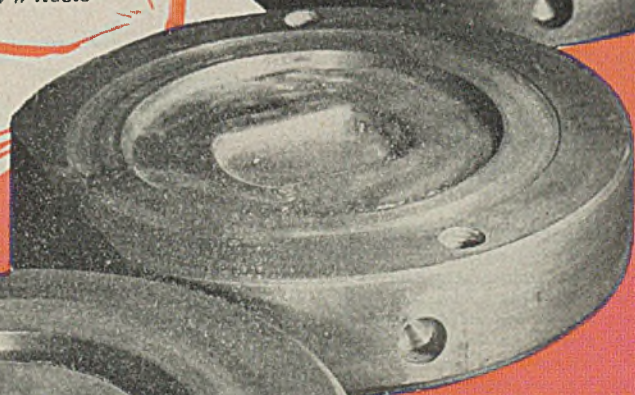
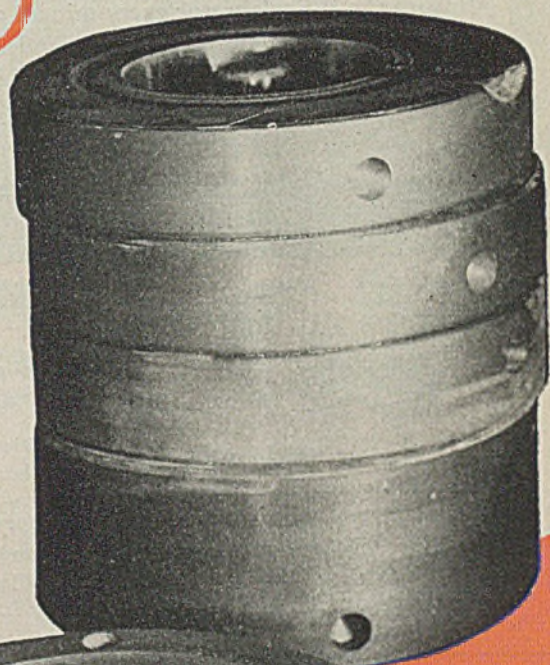
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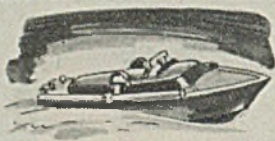
# Wheelabrator Speed Cleaning Makes Every Minute Count!

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A typical 27 x 36" Wheelabrator Tumbblast load of forged micrometer frames at the Rhode Island Tool Co., Providence, R. I., requires only five minutes to remove scale from the 800 pound load.



Park Drop Forge Co., Cleveland, Ohio, has been cleaning 13 to 15 diesel engine crankshafts measuring 54" long and 3" diameter, weighing 200 lbs. each, in 10 minutes with their 48 x 72" Wheelabrator Tumbblast.



A 20 x 27" Wheelabrator Tumbblast is used by an eastern tool manufacturing company for cleaning a variety of carbon and high speed drills, taps, cutters and reamers. Typical loads consist of from 1,000 to 2,500 pieces and require an average of 15 minutes cleaning compared with 4 hours with previous equipment.



35 machine gun bases weighing approximately 22 pounds each, are cleaned in only eighteen minutes in a 36" x 42" Wheelabrator Tumbblast at a railroad specialty manufacturing company.



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and objectionable from the standpoint of handling.

Another form of carbon encountered at this time had the appearance of a scale and occurred on different parts of the load of work and frequently interfered with carburization to the extent of preventing it almost entirely in certain spots. For instance, in the case of a ring gear, the entire gear would be carburized uniformly except in certain spots underneath a layer of carbon scale where carburization had not been effective at all. As a result of this, carburization was found to be spotted and uncertain, since the absence of carbon in these areas resulted in a softness which might appear in any portion of the gear.

Each of these forms of carbon could be traced to definite conditions of the carburizing gas, and it was necessary to eliminate both of them. The presence of free carbon on the work in the form of soot is traceable directly to the use of a rich carburizing gas. At high temperatures gases containing large amounts of hydrocarbon break down and liberate free carbon. This coats the work while passing through the high temperature zone and comes out as dirt in the form of free carbon or soot.

## Carbon Deposition Zone Effective

It will be recalled that in the continuous gas carburizing process as originally described, there was a zone in the furnace wherein the deposition of carbon or soot upon the work was fostered. It will be recalled also that this carbon deposition zone was located at the charge end of the furnace and was effective at a time when the work was being raised to carburizing temperature. This carbon deposition zone is still an effective part of the process as practiced today, and must be clearly distinguished from the carbon which covers the work in the high temperature zone and comes forth as dirt on the work. The one is a low temperature phenomenon essential to carburization. The other is a high temperature phenomenon resulting from the use of a rich hydrocarbon atmosphere.

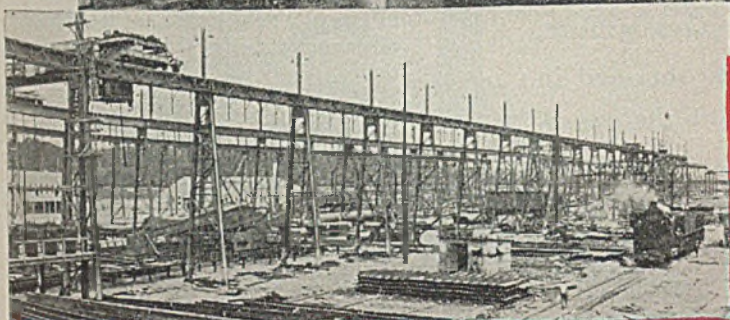
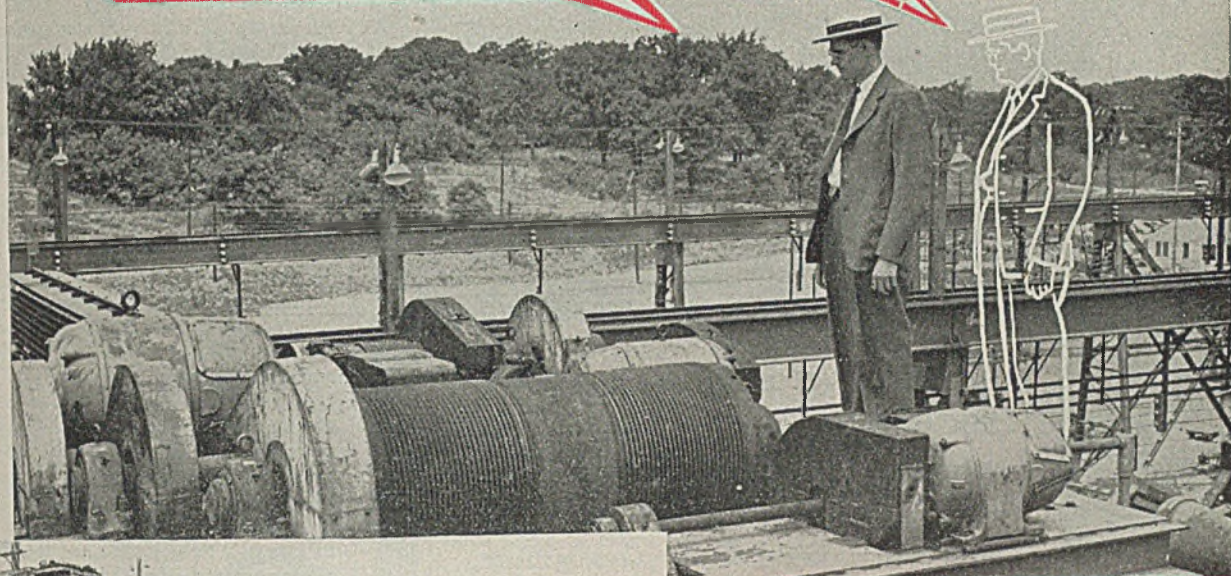
The formation of carbon scale or coke upon the work during carburizing became an important factor first of all when butane or propane was used as the carburizing gases. In the commercial form, these gases usually contain varying amounts of unsaturated hydrocarbon compounds. When these gases passed through the low temperature or carbon deposition zone of the furnace, they went through a series of reactions whereby they deposited carbon as desired but formed also some high boiling point tars which condensed on the cold work as liquid products. When these entered the high temperature reaction zone, they were converted into carbon scale or coke, which was responsible for spotty carburization of the work as it has been shown. Methods have been developed which overcome both of these objections so that at the present time they are no longer a factor in the car-

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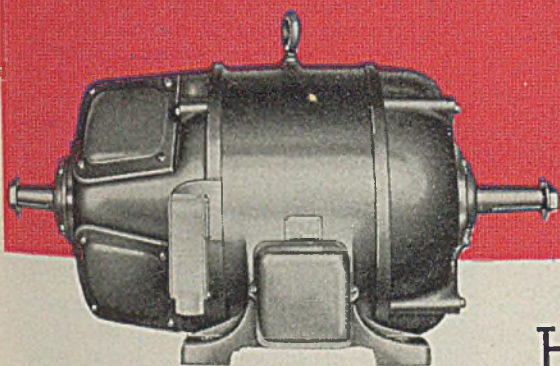


**SUN, RAIN, SNOW,**

**and the torturing  
frequent starting and  
reversing of impact**

**loads prove the stamina of**

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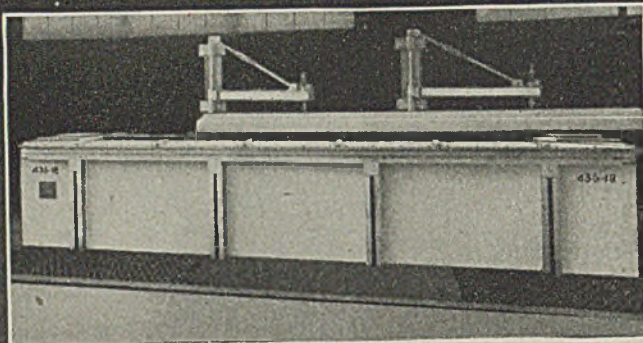
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burization procedure. These will be described in a subsequent section of this article.

*C—Richness of the Atmosphere:* As pointed out in the two sections just preceding, the handicaps encountered in the development of gas carburizing were traceable in each case to the use of an atmosphere rich in hydrocarbon gas. It might well be asked why it was necessary to maintain so rich an atmosphere when its effects were so deleterious. The answer is to be found in the limitations imposed upon the process in the act of introducing work into the muffle and removing it from the muffle, during operation.

### Atmospheric Changes Limited

At these times when the muffle chamber was opened at one end or the other, an influx or non-carburizing gas lowered the effectiveness of the gas remaining in the muffle to a point where a further reduction of hydrocarbon would interfere with carburization. These periodic changes of atmosphere produced a kind of surging treatment which had been found to be beneficial in other connections. In the subsequent development it became necessary to take greater pains to insure a tight muffle and the absence of gases which would hinder the operation.

*D—Carbon Content of Case:* In the carburization of certain steels, particularly those containing liberal amounts of the usual alloying elements, it was found necessary to control the carbon content of the carburized case within narrow limits. This had an effect upon the formation of austenite during quenching, which was objectionable for certain types of work. There were other reasons also which made it desirable to control the carbon content of the case sometimes at one value and sometimes at another, depending upon the particular application. In the process as originally set forth, it was impossible to do this without encountering difficulties.

To produce a high carbon case resulted in the formation of a large amount of free carbon which made the operation dirty and otherwise objectionable. To produce a low carbon case required too much time, since the carburizing potential of the atmosphere was low and the rate of diffusion slow. It was usually better in this case to carburize to a high value and then allow the carbon to diffuse to the desired lower value.

In either case, the process as originally presented lacked flexibility in these regards, and this had to be overcome by subsequent developments in design.

*E—Size of Muffle:* The original furnace had a single muffle in it designed for handling one line of work only. The reason for this was the difficulty involved in casting larger metal muffle sections. As these sections increased in size, it became increasingly difficult to produce sound castings and to mount them satisfactorily in a furnace structure. This limitation was overcome by the use

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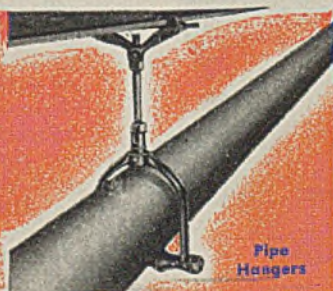
For new war construction, or maintenance and repair of existing piping, call Grinnell Company, Inc., Executive Offices, Providence, Rhode Island. Plants and offices throughout U. S. and Canada.

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*This cylinder, a reservoir of hydraulic energy for aircraft use, is another example of the way in which the Hackney Deep-Drawing Process helps manufacturers strengthen and reduce the weight of parts simultaneously.*

Hydraulic energy to feather propellers, operate landing gear, flaps, etc., requires accumulators which are light in weight, yet are strong enough to withstand high internal pressures.

Hackney engineers co-operating with the accumulator manufacturer developed a cylinder to meet the exacting specifications. Unnecessary weight was eliminated and uniform sidewall thickness was assured by cold drawing. Ample strength was assured by electrically controlled heat-treating.

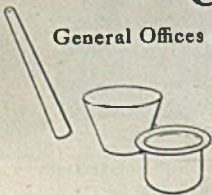
In addition to successfully meeting the weight-strength requirements, the Hackney Deep-Drawing Process makes important savings in time and materials as no machining is required for weight reduction in producing these improved products.

If you have a problem which deep-drawing might solve, let Hackney's engineers help you. Their experience may enable you to overcome manufacturing difficulties, meet war material limitations or effect product improvements. Write for details.

## Pressed Steel Tank Company

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of radiant tubes as heating elements within a tight refractory enclosure.

The above list of handicaps represents the limitations that have developed to date in the operation of these furnaces which have been responsible for the subsequent improvements that have made the continuous gas-carburizing furnace the precision tool that it is today. It will be in order at this point to trace the various steps taken and the reasons for the methods now being used. This will be done in the concluding portion of this article which will appear in the September 27 issue.

(Concluded Sept. 27 Issue)

### New Grease Absorbent For Floors Is Fireproof

A new fireproof oil and grease absorbent and floor cleaner, called Absorbo, is announced by Fidelity Chemical Products Corp., Newark, N. J. It is said to absorb up to 45 to 50 per cent of oil or grease by weight. The product is odorless, nonpoisonous and noninjurious to skin, clothing or flooring.

Though granular in form, the cleaner is nonabrasive and will not damage machinery or working parts due to abrasive action. The product is listed by the Underwriters' Laboratories as a class 1 non-combustible absorbent "for reducing fire and slipping hazards and for cleaning floors."

### Issues Revised Standards On Carbon Brushes

A revised edition of the "Carbon, Graphite and Metal-Graphite Brush Standards", publication No. 43-85, devoted to standard dimensions and tolerances for brushes, and standards for associated parts of brushes such as cables, clips, and connections, is announced by National Electrical Manufacturers Association, 155 East Forty-fourth street, New York. Copies of the pamphlet, which supersedes the one issued in 1934, are available from the association's headquarters.

### Welding Machine Takes On Riveting Job

Equipment originally developed for resistance welding is now being used to rivet stamped assemblies, Progressive Welder Co., Detroit, reports. Equipped with an indexing table, the machine hot-upsets and rivets in place vanes of hydraulic flywheels. The ends of the vanes are positioned through holes in the faces of assembly rings. Then "electrodes" of the welder are brought down under pressure against them, heating and at the same time upsetting the ends to rivet the parts securely.

Right amount of heat is provided by conventional welding timers combined with a lower current density than used for welding.

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*Cuts any material*

What have you that needs quick, smooth cutting—Metals? Alloys? Plastics? Plymetals? Rubber? Laminated Products? Composition Materials?

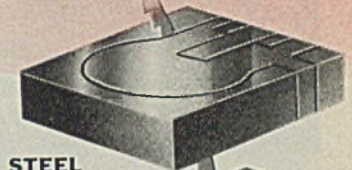
Armed with a DO-ALL Contour Machine and a supply of tough-edged

DO-ALL Band Saws, you can tackle any internal or external sawing job — flats, bars, tubing, blocks a foot thick, stacked sheets, etc.

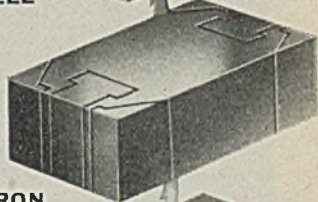
Just thread the DO-ALL with the proper band saw and you have ready for instant use Today's Fastest Machining Method—Meets the Challenge for Greater Production.

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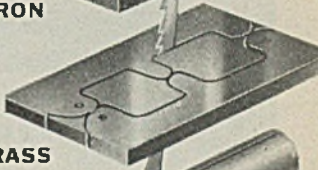
Everyone interested in advanced shape cutting methods, should see the 265-page DO-ALL Handbook giving details about this amazing machine. Free copy on request.



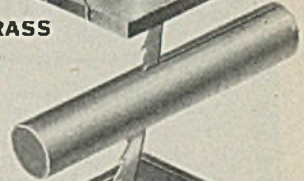
STEEL



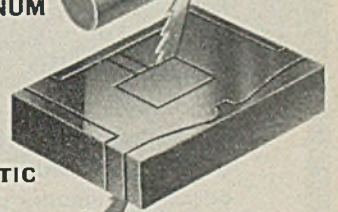
IRON



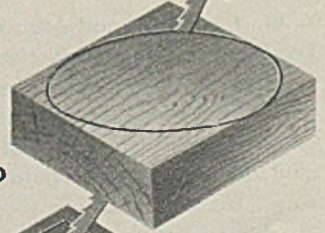
BRASS



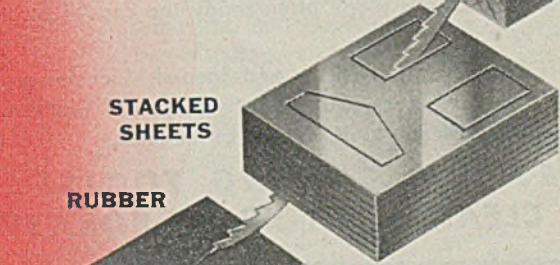
ALUMINUM



PLASTIC



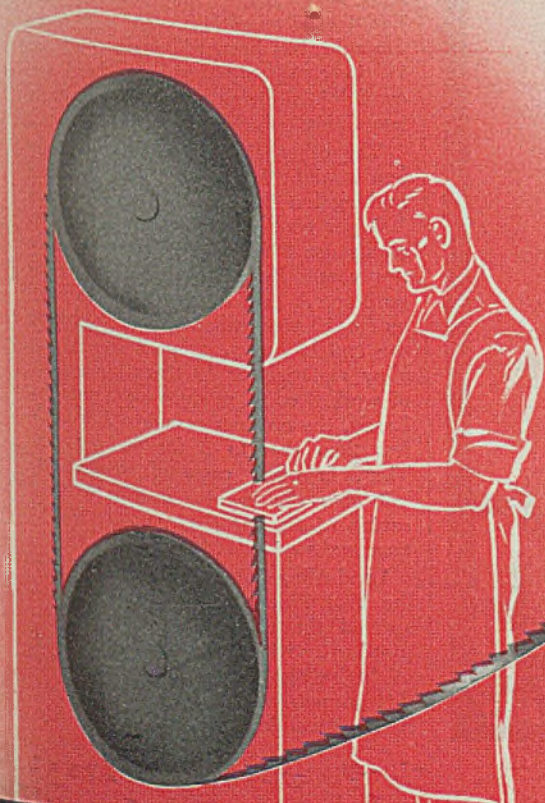
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DO-ALL Offices in 25 cities, with a staff of trained engineers to give you quick service on Contour Machines, Band Saws and Files, Grinders and Surface Grinders.



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# BLAST CLEANING



**saves priceless CUTTING TOOLS**

CURRENT SHORTAGES in cutting tools are so "fraught with danger to the war program" that the War Production Board has issued an appeal for drastic conservation to the entire metal industry.

The machining of imperfectly cleaned castings, forgings and heat treated parts—those having minute grains of sand burned into their surfaces, or hardened scale still clinging to their heat treated surfaces—makes one cutting tool extravagance that industry can easily, and quickly, eliminate.

A blast cleaned part—produced by Pangborn Air Blast or Rotoblast equipment—is cleaned down to virgin metal. No sand or scale is left to destroy cutting tools—hence extra long life for those priceless items. Blast cleaning also discloses flaws and fissures that otherwise would not be noticed until after machining operations had gotten well along the way. These two savings alone often repay the cost of blast installations in a short time.

Airless ROTOBlast Barrels, Tables and Special Machines are available for most work—and Air Blast Rooms and Cabinets for unusual or heavy work. Catalogs on request.

**SAVE YOUR CUTTING TOOLS!  
BLAST CLEAN WITH "PANGBORNS"**

# PANGBORN

WORLD'S LARGEST MANUFACTURER OF DUST COLLECTING AND BLAST CLEANING EQUIPMENT  
PANGBORN CORPORATION • HAGERSTOWN, MD.

## Tin-Conserving Solders

(Continued from Page 97)

the solder breaks down and spreads. The area thus covered may be measured by a planimeter and compared against that obtained with a known solder.

By using a flux to provide the wetting action that is so necessary, flowability and spread can be increased to an extent that it even surpasses that obtained by 50/50 tin-lead solder. It will be noted, however, that the new type flux had very little or no beneficial effect on the high-tin solders or on the 5/95 tin-lead alloy.

**Tinning and Coating:** Early in 1942 the Canada Metal Co. began an investigation of the problem of "tinning" such things as wire, cable, chaplets, and so on. Formerly, in the days of plenty, when there was no apparent need for the conservation of strategic metals, tin was used 100 per cent for these particular jobs. A series of experiments on this problem resulted in the development of an alloy containing only 10 per cent tin which satisfactorily answered all the requirements of a good tinning job. Of course, it was necessary to introduce other elements into the alloy in order to balance changes in wetting power fluidity and normal operating temperatures, resulting from the reduction of tin content. In all recent developments of new alternate alloys, particular care has been exercised to avoid substitution for tin by some other metal equally as difficult to procure. There has been every endeavor to produce alloys from elements yielded by Canadian mines.

The tinning alloy containing only 10 per cent of tin has been in use in several plants for over a year and has given a favorable account of itself in all instances. Thus, it is readily seen that a great deal of tin has been conserved in this one instance alone. Consider the case of two plants doing practically similar tinning operations. The one, A, for example, has been willing to co-operate in tin conservation and has been successful in utilizing an alternate material containing only 10 per cent tin.

The other, B, fails to look the problem straight in the face and has done nothing but insist that its work requires 100 per cent tin. Both these fictitious plants use 5000 pounds of tin normally per year. By utilizing the alloy composition, A gets enough metal to carry on for 10 years whereas B is finished at the end of one year, or, A has enough alloy material for 10 times the amount of work B could produce using pure tin. Lastly, the cost per pound to A is much less than that to B for the pure tin. Thus, in many cases of conservation, not only the country benefits in large saving of tin but the consumer himself may make considerable savings.

**Lead-Alloy Coat:** In the United States the War Production Board recently restricted the use of cadmium for rust-proofing and it is generally felt that zinc might be also eliminated eventually for this purpose. In view of this there has been tremendous interest in lead-alloy

STEEL



## THE SUB-BUSTER THAT WASN'T THERE

"We didn't have a chance. That murderous Nazi's fire whiplashed our open boat. Helpless, we ducked, and those who could, rowed on. Out in a ghostly glare, our ship went down.

"By God, we'll make them pay for this," said First Mate Stone, clenching his fist. Just then, a bullet got him in the throat.

"Your mind plays funny tricks at times like that. As those devils strafed us bow to stern, I seemed to see a DE Ship lunging in to pay them back a bit. Whenever I looked close, it wasn't there, and I kept wondering why."

\* \* \*  
Thousands of tiny parts make ships, planes, tanks, trucks, guns. In many cases, men's lives depend on *when* and *how* those parts are made.

Here, at R B & W, making millions of bolts and nuts every day, we have pledged ourselves to the realization that every part, even the smallest, counts. To special bolt-and-nut-making processes insuring flawless strength and accurate fit . . . we are adding, each one of us, the personal care and extra effort needed for world-wide victory.

Perhaps the workers in your plant would benefit from a clearer idea of what our soldiers and sailors are enduring. How important *each* one's part is . . . is the basic theme of a series of posters based on ads like this one—posters freely available to every "bits and parts" manufacturer. Write us. Russell, Burdsall & Ward Bolt and Nut Company, Port Chester, N. Y.

**RB&W** *Making strong the things that make America strong*

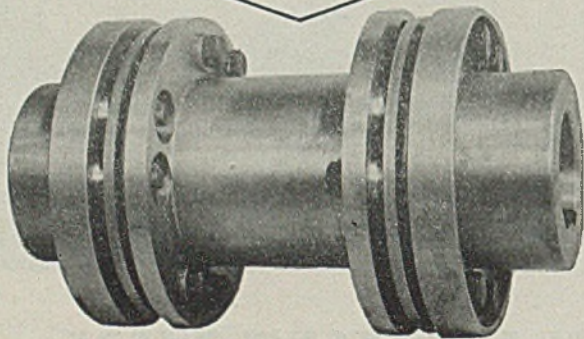


**RUSSELL, BURDSALL & WARD BOLT AND NUT COMPANY**

# THOMAS FLEXIBLE COUPLINGS

COMPENSATE FOR MISALIGNMENT  
ON MOTOR AND TURBINE DRIVES

- NO BACKLASH
- NO WEAR
- NO LUBRICATION
- NO THRUST
- FREE END FLOAT



Designed especially for high speed, heavy duty motor and turbine service where high temperature tends to aggravate shaft misalignment, this Thomas Flexible Coupling eliminates end thrust and cross-pull on bearings. There are no wearing parts to cause backlash or require lubrication. Power is transmitted in straight tension by the flexible discs, which absorb vibration that causes fatigue and wear of your equipment. Send for a Thomas catalog showing couplings for all purposes.



**THOMAS FLEXIBLE COUPLING CO.**  
WARREN • PENNA.

coating, which incidentally has several advantages over both cadmium and zinc coatings. Certain information has been published on the use of 2/98 tin-lead alloy for coating such things as sheets, fabricated articles, or copper.

This coating acts as a lubricant on sheets when drawn, is more ductile than common coatings, can readily be soldered with non-acid flux, can be painted immediately, is more economical because 60 pounds of tin-lead alloy will do the work of 100 pounds of zinc.

One of the large steel companies used hundreds of tons last year in place of terne metal containing 18 to 20 per cent tin. This particular firm believes in the ultimate use of sheets, coated with tin-lead alloy after the war instead of galvanized sheets. Many radio and transformer boxes and other sheet metal articles in mechanical transport and tanks plated with cadmium or zinc are difficult to solder and require acid flux. Fabricated articles of sheet metal are simultaneously coated and soldered by dipping into 2/98 tin-lead alloy in one operation.

#### Procedure for Lead Coating

The following process has been found to be very effective in producing a satisfactory lead coated article:

The steel, copper or brass sheets or other shapes should be thoroughly cleaned of all greases, dirt or foreign matter. The usual cleansers are tri-sodium phosphate solutions or vapor degreasers for oil, grease or drawing compound, and shot or sand blasting for scale or oxide. Any article cleaned in tri-sodium phosphate solution should be rinsed in plain water. The article is then dipped in a 5 per cent muriatic acid solution for pickling. A shot or sand blasted article may also be pickled but this is not absolutely necessary.

The length of time required in the pickling solution varies with the condition of the surface. A hard clean surface may require as long a time to pickle as an extremely dirty surface because some etching must be done so that the alloy will adhere. As the final appearance and the efficiency of the coating depends upon the conditions of the surface before it is coated, some experimenting will be necessary to determine the length of time required for pickling.

After pickling but while still wet, the article is placed in the D-W anhydrous flux bath. The flux should be kept at a temperature of about 343 degrees Cent.

At that temperature the flux is a black, viscous liquid and should completely cover the articles to be dipped.


The article should be held in flux until it is thoroughly heated to the temperature of the flux, the time depending upon the weight of the article to be covered. The article is then taken out of the flux and dipped into the 2/98 tin-lead alloy bath.

The article should remain in the lead alloy bath long enough to be thoroughly heated and should be withdrawn through a clean metal surface free from flux. This can be accomplished by hav-



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 Dow supplies sand castings of Dowmetal Magnesium Alloys that meet the strictest Government specifications. These parts are fabricated in our own shops under strict metallurgical control and are an important feature of Dow's overall magnesium service, which ranges from ingots to finished products.

Dow is cooperating with producers of wartime prod-

ucts that call for magnesium parts. If your developments for peacetime markets include the use of magnesium, we suggest consultations with us. The advantages of our long experience with this weight-saving metal are yours to command.

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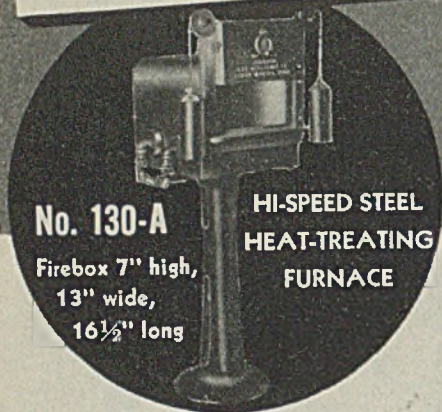
FROM INGOTS TO FINISHED PRODUCTS

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# All Johnson Gas Appliances

DELIVERED IN TWO WEEKS

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HI-SPEED STEEL  
HEAT-TREATING  
FURNACE

Firebox 7" high,  
13" wide,  
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You Can Also Get Any Part  
for Any Johnson Furnace or  
Burner Built Since 1901 . . . .

We have available patterns and parts for any Johnson unit ever built. A price sheet covering these parts will be furnished on request. If the Johnson Gas Appliances you now own need repairs we'll be glad to furnish them.

**No. 130-A Heat-Treating Furnaces (Above)**

4-burner for 1400 to 2000°F. — \$295.00

6-burner for 1800 to 2400°F. — \$325.00

Counterbalanced door opens upward for heat conservation when placing or removing parts being treated. Complete with large No. 120Y Johnson Blower.

**No. 101 Johnson Bench Furnace**, powerful, efficient and economical. For heating soldering coppers up to 12 pounds per pair.

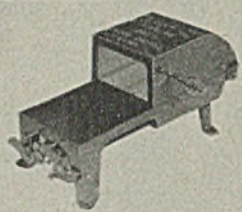
**No. 70 Hi-Speed Steel Heat-Treating Furnace** Firebox 9" long, 7¾" wide, 5" high. Reaches 2400°F. in 30 minutes.

**No. 34 Adjustable Pre-Heating Torch**, with flame temperature of 2550°F. Produces hard flame, 3" dia. by 8" long, or long bushy flame.

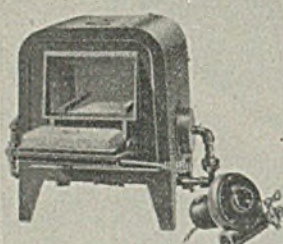
**No. 40 ABC Atmospheric Ring Burners**. Powerful, durable, efficient. Can be used single, in pairs or in triple, each unit having two rows of raised gas ports.

**No. 120 X Johnson Blower** — for efficient delivery of constant air pressure. Cast iron housing, cast aluminum wheels, G. E. Motor. Also available in larger size.

TODAY, write for the FREE new Johnson Catalog, listing all Johnson Gas Appliances



No. 101 Bench Furnace  
2 burner—\$13.50



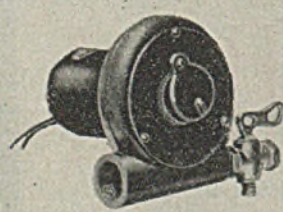
No. 70 Hi-Speed Steel  
Heat-Treating Furnace  
\$89.50



No. 34 Adjustable  
Pre-Heating Torch  
\$40.00



No. 40 ABC Atmos-  
pheric Ring Burner  
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No. 120X Johnson  
Blower with G.E.  
Motor—\$30.00

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ing a partition across the surface of the solder bath to keep the flux on the side where the article enters, and passing the article under the partition when withdrawing. Any flux which appears on the surface while the article is in the bath can be pushed back before withdrawing the article. The article can, then be quenched in paraffin oil at a temperature of about 150 degrees Cent. or in clear water, whichever gives the preferable surface.

Many fabricated articles of coated sheet metal are spot welded or hand soldered. If uncoated sheets are merely tacked here and there by spot welding or riveting, the coating and soldering will be done when dipped in the alloy which costs and solvers at the same time.

**Tinless Solders:** The production of a solder containing no tin that could be used under the same conditions with the same technique as 50/50 tin—50 per cent lead solder, has been accomplished after a year of research. During this year of investigation, tests have been made on over 1000 alloys containing such elements as lead, tin, antimony, silver, cadmium, copper, bismuth, etc. Initially 20-per cent tin alloys were investigated and as the work progressed this percentage was reduced to 15, 10, 5, 2 and finally to 0.

**Melting Point:** Generally speaking the feature that the soldering trades most desire in a solder is a melting point which will compare with the melting points they have been accustomed to in the lead-tin series of solders. This has been the greatest problem facing the silver-lead alloy solders. If a workman has grown accustomed to using 40/60 tin-lead solder over a period of years and is asked to use silver-lead solder in its place, he will likely consider it an impossibility because of the difference in working temperatures. Another disadvantage for some applications is that copper will anneal at the temperatures required to sweat the silver-lead.

An interesting operation with silver-lead solder is the soldering of cellular or honeycomb type radiator cores. The soldering of the core is carried out by dipping the assembled core into a bath of one of the new type fluxes and then into a bath of the solder alloy. In this type of core the copper strips are reinforced with brass strips. Therefore the annealing effect on the copper has no detrimental effect on the finished radiator. A perfect job is thus produced.

Also, the silver-lead alloy has given a very good account of itself in the car manufacturing industry. However, once again the operation is carried out using a bath of molten metal. In view of these instances, which represents two of the most difficult soldering jobs, it is evident that silver-lead solder can be effectively used for all bath and dip soldering operations, provided the highest temperature required is not detrimental to the product and one of the new types of fluxes is employed.

However, for general hand soldering

OFFICES IN ALL PRINCIPAL CITIES

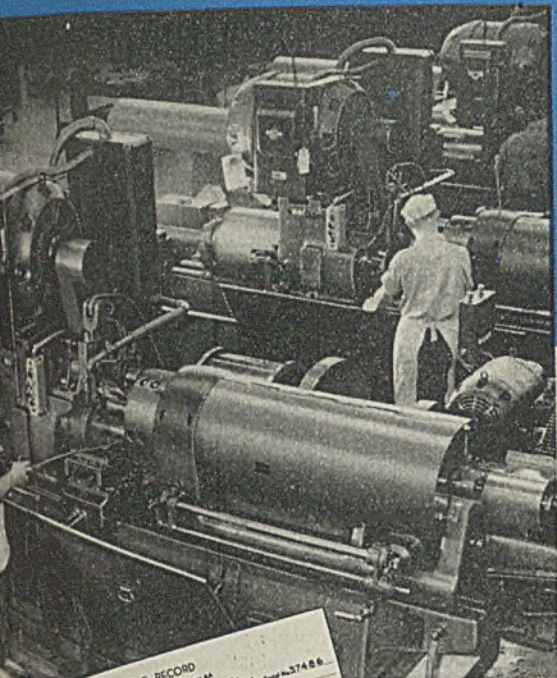
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**CEDAR RAPIDS, IOWA**



# Prescription for Profitable Production



**C**OSTS very often get out of control on jobs which, for one reason or another, go into production and out . . . and back again. Set-up time, even on modern machines, can run up the bill, as every production man knows.

That's just another kind of a job on which Cleveland Universal Camming can make surprising savings. In the first place, *set-up time per operation* is reduced to a remarkable minimum by the simplicity and accessibility of all controlling cams. Secondly, the speed with which Cleavelands *complete several operations* is such that savings over other methods *commence with the first few pieces* finished and increase in proportion to the number produced.

Because of the accurate scaling and simple adjustments of the universal cams which control all operations, the set-up man can keep an exact record of every setting. This he uses as a sort of "prescription", if the job goes back on the machine, to re-tool with a great saving over the original set-up time.

That's the sort of saving that contributes to profitable production.

TOOLING RECORD  
 CLEVELAND AUTOMATIC MACHINE CO. A.S.  
 Machine No. C 1/4 A Serial No. 37488  
 Job No. 17  
 Part No. 17  
 Operator CHOVANEC

Tool	Part No.	Material	Speed	Feed	Time	Remarks
ADJUSTABLE GAGE STOP	1	15	E3E	LOW		
CENTER DRILL # HOLDER	1	13	S4E	HIGH		
1/16" H.S. OIL FEED DRILL # HOLDER (TO DRILL 1/4")	1	18	S4E	HIGH		
1/16" H.S. OIL FEED DRILL # HOLDER (TO DRILL 1/2")	1	11	S4E	HIGH		
H.S. REAMER # HOLDER	1	11	S4E	HIGH		
H.S. REAMER # HOLDER	1	25	S4E	LOW		
H.S. REAMER # HOLDER	1	25	E3E	LOW		
N-48 CIR TOOL # POST	A	48	F			
N-54 CUTOFF POST	B	54	D			
N-54 CUTOFF POST	C	54	D			
N-54 CUTOFF POST	D	54	D			
N-54 CUTOFF POST	E	54	D			
N-54 CUTOFF POST	F	54	D			
N-54 CUTOFF POST	G	54	D			
N-54 CUTOFF POST	H	54	D			
N-54 CUTOFF POST	I	54	D			
N-54 CUTOFF POST	J	54	D			
N-54 CUTOFF POST	K	54	D			
N-54 CUTOFF POST	L	54	D			
N-54 CUTOFF POST	M	54	D			
N-54 CUTOFF POST	N	54	D			
N-54 CUTOFF POST	O	54	D			
N-54 CUTOFF POST	P	54	D			
N-54 CUTOFF POST	Q	54	D			
N-54 CUTOFF POST	R	54	D			
N-54 CUTOFF POST	S	54	D			
N-54 CUTOFF POST	T	54	D			
N-54 CUTOFF POST	U	54	D			
N-54 CUTOFF POST	V	54	D			
N-54 CUTOFF POST	W	54	D			
N-54 CUTOFF POST	X	54	D			
N-54 CUTOFF POST	Y	54	D			
N-54 CUTOFF POST	Z	54	D			
INDEPENDENT CUTOFF						
OIL FEED						

PLAT IS MILLED  
 HOLDER CAN BE TAKEN  
 TO RESET TO HAVE  
 POSITION TO HAVE  
 BALANCE OVER  
 CUTOFF POST

Camco's newest booklet, describing the full Cleveland line of Single Spindle Automatics, has just been released. It contains information you will find interesting, whether you are production man or president.

## Remember, Cleavelands Cut Costs

**THE CLEVELAND AUTOMATIC MACHINE COMPANY**  
 CLEVELAND, OHIO



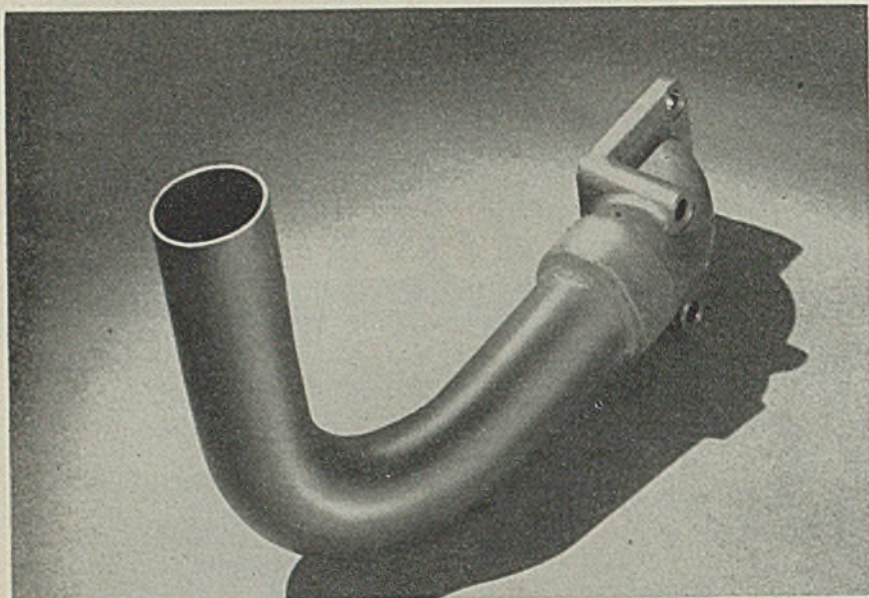
**SALES OFFICES**

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DETROIT: 540 New Center Building

NEWARK: 902 American Insurance Building

CINCINNATI: 1315 American Building



## Anything like this IN YOUR PLANT?

This odd-looking thing is a specially fabricated tubular part used for the manufacture of an oil cooler.

It is made of seamless copper tube, 2" in diameter and has a wall thickness of .049". After the part is formed to the desired shape (specified by the customer), a special cast bronze fitting is brazed to one end.

Required for a definite purpose, it was designed by the user in collaboration with Wolverine tube-fabricating engineers. All specifications are being met and the job is in production.

If this piece reminds you of a similar problem of yours involving tube or tubular parts, call Wolverine Tube Division for consultation and quotation. We have hundreds of standard tools already on hand for making parts and assemblies similar to the part shown here, along with a wealth of experience in handling seamless tube.

Or if you prefer to make the part yourself, call on Wolverine anyway as a source for tube that will be uniformly high in quality and possess the right properties for fabricating. Also consult our engineers regarding types of tools, methods, and techniques. Their talents and services are yours for no cost.

• Our new address is Detroit 9, Mich.

### DEFINITIONS

**Draw Bench**—a mechanical device containing a die through which metal is pulled to reduce its diameter. Tubes are thus made smaller and longer.

### BUY WAR BONDS



CALUMET AND HECLA CONSOLIDATED COPPER COMPANY

**WOLVERINE TUBE DIVISION**

Seamless Copper — Brass

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DETROIT, MICHIGAN

applications, silver-lead left much to be desired. The next step was the study of solders resulting from the replacement of a certain amount of tin by bismuth. This series was investigated thoroughly and although the alloys contained 20 per cent tin, making them only economy solders, features were observed which were not present with the silver-lead solders.

These may be classified as: (1) low melting point; (2) increased fluidity (3) increased wetting power; (4) readily handled with hand iron.

One of the main drawbacks with these economy solders was "hot-shortness"; that is, the tendency to crack before the final state of equilibrium had been reached during the cooling down after soldering. This was only detrimental when tension had to be overcome by soldering. Nevertheless this fact limited their use.

### Reproducing Tin Characteristics

As previously mentioned, the amount of tin in alternate solder alloys was reduced to zero as research continued. This was made possible by replacing the tin with combinations of other elements, such as antimony, silver, bismuth, etc., which tended to replace some of the characteristics which were normally present with the presence of tin. It is true, there were certainly shortcomings with this alloy, particularly "hot-shortness," but it did sweat and flow quite readily. The problem of "hot-shortness" which was evident in the majority of alternate solders could be tolerated provided special technique was used and the job held in shape by jigs, clamps, or plates. It was practically taken for granted that "hot-shortness" could not be overcome until a more recent development definitely removed all traces of the brittle range previously mentioned.

**Recommended Alloys:** From the many alloys which have been subjected to investigation, three classes have now been selected which will do a thorough soldering job in all applications. The majority of soldering jobs may be classified into two groups, those that can tolerate a relatively high temperature without any detrimental effect on the finished product; and those jobs where there is danger of undesirable results with higher temperatures. The third group is made up of the soldering of milk and cream cans and a range of general dairy equipment.

For the first group, silver-lead is recommended, to be used in conjunction with one of the new type fluxes previously mentioned. Silver-lead solder is very suitable for bath soldering operations and dipping pots. On this type of work the most satisfactory results are obtained with bath temperatures from 343 to 370 degrees Cent. Silver-lead solder may also be used in hand soldering operations, provided certain changes in technique are made.

For general hand soldering operations, where no changes in technique are necessary, a recently developed cadmium-lead alloy constitutes the most superior



**Why doesn't somebody do something?**

**... or don't they know any better?**

A sudden blaze calls for fast action... grab an extinguisher... hit the fire in a hurry.

Yet it takes "know how." Your men must know how to pick the *right* extinguisher, must know how to handle it. *Have you taught them these simple, important facts?*

Demonstrations do this teaching job best. Show your employees real fires, with real extinguishers in action. A series of well-run demonstrations may help save your plant, if fire breaks out.

So Walter Kidde & Company have prepared "How To Teach Fire-Fighting." It tells how to make these demonstrations most effective. Write for your plant's copy. It's free, of course. Walter Kidde & Company, Inc., 947 Main Street, Belleville, N. J.



alternate to 50/50 tin-lead solder. This material is recommended for all solder in bar and extruded forms with the exception of use in connection with the dairy trade.

For the soldering of milk and cream cans, and general dairy equipment, a tin-silver-lead alloy is recommended. Table II, showing the results of tests on certain alternate solders, gives some small indication of their possibilities. The alternate materials are here compared with 50/50 tin-lead solders.

Considering the three types of solders recommended, there is absolutely no tin present in two of them, and only 15 per cent tin in the third. It will, therefore, be seen that the general replacement of tin-lead solders by three solders of this type would make an important contribution to the conservation of tin.

### AISI Revises Manual on Rolled Carbon-Steel Bars

A steel products manual on hot-rolled carbon-steel bars, section 8, was issued recently by the American Iron and Steel Institute, 350 Fifth avenue, New York. Revised as of June of this year, the publication is divided into four sections covering 72 pages.

The first deals with definitions and manufacturing practices; the second discusses the standard carbon steels, NE carbon steels, ranges and limits for non-standard steels, permissible variations for check analyses, methods of sampling and steels subject to physical tests. Manufacturing tolerances and a glossary of manufacturing terms are embodied in the third section, while the fourth part describes methods for marking packaging and loading, and the terms used in connection with these operations.

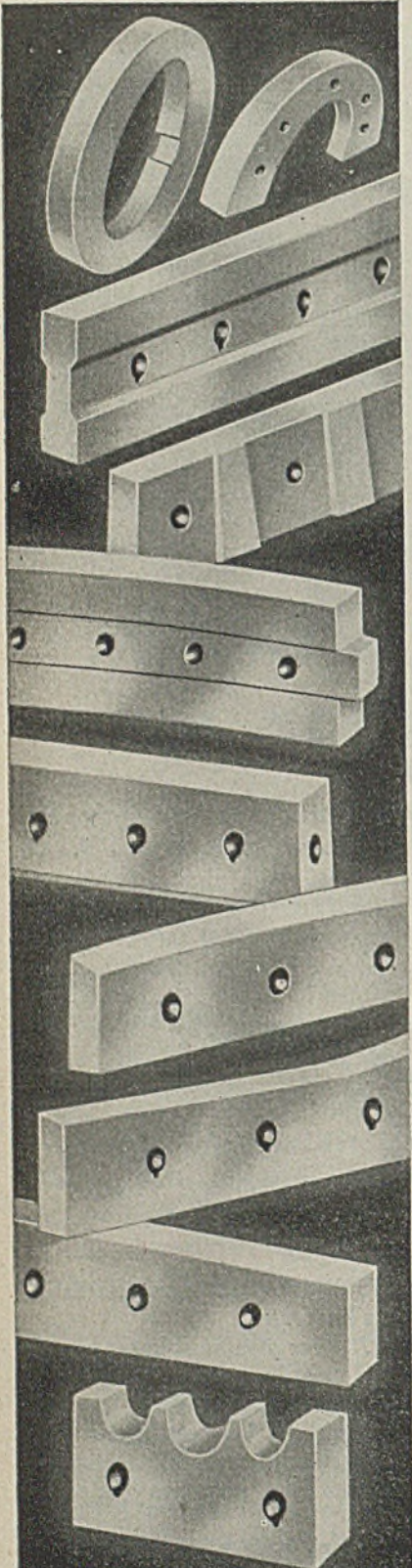
### Baldwin-Southwark Makes Wood Toughness Tester

A new machine for testing the toughness of wood, developed recently by U. S. Forest Products Laboratory, is now being manufactured by Baldwin-Southwark Division, Baldwin Locomotive Works, Philadelphia. The machine, it is reported, discloses possible physical weakness in wood more accurately than by density and other physical property tests.

### Substitute Drill Housing Aids Women Workers

Substitution of an all-plastic housing on its pneumatic drill not only reduced the weight of the unit but is eliminating fatigue among workers, Aro Equipment Corp., Bryan, O., reveals. Weighing 1 pound, 12 ounces, the tool is particularly suitable for women workers.

The drill operates at 2500 revolutions per minute, is 12 6/4 inches in overall length and accommodates 1/8, 3/16, 1/4 or 5/16-inch drills with Jacobs chuck.



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