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# STEEL

The Magazine of Metalworking and Metalproducing

## DECEMBER 4, 1944

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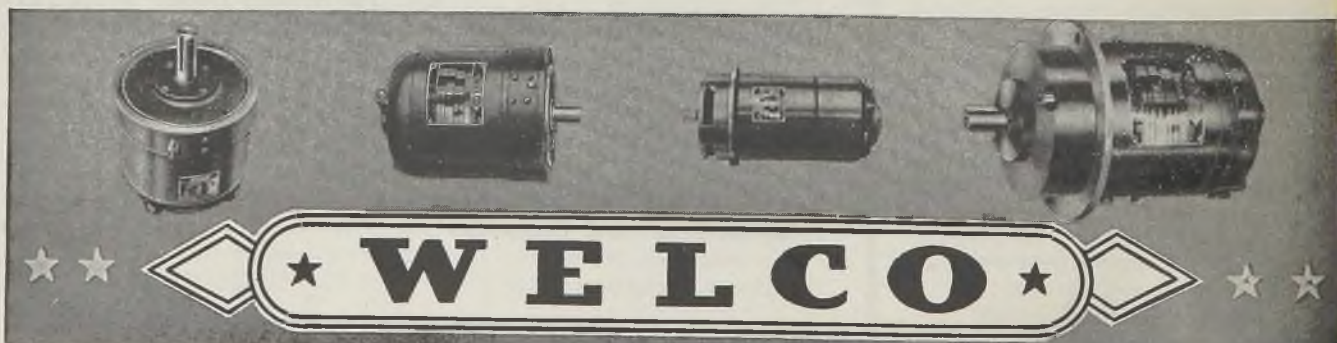
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## Make-Believe Ruling

Sometimes we wonder what prompts members of the War Labor Board to resort to deceit to justify its actions. If the recent ruling in the steel wage case had been announced without comment, the public would have appraised it for what it really is—a compromise dictated by political expediency.

But the chairman of the board was not willing that the ruling speak for itself. Instead he went to great lengths to explain it and to contend that it does not violate the spirit of the Little Steel formula. In stating brazenly that the board's decision "has not even bent" the formula, he taxed public credulity beyond the breaking point and thus further weakened WLB's waning prestige.

The text of the ruling reeks with insincerity and deception. It plays up the alleged courage of the board in turning down the union's demands and soft-pedals various grants, which in effect give the unions from a third to a half of what they demanded. Particularly it tries to give the impression that the motivating spirit behind the action of the board was to remove existing "inequities."

Far from smoothing out inequities, the ruling, if it becomes effective, will impose inequities greater than those existing before the board acted. To understand the force of this argument, it is necessary to remember that the steel wage case is only one element of the national wage problem. The remuneration received by all gainful workers is affected by the rulings of a dozen or more federal agencies. One must consider not only WLB's action on steel wages, but also its policies regarding the wages of white collar and other employes. One must consider also the rulings of the Treasury Department on salaries, of WMC on choice of jobs and hours of work, of the Bureau of Internal Revenue on personal income taxes, of OPA on prices and of other agencies on various collateral matters.

When one puts together all of the conflicting results of arbitrary rulings by these numerous agencies, he arrives at a system for determining the individual's work, hours, remuneration and tax burden which is loaded with gross inequities. One could prove easily that never in the history of this country has compensation been as far out of line with services rendered as it is today.

Unfortunately, because the WLB ruling is based on political expediency and not upon merit, it simply compounds existing inequalities.

---

**WHERE THE JOBS ARE:** One point on which the spokesmen for every element of society seem to agree is the necessity for maintaining employment at the highest possible level during the postwar period. The importance of jobs has been stressed so many times by so many competent authorities that the nation has accepted the idea of providing peacetime jobs for from 55,000,000 to 60,000,000 persons as a primary objective.

Unfortunately there has been a lot of loose talk

as to where these jobs are to be found. As a result far too many people have gained the idea that industry can or must furnish most of the jobs.

In prewar years only 24 per cent of the jobs were provided by the manufacturing industries; 24 per cent by agriculture; 16 per cent by trade, distribution and finance; 15 per cent by service and miscellaneous occupations; 12 per cent by mining, public utilities, transportation and construction; 8 per cent by government civilian service and 1 per cent



by government armed services.

It is true, of course, that a prosperous manufacturing industry helps make more jobs in trade, distribution, service, public utilities, and transportation, as well as in manufacturing itself. However, it is well to remember that normally industry directly provides less than a quarter of all the jobs.

—p. 95

**SCRAP IS STRONGER:** Steelmaking scrap, always sensitive to impending changes in the balance of supply and demand, is reacting characteristically to conditions resulting from the progress of the war in Europe.

Last August when an early end of fighting was considered possible, scrap consumers believed it was desirable to trim inventories. Many of them stayed out of the market throughout September, with the result that the prices of some grades of scrap broke sharply. Railroad No. 1, with a ceiling of \$21 at Pittsburgh, a few months ago was selling for as low as \$17.50 f.o.b. mill.

Now the situation is changing rapidly. With heavy, prolonged fighting on the Western front in prospect and steelworks operations holding at more than 90 per cent of capacity, it is unlikely that scrap demand will let up appreciably until the war in Europe is over. As a result, the tone of the market is stronger and prices of some grades are crowding OPA ceilings.

—p. 84

**UNBALANCED PROGRESS:** At the 65th annual meeting of the American Society of Mechanical Engineers, Retiring President Robert M. Gates made this thought-provoking statement:

"Changes which we engineers have fostered to create this fast shifting world of new tools, gadgets and methods and to put to use great forces of steam, electricity and chemistry have been against a background of much slower changing human nature, ill adapted in its fundamental characteristics to such rapid change in its environment.

"These changes have value only insofar as they improve life for human beings. Our civilization can advance only as adjustments in human relations keep pace with changes in our environment, or at least do not lag too far behind them."

These words are particularly pertinent today. It is more important than ever before that we promote understanding of social, political and economic forces to match our advances in technology. —p. 82

**INDUSTRIAL RUBBER:** Capture by Japan of important sources of natural rubber precipitated a problem of finding substitutes not only for use in tire casings and tubes but also for numerous other products. There are from 35,000 to 40,000 items of mechanical rubber goods made by 300 companies. Thousands of these items are used by industry and in normal times they account for about 15 per cent of crude rubber consumption. Therefore, industry has a big stake in the synthetic rubber program.

Five types of basic synthetic rubbers are being produced in quantity in this country. They are Buna-S, Buna-N, Butyl, Neoprene and Thiokol. These are converted into some 5000 compounds used in the production of rubber goods. Through ingenious compounding, manufacturers have been able to produce substitutes for natural rubber having a wide range of physical characteristics. Some of these are so well adapted to belting, hose, packing, linings and other industrial uses that they may hold their place against the competition of natural rubber after the war.

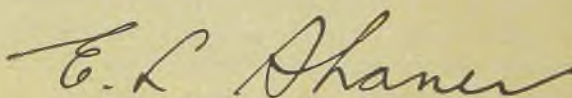
—p. 112

**TOOL BACKLOG HIGHER:** A sharp upturn in demand has boosted the machine tool industry's backlog of unfilled orders to the highest level since November, 1943. Bookings in October were up 70 per cent from those of September and a further gain in November is assured.

This burst of new business comes from three principal sources. Orders for about 30,000 general purpose machine tools for shipment to Russia under lend-lease have been placed. This work is scheduled to be completed by June 30, 1945. Orders for large shell turning lathes for use in the United States also have been placed.

A third source of new orders are industries seeking machine tools for reconversion. These are un-rated orders which must take their turn behind rated business. Schedules on this work have been pushed back by the shell machine and Russian lend-lease orders.

This business comes to machine tool builders at a time when they are handicapped by manpower shortages and a scarcity of small motors. —p. 86



EDITOR-IN-CHIEF





# A Question of Steel Inventories

When cancellations are issued and cutbacks ordered will your steel inventory be too high? If so your excess stock may prove unsuited for quick conversion to other production, and decline sharply in value. By lowering your inventory you can help reduce the overall tonnage of idle steel.

Though the situation continues critical, Ryerson stocks available for prompt shipment are more than 100 per cent above 1942. This improvement in Ryerson and other warehouse stocks has enabled manufacturers generally to cut excess reserves and maintain inventories at lower working levels.



We suggest, therefore, that you check your steel inventory, and then talk with a Ryerson representative. A large reserve may be necessary. On the other hand you may find your inventory can be cut, and that you can protect yourself against disposal of an overstock at a sacrifice.

Ryerson complete, diversified stocks include more than 10,000 kinds, shapes and sizes of steel. There are 11 Ryerson plants. Facilities for cutting and otherwise preparing steel are unsurpassed. Shipments are promptly made by truck and rail. Call your nearest plant.

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*Inland medical staff  
discussing an X-ray film.*



*Blood tests often suggest corrective  
treatments that keep men at work.*



*The X-ray is extremely useful in  
preventing the loss of man-hours.*



*The knowledge of heart action is useful in plac-  
ing workers and extending their work years.*

## INLAND CLINIC HELPS SOLVE MANPOWER PROBLEM

The Inland clinic, established long before Pearl Harbor, has taken on added importance during the war by helping to solve the vital manpower problem.

Working closely with the Inland industrial relations and safety departments, the clinic appraises the usefulness of many handicapped people—suggests types of jobs they can perform,—helps find work they can do in the Inland mills to replace workers who have gone to war.

The clinic staff speeds men back to jobs by assisting them in obtaining needed outside medical attention. It recommends and arranges for special treatment. It helps find medical service for workers new in the vicinity and for those whose regular physicians are away at war.

The 24-hour dispensary provides medical attention quickly and keeps many a man producing who otherwise might be absent from work because of slight injury or minor illness.

Finally there is the regular clinical work—free examinations that forestall illness, prevent accidents, speed the recovery of injured and sick employees. Although not compulsory, all but a very small percentage of Inland employees have taken advantage of this service.

Through its important work the Inland clinic has literally added thousands of man-hours to America's war effort, bringing Victory that much sooner.



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# Will WLB Ruling Bring Higher Prices?

Granting of "fringe" demands viewed by producers as increasing costs, necessitating adjustment in ceiling prices. Board's directive flanks stabilization program

THE War Labor Board's action in granting "fringe" demands in the steel wage case—while ballyhooing its rejection of the union's request for a straight 17-cent hourly rate increase—is regarded in steel and neutral circles as another clever flanking of the stabilization program.

Its effects will be to increase steel production costs substantially, necessitate higher prices for most basic steel products, and possibly drive some of the smaller companies out of business.

While pretending to hold to the Little Steel wage formula, the board actually granted wage increases which will amount on the average to between 5 and 10 cents an hour—specifically how much no one knows. These include lifting the differential for the second shift by 4 cents an hour and on the third shift by 6 cents an hour; liberalized holiday and vacation pay; directing the companies to negotiate for the elimination of intra-plant rate inequities, which itself may mean overall average increase of 5 cents an hour.

The board orders, in addition to these outright increases, that the companies negotiate with the union on the matter of severance pay for workers laid off as the result of permanent closing of plants or portions of them.

The denial of the union's principal demand for a 17-cent hourly wage increase was made "without prejudice to resumption by the board of its consideration of the demand for a general wage increase and of the procedure that might then be appropriate if there is any change in the national wage stabilization policy."

Every one of the increases granted will increase the cost of making steel. They will raise the volume of excess purchasing power pushing up prices. Every one will be taken as a precedent by workers in other industries.

Steel producers and neutral analysts view the board's decision as bending badly the Little Steel formula, despite WLB Chairman W. H. Davis' statement to the contrary. Many found the decision hard to reconcile with Economic Stabilizer Fred M. Vinson's reaffirmation of the anti-inflation offensive of the week before.

The United Steelworkers hailed the



Shown at the closing session of the CIO convention in Chicago were, left to right: Sidney Hillman, chairman of the Political Action Committee of the union; Secretary of Interior Harold Ickes; and Philip Murray, CIO president.

NEA photo

decision as a "great victory for the organization."

"The United Steelworkers have wrung these concessions for millions of workers throughout the country," Philip Murray, CIO president, said, according to a union spokesman at Chicago. "We had to plow the ground."

Union officials emphasized the 17-cent increase demand had not been finally rejected by the board, but has been turned over to the President for action, that all issues in the case are subject to approval by stabilization officials and the Chief Executive.

## Wage Increase of 17 Cents Still Sought

"It (the 17-cent increase) is still very much alive, and we intend to continue our fight for the increase and the breaking of the Little Steel formula," one union official stated.

What the increased cost of producing steel under the increases voted by the board can be estimated only roughly.

The union estimates the retroactive pay, covering ten or eleven months, will amount to \$150 to \$200 a worker, or a total of \$60 million or more.

This further increased cost naturally brings up the question as to what will be permitted by the government in the way of price readjustments. In many quarters it is believed that the WLB had taken Mr. Vinson and the Office of Price Administration into its confidence before making the announcement and had in all probability been able to convince

them that the concessions would not be sufficient to justify a general increase in the steel price schedule.

Nevertheless, steel producers think they have a strong case and many believe an industry-wide appeal for higher prices should be made to Washington. They recall that early in the year OPA indicated a willingness to make some price adjustments of an overall character. However, the policy of producers as a whole was opposed to changes at that time in view of the fact the wage hearings were in process and that the decision in the wage case would upset any price formula previously agreed upon.

As was pointed out last spring, the steel industry has been selling some leading products at losses of from \$3 to \$5 a ton, including plates, bars, shapes, sheets, wire products, rails and semi-finished steel.

That the industry as a whole has been able to keep its head above water has been due to such special wartime contracts as shipbuilding, manufacture of shell, armor plate, machine gun components and other fabricated items carrying a high price; to the extras and differentials to which producers are entitled and which they can obtain under wartime pressure; and to OPA relief in scattered individual cases.

Cancellation of the profitable munitions contracts and the easing in the pressure for steel when the war in Europe ends will change this picture and





JOHN A. STEPHENS

*"Hidden ball tricks sometimes pile up as big a score as do direct line plunges"*

the producers will be selling mainly their loss items, and many extras and differentials will disappear under normal competition.

The increases directed by the board will be an especially heavy blow to the small semi-integrated producers, many of whom already are operating at a loss. Unless substantial relief is granted, many of these companies believe they face financial ruin. One of their hardest problems will be the adjustment of rates since they ordinarily pay less than the larger ones for the same job.

As is customary with government agencies making important announcements of this character, the board's rul-

ing was released late on a Saturday—in time to present the board's version in the Sunday newspapers and at a time when most industrial executives were away from their desks. By the time the official release had trickled out to the producers and they had had time to digest it, the issue was "cold turkey" as far as news was concerned. The board's version consequently received the big headlines; the producers' comments relatively little space.

Charles R. Hook, president, American Rolling Mill Co., Middletown, O., said that an increase in basic steel prices immediately is imperative if the industry is to maintain necessary financial strength to cope successfully with post-war problems of employment and production.

"Steel prices of many important basic products were out of balance long before the War Labor Board announced its proposed increase in wages," Mr. Hook said. "A careful and thorough investigation by OPA of the steel price situation based upon production costs will clearly reveal that a substantial increase in most steel prices is justified as essential."

Irving S. Olds, chairman, United States Steel Corp., said the decision seriously affects the stabilization program.

"By its action, the board has ordered increases for a great many of the wage earners in the steel manufacturing subsidiaries of the United States Steel Corp., retroactive to Jan. 3, 1944.

"No increase in the cost of living since January, 1941, justified these wage increases. The average hourly pay of wage earners in these steel manufactur-



ERNEST WEIR

*"This naturally will result in a very substantial increase in the overall cost of making steel"*

ing subsidiaries of United States Steel Corp. has increased about 43 per cent between January, 1941, and September, 1944. Their average weekly earnings have increased about 65 per cent during this period.

"Within the past few days, the cost of living committee named by President Roosevelt has reported an increase in the cost of living since January, 1941, of between 29 per cent and 30 per cent.

"Money to pay increases must come from somewhere. Whatever the source, the public eventually pays the bill in one way or another.

*(Please turn to Page 206)*

## Text of War Labor Board's Ruling in Steel Wage Case

Text of the directive order issued by the National War Labor Board in the steel wage case follows:

By virtue of and pursuant to the powers vested in it by executive order No. 9017 of Jan. 12, 1942, and executive orders, directives and regulations issued under the act of Congress of Oct. 2, 1942, and the War Labor Disputes act of June 25, 1943, the National War Labor Board hereby decides the dispute and provides by order the terms and conditions of employment that shall govern the relations between the parties, as follows:

### I. GENERAL WAGE ADJUSTMENT

The union, frankly conceding that its demand for a 17-cent per-hour general wage increase was beyond the authority of the board to grant under the existing wage stabilization policy, requested that the National War Labor Board "... recommend to the President of the United States that he exercise the authority vested in him under the October, 1942, law to direct the National War Labor Board to order the steel companies involved in this proceeding to grant the

union's request of a general wage adjustment of 17 cents per hour." On Oct. 11, 1944, the National War Labor Board resolved, with reference to all requests to modify the stabilization policy pending before it, that it would not "... include in its factual report to the President any recommendation for action one way or the other with regard to the Little Steel formula."

This denial is without prejudice to resumption by the board of its consideration of the demand for a general wage increase and of the procedure that might then be appropriate if there is any change in the national wage stabilization policy. This provision is made in order that the board may not be foreclosed in such an event from using the evidence which has been presented to it in this case.

### II. THE ESTABLISHMENT OF A FUND FOR STEELWORKERS IN THE ARMED FORCES

This request is denied.

### III. GUARANTEED ANNUAL WAGE

The demand of the union is for a guaranteed wage for each employe of each

company during the life of the contract. The facts set forth in the panel report indicate that this demand in its present form would, if granted, subject the industry to such serious financial risks, notwithstanding the carry-back and other provisions of the tax laws, as to be unworkable. These risks could be reduced by modifications and safeguards worked out through collective bargaining, but in the present state of the country's information on the subject the board is not prepared, in this case or in other dispute cases, to impose such guarantee by order. The board is, however, recommending to the President in a separate report:

(1) That the whole question of guaranteed wage plans, and the possibility of their future development in American industries as an aid in the stabilization of employment and the regularization of production, should now be comprehensively studied on a national scale; (2) that such study should be conducted by a specially appointed commission charged with the duty of examining into the experience which industry and labor have thus far had with these plans, and of re-





IRVING S. OLDS

*"Money to pay the increases must come from somewhere. Whatever the source, the public eventually pays the bill"*

porting the facts for the benefit of the country, together with recommendations regarding any further steps in this direction which may seem practical and desirable; (3) that such a body would be best able to perform its nationally important tasks if created independently of the War Labor Board by the President; and (4) that the President appoint a commission for these purposes.

**IV. VACATIONS**

(a) One week's vacation with pay shall be granted to each employe who has been continuously in the employ of a company for one year, and two weeks' vacation with pay shall be granted to each employe who has been continuously in the employ of a company for five years or more.

(b) The eligibility requirements in the previous contract for vacation compensation other than length of service shall prevail unless modified by agreement between the company and the union.

(c) The request of the union for vacation compensation to employes who are in the armed forces or the Merchant Marine is denied.

(d) The hours of vacation pay due an employe for each vacation week shall not be less than (1) 40 hours per week, or (2) the scheduled work week of the plant (or, if the parties agree, of the company), whichever is the larger. Provided, however, that if the previous contract provides hours of vacation pay in excess of the foregoing provision, the previous contract provision shall prevail. The rate of pay for vacation hours (straight time or otherwise) shall be in accordance with the practice of the company and the union previously.

**V. DISMISSAL OR SEVERANCE PAY**

The union demanded from the companies a provision for dismissal or severance pay for employes displaced as a result of a permanent closing down of plants or portions thereof.

(a) The principal points developed in

the presentation of the case to the board are: (1) that in the steel industry, plants and facilities have been built during the war which are more efficient than many of the older plants and facilities; (2) that when the demands of war production fall off, the companies may permanently close down less efficient plants or portions thereof. The problem presented to the board concerns the permanent displacement of groups of employes which may result from the closing down of plants and facilities after the war and the concentration of production in the plants and facilities which have been built or technologically improved during the war, for the purpose of reducing the overall cost of such production. The board believes that it would be fair and equitable for the companies to devote a portion of any such benefit to a severance payment to displaced workers, and that, as contended by the union, such a payment would be consonant with the carry-back provisions of the tax laws. Particular regard should be given to the regular working forces rather than employes who have entered the industry for temporary war service only. Ordinary technological displacements incident to peacetime improvements in machinery and processes were not covered in the presentation of this case sufficiently to enable the board to pass on this subject, and the board's order does not cover such displacement.

(b) The principle of severance payment for these purposes, and under the circumstances of this case, being hereby approved, it remains for the parties to develop by collective bargaining appropriate provisions for severance payment. The board approves the principle that severance pay should be limited to employes with a certain seniority and that the older employes in point of service should be entitled to a larger severance pay. Among the provisions which should be worked out through collective bargaining are those relating to the eligibility of employes, the amount of severance pay benefits, the circumstances under which the benefits should be paid, the transfer of employes to other suitable employment, the relation to existing pension and retirement plans, etc.

(c) The board directs the company and the union to negotiate the terms of a severance pay agreement appropriate to each plant or company. The board will approve under the wage stabilization program reasonable provisions for severance payments which may be mutually agreed to. If no agreement is reached within 60 days from the date of this directive order, the issues still in dispute shall be reported by the companies and the union to the board together with the nature and results of their negotiations.

**VI. SICK LEAVE**

The board will approve, under the wage stabilization program, reasonable sick leave plans agreed to by the company and the union, but it declines to order sick leave on the facts in these cases.



CHARLES R. HOOK

*"A substantial increase in most steel prices is justified and essential"*

**VII. SHIFT DIFFERENTIALS**

For hours worked on the second shift there shall be paid a premium rate of 4 cents per hour. For hours worked on the third shift there shall be paid a premium rate of 6 cents per hour.

**VIII. HOLIDAYS**

(a) The following days shall be considered holidays: Thanksgiving Day, Jan. 1, July 4, Labor Day, Christmas Day, and Memorial Day. By local agreement another day may be chosen as a holiday in place of Memorial Day.

(b) Employes required to work on the holidays enumerated above shall be paid at the rate of time and one-half for all hours worked.

(c) For the purpose of determining whether an employe has worked six days in his regularly scheduled work-week, holidays shall be considered as days worked, whether worked or not, and regardless of whether they are scheduled as days of work or of rest.

Time and one-half shall be paid for work performed on the sixth and seventh consecutive days but only when such sixth and seventh days are the sixth and seventh days of the regularly scheduled work-week. This directive order shall not be so applied as to alter existing practice already approved by the Secretary of Labor under order 9240.

**IX. GEOGRAPHICAL WAGE DIFFERENTIALS**

The union's demand for the elimination of geographical wage differentials is denied. This denial shall not be construed to affect the correction of intraplant wage rate inequities under section X or XI.

**X. RATE ESTABLISHMENT AND ADJUSTMENT**

1. With respect to the establishment of rates for new jobs, present practices of the company and the union shall continue except as herein modified. When a wage rate for a new job is installed the employe or employes affected may,

*(Please turn to Page 108)*



# Discussions Cover Broad Range Of Subjects at ASME Convention

Meeting in New York largest in 65-year history of the society, almost 3000 attending. Program featured 278 speakers at 73 sessions. Chief of Army Ordnance and others prominent in engineering receive honors

By GUY HUBBARD

Machine Tool Editor, STEEL

SINCE the beginning of the first World War, I have been privileged to follow closely the activities of the American Society of Mechanical Engineers, but never in my 27 years acquaintance with the organization have I seen anything to equal, in size and in wide diversification of interest, the sixty-fifth annual meeting, held at Hotel Pennsylvania, New York, Nov. 27 through Dec. 1.

Some idea of the size and scope of the 1944 meeting can be gained from the statement that those who attended—estimated at almost 3000—had the benefit of 73 sessions and other events, featuring 278 speakers, and covering an astounding range of subjects. Just to mention a few, there were sessions on helicopters, high-speed milling, electronics, ingenuity, rubber and plastics, management, fuels, hydraulics, materials handling, applied mechanics, wood industries and railroads.

The spirit of the meeting was exemplified by an address by Robert M. Gates, retiring president, at the annual dinner. He said: "Changes which we engineers have fostered—to create this fast shifting world of new tools, gadgets, methods, to put to use great forces of steam, electricity, chemistry—have been made against a background of much slower changing human nature, ill adapted in its fundamental characteristics to such rapid change in its environment.

"These changes have value only insofar as they improve life for human beings. Our civilization can advance only as adjustments in human relations keep pace with changes in our environment, or at least do not lag too far behind them. The heritage of freedom that Americans enjoy, and which has permitted our profession to make its finest achievements on which we depend for future progress, cannot be taken for granted—else we shall lose it.

"While the nature of our civilization and of our daily life is being changed by science, engineering and industry, we must keep open—indeed we must open wider—the door of individual opportunity. We must encourage study of human relations as well as of relations of impersonal forces and materials. We must adapt our educational facilities and programs to the needs of life tomorrow, as best we can foresee those needs.

"Engineers no longer can be 'isolation-

ists' as far as the traditional branches of the profession are concerned. Specialize as we will, divide and subdivide our profession as we may for convenience, get away out on the end of a twig of one of the numerous limbs of the engineering tree as we may, the fact remains that the tree itself is still there supporting its branches. Most of us at one time or another will have to climb around in that tree a lot."

The most impressive tribute paid to ASME as an aid to the war effort was paid by Maj. Gen. Levin H. Campbell Jr., chief of ordnance, U.S.A., in a luncheon address. "This society," said General Campbell, "has been so closely associated with ordnance activities that we have come to regard it as an essential element in our ordnance system. It has been performing work of great importance in the defense of our country. Leadership and counsel which ASME



ALEX D. BAILEY  
New president of ASME

has provided have been and are of inestimable aid to the Ordnance Department in the carrying out of its heavy responsibilities."

Of particular interest to readers of STEEL is a point brought out by General Campbell: "Metal progress in our country and throughout the world owes much of its speed and thoroughness—to say nothing of its applicability in modern life—to ordnance researches in cannon and projectile making. Gun making in the United States pioneered in the field of

## Todd Named Director of WPB Steel Division

WILLIAM B. TODD has been appointed director of the Steel Division, War Production Board, succeeding Norman W. Foy, resigned. He has been associated with the steel industry for more than 40 years and has carried out several important assignments with the government since the outbreak of the war.

Mr. Todd has been deputy director of the Steel Division since May, 1944, and previously was a representative of WPB in England. He was a member of the Harriman Commission which made a comprehensive study of British iron and steel production and distribution for President Roosevelt.

His rise in the steel industry was rapid. Following his term of office as vice president of the Union Drawn Steel Co., Beaver Falls, Pa., Mr. Todd was appointed assistant general sales manager of the Jones & Laughlin Steel Corp., Pittsburgh, early in 1930 and subsequently was elevated to the position of director and vice president in charge of sales. He resigned this post with the company in 1937 and early in the following year was selected foreign representative of the Steel Export Association of America with headquarters in London.

Mr. Foy had been with the Steel Division for more than three years and had been its director since March of this year. His service with the division was



WILLIAM B. TODD

highly praised by J. A. Krug, WPB chairman, who paid special tribute to Mr. Foy's co-authorship of the Controlled Materials Plan.

Harry M. Francis succeeds Mr. Todd as deputy director of the Steel Division. Mr. Francis has been on leave to WPB for many months from his post as assistant vice president, sales, American Steel & Wire Co., Cleveland.



new and stronger metals, so that at the close of the nineteenth century vast industrial fields were opened up in the realms of transportation and construction. Such was the impetus of the arms maker, aided and guided by the metals scientist and technologist."

Another significant statement to the impact of wartime developments upon postwar conditions was that by Archibald Black, manager, mechanical department, Simmonds Aerocessories Inc., New York. "When war shortages have passed into history—a condition very close to attainment already—we may expect to see extensive jockeying for position on the part of producers of widely different materials.

"No longer does the designer accept the dictum that any field is apportioned to one material or another. Carbon steel, alloy steel, aluminum, magnesium, zinc, copper, nickel, wood and a long list of synthetics have all become direct competitors in many cases.

"In some cases 'substitutes' have come

to stay, unexpected advantages having resulted. In other cases we will revert at once to time-tried materials. In still other cases it may take years to decide which material eventually is to win out."

While many people suppose that the use of cemented carbides for machining still are in more or less experimental stages, the real facts are that more than 50 per cent of all metal removed by machining now is being cut with carbide tools. Amplifying this point, Fred W. Lucht, development engineer, Carboloy Co., Detroit, stated that highly successful application of such tools in the shops of the United States and our Allies has been a tremendous factor in enabling us so greatly to outproduce the Axis.

Testimony of many authorities in metal cutting including M. E. Martellotti and Hans Ernst, Cincinnati Milling Machine Co., Cincinnati, W. L. Kennicott, Kennametals Inc., O. W. Boston, University of Michigan, Ann Arbor, Mich., A. O. Schmidt, Kearney & Trecker Corp., Milwaukee, and Thomas Githens, Cleveland

Twist Drill Co., Cleveland, all tended to indicate that the art of metal cutting rapidly is becoming much more of an exact science than has been the case in the past. From now on tool and machine tool design therefore will be based on known factors rather than upon rule-of-thumb and empiricism.

Management came in for no small degree of attention during the meeting, and in this connection certain conclusions advanced by Guy R. Cowing, General Motors Institute, Flint, Mich., are worthy of note. Mr. Cowing summarized the institute's views thus:

1. Upon the effectiveness of individuals within the industrial structure depends the very existence of a postwar world of the type for which we are fighting.

2. Effectiveness of individuals within the industrial organization will depend entirely upon effectiveness of processes of personal development within and out-

(Please turn to Page 202)

## Present, Past and Pending

### ■ ARMY RELEASING 250 FORMER FOUNDRY WORKERS

DETROIT—The Army is releasing 250 soldiers with foundry experience to work in Michigan foundry and forge shops. Representatives of the United States Employment Service are interviewing the men at the Army separation center at Fort Sheridan, Ill.

### ■ UNION OFFICIAL PROPOSES CUT IN WORK-WEEK

DETROIT—R. J. Thomas, president, United Automobile Workers-CIO, and union member, National War Labor Board, has proposed a reduction in the work-week from 48 to 40 hours in a group of Detroit plants which have experienced a drop in employment. He urged maintenance, however, of the workers' total weekly take-home pay.

### ■ STRIKES CONTINUE TO CUT CHICAGO STEEL OUTPUT

CHICAGO—Steel production in this district continues to be lost through strikes. Walkout of workers at Carnegie-Illinois Steel Corp.'s South Works, which started Nov. 29 in the No. 2 electric furnace shop, was the 78th work stoppage in the company's plants in this district since Jan. 1. Two electric furnaces, producing 325 tons of stainless and alloy steel a day, were forced to suspend operations last week.

### ■ ARMY TO PAY WAGE PREMIUMS TO ATTRACT WORKERS

WASHINGTON—Army procurement officials have been authorized by the War Department to channel munitions work into noncritical labor areas by paying premiums up to 15 per cent over the lowest price bid by manufacturers in districts where labor shortages exist. Similar premiums were sanctioned for contracts placed with small companies regardless of location.

### ■ \$26 MILLION SURPLUS PROPERTY DISPOSED IN OCTOBER

WASHINGTON—Surplus War Property Board announced last week that Reconstruction Finance Corp., Treasury Procurement department, Maritime Commission and War Food Administration disposed of \$26,772,000 worth of surplus property in October. This represented 64 per cent of cost or appraised value. Inventories as of Oct. 31 totaled nearly \$709 million.

### ■ OPA AMENDS ALUMINUM SCRAP PRICE SCHEDULE

WASHINGTON—Maximum charge of 3½ cents a pound for service of converting plant aluminum scrap solids into ingot on a toll basis and maximum price of 9½ cents for clean aluminum foil scrap have been established by OPA.

### ■ DIE CASTING PRICE CONTROL REGULATIONS REVISED

WASHINGTON—Sellers of die castings who have been regularly making sales below the OPA maximum prices have been authorized to apply for permission to increase prices on subsequent sales up to the allowed maximums.

## War Research in Steel Has Peacetime Significance

Much research now under way in steel company laboratories is aimed primarily at improving military equipment, but many of the projects also are expected to be of benefit in peacetime, according to the American Iron and Steel Institute.

Among the important projects under study are investigations into the effects of temperatures upon metal properties.

A study of the heat treatment and ballistic resistance of steels for light weight armor plate might appear at first glance to be strictly a war-time project, yet the findings may be valuable in improving steel for coal chutes and other purposes.

Seeking improved steels for guns, several laboratories are co-operating in the study of improved compositions and heat treatments.

Another study that holds promise of peacetime benefits is devoted to the development of special stainless steel articles, such as springs, where an exceptionally high proportional limit and tensile strength are desired.

A number of research projects are centered upon welding. Fundamental studies on the heat treating characteristics and metallography of boron-treated steels are being made. A recently developed black oxide coating for stainless steel, which has already been introduced to steel users, is being further pursued from the research standpoint.

Other projects include: Electropolishing processes for stainless steel; the commercial development of stainless steels possessing precipitation hardening properties; the mechanical properties and metallurgical characteristics of low alloy constructional steels; research on heat treated stainless steel for aircraft structural members, research on alloy steel for certain highly stressed aircraft parts, and study of the effects upon steel of extreme cold.



# Scrap Prices Now Head for OPA Ceilings

*Strong tone develops in market with winter approaching and prospects for early ending of European war less promising*

**CHICAGO**—Lengthened duration of the war in Europe and resulting increased demand for capacity steel production is having a marked strengthening effect upon the iron and steel scrap market. The sagging and confused tone of the market, evident two or three months ago, has not only been arrested, but prices of the important grades are moving back to ceiling or near-ceiling levels.

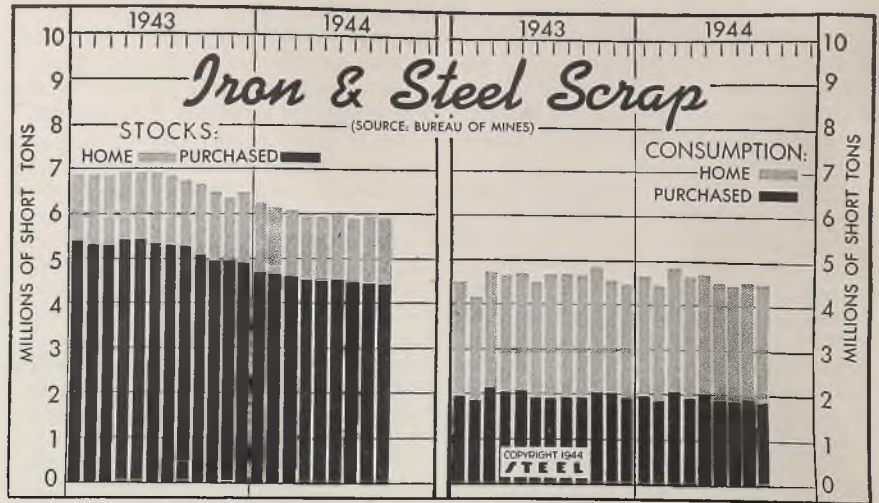
Consumers are reticent to divulge their inventory positions, but estimates indicate stocks not substantial but adequate in view of the freer availability of additional scrap when needed. Insofar as can now be seen, steel mills will be operating at capacity through the winter. And with winter weather approaching during which period collection, preparation and shipments of scrap will be more or less retarded, the market is receiving a certain degree of stimulation.

With scrap collection and preparation already greatly reduced by manpower shortage in dealer yards, the flow from this source is in low volume. As a result, consumers are depending more and more upon railroad and industrial material, and it is in this category that price strengthening is pronounced. Heavy scrap is in greatest demand. A number of railroad grades are back to OPA ceiling and several industrial heavy melting items are moving toward ceiling.

No. 1 railroad heavy melting steel has sold at the ceiling of \$19.75; No. 1 heavy melting industrial at \$17.75, \$1 below ceiling; No. 2 heavy melting at \$16.75, \$2 below ceiling; and No. 1 bundles at \$17.25, \$1.50 below ceiling.

### Stronger at Pittsburgh

**PITTSBURGH**—There is solid reason behind the present upswing in scrap. With steel operations holding in the nineties and showing little possibility of any sharp decline before the end of the war in Europe, scrap demand is strong. It is now admitted by some buyers here that they guessed wrong



during August, when the end of the war seemed an immediate possibility.

The result of that guessing was a movement out of the scrap market during September in an effort to cut down inventories. With all prominent buyers out of the market, prices broke sharply. At that time, however, many realized that if the European war did not end soon buyers would be back in the market and prices would almost immediately respond by returning to ceiling. That is now happening. Led by railroad No. 1 heavy melting steel the market is rapidly edging toward the ceiling. All major scrap buyers in this area have been purchasing during November and most of them are still in the market for December tonnage.

Ceiling on railroad No. 1 is \$21, and the latest railroad closing contained steel which sold for \$20.25 to a broker. Adding the usual 50-cent per ton commission indicates consuming mills probably paid only 25 cents less than ceiling. This compares with tonnages sold during the past two months as low as \$17.50 f.o.b. mill.

### Some Grades Below Ceiling Levels

Probably some grades will stay below ceiling levels. Machine shop turnings, for example have been consistently selling several dollars below the usual differential, and in all likelihood will remain below ceilings. The same is true of other grades of turnings, and to some extent, low quality bundled material. No. 2 compressed bundles have been lagging.

It is thought probable that sales of No. 1 dealers and industrial heavy melting steel will be made here at ceiling levels during December. In fact, it is reported some brokers are asking ceiling levels now on prime scrap. The reason for this is due primarily to the fact that these brokers see the possibility of a scrap shortage later in the winter. Some market factors see the possibility of a severe shortage during January or February due to the weather and the manpower shortage. In addition, a smaller flow of industrial scrap

is anticipated from the shipyards and a larger percentage of turnings from the shell and small arms program, all of which indicates a lighter grade of scrap and more losses in melting.

### Eastern Offering Prices Up

**PHILADELPHIA**—While there has been little consuming demand to provide a thorough test, there has been a sharp increase in the offering prices of eastern sellers on the principal melting steel grades of scrap. In the Philadelphia area, sellers have boosted their prices on No. 1 and No. 2 melting steel and No. 2 bundles \$2.50 a ton within the past few days, and that there have been no advances yet in the asking prices on some other grades is ascribed primarily to the fact that dealers have not had to cover much on unfilled contracts for such grades and that the cast grades were already at OPA ceilings. It is expected, however, that various other items will be affected shortly by the strong upward turn in sentiment.

Strength is ascribed to several factors. Primarily there is the approach of winter, combined with prospects that the war in Europe will run into next year. Further, despite relatively modest buying over recent weeks by many consumers there has been increasing difficulty in the accumulation of merchant scrap by the various yards, due to the recent decline in prices and the increasing shortage of manpower.

Consumers still have a fair supply on hand, although abnormally low for this season. During the early part of the fall, and especially with the possibility that Germany might be defeated before the end of this year, there was a strong disposition among buyers to reduce inventories substantially. Later, however, the possibility of a collapse in Germany appeared less imminent. Prices began to level off. Even then insofar as the East was concerned, there was only relatively modest buying in most cases, although stocks were built up a trifle from the low point. It is estimated that most eastern mills have around 45 to 60 days' supply. Some are even in bet-



ter position; others worse. It is generally conceded that the average stockpile is not as heavy as it should be, with winter at hand and the war still going full blast on all fronts.

Cast grades continue scarce, and if prices were not holding at OPA ceiling levels, those on the principal cast grades would have advanced long ago.

Dealers buying prices in New York have been advanced \$2.50 on No. 1 and No. 2 melting steel and on No. 2 bundles. Other advances are expected shortly.

#### Tone Firmer at Cleveland

CLEVELAND—Two leading steel scrap consumers in this district continue out of the market and expect to remain so until around the first of the year. Both plants have about six weeks' supply of scrap on hand. One has reduced its purchased scrap inventories 83 per cent since May 1 last, and its combined stock of purchased and home scrap by 60 per cent. This plant is consuming about 40,000 tons monthly and contemplates no immediate change in the open hearth mix of 60 per cent scrap and 40 per cent pig iron. The other mill has 31,000 tons of purchased scrap on hand and about 4000 tons of home scrap. It is also receiving about 14,000 tons monthly from another works of the company outside this district. Consumption at this works is averaging 20,000 tons monthly. The plant received 5000 tons of turnings by vessel last week and four additional ship loads averaging about 4000 tons of scrap each are expected shortly.

With steel ingot operations in the Cleveland-Lorain district fluctuating between 90 and 95 per cent in recent months consumption of scrap has been moderately below peak war levels.

Both consumers and dealers anticipate scrap prices will soon climb to ceiling levels if there is a definite indication that the European war will last through the winter months. Steel mills are expected to again start buying on a somewhat restricted basis if this proves true, temporarily causing a shortage in the supply of the better grades.

There is plenty of blast furnace scrap available as well as alloy material. Cast scrap supplies continue tight and remain at ceiling price levels.

#### Detroit View Conservative

DETROIT—There is little to support the belief scrap prices in the near-term will rise to ceiling level here, although further strengthening is apparent on the basis of recent sales. Open-hearth grades are up 50 cents a ton, borings \$1 a ton, and low-phos plate 50 cents a ton. Better demand and short supply of cupola cast material has moved this single item up to the ceiling price of \$20, but it has been quoted only \$1 off this level in recent weeks.

Chevrolet list, including about 100

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## Steel Mill Repair Costs Mount Under Heavy Production Pressure

EXPENDITURE for steel plant repairs and maintenance during 1943 established a record of \$528,000,000, increase of 13 per cent over the \$465,000,000 spent during 1942, the American Iron and Steel Institute reported last week.

The 1943 cost of maintenance was more than three times the amount expended for similar upkeep during 1938, when \$171,000,000 was spent.

The sharp rise in expenditures for repairs and maintenance last year reflects

the long continued high rate of activity by the industry, and to some extent higher costs of labor and equipment.

Year by year since 1938 the amount spent for upkeep has risen. In 1939 the amount spent was \$247,000,000; in 1940 it was \$305,000,000; in 1941 it was \$420,000,000.

For each ton of hot-rolled iron and steel produced last year, repairs and maintenance charges equaled \$8.35, contrasted with \$7.45 per ton in 1942.

## 30 Stacks Idle As Demand Declines

PIG IRON production has declined slightly in recent weeks, mainly because of lower demand. Fifteen blast furnaces were idle Nov. 1 for lack of an outlet for pig iron or for lack of need for hot metals, according to the American Iron and Steel Institute, New York.

Nine other furnaces idle upon that date were being repaired while five additional units were inactive for other reasons. One other furnace, completed last summer, has not yet been put into production because of lack of need for pig iron it could produce.

The total of 30 blast furnaces idle on Nov. 1 was 12 per cent of the grand total of 253 blast furnaces operated by the nation's pig iron and ferroalloy producers. As of Jan. 1, 1944, only 17 furnaces were idle out of a total of 247, equivalent to 7 per cent idle. On July 1, of last year, 23 of 243 furnaces owned by producers of pig iron and ferroalloys

were idle, equivalent to 9 per cent of the total number of blast furnaces.

## Alloy Steel Output in October Above September

Alloy steel production in October totaled 842,392 net tons, about 11 per cent of total steel production during that month, according to the American Iron and Steel Institute, New York. This compares with 840,575 tons in September and 989,432 tons in October, 1943. In the first ten months this year total alloy steel production was 8,874,012 tons, against 11,432,939 tons in the corresponding period in 1943.

Of the October tonnage open-hearth furnaces produced 556,612 tons, the remaining 285,780 tons coming chiefly from electric furnaces.

## October Pig Iron Output Recovers to 5,200,175

PIG IRON production in October recovered from the low established in September and totaled 5,200,175 net tons, compared with 4,987,645 tons in September. In October, 1943, output was 5,323,738 tons. Cumulative tonnage for ten months was 52,036,708 tons, compared with 51,231,075 tons in the comparable period last year.

Rate of operation in October was 90 per cent of capacity, compared with 89.4 per cent in September and 98.1 per cent in October, 1943, the latter based on

capacity existing at that time.

Ferromanganese and spiegeleisen output in October was 57,966 tons, compared with 73,605 tons in September and 65,750 tons in October, 1943. For nine months these products totaled 560,355 tons, compared with 551,529 tons in the ten months last year.

For ten months this year production was at 92.6 per cent of rated capacity, against 96.8 per cent of capacity existing in 1943. Details of October production are as follows:

District	Pig iron	Ferro, spiegel	Total		Per cent capacity
			October	Year to date	
Eastern	897,422	25,096	922,518	9,507,593	85.4
Pittsburgh-Youngstown	2,108,130	20,207	2,128,337	21,271,149	93.5
Cleveland-Detroit	532,747	.....	532,747	5,202,166	95.0
Chicago	1,094,692	.....	1,094,692	11,050,640	91.9
Southern	353,394	12,663	366,057	3,588,622	85.7
Western	155,824	.....	155,824	1,416,538	64.7
Total	5,142,209	57,966	5,200,175	52,036,708	90.0

American Iron and Steel Institute. Companies included above during 1942 represented 99.8 per cent of total blast furnace production.



# Sharp Jump in Tool Orders Boosts Backlog to Highest Point in Year

*October bookings rise 70 per cent over September's and further gain in November indicated. New war needs and heavy lend-lease orders for Russia reflected. Reconversion tool demand increasing*

SHARP upturn in orders for large shell turning lathes and the placing of the bulk of some 30,000 general-purpose tools for shipment to Russia under lend-lease arrangement, have boosted the machine tool industry's order backlog to the highest level since November, 1943.

New orders, less cancellations, booked by machine tool builders during October totaled \$56,521,000—increase of \$23,369,000 or 70.5 per cent over the September figure. Still further increase is said to have occurred during November. The number of new orders placed in October increased 4400 units to a total of 13,319 machine tools.

Recent removal of the rating floor in order E-I-b has made possible the entering of unrated orders which will be shipped in such manner as not to interfere with delivery of rated orders for similar equipment on required dates. First shipments of unrated orders made in September amounted to \$24,100 and October unrated shipments amounted to \$421,100.

The backlog of unfilled machine tool

orders increased to \$213,392,000, in October, or 9.9 per cent over September. At the October rate of shipments, about six months will be required to fill orders on hand as of the end of that month. This compares with 5.4 months' backlog as of Sept. 30. Peak in order backlog of \$1,392,803,000 was reported on March 31, 1942.

About \$25,716,400 of the current machine tool order backlog constitutes unrated orders. Deliveries on most of these unrated tools, which represent reconversion equipment for the automotive, electrical appliance and textile industries, have been pushed back in recent weeks on an average of about one month. This has been due primarily to the large number of lend-lease Russian orders and additional pressure to get up to schedule on vital war program orders.

Manpower shortage and scarcity of small electric motors and bearings continue to be the chief obstacles preventing the machine tool industry from meeting present war requirements. From

78,000 wage earners in the industry on Dec. 1, 1943, the number shrank to 53,900 in September, and dropped further to around 50,000 as of Dec. 1. This is in sharp contrast with peak employment of 123,000 in early 1943. Deliveries on some small electric motors are extended 22 weeks. A \$5 million program is now under way in non-critical labor areas to expand facilities for output of fractional horsepower motors.

Despite handicaps, machine tool shipments have been edging upward the past five months, but remain far short of meeting current war requirements. October tool shipments of \$37,100,000 represent a gain of 3.4 per cent over the preceding month. However, they were well below the \$78,300,000 shipped in the corresponding month last year.

Deliveries on the bulk of the machine tool orders for the heavy shell program will not get well under way until early January. The machine tool orders under the \$120 million lend-lease program with Russia are scheduled to be completed by June 30, 1945.

Industry representatives feel the bulk of the machine tool schedule for Russia will arrive too late for the European war. They also point out that most of the tools could easily be diverted to peacetime jobs. Permitting Russia to place large orders for general-purpose new machine tools when there are so many government-owned surplus tools of that variety is not considered by most trade authorities to be consistent with our own best interests in meeting lagging war programs and reconversion.

## Former U. S. Steel Corp. Chairman Becomes Secretary of State

Edward R. Stettinius Jr., who became chairman of the United States Steel Corp. at 37 in 1938, last week was named Secretary of State, second youngest man ever to attain that post. Since leaving the Steel corporation, Mr. Stettinius had served as priorities director in the early rearmament program, as director of lend-lease, and more recently as Under Secretary of State. Prior to joining the Steel corporation, he had served ten years with General Motors Corp.

Mr. Stettinius is one of the few men from the steel and metalworking industries to become a cabinet member. Others since the turn of the century include: Robert P. Lamont of the American Steel Foundries, Dodge Bros., International Harvester Co. and other companies, who was Secretary of Commerce in 1929; Roy D. Chapin of the automotive industry who was Secretary of Commerce in 1932; and William H. Woodin of the American Car & Foundry Co., who was appointed Secretary of Treasury in 1933.

Mr. Stettinius' appointment was widely acclaimed in Congress and the press. At right, he is shown with a group of advisers just before leaving for the London



conference last spring. Seated, left to right, are: Dr. Isaiah Bowman, president of Johns Hopkins University; Mr. Stettinius; Wallace S. Murray, director of the Office of Near Eastern and Af-

rican Affairs; and John Lee Pratt, consultant on commercial affairs. Standing are H. Freeman Mathews, deputy director of the Office of European Affairs, and Robert J. Lynch, executive secretary.



# Geneva Steel Expansion Urged

*Senate committee told by University of Utah economist additional investment should be made to convert mill to production of complete range of flat-rolled products*

**SAN FRANCISCO**  
AN ADDITIONAL \$40,000,000 investment should be made by the federal government in the Geneva, Utah, steel plant as a step to assure future western prosperity, Prof. J. R. Mahoney, director, Bureau of Economic and Business Research, University of Utah, told a Senate investigating committee here recently.

Dr. Mahoney urged the additional postwar funds as a means of bringing the West "a long step toward full industrialization". Government investment in the plant, according to recently disclosed figures, already amounts to about \$216,000,000.

Dr. Mahoney forecast that the \$40,000,000 needed to convert the Geneva mill to the manufacture of a wider range of steel products would result in eventual production of a complete list of flat-rolled steel items which would pave the way for great expansion of the western steel fabricating industry.

Prof. Mahoney based his views on postwar operation of the Geneva and

Fontana plants on the huge natural resources in the West. Recent exploration in Utah, he said, has disclosed surprising possibilities.

He listed western resources as half of the nation's coal reserves, two-thirds of the country's hydroelectric potential, oil and a wide range of metal resources.

The West cannot become industrially mature in steel until it develops its own iron, coal and limestone, Dr. Mahoney pointed out. Having done this, he said, the next move must be fabrication of an increased number of steel products on the West Coast. He gave the important western canning industry as an example of a potential market for western steel. One-third of the country's canning is done in the western states, he declared, but it makes virtually no tin plate of its own. He proposes that postwar expansion of the Geneva plant include a rolling mill for tin products to correct this deficiency.

Disposal of the Geneva mill, which has been a subject of much discussion in the West ever since its completion,

was touched on by Dr. Mahoney. He suggested two alternatives: That the plant be sold to a postwar private operator at a normal price, with the remainder of its cost written off by the government as a wartime expense; or that its disposal price be based fairly on that portion of its capacity which might be used efficiently for peacetime production, with the price adjusted on a sliding scale so that it could be moved upward if the plant is operated at higher rate of capacity than originally agreed on.

## California's War Contracts Increase During September

**SAN FRANCISCO**

War supply contracts placed in California during September aggregated \$214,356,000, bringing the total since June, 1940, to approximately \$16,400,000,000, according to the War Production Board.

In the San Francisco Bay area, plane contracts increased \$3,683,000 in September to \$13,769,000; ships, \$3,201,000 to \$2,686,189,000; ordnance, \$5,021,000 to \$126,499,000; miscellaneous supply contracts, \$3,299,000 to \$516,719,000.

Industrial and military facility projects for California at the end of August totaled \$2,265,403,000, an increase of \$60,394,000 over the previous month.

Henry J. Kaiser's shell plant at Denver has been awarded two new Army ordnance contracts valued at more than \$1 million according to Col. K. B. Harmon, district chief, San Francisco Ordnance District. The awards cover manufacture of fuses and boosters. At present the Denver plant machines 8-inch and 155-millimeter artillery shells for the Army.

Nine additional northern California firms have been authorized by WPB to make civilian goods under the spot procedure reconversion program. This brings total authorizations for the area to 89 with a scheduled annual production of \$11,627,414. For all of California authorizations total 204 with an annual production of \$23,819,019.

## WPB Orders Further Cut On Magnesium Production

Production of magnesium metal in government-owned plants will virtually cease by Jan. 1, War Production Board has announced. The board has scheduled the closing of government-owned plants in Velasco, Tex., operated by Dow Magnesium Co., and in Spokane, operated by Electro Metallurgical Co. Partial curtailment has been ordered at the Diamond Magnesium Co., Painesville, O.

This action was taken because military use of magnesium has continued to decrease and because the surplus stocks of the metal have almost doubled the amount of the safety reserve as established by WPB.

## POSTWAR PRELIMINARIES

**STEEL WAGES**—Recent concession by War Labor Board will necessitate higher steel prices if industry is to be financially able to maintain employment and production after the war, producers believe. See page 79.

**RESEARCH**—Studies aimed at improving military equipment will offer benefits to peacetime steel products. See page 83.

**GENEVA STEEL**—Additional investment of \$40 million at Geneva Steel plant urged to convert mill to production of wide range of flat-rolled products. See page 87.

**FOREIGN TRADE**—Ten billion dollar export budget recommended by National Planning Association to help maintain employment in war-expanded industries and enable United States to take lead in developing world trade. See page 88.

**BEARING ALLOY**—Development of new tri-alloy bearing alloy by Ford metallurgists may have important potentialities in postwar passenger cars. See page 95.

**SYNTHETIC RUBBER**—Five types of synthetics now used in belting, hose, packing, linings, etc., not only are satisfactory substitutes but are expected to earn permanent place for many applications. See page 112.

**INDUCTION HEATING**—Continued expansion and enlarged acceptance of induction heating methods are anticipated, as equipment producers expand laboratory facilities for further exploration in this field. See page 116.

**STRETCH-FORMING**—Stretch-forming machines for straightening, strain-hardening and strengthening aircraft structural sections are taking over more of the functions of machinery previously used—a trend started by demand for these characteristics. See page 126.



# Higher Exports of Machinery, Autos, Other Metal Goods Seen After War

*National Planning Association recommends \$10 billion foreign trade budget to help maintain full employment here and enable United States to take leadership in expanding world trade. Envisages greater imports of raw materials*

A \$10 BILLION foreign trade budget, calling for increased exports, imports and foreign loans and investments, to help the United States maintain full employment in its war-expanded industries is recommended by the National Planning Association, Washington. The association believes the enlarged budget will enable this country, as the world's greatest creditor nation, to take leadership in expanding world trade in the peacetime period which is approaching.

Under the direction of Stacy May, director of the Bureau of Planning and Statistics of the War Production Board and chairman of the planning association's Committee on International Policy, the association has just completed a study on "America's New Opportunities in World Trade." Conditions which probably will exist after the war are reviewed in the study which also recommends changes in policies which will be necessary to meet postwar requirements, both here and abroad.

According to the study, America's exports of machinery, automobiles and "other metals and manufactures" should be two or three times greater in 1950 than they were in 1929. On the other hand, imports of many raw materials will be correspondingly increased.

### Budget To Facilitate Adjustment

The \$10 billion budget recommended by the committee is designed to help facilitate the adjustment that will be necessary in the distorted industrial structure immediately after the war and pave the way for the long term adjustment that will be required once the world's economic affairs are established on a more even keel.

The committee believes this budget cannot be achieved under present policies and therefore makes recommendations for bringing trade policies more in line with trade opportunities. It proposes (1) that increased imports be made possible by adopting a positive policy for tariff reduction, thus enabling foreign countries to buy the exports we need to sell and repay the loans we make to them; and (2) that private and public capital investments be increased by taking special measures to make them more secure, thus speeding world reconstruction and development.

To review U.S. tariff laws and work out means of selective tariff reduction, the committee suggests the establishment of a Commission on National Foreign Trade Policy, composed of representa-

tives from Congress and various administrative departments.

Reduction in tariffs would make possible not only increased imports for domestic use but also imports needed to conserve natural resources—many of which have been depleted by war—and to build up a stockpile of critical raw materials for reasons of national security.

### Urges Support of International Bank

To increase the flow of foreign investment, the committee recommends that the United States vigorously support the establishment of the proposed International Bank for Reconstruction and Development and exert an affirmative influence to enlarge its potential scale of operations. Other measures recommended for this purpose includes: Extension of the underwriting powers of the Export-Import Bank and the Reconstruction Finance Corp.; removal of existing regulations directed at the restriction of foreign loans; establishment of a Foreign Investment Commission, composed of representatives of appropriate federal agencies, to co-ordinate information and exercise general supervision over investments in an attempt to foster balanced programs of capital development and prevent unproductive and uneven capital flow; co-ordination of long-term investment programs with long-term trade agreements; and American participation in establishing some adequate mechanism for the stabilization of international exchange.

The need for these changes in policy was determined through a "Projected Foreign Trade Budget for 1950," based



Stacy May

after the war. The committee believes the \$7 billion foreign trade program estimated in the projected budget would neither make the important contribution that foreign trade can and should make to the maintenance of domestic full employment during the readjustment of war-expanded industries nor meet the world's needs for American goods and financial assistance.

Therefore, the committee recommended the \$10 billion budget which it believes will more nearly meet domestic and world needs during the difficult adjustment period following the war. The report points out that the recommended budget is set conservatively within limits that actually have been achieved under stress of war. It is believed that America has sufficient wisdom and intelligence to organize her affairs upon a comparable basis in times of peace.

Net totals of estimated balance of payments in 1950 are compared below:

	(In Millions)	
	Projected Budget	Recommended Budget
<b>1. MERCHANDISE TRADE</b>		
Exports .....	\$7,000	\$10,000
Imports .....	5,000	6,000
Excess of Receipts .....	2,000	4,000
<b>2. SERVICE AND OTHER CURRENT TRANSACTIONS</b>		
Excess Payments .....	300	300
<b>3. CAPITAL MOVEMENT</b>		
Long-term Capital Investments .....	1,000	3,000
Gold and Short-term Capital .....	700	700
Net Outflow of Capital .....	1,700	3,700
	<b>2,000</b>	<b>4,000</b>

on past trends, which estimated what our foreign trade program might look like if present and prewar foreign trade and investment policies were continued

Both the projected and recommended budgets were based on a gross national product of \$170 billion in 1941 prices (equivalent to a net national income of



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\$140 billion), which is accepted by the association as a reasonable goal for 1950 and as a measure of the level of economic activity under full employment conditions with the productive capacity likely to exist in that year.

"This nation confronts a world filled with potential buyers for American goods. On this country, and this country alone, rests the decision of whether these potential buyers are to become real customers," the committee states.

After the war virtually the whole world will want to buy American products, especially those of our vast industrial plant—machines and equipment for rebuilding destroyed and deteriorated factories and other investment materials which will provide more fruitful employment for its manpower. At the same time America will need new export outlets to enable the maintenance of a full employment economy and to protect war-expanded industries from collapse and distress when war requirements are no longer needed.

It was found that under existing policies, America's export opportunities would be limited not by foreign demand, but by lack of access to dollar exchange. The primary means by which dollar exchange is made available to foreigners is through our purchases of their goods and our foreign investment. Therefore, the committee recommends that our imports be raised to \$6 billion and that our long-term capital exports be increased to approximately \$3 billion annually.

According to the report, the prewar trend toward greater concentration of export demands for machinery and metal products may be expected to continue after the war. Even with the continuation of present trade policies, approximately 60 per cent of our total exports would probably be in the category of machinery, vehicles, and metals. The estimated values of America's exports for 1950, under existing policies, are compared with those of past years in the table below:

	1929 (millions)	1937 (millions)	1950 (millions)
Agricultural Goods	\$1,693	\$ 797	\$1,000
Machinery	607	479	2,000
Automobiles and Vehicles	591	410	1,200
Other Metals and Manufactures	537	502	1,100
Petroleum and Products, Chemicals, Wood and Paper Textiles, etc.	1,729	1,111	1,700
<b>Totals</b>	<b>\$5,157</b>	<b>\$3,299</b>	<b>\$7,000</b>

The committee believes tariffs cannot, and should not, be suddenly torn down. It does recommend, however, that this country adopt a positive policy for the systematic and gradual reduction of tariff structure.

However, the restrictionist policies which were adopted by America during its nonindustrial and debtor period are no longer appropriate, the report states. Actually, according to the committee, they "prevent foreigners from paying their financial obligations to us, depress our own export opportunities, and depress the world's trade level in general."

Because of the combination of skilled labor, modern equipment, and mass production, the committee maintains that American industries can compete with those of foreign countries. The committee also contends that "the fear that competition with 'cheap foreign labor' would destroy American labor standards and the American standard of living is without real substance." If we do business with the rest of the world, the report points out, export demands will increase employment and production in our efficient and high-wage industries and encourage the transfer of workers from low-wage industries and marginal agriculture, both of which depend upon substandard wages and working conditions.

The committee recommends the government establish a natural resources conservation program to encourage larger than normal imports of materials which are needed to conserve domestic supplies that are declining or approaching depletion because of heavy war requirements.

The projected values of some of the principal commodities which are likely to be imported in 1950, as compared with those of 1929 and 1939, are shown below:

Commodity	1929 (millions)	1939 (millions)	Projection 1950 (millions)
Burlaps	\$ 77.4	\$ 28.0	\$100
Cotton	53.3	7.5	10
Fats, oils and oilseeds	179.9	84.2	250
Hides and skins	137.3	47.1	70
Lead	13.1	7.1	50
Lumber and sawmill products	44.0	20.1	100
Manufactures (finished)	769.5	295.0	800
Meat and meat products	61.5	47.7	150
Nickel (bars, plates, and manufactures)	19.1	29.0	55
Petroleum (crude and semi-processed)	96.5	41.6	750
Rubber (crude)	241.0	178.1	160
Silk (raw)	427.1	120.9	50
Tin (bars, blocks, pigs, etc.)	91.8	70.6	110
Woodpulp and newsprint	247.7	201.0	400
Wool (unmanufactured)	38.9	22.4	120
Zinc	1.1	3.6	25

America needs opportunities for sound foreign investments to reduce excess savings which would stand in the way of full employment and otherwise would have

for economic development, according to the report. In addition, this country will probably be asked to furnish approximately \$18 billion for reconstruction needs in the first ten years after the war—about one-fourth of Europe's needs.

Therefore, the committee believes that the \$3 billion capital export figure for the early postwar period is "very conservative in the light of world needs and our own adjustment problems. If we make sure that the dollars borrowed and invested effect a genuine increase in the borrower's productive capacity, we can gain a temporary, but substantial, stimulus to domestic production and, in the end, profit from the greater stability and buying power which industrialization and the increase in economic efficiency will cause abroad."

## Favor Continued Intensive Military Research Work

Sentiment in favor of maintaining military research work at the present wartime tempo is gaining in Washington, as reflected in testimony developed by the House Special Committee on Postwar

### Military Policy.

Aggressors of the future will strike even faster than in the past and with 10-fold fury, warned Under Secretary of War Robert P. Patterson. Jet-propelled bombs, guided missiles of all kinds, rockets, and radar make it imperative, he said, that Congress create a postwar research board for national defense. The board, he recommended, should function under the supervision of the National Academy of Sciences which has turned in so outstanding a performance during World War II.

His testimony was upheld by representatives of various technical experts.

"Today we have the greatest Air Force in the world, but within two or three years every piece of equipment which we now have will be obsolete," declared Maj. Gen. Oliver P. Echols, assistant chief of Air Staff, Army Air Forces, and member of the Aeronautical Board and the National Advisory Committee for Aeronautics.

"With the research now going on with jet engines, rockets, supersonics, electronics and improved explosives, we have no idea as to what the airplane of the future will be like."





TO VIEW BATTLEFRONTS: Members of the House Military Affairs committee are shown leaving National airport, Washington, to tour European battlefronts. The group first will visit London, then Paris, Rome and Algiers, before returning to this country about Dec. 20. Shown are, standing, left to right: Representatives Davis of Tennessee; Costello of California; Colonel Hauk; Representatives Rooney of New York; Winstead of Mississippi; Kilday of Texas; Elston of Ohio; Colonel Collins,

commanding officer, Air Transport Command, National Airport; Commissioner Pagan of Puerto Rico; Representatives Harness of Indiana; Sheridan of Pennsylvania; Brooks of Louisiana; Shafer of Michigan; Lieut. Col. F. T. Newsome; Representatives Thomas of New Jersey; Merritt of New York; Sparkman of Alabama; and Maj. E. B. Crosland. On the steps are: Representatives Luce of Connecticut; Fenton of Pennsylvania; and Delegate Farrington of Hawaii. U. S. Army photo from NEA

## Lanham Trademark Bill Supported By Bar and Manufacturers Groups

*Pending legislation would offer greater security to holders of trademarks, operate more effectively in the public interest and make it easier to control illegal use. Federal Trade Commission, State and Justice departments suggest revisions*

SPOKESMEN for the American Bar Association, the National Association of Manufacturers and other organizations have urged the Pepper subcommittee of the Senate Patents Committee to report favorably on H. R. 82, the so-called Lanham bill which passed the House in June of 1943 and which has been pending since in the Senate. The Lanham bill objective is "to provide for the registration and protection of trademarks used in commerce, to carry out the provisions of certain international conventions, and for other purposes."

The Lanham bill, say patent attorneys who have analyzed it, would offer greater security to holders of trademarks, operate more effectively in the interest of the public, and make it easier to apprehend those who engage in "pirating" of trademarks. It would cause the commissioner of patents to cancel trademarks at the end of six years following registration

unless the registrant has filed an affidavit showing that he still is using the trademark; this provision would kill off dead names from the register and give seekers of new trademarks and names wider latitude.

Whereas persons who feel aggrieved by the registration of new trademarks now have only 30 days in which to file opposition, the Lanham bill allows the commissioner to extend this period in accordance with his judgment.

Perhaps the most important feature of the Lanham bill is that which allows a person only five years following registration to request cancellation of a trademark from which allegedly he suffered damage; under existing law threats of this kind frequently have been suspended over the heads of trademark holders indefinitely and there have been numerous instances in which courts have ordered cancellation of trademarks after

they had been in use for as long as 15 years during which their value had been built up by the investment of millions of dollars in advertising.

Whether the Senate Patents Committee will report the bill for Senate action before the expiration of this session is not clear, particularly because of three government objections to it. The Department of Justice complained that the strengthening of the trademark holder's security might encourage monopoly and restraint of trade. The State Department protested against enactment of any law that would make it more difficult to carry out the government's policy of fostering foreign trade.

The Federal Trade Commission suggested that the bill be amended to give federal agencies the right to oppose registration of trademarks which they did not consider as advancing the public interest. This would not mean any change from present practice under which the commissioner of patents welcomes, and gives thorough consideration to, oppositions filed by the federal agencies.

## Russia Seen Needing 20,000,000 New Vehicles

Soviet Russia's postwar demand for motor vehicles will total at least 20,000,000 units, according to the National Highway Users Conference, Washington.



## WPB Allots Larger Amount of Metals for Rolling Stock

*Domestic transportation industry is scheduled to receive 1,254,838 tons of carbon steel for first quarter, representing a gain of some 215,000 tons over the present quarter but still 331,000 under amount requested by ODT*

SUPPLY of controlled materials for domestic transportation in the first quarter of next year will be greater than that allotted for the last quarter of this year, but less than the amount requested by the Office of Defense Transportation, War Production Board announced recently.

The domestic transportation industry will receive 1,254,838 short tons of carbon steel in the first quarter of 1945, compared with a requested total of 1,585,847 tons and the fourth quarter allotment of 1,039,100 tons. Proportionate amounts of alloy steel, copper and aluminum were authorized. In addition to the direct ODT allotment, the WPB has set aside an adequate reserve for railroad and local transit maintenance, repair and operating supplies.

The ODT, as claimant agency for domestic transportation, was allotted 507,000 tons of carbon steel for railroad replacement rails. This amount is the total available capacity less military and export "must" requirements. ODT has requested 600,000 tons.

WPB made materials available for the construction of up to a maximum of 2300 box cars for delivery in the second quarter of 1945 contingent upon the placement of orders by the railroads with car builders by Dec. 1, 1944. ODT has requested the railroads to place orders before Jan. 1, 1945, for additional box cars for delivery in the third quarter, materials for which will be made available in time to complete the program.

WPB has allotted 155,000 tons of carbon steel for automotive replacement parts, for which the ODT has requested 160,000 tons. This is the largest amount provided for this purpose since the start of the war.

An allotment also has been made for the production of light trucks at the rate of 10,000 units a quarter, the first authorization for that purpose since the war began. No light trucks have been manufactured for civilian use since early in 1942.

Material has also been allotted for the construction of passenger-train cars, chiefly day coaches, with some baggage, mail and express cars. The materials will be used to construct 105 cars now on schedule, and the remainder of ODT's program of 250 such cars per quarter will be started as soon as governmental authorities approve the manpower requirements.

Carbon steel requirements for locomotives, freight cars, trucks, integral buses,

street cars, trolley coaches and truck trailers were met with amounts sufficient to cover production schedules. ODT requested 20,000 tons for water transport and was allotted 15,000 tons.

### Restrictions on Metal Can Production May Be Relaxed

A proposed relaxation of metal can order M-81, which would permit cans for a limited number of previously prohibited items but which would retain the quota system for all products, is being considered by members of the industry and the War Production Board. This action would be a conservative first step toward revocation of the order which probably cannot take place until victory in the Far East releases Malayan tin for world markets.

### Hatfield Heads Group To Spur Engine Parts Output

Critical shortage of spare parts for the repair of internal combustion engines used in heavy-duty trucks, landing craft and other equipment affecting both Army and Navy operations has prompted the War Production Board to establish a special task group headed by Robert M. Hatfield Jr. of Cleveland, a former WPB executive and until recently a lieutenant in the Navy.

Mr. Hatfield, serving as a special assistant to Harold Boeschstein, deputy vice chairman for operations, is organizing an advisory committee from the Army, Navy, Aircraft Resources Control Office, Office of Defense Transportation, and WPB's Automotive, Shipbuilding and Power divisions.

Mr. Hatfield and military authorities will visit spare parts plants in the Midwest (concentrated mainly in Michigan, Illinois and Ohio) during the next several weeks to determine how quickly the manufacturers can satisfy the expanded demands for spare parts.

### Krug Makes Appointments to Aircraft Production Board

Chairman J. A. Krug of the War Production Board has announced that the Aircraft Production Board, of which he is chairman, now has the following membership: Lieut. Gen. William S.

Knudsen, director, Air Technical Service Command, Army Air Forces; Maj. Gen. Oliver P. Echols, assistant chief, Air Staff for Materials and Services, Army Air Forces; Rear Admiral L. B. Richardson, assistant chief, Bureau of Aeronautics, Navy Department; T. P. Wright, administrator, Civil Aeronautics Administration; and Myron A. Tracy, recorder and acting director of the Aircraft Resources Control Office, and recorder, APB.

Admiral Richardson has replaced Rear Admiral E. M. Pace, special assistant on materials to the chief of the Navy Bureau of Aeronautics. Mr. Wright has been appointed a member of the APB in recognition of his former experience as head of the WPB Aircraft Resources Control Office. Myron A. Tracy has been appointed acting director, Aircraft Resources Control Office.

### Appointments-Resignations

James Rowan of the Great Lakes Steel Corp., who had been serving the War Production Board's Steel Division recently as special consultant, has returned to his former position at Great Lakes.

David J. Holmes has been appointed chief of the Transportation Branch, War Production Board, replacing L. L. Adams who has been appointed associate director of the Division of Rates, Office of Defense Transportation. A. S. Dolch succeeds Mr. Holmes as chief of the Traffic Section, Transportation Branch.

C. Ray Davisson has been appointed director of the Plumbing and Heating Division, WPB, to replace J. F. Wilber.

Roland P. Brown has been appointed director of the Durable Goods and Products Division of the War Production Board's Office of Civilian Requirements. He was previously deputy director of the division and replaces Henry A. Dinegar who has accepted a position as appliance division manager of American Steel Export Co., New York.

Albert M. Carter, a member of the board of directors of the Smaller War Plants Corp. since the corporation was established in June, 1942, has been elected vice chairman.

Leon B. Taylor has been appointed chief of the Farm Machinery and Supplies Branch, Office of Materials and Facilities, War Food Administration. He succeeds David Meeker who was appointed recently director of surplus property and reconversion in WFA.

James E. Carroll has resigned as assistant director, Department of Railway Transport, Office of Defense Transportation. He is returning to his former position on the staff of the executive vice president of the Chicago, Burlington & Quincy railroad in Chicago.



# PRIORITIES-ALLOCATIONS-PRICES

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

## INSTRUCTIONS

### CLASS B PRODUCT MANUFACTURERS:

In all cases where an applicant is required to accompany his CMP-4B application for controlled materials and an authorized production schedule with labor information (form WPB-3820 revised) the information must be applicable to the actual manufacturer of the product.

This action was taken to clarify the requirement of labor information in cases where CMP-4B applications are filed by persons who make allotments of controlled materials to persons who will manufacture class B products for them. Exceptions to the general rule that allotments of controlled materials for the manufacture of class B products must be obtained from WPB industry divisions are: (1) Where the customer has obtained an allotment or material believing that he would make the class B product himself, and finds that unforeseen contingencies prevent him from doing so; (2) where the customer designs and engineers a product and it is his practice to subcontract for the production of all or a portion of products which he designs and engineers and the actual manufacturer is not in a position to anticipate requirements of materials and components needed for making it. In both cases, manpower information submitted on form WPB-3820 must be applicable to the plant of the manufacturer rather than the plant of the persons filing the CMP-4B application.

**POSTWAR PRODUCTION:** Purchase orders may be placed now for materials to be used in postwar production, but the materials may not be received into a manufacturer's inventory. Under provision of priorities regulation No. 1, persons are prohibited from receiving more than a minimum practicable working inventory of materials or products into stock. As a result, deliveries of materials for postwar production may not be accepted now and orders for such materials must call for delivery at a future time when the material can be received.

## L ORDERS

**REFRIGERATORS:** Restrictions on the iron and steel content of domestic ice refrigerators have been relaxed. Use of stainless steel, monel metal and inconel metal in manufacture of these refrigerators is prohibited but use of other types of iron and steel, except galvanized steel is permitted to the extent that they are available under the Controlled Materials Plan or from idle and excess inventory. Use of galvanized steel is limited to a maximum of 15 pounds per unit.

Manufacturers who wish to make domestic ice refrigerators must apply to WPB for production quotas, specifying the amount of iron and steel and other materials to be used per unit. (L-7-c)

**LAMPS:** Portable lamp manufacturers, who may make lamps for preferred orders only under order L-33 and for civilians as authorized under priorities regulation No. 25, now may use iron and steel for any lamp part. The previous provision restricting the use of other metals, such as zinc, aluminum, and magnesium, to sockets, separate switches, plugs, lamp cords, auxiliary ballasts, and starter switches has also been deleted from order L-33. Previous restrictions on the use of copper are retained, except that lamp manufacturers now may use No. 18 B & S gage copper conductor cords, not longer than 11 feet, as well as the previously permitted No. 20 B & S gage cords, if they were in the manufacturer's or the supplier's inventory on Dec. 10, 1942. Use of metal (exclusive of iron or steel for

wire frames) is prohibited in the production of lamp shades or parts, except to fill preferred orders or as authorized under PR 25. Shade manufacturers who are not operating under "spot" authorizations but who wish to make wire frames for lamp shades for civilians therefore will be dependent upon the use of iron or steel obtainable without priority assistance, through the purchase of frozen, idle, excess, or distressed stocks of iron or steel under the terms of priorities regulation No. 13. (L-33)

**LIGHTING FIXTURES:** Manufacture of following types of fluorescent lighting fixtures is now permitted when they are provided with

## INDEX OF ORDER REVISIONS

Subject	Designations
Cadmium	M-65
Electronic Equipment	L-265
Idle Materials, Equipment	PR No. 13
Lamps	L-33
Lighting Fixtures	L-78
Plumbing Fixtures, Aircraft	L-313
Refrigerators	L-7-c
Rolling Stock	L-97
Scales	L-190
Sealing Tape Machines	M-126
Spot Authorization	PR No. 25

ballasts or transformers that control two or more lamp tubes: Designed for a continuous row of single tubes rated 40 and 100 watts per tube. Fixtures for a continuous row of single tubes rated 15, 20, or 30 watts are still prohibited. Manufacture of individual or continuous row fixtures using five or more rows of tubes is now permitted. Provision requiring WPB authorization for sale on un-rated orders of fixtures that were in inventory on June 2, 1942, has been deleted. (L-78)

**ROLLING STOCK:** Railroad equipment builders who are in a position to produce locomotives and railroad type cars in advance of their production schedules may do so, upon notification to the War Production Board. The manufacturer may proceed with such advance production provided it does not interfere with other production or delivery schedules or if he is not otherwise directed in writing by WPB. Sequences of production established in schedules must be maintained. (L-97)

**AIRCRAFT PLUMBING FIXTURES:** Order L-313, which governed the manufacture of aircraft plumbing fixtures, has been revoked. Manufacturers of fittings must continue to comply with priorities regulations and must make application for the necessary materials as required by the controlled materials plan. (L-313)

**SCALES:** All simplification restrictions have been removed on railway track scales, portable beam scales and certain other smaller scales, such as baby weighing, egg grading, milk, and dietetic scales. Production controls have been amended to permit an increase or decrease in production of any of these scales as changing conditions require. The following scales (class B) are no longer subject to distribution controls: Person weighing scales for clinical use and baby weighing or nursery scales; mailing and parcel post scales, except spring type scales equipped with postal charts and having a retail list price of \$5 or less; egg grading scales, milk scales, cotton beam scales, cotton spring scales, and grain sampling, grading and testing scales; and dietetic scales, graduated in the metric system for personal use by a person

whose diet is regulated by a licensed physician and prescription scales as used by prescription druggists. Production of these class B scales must be specifically authorized in writing by WPB. Applications to produce them should be made for a total number on CMP form 4B. Manufacturer's permitted inventory of industrial types scales has been increased to 1/10 of the scales billed by him in 1941. (L-190)

**ELECTRONIC EQUIPMENT:** No producer of electronic equipment now is permitted to manufacture any electronic equipment except to fill preferred orders to fulfill, under CME, any authorized production schedule or authorized program as defined in CMP regulation No. 1, except a schedule or program authorized under priorities regulation No. 25 covering the spot authorization plan. (L-265)

## M ORDERS

**CADMIUM:** Manufacturers now may sell cadmium chemicals without the necessity of the purchaser certifying to its use. Threaded fittings of gray and malleable iron, 1/2-inch or less in size, may now be plated with cadmium. Cadmium may be used now for the production of overhead electrical contact wire in railroad, street car and trolley bus systems. (M-65)

**SEALING TAPE MACHINES:** Unrestricted manufacture of gummed paper sealing tape machines is now permitted, insofar as manpower and material restrictions will permit. Controls will continue to be enforced over manufacturers' and distributors' inventories. (M-126)

## PRIORITIES REGULATIONS

**IDLE MATERIALS, EQUIPMENT:** A list B, covering "special sales" for export, has been added to priorities regulation 13, governing sales of idle and excess materials and equipment. Materials not on list B may be sold for export in special sales without restrictions. If the buyer cannot extend a preference rating equal to or higher than that shown for the item, or if the list specifically requires it, special permission must be obtained from WPB. Applications should be made on form 1161 unless another form is specified in the list. However, in the case of steel or copper in controlled material form, either the buyer or the seller may apply for permission by letter in duplicate to the proper controlled materials division.

Changes in list A, which covers restrictions on domestic special sales of surplus materials, include the addition of uranium and the deletion of construction machinery. Only those slide fasteners manufactured from materials containing copper now remain under the controls of list A.

In the case of controlled materials, if the material is copper, copper-base alloy, aluminum or steel, a holder may also fill an order bearing the standard certification described in priorities regulation No. 7 and the words: "Purchased for resale in accordance with direction 48 to CMP regulation 1." Either the buyer or the seller may apply for the special permission to make a transaction in controlled materials without allotment. (PR No. 13)

**SPOT AUTHORIZATION:** Electric and Gas domestic refrigerators (L-5-c) and domestic washing machines (L-6) have been made subject to the "spot authorization" procedure (PR No. 25). The following items also have been made subject to the procedure: Tank wagon bodies for motor trucks and trailers (L-253); motorcycles (L-331); electric wiring devices and heater cord sets (L-277); caskets, shipping cases, burial vaults (L-64); toys and games (L-81); furniture and furniture parts (L-26-a); logging, lumber and wood products machinery and equipment (L-331); physical therapy equipment (L-259); luggage (L-284); antifriction bearings (L-154-a); light power-driven tools (L-237). Form WPB-4000, the application form used in connection with the spot procedure, may be used according to the amendment to apply for an allotment on preference rating to make articles that are not covered by WPB limitation or conservation orders. (PR No. 25)



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## Problem of pricing parts and materials for postwar automobiles, now flooding suppliers' offices, becoming increasingly knotty. Briggs expects to be producing passenger car bodies within three months after termination of European war

AS postwar orders for materials and parts flood into the offices of suppliers from the motor car companies, the problem of pricing is becoming increasingly knotty. Many of these orders carry stipulations to the effect "prices will be subject to negotiation at the time of shipment or shortly thereafter." But there are orders for materials and parts which already are being produced and shipped, say, for replacement purposes. On the latter, prices are already in effect and are governed strictly by OPA price ceilings. Now it is no exaggeration to state some suppliers are losing as much as 30-50 per cent on this type of business and find it impossible to obtain any price relief from OPA. So they just continue shipping at a loss, and absorb the loss by charging it against items going into war production which carry sufficient profit margin to carry the loss on civilian products and still leave a profit.

The question is: What can be done when war production drops off to the point where losses on civilian products cannot be absorbed? It is of little avail to expect that at this moment the buyers of civilian goods can be expected to accept a higher price, and it is next to futile to obtain approval for increase now from the OPA, which might go so far as to approve an increase in manufacturing cost, but would make no allowance for administrative, selling or overhead costs to say nothing of profit.

There is the possibility that if the volume of civilian goods production could be lifted sufficiently fast after cutbacks in war production, suppliers might not stand to be in such a bad way, but reconversion is at best going to be a time-consuming proposition, fraught with many more delays than are now envisioned by even the pessimistic planners. There is just no such thing as shutting off the war faucet today and turning on the civilian product spigot tomorrow.

Even assuming buyers could be persuaded to agree specifically to renegotiation of prices after V-E Day, there is the matter of price ceilings to contend with. Current thinking in Washington does not contemplate any scuttling of the OPA on V-E Day. Obviously the situation is going to be mixed with respect to various suppliers. If, on the one hand, a supplier continues on a portion of war production after V-E Day, his pricing problem on civilian material is not so critical, but if his war output is slashed precipitately he will definitely be in the soup.

Briggs Mfg. Co., prewar builder of Chrysler and Packard bodies, announces the likelihood of automobile body pro-

duction within three months after the European war is over, with eventually a 25 per cent increase in manufacturing plant. War contracts now held indicate reasonably steady employment for the present force of 37,800 in 11 Briggs plants through March of next year.

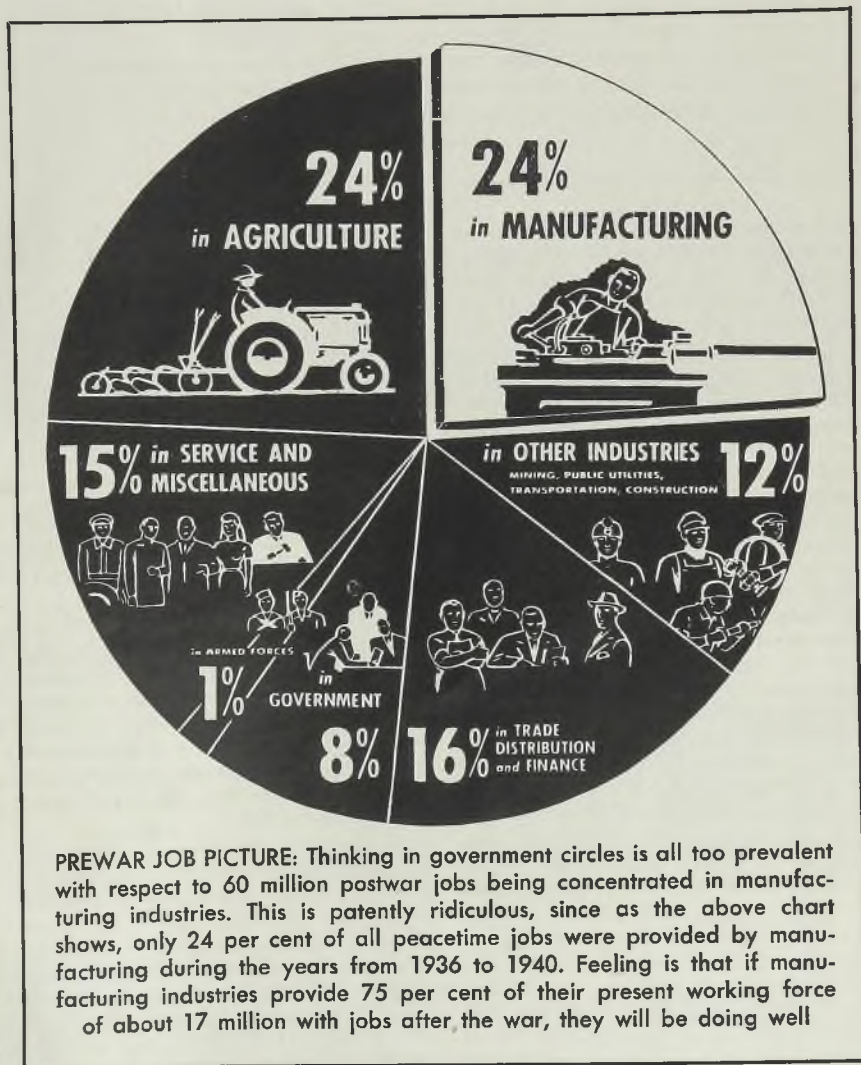
Preparations for conversion of plants to postwar production have already begun, with a number of floor layouts for equipment in body plants completed. The company's plumbing ware division probably will be the first to enter peacetime business on the basis of the present outlook, and Briggs has taken steps to reinforce its position in this field with purchase of the John Douglas Co. in Cincinnati, independent manufacturer of plumbing goods, including cast brass fittings and other specialties.

At the moment, Briggs employs 33,500 in its nine Detroit plants, 200 at its precision castings division in Cleveland,

4100 at Evansville, Ind. Some increase of employment at the latter two cities is looked for in coming months.

Magnitude of the autobody reconversion job is shown by estimates that about \$39,000,000 worth of government-owned machinery, tools, dies and fixtures must be removed from plants, along with \$39,000,000 in materials inventory. Most of the increase in prewar facilities will be concentrated at the Briggs Mack avenue plant in Detroit.

Ford metallurgists have developed a new bearing alloy which appears to have important postwar automotive possibilities in passenger car engines. It is a tri-alloy type, containing 35-40 per cent lead, 4.5-5.0 per cent silver and the balance copper, with a trace of iron. Experiments were begun about a year ago to develop a superior alloy to replace cadmium-silver cadmium-nickel and the copper-lead types. During the war, most of the cadmium supply has been grabbed off by the Navy for coating stainless steel in shipboard uses and for a secret stockpile to cover possible chemical warfare requirements. Some difficulty has been experienced with copper-lead bearings because of the high hard-



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**BRIEFING BEFORE ATTACK:** Three-dimensional terrain models, based on aerial photos, reconnaissance reports and prewar maps brought up to date, are now in use in studying objectives before our fighting men launch an attack against the enemy. Terrain models are made from anything ranging from rubber and rubber substitutes to clay, plastics, and metal. Collapsible rubber contour maps are made for the Navy by a process developed in the laboratories of the United States Rubber Co., New York

ness of the alloy wearing the shaft, and furthermore it is difficult to make double-face or floating bearings such as used in Ford connecting rods because of the segregation of lead in the alloy.

It was observed that this segregation did not occur when silver was added to the alloy, so Ford rushed laboratory tests through the road test stage and is now in production on coating steel strip with the tri-alloy material. A continuous process developed ten years ago for casting copper-lead alloy on strip is used, cleaned flat steel strip being passed slowly through a set of carbon block cores containing the molten alloy. As the strip emerges from the cores, both sides are coated uniformly with the alloy and the material then is formed and machined into bearings. Ford is supplying the coated steel strip to a large bearing manufacturer for fabrication, in addition to producing some at the Rouge plant. Better than 500,000 are already in service in military vehicle engines.

Obviously the cost of the tri-alloy bearing is higher than former types, probably about twice as much. But there is ample supply of silver in this country, and one producer of aircraft bearings currently is melting two tons daily. Encouraging though tests on the copper-lead-silver bearing appear, there are other developments just around the corner in the bearing metals field which shortly may outdistance even this new material.

Higher and higher bearing loads in automotive and aircraft engines have proved a mighty spur to improvements in bearing metals.

Engineers who can be spared from their war production tasks in motor plants to expedite the planning of motor car resumption are finding one of their principal tasks the reduction of labor costs in manufacturing operations—the big stumbling block to maintaining a semblance of normal automobile prices. A case in point, which has interesting connotations as far as the use of steel is concerned, has to do with bumpers.

#### Polishing Is Principal Bottleneck

Principal bottleneck and cost hurdle in fashioning of bumpers is the polishing before plating. The operation is tedious and time-consuming and does not lend itself readily to automatic or mechanized design because of the complicated shape of the bumper section, its curved ends and overall camber.

Furthermore, new bumper designs call for still wider stock and still more sweep-back at the ends, additionally complicating the polishing. So, it has been proposed to buy a specially die-rolled section from steel mills, with cold-rolled finish which might obviate polishing operations altogether. It appears possible such a section could be formed suitably in a press without scratching the surface, heating the material in a controlled at-

mosphere furnace and quenching on a cambering press. Typical steel stock might be SAE 1080, aiming at a finished brinell hardness of 300-350. A further idea is to make a three-piece design where the ends must be carried back across a portion of the front fenders.

Another proposal has been to change to a low-alloy-high-tensile steel, of which there are many types available, and heat treat to a hardness of 250-280. This would of course raise material cost slightly but probably not enough to cancel out savings in polishing costs. In any event, plating of course still will be used and present indications are that plating thickness will be at least doubled over the prewar specification. Much grumbling has been heard from car owners over pitting, peeling and general instability of plating on bumpers; it is believed this can be overcome to a large extent by doubling the thickness of nickel in the copper-nickel-chrome plating.

The question has been asked, with considerable logic: Why put a bright lustrous finish on a part whose sole function is to wrestle away other vehicles contending for highway space? Why not a hammered, frosted or a mottled finish on bumpers, all of which would appear functionally more suitable than a bright finish? About the only answer heard thus far is that bumpers have always been plated in the last 15 years or so and the public likes them that way, so that is how they will continue to be finished. A leading steel company may have something to offer in the form of a stainless-clad steel which it is advocating for bumper stock. How this veneered material would stand up under severe forming operations is not known.

On the basis of its population, the Detroit region of the WPB is producing an average of \$3800 of war supply contracts per capita, considering all prime war contracts awarded since Pearl Harbor. National total of such contracts is something over \$175 billions, of which the Detroit region has been assigned 12.3 per cent. Actually, the figures do not mean too much except an ingenious tabulation by the local WPB to show how Detroit leads all 13 WPB districts in contracts per capita.

Despite production of an enormous volume of spare parts for trucks, engines and combat vehicles, another critical shortage of engine parts has developed according to latest reports from Army and Navy operations. So a WPB task group has been organized under direction of R. M. Hatfield Jr. to visit plants producing these parts and determine how quickly they can meet enlarged demands.

Shipment of several thousand trucks of slightly altered design to meet requirements of Chinese military forces has begun from the Dodge plant here.

Ford has been awarded \$6,000,000 contract for a jettison-type auxiliary aluminum gasoline tank for airplanes, presumably B-24 Liberators, to be produced in the pressed steel building of the Rouge plant over the next six months.



# ECONOMY!

—ANOTHER ZINC ALLOY DIE CASTING CUTS COST AND IMPROVES APPEARANCE



The restaurant-size can opener shown\* provides one of many case histories attesting to the economies of zinc alloy die castings. This device, as you see it, is composed essentially of cast iron parts. Now the manufacturer has adopted a zinc alloy die cast body with a steel arm cast as an insert (right). This casting costs less than 50 cents *complete*, whereas the machining of the former cast iron body *alone* cost approximately \$1.00.

Add to this saving the elimination of an assembly operation in fastening the arm to the body. Take into account, also, the improved appearance due to the smooth as-cast surface of the die casting. The result is typical of the economic and physical improvements achieved in many widely varied products today through the intelligent use of zinc alloy die castings.

Economy is just one of many inherent advantages which make die castings of zinc alloy the most widely used under normal conditions. *Every die casting company is equipped to make zinc alloy die castings*, and will be glad to discuss all of their advantages with you — or write to The New Jersey Zinc Company, 160 Front Street, New York 7, N. Y.

\*This can opener is now widely used by the Armed Forces.



# ZINC

FOR DIE CASTING ALLOYS

The Research was done, the Alloys were developed, and most Die Castings are specified with  
**HORSE HEAD SPECIAL (99.99+ % Uniform Quality) ZINC**





JOHN M. MILLE



PAUL M. MUELLER



JAMES E. POWER

John M. Mille, formerly manager of the arsenal machine shop of Pittsburgh Steel Foundry Corp., Glassport, Pa., has been made assistant to the president of the company.

Paul M. Mueller, for the past nine years headquarters engineer for Revere Copper & Brass Inc., New York, has joined Blaw-Knox Co., Pittsburgh, as chief engineer in charge of development.

Paul B. Tonnar, formerly chief engineer, Andrews Steel Co., Newport, Ky., has become associated with Carnegie-Illinois Steel Corp., Pittsburgh, on the chief engineer's staff.

Col. Horace A. Shepard has been named acting chief of the production section in the Procurement Division, Air Technical Service Command, Wright Field, O. Continuing as chief of the Procurement Division's control section, Colonel Shepard succeeds Col. George E. Price, who has left Wright Field on an undisclosed mission.

Edward Stokvis, executive vice president, R. S. Stokvis & Sons Inc., New York, and general manager, N. V. Handelsmaatschappij R. S. Stokvis & Zonen, Curacao, N. W. I., has become a director of the Colonial Trust Co., New York.

J. C. Gross has been appointed eastern district stores manager with offices in New York for Westinghouse Electric Supply Co., New York.

William P. McGervey Jr. has been named president, Hanford Foundry Co., San Bernardino, Calif., Arnold K. Steger has been made vice president, and Maurice W. Cardwell, secretary and treasurer. All three officials formerly were associated with Warman Steel Casting Co., Los Angeles.

George Krieger, who has been in charge of the Farm Machinery Division, War Production Board, serving recently as special assistant to Donald M. Nelson, has resigned and is returning to the

Ethyl Corp., New York, to be in charge of rural marketing and special development work as assistant to Julian J. Frey, general sales manager.

James E. Power has been appointed eastern sales manager, mechanical goods division, United States Rubber Co., New York.

H. R. Pittman has been appointed treasurer, Vulcan Iron Works, Wilkes-Barre, Pa., succeeding W. W. Moss, resigned.

Ernest Greenway Jarvis, founder, president and general manager, Niagara Falls Smelting & Refining Corp., Buffalo, has been named chief metallurgist for Continental Industries Inc., New York. Mr. Jarvis is author of "Facts for Foundrymen."

Lewis S. Bergen is resigning as associate director of metallurgy and research, Crucible Steel Co. of America, New York, to become president of Bergen Precision Castings Inc., Pleasantville,



JOHN W. MOXON

Who has been elected secretary-treasurer, Carpenter Steel Co., Reading, Pa., noted in STEEL, Nov. 27, p. 63.

N. Y., recently-formed organization of steel and alloy metallurgists, ceramic engineers and technicians skilled in the field of precision castings, whose objective is the scientific development of this process to higher quality standards than now available.

E. L. Milford has been named manager of the Chicago office of American Gas Furnace Co., Elizabeth, N. J., succeeding William J. Barescheer, retired. The company has opened a new office in Milwaukee at 152 West Wisconsin avenue, supervised by George A. F. Machlet.

Harold Martin, formerly manager of merchant product sales in the Boston sales office of American Steel & Wire Co., Cleveland, has been appointed assistant manager of New England sales.

Charles E. Scholl, formerly sales manager, Bright Light Reflector Co., Brooklyn, N. Y., has become associated with Federal Electric Products Co. Inc., Newark, N. J., as general sales manager.

Gerald L. Murphy, a senior associate of McKinsey & Co., New York, management consultants, has been elected a principal in the firm.

Frederick H. Ruff, formerly affiliated with Universal Cyclops Steel Corp., Bridgeville, Pa., has joined Jessop Steel Co., Washington, Pa., as controller.

Gilbert D. Dill has been appointed a member of the sales engineering staff of American Foundry Equipment Co., Mishawaka, Ind. Mr. Dill formerly served as purchasing engineer for Arthur G. McKee & Co., Cleveland, in charge of purchases involved in construction of two wartime steel plants.

Frank O. Zimmerman has been appointed assistant manager of the Chicago sales branch, Federal Telephone



ALVIN B. EINIG

Who has been elected president, American Machine Tool Distributors' Association, as announced in STEEL, Nov. 20, p. 70. Mr. Einig is general manager of Match & Merryweather Co., Cleveland



& Radio Corp., Newark, N. J. Formerly he was with Westinghouse Electric Elevator Co. at Chicago and Indianapolis.

J. Donald Smith has been appointed manager of the sales promotion department, York Corp., York, Pa.

L. J. Kramer has been made superintendent of the lapweld tube department, Allegheny Ludlum Steel Corp., Brackenridge, Pa., succeeding the late Charles Rupert.

William S. Newell, president, Bath Iron Works Corp., has been elected president of the Society of Naval Architects and Marine Engineers, succeeding John F. Metten, board chairman, New York Shipbuilding Corp., Camden, N. J.

Harry C. Gunetti, for the past three years general superintendent, Joshua Hendy Iron Works, Sunnyvale, Calif., has been named general manager.

Daniel H. Holmes has been appointed district sales manager of the New York territory for the Weatherhead Co., Cleveland.

L. S. Stilwell, sales representative of Western Automatic Machine Screw Co., Elyria, O., has been named branch manager of the company's Cleveland sales office, replacing W. W. Kimbrough, who becomes branch manager of the Detroit office and warehouse.

John P. Roche, assistant to the president, Oliver Iron & Steel Corp., Pittsburgh, has been appointed industry member, National War Labor Board, Washington.

E. H. Branning, president of CKR Co., Cleveland, until it merged with American Fork & Hoe Co., also of Cleveland, and subsequently an executive of the latter concern, has been appointed general manager, Wood Shovel & Tool



L. J. KARMEN

Co., Piqua, O. For the past two years Mr. Branning has served as head of the Hardware and Tools Procurement Division, Army Service Forces.

L. J. Karmen, previously associated with Booz, Allen & Hamilton, management engineers of Chicago and New York, has joined the Crosley Corp., Cincinnati, as director of administration, manufacturing division.

Dean Swift has opened offices in the Chanin building, 42d and Lexington, New York 17, to represent Western Gear Works, Seattle, and the associate plant, Pacific Gear & Tool Works, San Francisco.

Matthew M. Gouger has been appointed assistant general superintendent of National Tube Co.'s Ellwood works, Ellwood City, Pa.

Gregory L. Rees has been appointed range and water heater sales division manager, Edison General Electric Appliance Co., Chicago. H. J. Scaife has been named manager of the western sales



P. S. DICKEY

region, with headquarters in San Francisco, and is succeeded as kitchen sales manager by John Fellmann. Floyd Slasor becomes manager of the refrigeration sales division.

P. S. Dickey, formerly research engineer, Bailey Meter Co., Cleveland, has been appointed chief engineer. He will be assisted by H. H. Gorrie, who has been named assistant chief engineer, and R. E. Clark, newly-appointed manager of contract engineering.

Martin J. Conway has been appointed manager, Petroleum division, Lukens Steel Co. and subsidiaries, By-Products Steel Corp. and Lukenweld Inc., Coatesville, Pa. Mr. Conway has been associated with Lukens since 1926.

J. Ringen Drummond has been appointed assistant factory manager, Timken Roller Bearing Co., Canton, O., succeeding H. M. Richey, who became factory manager last December.

Robert W. Biggs has been named manager of the McKeesport, Pa., works of Jones & Laughlin Steel Corp., Pittsburgh, succeeding the late Walter B. Minch.

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

Horace H. Lester, physicist, and Wallace B. Kennedy, superintendent of production, Watertown arsenal, have received Exceptional Civilian Service Awards "for extraordinary service within and beyond the call of duty."

New western sales representatives for Allis-Chalmers Mfg. Co., Milwaukee, include Frank Sullivan, Seattle; Earl Lancaster, Los Angeles; Frank Turner, Portland, Oreg., and E. J. Baireuther, Denver.

Robert E. Dye, since 1935 assistant general manager, Dome Mines Ltd., South Porcupine, Ont., Canada, will succeed J. H. Stovel as general manager,



GEORGE S. EATON

Who has been appointed executive secretary, National Tool and Die Manufacturers Association, Cleveland, reported in STEEL, Nov. 27, p. 62.



FREDERICK S. BLACKALL, JR.

President and treasurer, Taft-Peirce Mfg. Co., Woonsocket, R. I., who has been elected president of the New England Council, as reported in STEEL, Nov. 27, p. 62.



effective March 1. Mr. Stovel will continue as vice president and managing director of the company and its subsidiaries.

—o—  
**Carl L. Norden**, of Carl L. Norden Inc., received the 1944 Holley Medal from the American Society of Mechanical Engineers for "his invention and development of the Norden bombsight and other valuable devices which should hasten the peace."

—o—  
**Harold J. B. Thompson** has joined the staff of Lukens Steel Co. and its divisions, By-Products Steel Corp. and Lukenweld Inc., Coatesville, Pa., as manager of real estate.

—o—  
**Elmer K. Bolton**, chemical director of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., has been awarded the 1944 Perkin Medal of the Society of Chemical Industry. He was cited for



**A. C. STREAMER**  
*Vice president of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., who has been elected president, National Electrical Manufacturers' Association, noted in STEEL, Nov. 6, p. 97.*

leadership in the synthesis of the first general-purpose synthetic rubber to be developed either here or abroad and for his direction of nylon research.

—o—  
**Price R. Reid**, formerly general manager of the Concan Ordnance Co., a Continental Can Co. subsidiary which was dissolved early this year, has been appointed assistant division manager of operations of Continental's eastern division, with his headquarters in Baltimore, 3500 East Biddle street.

—o—  
**Fred D. Lehn** has been appointed assistant secretary and assistant treasurer, Underwood Elliott Fisher Co., New York, and **John M. Thompson Jr.** has been named director of the international division to succeed Mr. Lehn.

—o—  
**Willis A. Kropp**, industrial design engineer and stylist, has joined Aircraft Parts Development Corp., Summit, N. J.

OBITUARIES . . .

**Walter E. Meub**, 60, since 1932 vice president in charge of finance, Youngstown Sheet & Tube Co., Youngstown, O., died Nov. 28 in Columbus, O. He had been with the company 35 years, starting in 1909 as a clerk at the Campbell plant, and advancing rapidly through the sales and auditing departments. In 1916 Mr. Meub was named secretary to the late James A. Campbell, founder and president of Youngstown Sheet & Tube, and four years later he became secretary of the company. In 1922 he was made assistant treasurer, and in 1925 was elected secretary and treasurer.

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**Emile Darte**, 66, vice president and general manager, Electro Metallurgical Co. of Canada Ltd., Welland, Ont., died Nov. 26 in Brockville, Ont.

—o—  
**Arthur Zinn**, 75, retired metal goods manufacturer and one of the organizers of Gem Safety Razor Corp., which in 1919 combined with other safety razor companies to form American Safety Razor Corp., Brooklyn, N. Y., died Nov. 19 in New York.

—o—  
**Edward League Dawes**, 91, a founder of Standard Sanitary Mfg. Co., and until his recent retirement a vice president of American Radiator & Standard Sanitary Corp., New York, died Nov. 20 in Sewickley, Pa.

—o—  
**George Kneeland McNulty**, 73, who prior to his retirement in 1943 had been affiliated with the metal trade in the United States for half a century, died Nov. 27 in St. Catharines, Ont., Canada. Mr. McNulty was Baltimore representative for C. S. Trench & Co., New York, later becoming sales agent in Pittsburgh for Lewis Lazarus & Sons, and also acting for a considerable time as sales agent, Hegeler Zinc Co., Danville,

Ill. Following his Lazarus connection in 1932 Mr. McNulty rejoined C. S. Trench & Co., serving as their Pittsburgh correspondent until the government took over all of the wholesale distribution of tin in 1942. The last position he held was with Copper Recovery Corp., New York, for some months prior to the winding up of that organization.

—o—  
**John S. Burke**, 82, co-founder of the Logansport Radiator Co., Logansport, Ind., died there Nov. 20.

—o—  
**Dr. Thomas Swinden**, 58, director of research, United Steel Companies Ltd., Sheffield, England, died Oct. 27. He was a director of Samuel Fox & Co. Ltd., Distington Hematite Iron Co. Ltd. and British Magnesite Corp. Ltd. Dr. Swinden made many important contributions to ferrous metallurgy, including researches on tungsten and molybdenum steels, development of refractory materials, determination of oxygen in steel, and in the improvement of welding methods. He was a member of many scientific and technical organizations, including the American Society for Metals, and he was recipient of the 1941 Bessemer Gold Medal of the Iron and Steel Institute (British).

—o—  
**Charles Martin Walker**, 53, president, Crucible Furnace Co. Inc., Richmond, Va., and Culpepper Machine Works, died Nov. 19.

—o—  
**W. Howard Edwards**, 54, president, Edwards Iron Works Inc., South Bend, Ind., and formerly an executive for Studebaker Corp., died recently. During World War I Mr. Edwards was in charge of ordnance materials for Studebaker and later was on the claims board of the Chicago district of the United States Ordnance Department. He organized his own company in 1920 and ten years later began expanding into the manufacture of truck bodies, cabs and

semi-trailers which brought him in close contact with the Studebaker truck division, of which he was named general manager in November, 1933.

—o—  
**Walter B. Donnell**, 56, assistant secretary, Midwest Piping & Supply Co. Inc., St. Louis, died Nov. 9 in that city.

—o—  
**Dr. Rudolph C. Engel**, 65, medical director of Republic Steel Corp., Cleveland, died Nov. 28 in that city.

—o—  
**Carl A. Cover**, 51, vice president, Bell Aircraft Corp., Buffalo, and manager of the company's B-29 Superfortress plant in Georgia, and **Max Stupar**, 59, Bell industrial planning director, were killed Nov. 27 in the crash of their twin-engined cargo plane at Wright Field, O., while en route from Marietta, Ga., to Buffalo.

—o—  
**Clarence B. Wilkinson**, 61, for nearly 25 years an engineer with American Steel & Wire Co., Cleveland, died Nov. 27 in Richfield, O.

—o—  
**Charles W. Gollmar**, 63, former purchasing agent, Neville Locomotive Stoker Co., died Nov. 21 in Pittsburgh.

—o—  
**Howard Gay**, 51, secretary and cost department manager, Macwhyte Co., Kenosha, Wis., died Nov. 23 in that city. His cost accounting system installed in 1919 is recognized as a model for the industry.

—o—  
**Albert W. Niedringhaus**, 75, for many years production manager of Granite City Steel Co., Granite City, Ill., died Nov. 14.

—o—  
**Frank Kister**, 67, assistant district manager, American Car & Foundry Co., New York, died Nov. 19 in St. Charles, Mo. He had been associated with the company for 51 years.



## National Tube in Full Production Of Rocket Parts

*U. S. Steel Corp. subsidiary producing rocket motor tubes and "war heads" at McKeesport, Pa., plant*

ROCKET motor tubes and "war heads" for the Navy, made from tubing and seamless pipe, have passed from experimental to full production at the Christy Park Works, National Tube Co., McKeesport, Pa., subsidiary of the United States Steel Corp.

Not far from the new fragmentation bomb production line and in the same shop where National Tube in 1939 developed the new method of spinning

bombs from pipe, workers are engaged in machining, surface treating, painting, inspecting and packing motor tubes for the Navy rockets. They are made from the seamless cold drawn tubing manufactured at the National Tube's Tubular Alloy Steel division at Gary, Ind.

In one operation, a nozzle-like venturi tube is inserted near the end of the casting. The motor power of the rocket is generated within this motor tube by reaction of burning gases escaping backward, and the venturi controls release of these gases. At loading plants, long powder sticks are inserted in the four-foot tubes and electric fuses are attached.

The "war head", which resembles a shell or small bomb, is made at Christy Park from seamless pipe. Officially known as the rocket body, it holds the explosive charge and is attached to the front end of the motor tube.

At the McKeesport plant, the front and back ends of the rocket body are shaped from heated pipe sections under hydraulic pressure followed by finishing opera-

tions which include sandblasting, machining and painting. Explosive charge is loaded at arsenals.

Rockets are used for antitank and antipersonnel purposes, as well as for firepower on fighter planes, and as take-off boosters.

## Forms Public Relations Agency in Metals Field

The new firm of Joseph Meredith Kurtz & Associates, public relations counsellors, has been formed in Cleveland with offices in the Hanna building by Joseph M. Kurtz, formerly assistant editor of STEEL.

Promotion of activities regarding plant management and new engineering and product developments of industrial plants will be a specialty of the new firm. The concern plans to concentrate its efforts in the metalworking and metal producing fields.

Mr. Kurtz, prior to joining STEEL, was a member of the editorial staff of the *Vindicator*, daily newspaper of Youngstown, O. He is a graduate of Ohio State University.

## Timken To Build New Plant at St. Thomas, Ont.

St. Thomas, Ont., will be the site of a new bearing and rock bit plant to be operated by Timken Roller Bearing Co. Ltd., Canadian subsidiary of Timken Roller Bearing Co., Canton, O.

Timken Roller Bearing Co. Ltd., has purchased from the city of St. Thomas approximately 75 acres of ground on the east side of the city in Talbot street.

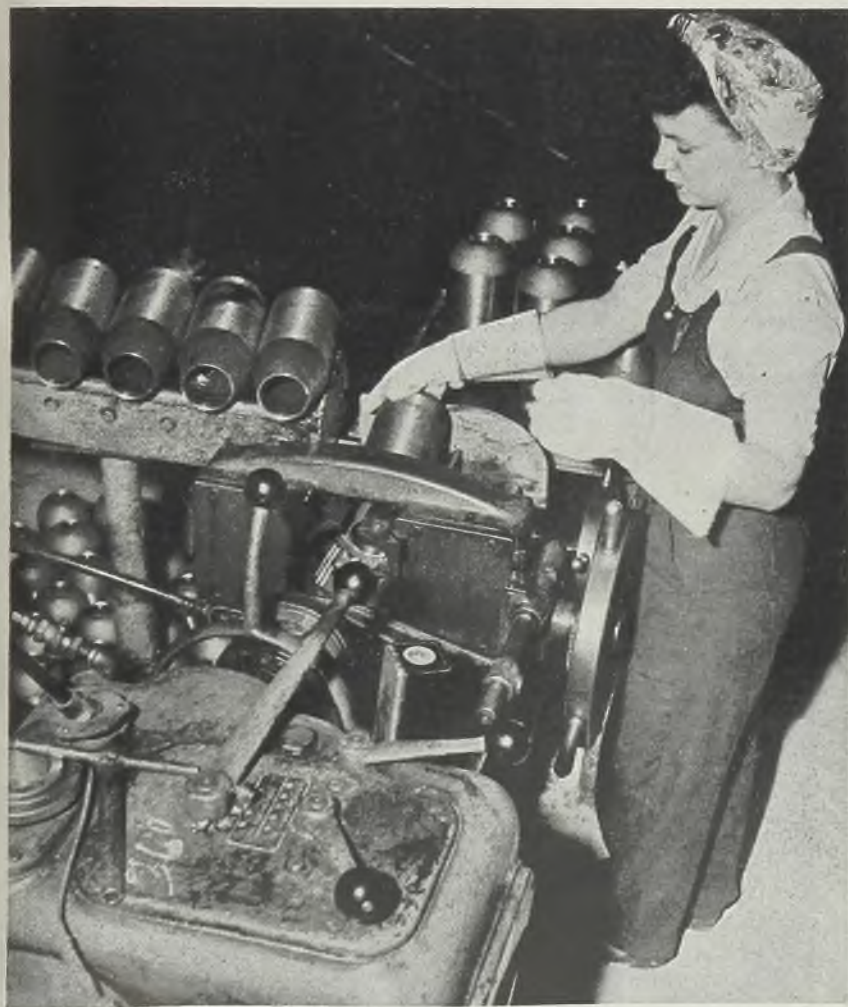
## Metal Products Company Organized at Youngstown

A new industrial plant, Kor Die & Metal Products Co., Youngstown, O., which will produce metal dies for fabricating plants, has been organized by David M. Oyer and Morris Regenstein, operators of the Wickliffe Lumber & Supply Co.

The new firm will begin production within a few weeks and already has begun installation of equipment. It will occupy a plant on Mahoning avenue, Youngstown. The plant has 12,000 to 14,000 square feet of floor space.

## Plan Radio Output 60 Days After Restrictions Lifted

Within 60 days after present government restrictions are lifted, Stewart-Warner Corp., Chicago, will be producing and shipping civilian radios from what is now reputedly the largest privately-owned shell fuze plant in the nation, Frank A. Hiter, senior vice president of the corporation told postwar radio distributors and dealers recently.



*Rocket bodies, known to the men of the Navy as "war heads," are manufactured from seamless steel pipe at Christy Park Works, National Tube Co., McKeesport, Pa. This woman is operating a machine which cuts the threading in the tail end of these explosive devices. It is attached to the head end of the rocket motor tube*



# WING TIPS

*Technical papers reveal tremendous accomplishments made by electrical industry in improving existing equipment and in developing new accessories for the nation's airplanes. Greater efficiency in aircraft performance rising as result*

NEED for greater efficiency in the performance of aircraft has been rising during the past few years almost as rapidly as that for increased quantity of planes. This need has stimulated research, especially in the electrical industry which has made remarkable progress in improving existing equipment and in developing new aviation accessories.

Technical papers which were presented at American Institute of Electrical Engineers' meetings on air transportation earlier this year reveal what accomplishments have been achieved and the direction which current studies are taking on electrical equipment for aircraft.

D. E. Fritz and C. K. Hooper, both of Westinghouse Electric & Mfg. Co., in their paper, "Alternating Versus Direct Current for Aircraft Radio Power Supply," said: "A consideration of the factors of reliability, efficiency, servicing simplicity, flexibility and minimum radio interference, leads to the conclusion that for aircraft radio power supplies, a-c systems are to be recommended. The choice of frequency does not greatly affect this recommendation, but single-phase operated radio equipment is to be preferred to three-phase equipment, even though the aircraft electrical system may provide three-phase power for other uses."

The following conclusions were reached, as applying to four general types of commercial and military airplanes: Where 400-cycle, three-phase systems supply the major portion of the airplane's electrical load, the radio equipment should be operated from one phase of the supply system; if a low voltage direct current system is also available, it should be utilized to operate relays, band-switching motors, tube filaments, microphone circuits, etc.

J. D. Miner Jr., Westinghouse Electric & Mfg. Co., in his paper on "Design Considerations for D-C Aircraft Generators," portrayed the trend of the past few years toward higher and higher generator ratings and suggested approaches to solutions of some of the problems involved as further increases in ratings are necessary. He summarizes the points in his paper:

"High maximum ratings for aircraft generators are of primary importance to military aviation. In general, high ratings will be and must be accompanied by high operating speeds. As far as mechanical considerations are concerned, endurance, especially at high speeds, is of primary importance, while improvements in ventilation offer a major opportunity for increased ratings. As far as electrical considerations are concerned, increased excitation will do

more than any other single factor to increase output at any given speed.

"Generators for maximum ratings must be designed to provide good commutation over the full range of speed and load, and, in general, this requires the use of carefully designed interpoles and pole-faced windings. High temperatures are not as important in obtaining maximum outputs as has sometimes been indicated.

"Two things are suggested for the consideration of those who would like to assist the generator designer in his efforts to increase ratings: (1) Intensive development of high-induction magnetic materials; (2) development of a voltage regulator which will permit field currents of at least 15 amperes."

## Rating Limit Not in Sight

H. E. Keneipp and C. G. Veinott, Westinghouse Electric & Mfg. Co., in their paper, "A 40-KVA, 400-Cycle Aircraft Alternator," said a number of these alternators have been built and that extensive tests have demonstrated that such machines are ready for use in aircraft as soon as a constant-speed drive, or other suitable driving means is made available. "A weight of 85 pounds for this 40-kva alternator, compared with a weight of 47 pounds for a 9-kw d-c aircraft generator indicates that electrical outputs of generators can still be expected to increase faster than the weights," they continued. "Experience gained in the building and testing of this alternator can be used to develop better and lighter machines, or machines of still higher rating; the limit of ratings of aircraft generators is not even in sight."

H. J. Braun, Westinghouse Electric & Mfg. Co., reviewed fundamental characteristics of the three-phase induction

motors with respect to their possible application in aircraft. In his paper, "Some Aspects of the Application of Induction Motors to Aircraft," he presented a brief review of present motor specifications and test data on the operation of an induction motor with one or two lines shot away. Common types of motor loading were discussed with reference to the suitability of induction-motor drive for each. Charts were appended to illustrate the characteristics of motors and various types of loading. He concluded that the simplicity, ruggedness, and lack of commutating or slip ring brushes have given induction motors an advantage which far outweighs the few disadvantages they may have.

Cyril G. Veinott, Westinghouse Electric & Mfg. Co., in his paper, "Inherent-Overheating Protection of D-C Aircraft Motors," said that locked-rotor tests taken at ground level show that effective protection is obtained over the tested range of ambient temperatures from minus 58 degrees Cent. to plus 78 degrees Cent. A reduced-voltage test demonstrated that the protection is as effective at 17 volts as at 26 volts while altitude-chamber tests demonstrated that the effectiveness of the protection is not impaired at 40,000 feet, also that the protective device has ample interrupting capacity at this altitude.

In another paper, "Blast-Tube Cooling for Aircraft Generators," Mr. Veinott said that the performance of the blast tube can be expressed in terms of two factors: Internal pressure available with no flow and air-flow resistance, a quantity analogous to ohms in a d-c circuit. "Values of these two constants, which vary somewhat, depending upon the installation, upon plane speed and other factors, are all that is required to predict the air flow through a generator which has been tested independently of the blast tube," he said. "Tests on the generator alone can be made to yield, in the case of a generator with no internal fan, a single constant, the air-flow resistance. If the generator has an internal fan, more tests are required on the generator to determine the char-



PRODUCED FOR CHINA: North American Aviation workers are putting the final touches on this AT-6 Texan combat trainer for the Chinese Air Force under an order allocated to China by the U. S. Army Air Forces

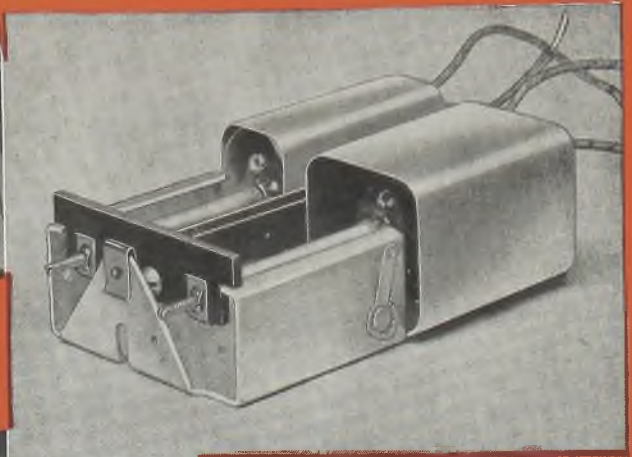


# THE *Self-Retaining* "U" Type SPEED NUT

**SPEEDS UP AND IMPROVES ASSEMBLY OF STOVES, RADIOS AND MOTOR VEHICLES**



Self-retained "U" nuts permit blind assembly of stove panels and door liners. They fasten parts securely, yet are resilient enough to prevent enamel damage.



"U" nuts fit over a fibre bracket holding automatic tuning screws. Spring prongs of Speed Nuts provide correct tension to permit adjustment of core screws.



Heavy duty "U" nuts fasten auto muffler bracket to frame. One operator makes complete attachment with power screwdriver, as "U" nuts are self-retained in position.

"U" type SPEED NUTS are easily and quickly applied — just snapped by hand into screw-receiving position — no welding, riveting or clinching necessary. No wonder "U" nuts SPEED UP product assembly!

"U" type SPEED NUTS hold tight — their arched prongs absorbing vibration to prevent loosening. Yet, their resiliency prevents damage to the parts they hold. No wonder "U" nuts

IMPROVE the finished product! Available in many shapes and sizes, "U" type SPEED NUTS fit a wide range of thicknesses — metal plastic or glass.

Send us your design details and we'll show you how SPEED NUTS can cut assembly time and cost and improve the quality of your product too. Write today!

**TINNERMAN PRODUCTS INC.**

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In Canada: Wallace Barnes Co., Hamilton, Ontario.

In England: Simmonds Aerocessories Ltd., London.



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\*Trademark Reg. U. S. Patent Office

**F A S T E S T   T H I N G   I N   F A S T E N I N G S**



acteristics of this fan, but no more tests are required on the blast-tube installation.

"In general, the method of attack is: First, the air flow resistance of the generator and blast tube are obtained; second, the velocity head of air flow is computed from the closed-end pressure and resistances; third, the velocity, volume, and weight are then computed from the velocity head.

"A more rational and illuminating method of specifying the minimum characteristics of a blast tube is proposed. The new method of specification would provide the airframe builder with a clear-cut specification which could be used for design and checking of the blast tube, it would provide the generator builder with a rational basis for designing his cooling system in the generator for maximum effectiveness, and, further, would provide a simple method for determining what pressure to apply to any given generator for sea-level tests, either at atmospheric pressure or in an altitude chamber."

J. C. Cunningham and W. M. Davidson, both of Westinghouse Electric & Mfg. Co., arrived at the following conclusions in their paper on "A-C and D-C Short-Circuit Tests on Aircraft Cable":

"1. The magnitude of fault current, cable size, and contact area, and the heat-dissipating ability of the surface immediately adjacent to the fault are the principal determinants of the time required to burn clear a cable fault. (a) Higher current produces shorter clearing time. (b) Larger cables require

longer to clear at a given current. Their increased stiffness may prevent formation of an arc or reduce the rate at which the arc is lengthened. Faults on heavy cables also have more contact area and radiating surface. However, these factors would not usually increase clearing time in proportion to the cable cross section because of the increased probability of fraying.

"2. Damage to both insulation and structure and fire hazard are greater at low currents than high currents because of the much longer time required to clear. Damage would be reduced for currents which approach the normal capacity of both cable and structure. A completely fireproof insulation would be desirable.

### 1000-Volt Test Prolongs Arcing

"3. Voltage differences below 240 volts had no significant effect on total time to clear although the arcing time on d-c tests was increased slightly and damage to the aluminum sheet was increased. D-C faults at 240 volts showed appreciable increase in arcing time and a few tests at 1000 volts showed prolonged arcing.

"4. 'High-thermal-capacity' faults, although unlikely to occur, required much longer to clear than 'low-thermal capacity' faults. The resulting damage and fire hazard were correspondingly greater. At very low currents this difference disappeared because of the long time required to burn clear either type of fault. . . .

"5. Reduced air pressure caused some

reduction in tendency to weld at 28.5 volts. At higher voltages on d-c faults the increase in arcing time became sufficient to constitute a disadvantage.

"6. The greatest fire hazard resulted from insulation fires at low currents. Spatting of hot metal particles also produced some fire hazard at all currents. The action was more violent with d-c faults than with a-c faults.

"7. Vibration will probably cause longer arcing time and more restrikes than were obtained in these tests. Also, under actual conditions the electrical system is energized and the cable is in motion when a short-circuit occurs. Both of these factors may help to reduce the probability of welds.

"8. Protective devices to isolate cable faults should be used where the available fault current can be low enough to produce serious fire hazard or result in a weld. In most cases it will be necessary to provide protective devices on 400-cycle systems to assure clearing in a short enough time (approximately 0.1 second) to prevent loss of synchronism or stalling of motors. In a d-c system ample battery capacity or separate generator or excitation are required unless faults can be cleared in a few tenths of a second."

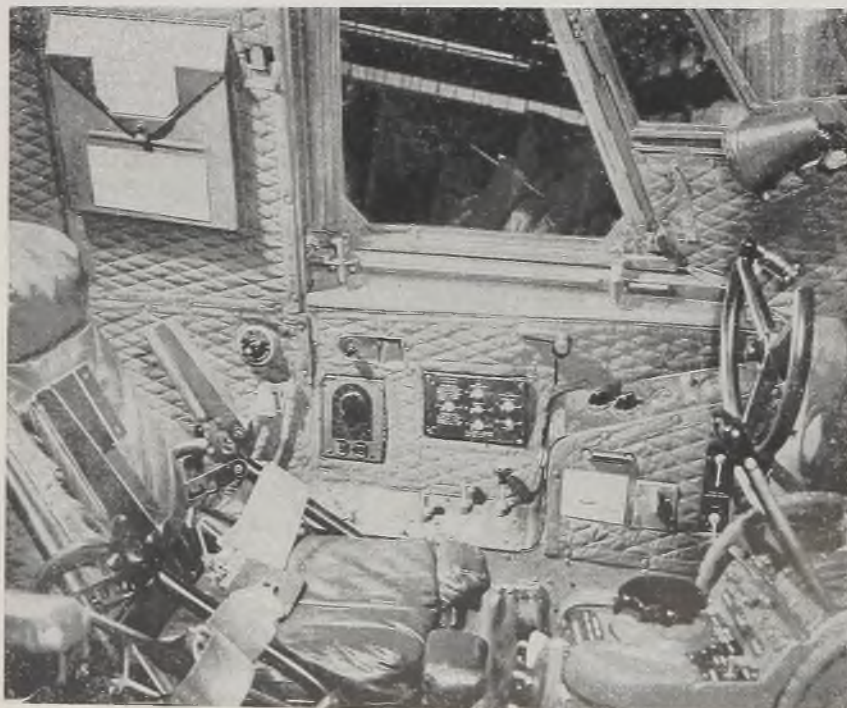
## "Glass" Insulation Offers More Flying Comfort

Army airmen piloting huge Curtiss C-46 Commando cargo transports through the sub-zero temperatures of high altitudes will find new comfort in the latest insulation achievements attained by engineers in the St. Louis plant of Curtiss-Wright Corp.'s Airplane division, who have perfected a fiber-like glass insulation blanket.

The plane's new "blanket" insulation is in the form of minute glass fibers, .0002-inch in diameter, actually infinitesimal glass rods, fabricated into a soft, silk like blanket half an inch thick in a resin set, and installed in the airplane by means of a durable aluminum finish trim cloth and simple, efficient snap fasteners.

The insulation is a decided improvement over others for aeronautical uses, and affords a saving in weight of more than 200 pounds per airplane of the Commando size over materials such as kapok or other vegetable fibers. The entire glass fiber installation for the plane weighs only 185 pounds.

The glass fiber blanket is a development of the Owens-Corning Fiberglas Corp., Toledo, O. It weighs one ounce per square foot in the one-half inch thickness. Besides its all-important feature of lightness, the glass insulating material is easily fabricated, even to its fitting around electrical outlets, control boxes, corners, windows, air ducts, etc., giving a completely cloaked airplane, even to the window coverings. It is non-inflammable. It has especially high sound absorbing qualities.



Captain's side of the pilots' compartment of a Curtiss C-46 Commando transport of the Army type, built by Curtiss-Wright Corp., shows the inch-thick "fiberglas" insulation with diamond quilted trim cloth. It offers protection against heat or cold and noise. Note the adaptability of the installation around the various instruments, windows and switches



*... it is later than you think!*

# Plan Now to EX-CELL-Oize for Tomorrow's Production Needs

NOW is the time to prepare for needs immediately ahead . . . for tomorrow's keener competition that will make more efficient production methods essential. Your production problems may readily be solved by special-purpose machines that perform multiple operations . . . machines designed and built to meet your specific requirements. Ex-Cell-O has had many years of practical experience in *precision engineering* special-purpose machines that combine improved accuracy and finish with greater production and worthwhile economy. Get in touch today with Ex-Cell-O at Detroit or with any of its field engineers in 32 other industrial centers both in the United States and Canada.

**EX-CELL-O CORPORATION  
DETROIT 6**



Special Ex-Cell-O Machine to mill four grooves in aluminum alloy plates



Special Ex-Cell-O four-way machine to drill 40 holes in body of alloy steel sleeves



**ECONOMIZE  
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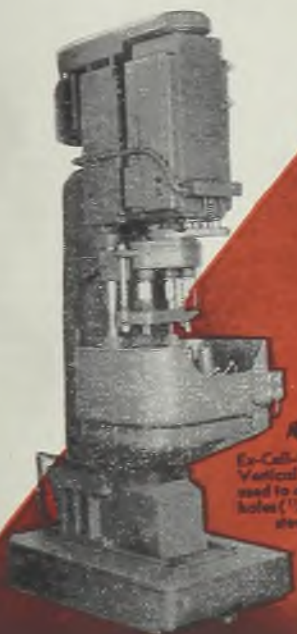
**PART:** Aircraft motor accessories drive housing

**MATERIAL:** Magnesium

**OPERATION:** Finish bore and face five periphery holes

**MACHINE:** Ex-Cell-O No. 61 Cylinder Boring Machine

One Ex-Cell-O machine now does the work on this part where previously four other machines were required. The big saving in machines, fixtures, operators and floor space is readily apparent.



Ex-Cell-O Style 45 Vertical Drill Press used to drill and ream holes (1/4") in stainless steel flange



Ex-Cell-O Style 61 Cylinder Boring Machine, used to finish bore connecting rods

Where increased production, high accuracy, and greater economy through multiple operations are required . . . consult EX-CELL-O.

**EX-CELL-O makes:**

- SPECIAL MULTIPLE WAY-TYPE PRECISION BORING MACHINES
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- PRECISION BORING, TURNING AND FACING MACHINES, AND FIXTURES
- PRECISION CYLINDER BORING MACHINES

- PRECISION THREAD GRINDING MACHINES
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- PRECISION BROACH SHARPENING MACHINES
- OTHER SPECIAL PURPOSE MACHINES
- BROACHES AND BROACH FIXTURES
- HYDRAULIC POWER UNITS

- GRINDING SPINDLES
- DRILL JIG BUSHINGS
- CONTINENTAL CUTTING TOOLS
- TOOL GRINDERS
- FUEL INJECTION EQUIPMENT
- R. R. PINS AND BUSHING
- PURE-PAK PAPER MILK BOTTLE MACHINES
- PRECISION AIRCRAFT AND MISCELLANEOUS PARTS



PRELIMINARY work already done to assist China in her industrialization program, as reported by W. W. Kintner, Timken Roller Bearing Co., Canton, O., will be of tremendous value to Donald M. Nelson's mission which has undertaken the task of stimulating the war production of our Far Eastern ally. Mr. Kintner recently returned from China where he served the State Department as a specialist under a program of cultural exchange with that country.

Mr. Kintner says one of the chief handicaps in China's efforts to become fully industrialized in ten years has been a lack of skilled workmen. A majority of the available manpower is inexperienced in machine work and must be trained by a comparatively few engineers who are thereby prevented from contributing their special skills fully to actual production. The United States mission under Mr. Nelson will have the close co-operation, however, of the managements of most of the mechanized industries which are in the hands of capable engineers, many of whom have been educated in foreign countries.

Among serious handicaps in the Chinese industrialization program is the lack of high quality raw materials and manufacturing equipment. The invasion of their country by the Japanese forced the Chinese to move their industries to the interior where transportation is inadequate for bringing in supplies and equipment. Some equipment has been installed in underground quarters as protection against air raids and this tends to reduce plant efficiency.

Mr. Kintner inspected many plants, instructing the young engineers who were acting as foremen in the shops on how they could best use the materials and machines available and, when the materials best suited to a job were not available, what to use as a substitute. As an example of the contribution which Mr. Kintner made to the program, he "tried to establish a standard for forging and grinding lathe and planer tools that would cut more efficiently and could be used longer between grindings. This also saved tool steel which is very scarce. For some reason the workmen had acquired the habit of grinding too much rake and clearance on tools and this weakened the cutting edge."

Mr. Kintner also showed the workmen how to make a brazing compound and how to successfully braze small pieces of high-speed steel to carbon steel shanks. It was sometimes necessary, he pointed out, to train one man to grind the tools and have him do all the grinding. He was able in some instances to design fixtures for holding headstocks and gear boxes that were being bored on a lathe so that more accurate work could be done and much time saved in set-up. He helped design taper and relieving attachments for the lathes that were being built.

In some cases, where parts for machines were missing, he was able to show how parts could be made to put the machine in operation. In one of the plants he

# Earlier Assistance by Industrialization. Wild

*Timken Roller Bearing Co. executive, recently returned from Far East, says country's chief handicaps are shortage of skilled workmen, lack of transportation and high quality raw materials. Much help extended by United States industrialists*

visited, Mr. Kintner designed cams, tools and tool holders so that a Brown & Sharpe automatic could be set up to make oil cups for the machine being built; fixture for generating a lead screw for a new lathe that was being built; a carbonizing furnace that could be operated on charcoal gas, etc.

At one plant, he instructed a class of young engineers in the operation of various machine tools. These young men now have classes of workmen to whom they are giving instructions, indicating the pattern to be followed in the industrial education of the Chinese workers.

### Engineers Lack Practical Training

Supervision in the shops is almost all in the hands of the young men who have graduated since the schools were driven to the western provinces, Mr. Kintner reported. They are well informed on the technical side of engineering but are weak on the practical side. The colleges lost much of their shop equipment in the move so cannot do much along the practical line.

For the past five years they have not been able to get books or magazines that report the changes in production methods.

All the plants are heavily over-staffed. This is made necessary because of the illiteracy among the workmen. When graduates from the middle schools are available for workmen, they can be trained as foremen and this will release the engineers for engineering work.

Mr. Kintner reported that he had been asked whether any American firms would be interested in Chinese companies having as little as \$100,000 capital. He replied that American firms would probably be more interested in plants of that size than they would be in much larger ones.

Through W. E. Umstatt, president, Timken Roller Bearing Co., Mr. Kintner was able to secure two things that were urgently needed. One was plans and specifications for a five-ton steam hammer. This will enable the Chinese to work larger billets than was before possible and to make such forgings as crankshafts, etc. The other was information about the casting of Duriron in thin section parts. This will aid in making centrifugal pumps, pipes and pipe fittings. As Duriron is highly resistant to the corrosive action of acid, Mr. Kintner pointed out, some such parts are needed in the production of nitric acid which is used in the manufacture of explosives.

Mr. Kintner's work was conducted principally in the four National Resources Commission plants known as the Central Machine Works at Kunming, the Electro-Chemical Metallurgical Works at Sanchi, the Ipin Machine Works at Ipin, and the Kansu Machine Works at Lanchow. A description of these plants, as given by Mr. Kintner, indicates the progress which has been made in the industrialization of China and the extensive work which remains to be done by the new mission.

Central Machine Works, reportedly the largest machine shop in Free China, consists of seven divisions. Many of the machines are in caves cut into the side of a mountain. Manager of the entire works is Dr. S. C. Wang who is attached to the staff of Dr. T. V. Soong.

The entire plant has about 600 machines, about half of which are American

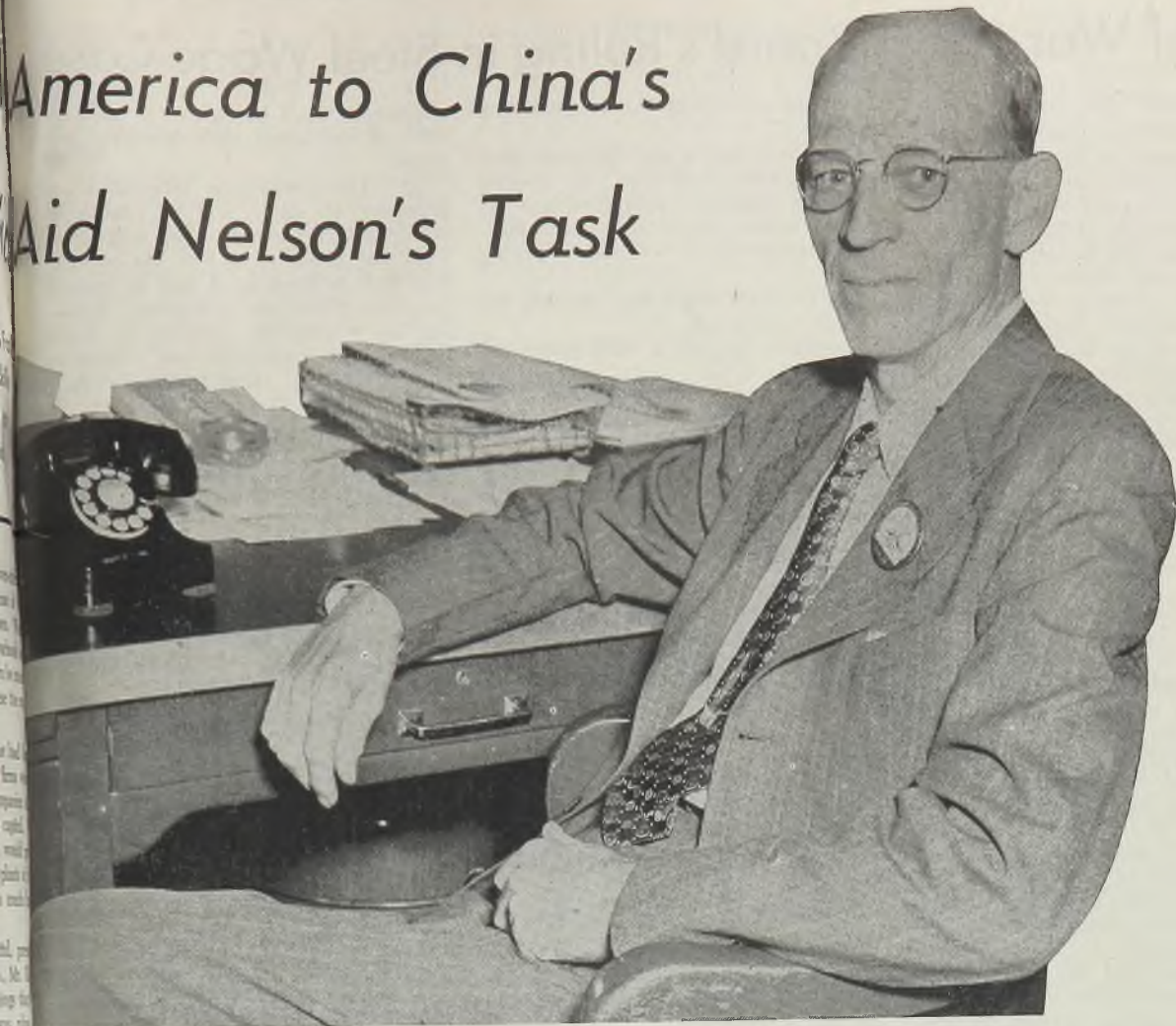
### TO DOUBLE OUTPUT

#### CHUNGKING

Donald M. Nelson, former chairman of the War Production Board who arrived here Nov. 16 to establish a similar unit in China, said he hopes to double this country's industrial production within the next six months. Mr. Nelson said he has not struck any snags in his program to date. Mr. Nelson and his advisers, five top-flight steel men, his deputy, Howard Coonley, and an alcohol expert, found that Chinese steel plants were working one shift six days a week. They declared production could be increased substantially.



# America to China's Aid Nelson's Task



*Technical instruction given Chinese by W. W. Kintner, shown above, under industrialization program has won commendation of United States State Department*

or German built and could be classed as production tools. The rest are old or are locally built from obsolete types and are too light for production work.

The first division of the Central Machine Works is the foundry which produces about 5 tons of castings per month. Provision has been made to enlarge the foundry as it cannot produce enough castings to supply the shops. The quality of the castings is poor because of the poor pig iron, coke and sand available.

Divisions three and four manufacture gas producers, gas engines, electric generators, blowers and small water turbines. These divisions are equipped with some good machine tools but operations are hampered by the lack of material and skilled workmen.

Division number five manufactures machines and small tools, including lathes, planers, shapers, milling machines, micrometers, universal lathe chucks and drill chucks, etc. This division has more good machine tools than any of the others and, due to the type of product produced, more nearly approaches modern production methods.

Division number six manufactures textile machinery. The machines are of the India type and are small but are required to fill pressing needs in China. This division has some very good machine tools and is run on a production basis. Division number two is the boiler shop, while division number seven does contract work, consisting chiefly of small but vital orders.

#### Loses Much Equipment

Electro-Chemical Metallurgical Works is located about 80 miles from Chungking and is directed by C. P. Yap, a graduate of the Colorado School of Mines and well-known in America as a chemist and metallurgist. Much of this company's equipment was lost in the moves from Nanking to Hankow and from Hankow to the present location after the outbreak of the Sino-Japanese war. The closing of the Burma road prevented the replacing of this equipment by purchases abroad.

Electro-Chemical has the following industries in operation at present: 15-ton open-hearth furnace; small rolling mill;

sponge iron furnace; smelter for melting old brass coins and reclaiming both zinc and copper, and a refinery for further treating the copper by the electrolytic process to a purity of 99.98 per cent; and a foundry for making cast iron, cast steel and Duriron castings.

This plant has two small power houses. The machine shop equipment is old but is being used to keep the various plants in repair and to build new equipment.

The Ipin Machine Works consists of a small foundry, forge and machine shop, the latter having very old and poor equipment. The products of this works are lathes, shapers, centrifugal pumps and a small charcoal gas producer and engine. The quality of the machine tools produced here is very low owing to the poor equipment and the lack of material. They are of good enough quality for maintenance work, however, and for use in small repair shops.

The Kansu Works is in about the same class as the works at Ipin. This plant produces wool washers, centrifuges for drying wool, lathes and centrifugal pumps. Because of poor equipment, the lathes are of poor quality but are of a heavier duty type than those built at the other plants. The shop also does a general contracting business.



## Text of War Labor Board's Ruling in Steel Wage Case

*(Continued from Page 81)*

at any time within a reasonable period to be agreed upon by the company and the union, file a grievance alleging that such new rate does not bear a fair relationship to other jobs in the same plant. Such grievances shall be adjusted under the grievance and arbitration machinery of the contract. If the grievance be submitted to an arbitrator, his decision shall be effective as of the date when the employe was assigned to the new job.

If the company and the union are unable to agree upon a new rate for a changed job, the company shall have the alternative of (1) establishing a new rate; (2) setting a temporary rate for a reasonable trial period. If the company elects to set a new rate for the changed job, the employe may file a grievance at any time within a reasonable period to be agreed upon between the parties, and any change in the rate so determined shall be retroactive to the date of the assignment of the employe to the changed job. If the company adopts the alternative of a trial period, the employe shall be guaranteed his straight time average hourly earnings during the three months immediately preceding the change in the job content. The details of applying this provision to cases in which an employe has worked at more than one job during the three months and to other exceptional situations, shall be left to collective bargaining.

The company and the union may agree to the computation of guaranteed earnings on a group or departmental rather than an individual basis.

3. Wage Rate Inequities. (a) The union requests board approval of a principle, stated as "equal pay for similar work throughout the industry," to be used as a guide in collective bargaining for the elimination of wage rate inequities. This request of the union is denied, because the phrase has been so variously interpreted by the parties that it would not be a useful guide, and because if interpreted to mean industry-wide equalization of all wage-rates, the principle would be contrary to the terms of executive order 9328 and the May 12 supplement of the Director of Economic Stabilization.

(b) The problem of adjusting inequitable intraplant wage rate relationships in this industry is one of long standing. Previous contracts with many of the companies provided machinery to adjust such wage rate inequities. In some contracts, a joint management-union commission was agreed upon to develop a procedure for that purpose. Those commissions failed to find the answer to the problem, largely because of lack of agreement upon the extent to which the adjustment of intraplant inequities should affect payrolls.

The National War Labor Board now has the task of specifying guide posts to facilitate collective bargaining direc-

ted to the solution of that long-standing problem.

(c) The company and the union shall negotiate the elimination of existing intraplant wage rate inequities, and reduction in the number of job classifications, in accordance with the following steps:

(1) Describe simply and concisely the content of each job.

(2) Place the jobs in their proper relationship.

(3) Reduce the job classifications to the smallest practical number by grouping these jobs having substantially equivalent content.

(4) Establish wage rates for the job classifications in accordance with the provisions of paragraph (d) below.

(d) The following guide-posts are established for collective bargaining:

(1) The extent of wage adjustments required to eliminate intraplant wage rate inequities will vary between the companies. From the record, it appears that little or no increase to eliminate intraplant wage rate inequities will be needed in some plants where wage rates are now in a sound relationship. The largest increases in payroll costs may be expected where little or nothing has been done in the past to correct wage rate inequities.

#### Average Increase of Five Cents

(2) The maximum increase for any one company shall not exceed an amount equivalent to an average of 5 cents per hour for all its employes covered by this directive order.

(3) The wage rate adjustments which may be made are to be solely for the purpose of eliminating intraplant wage rate inequities. They cannot be general across-the-board wage increases and any such general increases will be disapproved.

(4) As an aid to determining the correct rate relationship between the jobs in the particular plant, the company and the union may take into account the wage rate relationships existing in comparable plants in this industry. The contention that wage rate relationships in other plants in the industry have no significance for this purpose is rejected.

(5) The reduction of an out-of-line wage rate shall not be effective to reduce the wages of present incumbents.

(e) It shall be the duty of the commission, referred to in paragraph (f) below, to see that these limitations, and the principles contained in paragraph (d) above, are observed.

(f) Any agreement reached between the company and the union regarding the elimination of inequities shall be transmitted to a commission, to be established as hereinafter mentioned, for its approval before becoming effective. If agreement is not reached, the matters in dispute shall be referred to the commission for determination. Action of the

commission shall be subject to such review as the board shall hereafter prescribe.

(g) The commission referred to in paragraph (f) above, will be established after the board has received suggestions from the parties as to how the commission shall be constituted, and its powers, functions, duties and procedures, including the relationship between the functions of the commission and arbitrators under contracts. These suggestions shall be transmitted to the board within 20 days after receipt of this directive order.

(h) Except as otherwise provided by this directive order or by subsequent order of the board, or by mutual consent, the wage rate structures now in effect in the respective plants of the companies shall remain in effect for the duration of the new agreement.

#### XI. ESTABLISHMENT OF RATES FOR MECHANICAL AND MAINTENANCE OCCUPATIONS

The provisions of section X 3 above, shall include mechanical and maintenance employes, and the number of classifications for each of the mechanical and maintenance occupations shall be reduced to three whenever practical. The question when the total time worked at a higher-rated job or jobs justifies a transfer to a higher rated job classification, is a matter to be negotiated between the company and the union.

#### XII. MAINTENANCE OF MEMBERSHIP AND CHECKOFF

(a) The demand of certain companies that the existing maintenance of membership provisions of the contract be eliminated is denied.

(b) The following standard maintenance of membership and checkoff clauses shall be incorporated in the agreements between the parties:

"All employes, who, 15 days after Nov. 25, 1944, are members of the union in good standing in accordance with its constitution and by-laws, and all employes who become members after that date, shall as a condition of employment, maintain their membership in the union in good standing for the duration of the collective agreement in which this provision is incorporated, or until further order of the board.

"The union shall, immediately after the aforesaid date, furnish the National War Labor Board with a notarized list of its members in good standing as of that date.

"The union, its officers and members shall not intimidate or coerce employes into joining the union or continuing their membership therein.

"If a dispute arises as to whether an employe (1) was a member of the union on the date specified above or (2) was intimidated or coerced during the 15-day "escape period" into joining the union or continuing his membership



therein, such dispute may be submitted for determination by an arbitrator to be appointed by the National War Labor Board. The decision of the arbitrator shall be final and binding upon the parties.

"The company, for said employes, shall deduct from the first pay of each month the union dues for the preceding month of (up to one dollar and a half, \$1.50) and promptly remit the same to the international secretary-treasurer of the union. The initiation fee of the union of three dollars (\$3.00) shall be deducted by the company and remitted to the international secretary-treasurer of the union in the same manner as dues collections."

(c) In the cases of Follansbee Steel Corp., Universal-Cyclops Steel Corp., Granite City Steel Co., and Michigan Seamless Tube Co., the union shop provisions of the previous contracts shall be continued.

(d) Where the monthly dues of a local union are less than one dollar and a half (\$1.50) on written notice signed by the authorized representatives of the union that the dues have been increased in accordance with its constitution and by-laws in any amount up to one dollar and a half (\$1.50), the amount of dues to be checked off by the company shall be increased accordingly.

(e) All other requests for amendments to or modification of maintenance of membership are denied.

**XIII. LEARNERS**

The union's request that learners shall receive no less than the common labor rate is denied, but if a learner alleges that he is improperly classified, the grievance shall be handled under the provisions of the contract. The foregoing shall not preclude the union from raising the question under section X 3 of this directive order as to whether particular learner jobs have been properly evaluated in relation to other classifications.

**XIV. GROUP INSURANCE PLANS**

The board will approve, under the wage stabilization program, reasonable group insurance plans agreed to by the company and the union but it declines to order such a plan on the facts in these cases.

**EFFECTIVE DATE**

On Dec. 27, 1943, the board issued an interim directive order providing as follows:

"... the National War Labor Board orders that if or when any contract involved in these disputes shall be terminated by virtue of a notice of termination given under the contract, the parties shall, in accordance with the telegram addressed by the President of the United States to certain of the parties under date of Dec. 26, 1943, continue uninterrupted production under the contract terms and conditions until the differences that now separate the parties are peacefully and finally resolved, with the un-

derstanding that if the new agreement or, failing agreement, an order of the board, includes any wage adjustments, such wage adjustments shall be computed and applied retroactively to the date the contract would otherwise have terminated pursuant to the notice of termination."

The adjustments ordered in section IV, VII, X and XI of this order shall be computed and applied retroactively in accordance with the provisions of the order of Dec. 27, 1943. The board recommends that the parties negotiate with a view to settling the amount of retroactive pay due to employes in the form of individual lump sum payments.

**PRICE RELIEF**

Pursuant to executive orders 9250 and 9328, as supplemented by the directive of May 12, 1943, the terms and conditions ordered in sections IV, VII, X, XI

## Industry Members Dissent on Shift Differentials, Union Maintenance

INDUSTRY members of the board concurred with the majority of the provisions of the board's ruling, but dissented on the matter of rate differentials for late shifts and maintenance of union membership, and set forth certain reservations on other parts of the ruling. Their statement follows:

The industry members of the board believe that the question of dismissal pay for war workers is a national question. We are in complete sympathy with continuing efforts throughout industry to make provision for employes displaced through technological and other developments which separate them from their regular employment. We construe the action of the majority as tending to carry this board into the field of overall post-war planning, beyond, in our opinion, the functions for which this board was created and beyond the duties imposed upon it by law and executive orders. We fear that the very action of the board in this respect will jeopardize settlement of the problem on a national basis. For that reason we voted against the proposal contrary to our views on severance pay under normal conditions.

More than two years ago this board granted maintenance of union membership to the Steelworkers Union in many cases then before the board based upon the alleged responsibility of the union and its no-strike pledge.

Again today this board is continuing that provision in spite of the record of strikes by that union, strikes which persisted this week even at the very time that the board was in session on this case. The record in this case is conclusive as to the willingness of this union to strike when necessary to enforce its demands, even in time of war. If, as the majority maintained in the Humble case, responsibility is considered, then the de-

and the "effective date" shall become effective only upon determination by the Office of Price Administration that these adjustments will not require any change in price ceilings, or, if no such determination is made, then upon approval by the Director of Economic Stabilization. The parties will be notified promptly of the action of the OPA or the Director of Economic Stabilization.

Representing the Public: William H. Davis, George W. Taylor, Frank P. Graham, Lloyd K. Garrison. Representing Industry: James Tanham, Vincent P. Ahearn, Clarence Skinner, Lee H. Hill. (Dissenting with respect to Sections IV, V, VII, VIII, XII and "Effective Date"). Representing Labor: Neil Brant, John Brophy. (Dissenting with respect to Sections II, VI, X-3, XIV.) Matthew Woll, George Meany. (Dissenting with respect to Sections II, VI, X-3).

monstrated absence of responsibility in so many instances, should have produced denial of union maintenance today.

In ordering night shift differentials in this industry, whose operations necessarily are continuous in war and in peace, and without any distinction as to fixed and rotating shifts, the board has in effect changed a policy of long standing and has granted here, particularly as to rotating shifts, that which it has denied in many cases.

Not only has the board changed its policy, but it made change retroactive.

In many respects the effects of the board order will be disruptive. The order will increase costs because shift differentials mean more pay for no more work. It will disrupt certain wage relationships in the plants where men earn by seniority the right to work on the day shift but now will receive less than those of less seniority working on the second and third shift.

We joined with the majority in the action of denial with respect to a general wage adjustment because this action confirms the board's previous action on this demand and in our opinion disposes of the issue.

We voted for the resolution to iron out any existing wage rate inequities because it does appear to set forth certain principles within which the parties, bargaining in good faith, should be able to resolve such inequalities found to exist.

It is our understanding that in accordance with executive order 9328 the composite cost of the adjustments made to correct intraplant wage rate inequities for any company in these proceedings shall not increase the level of production costs appreciably.

Clarence Skinner  
Vincent Ahearn  
Lee Hill  
James Tanham



# THE BUSINESS TREND

## Downward Trend in War Output Appears Checked

IRREGULAR downward tendency in overall industrial output appears to have been checked somewhat as a result of recent intensive efforts to bring the few lagging war programs up to required production schedules. Although these lagging war programs are relatively few they represent such critically needed materiel as shells, guns, trucks, combat loaders, heavy bombers, transport planes, and radar equipment.

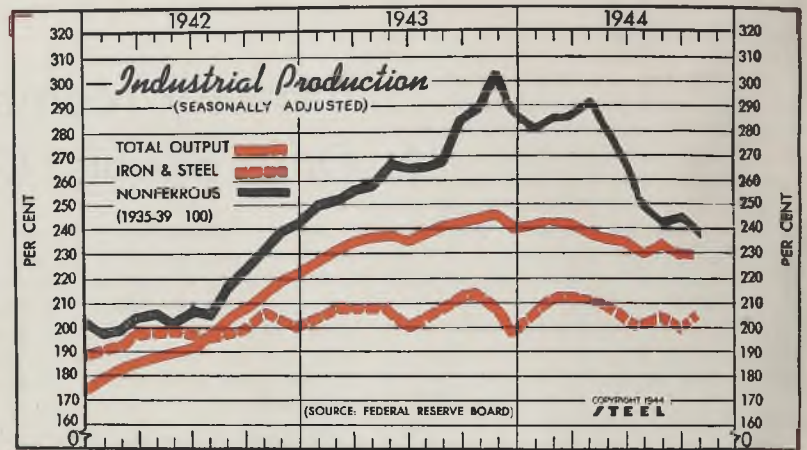
Latest official figures available show little change in industrial production during October from the September level and a continuation of the general leveling off tendency throughout November. The Federal Reserve Board's seasonally adjusted index eased one point to 230 during October, reflecting a further slight decline in durable goods manufacturing. Since last July this index has fluctuated between 230 and 232. The high point reached by the index during the war period to date was 247 in October and November last year.

**RECONVERSION**—Acute shortage of a few key war items and the probability that the European war will drag through the winter months has forced the War Production Board to tighten up on the granting of even very limited civilian goods production under the spot authorization plan. The WPB is continuing to make plans for reconversion but these plans will not get nearly the publicity as in the past.

**CONSTRUCTION** — Building contracts awarded in the 37 eastern states during October declined to the lowest level recorded since last May. F. W. Dodge Corp. reports construction awards in October valued at \$144.8 million, compared with \$175.7 million in September and \$213.5 million in the corresponding month last year. Public works and utility construction totaled \$52.2 million in October, against \$64.1 million in the preceding month; while residential and non-residential building contracts declined from \$111.6 million in September to \$92.6 million.

Construction activity in the first 12 months after V-E day will approximate the 1938 volume valued at \$3.2 billion, F. W. Dodge Corp. estimates. For the current year building awards are expected to total about \$2 billion, off sharply from the preceding two years.

**CASTINGS**—After a lapse of some months the production statistics of steel castings have again been made available through the "Facts for Industry" series, War Production Board. The new series includes "captive" foundries and are therefore more representative of the total industry. Steel foundries operated at 63 per cent of capacity during July, and shipments amounted to 176,735 short tons, the latest figures available show. Unfilled orders at the end of that period amounted to 933,959 tons, of which 74 per cent were carbon steel castings and 26 per cent alloy steel. The July figures for the accompanying steel castings chart are on the old basis for comparison purposes.



Federal Reserve Board's  
Production Indexes  
(1935-39=100)

	Total Production		Iron, Steel		Nonferrous	
	1944	1943	1944	1943	1944	1943
January	242	227	208	204	281	250
February	244	232	212	208	285	252
March	242	235	214	210	286	256
April	239	237	213	209	292	257
May	237	238	210	208	279	266
June	235	236	204	201	264	264
July	231	240	202	204	243	256
August	232	242	203	210	245	264
September	231	244	202	214	239	277
October	230	247	205	215	286	277
November	230	247	205	209	304	286
December	230	241	205	200	286	286
Average	230	239	207	207	270	270

### FIGURES THIS WEEK

#### INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	95	96.5	95.6	99
Electric Power Distributed (million kilowatt hours)	4,369	4,450	4,358	4,403
Bituminous Coal Production (daily av.—1000 tons)	2,030	1,777	1,967	2,162
Petroleum Production (daily av.—1000 bbls.)	4,700†	4,739	4,741	4,414
Construction Volume (ENR—unit \$1,000,000)	\$25.2	\$29.4	\$22.2	\$36.5
Automobile and Truck Output (Ward's—number units)	18,295	20,930	21,035	16,775

\*Dates on request.

#### TRADE

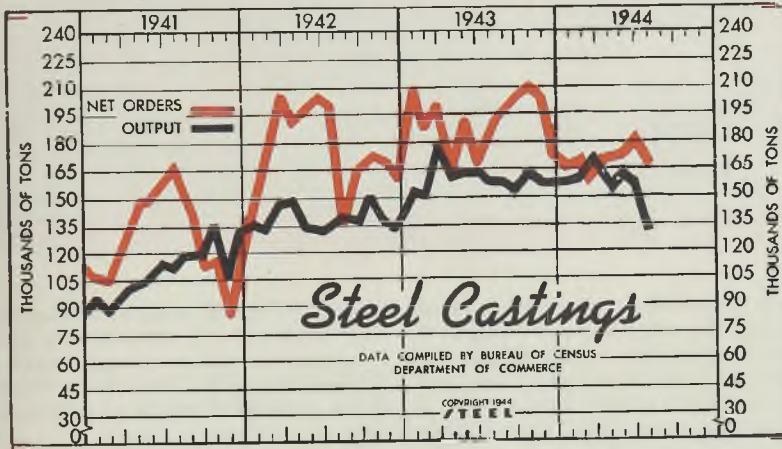
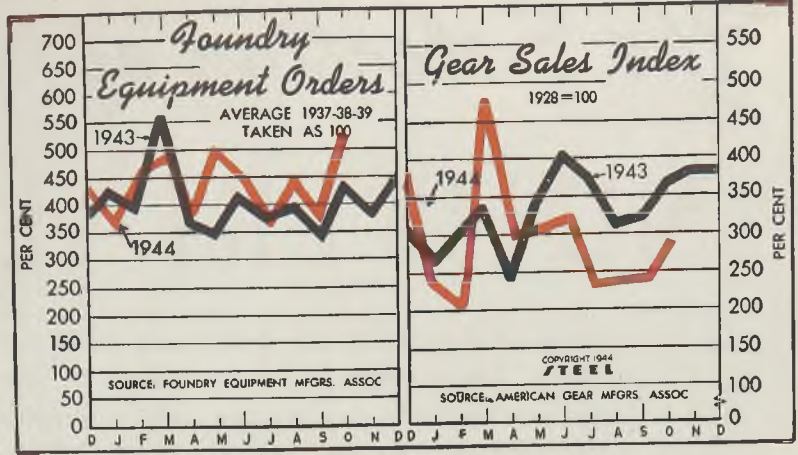
	Latest Period*	Prior Week	Month Ago	Year Ago
Freight Carloadings (unit—1000 cars)	800†	864	918	820
Business Failures (Dun & Bradstreet, number)	17	13	15	43
Money in Circulation (in millions of dollars)†	\$24,881	\$24,717	\$24,216	\$19,726
Department Store Sales (change from like week a year ago)†	+9%	+6%	+17%	+15%

†Preliminary. †Federal Reserve Board.



Foundry Equipment and Gear Sales

	Monthly Average (1937-38-39=100)			Index (1928=100)		
	1944	1943	1942	1944	1943	1942
Jan.	378.3	429.8	532.7	246	268	288
Feb.	456.8	399.5	567.9	214	303	353
Mar.	498.4	562.7	1122.4	485	334	455
Apr.	385.7	362.7	1089.3	308	240	378
May	503.9	348.9	653.6	305	342	421
June	466.1	413.6	774.0	328	401	378
July	375.8	379.4	800.8	242	374	344
Aug.	450.5	390.4	510.8	247	312	380
Sept.	388.0	346.6	446.4	248	320	351
Oct.	526.5	436.6	540.6	293	368	268
Nov.	.....	388.0	338.8	.....	387	359
Dec.	.....	442.8	382.5	.....	387	300
Avg.	.....	440.3	646.7	.....	336	355

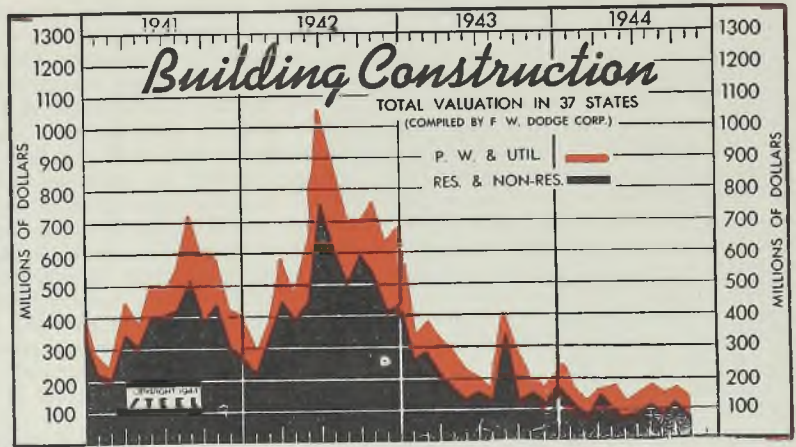


Commercial Steel Castings  
(Net tons in thousands)

	Orders		Production	
	1944	1943	1944	1943
Jan.	167.7	213.1	159.8	154.7
Feb.	173.6	191.2	161.4	151.5
Mar.	162.6	202.7	174.6	176.5
Apr.	175.1	165.8	155.8	161.4
May	177.0	192.5	161.8	163.8
June	181.8	171.8	157.4	163.9
July	169.9	187.3	131.9	158.8
Aug.	.....	200.6	.....	158.8
Sept.	.....	214.1	.....	157.8
Oct.	.....	211.3	.....	163.9
Nov.	.....	209.3	.....	158.8
Dec.	.....	173.6	.....	158.6
Total	.....	2,333.4	.....	1,928.6

Construction Valuation  
In 37 States  
(Unit—\$1,000,000)

	Total	Public Works-Utilities		Residential-Non-Res.	
		1944	1943	1944	1943
Jan.	159.2	50.3	85.8	108.9	264.3
Feb.	137.2	55.1	112.9	82.1	280.5
Mar.	176.4	61.3	123.0	115.1	216.7
April	179.3	72.0	127.7	107.3	175.6
May	144.2	55.8	95.8	88.4	138.6
June	163.9	70.7	73.3	93.1	156.8
July	190.5	80.5	50.0	110.0	133.7
Aug.	169.3	69.4	73.4	99.9	340.8
Sept.	175.7	64.1	175.1	111.6	125.0
Oct.	144.8	52.2	63.5	92.6	150.0
Nov.	.....	.....	59.0	.....	125.4
Dec.	.....	.....	67.4	.....	184.9
Total	.....	.....	1,106.9	.....	2,106.4



FINANCE

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	\$10,825	\$9,380	\$9,413	\$9,127
Federal Gross Debt (billions)	\$218.3	\$212.5	\$211.5	\$169.9
Bond Volume, NYSE (millions)	\$45,180	\$44,464	\$34,858	\$32,884
Stocks Sales, NYSE (thousands)	3,359	4,752	4,567	2,799
Loans and Investments (millions)†	\$54,043	\$53,570	\$54,079	\$51,989
United States Government Obligations Held (millions)†	\$39,883	\$39,467	\$40,197	\$37,857

†Member banks, Federal Reserve System.

PRICES

	Latest Period	Prior Week	Month Ago	Year Ago
STEEL's composite finished steel price average	\$56.73	\$56.73	\$56.73	\$56.73
Spot Commodity Index (Moody's, 15 items)†	248.5	248.5	248.6	244.4
Industrial Raw Materials (Bureau of Labor Index)†	114.3	114.3	113.2	111.3
Manufactured Products (Bureau of Labor Index)†	101.2	101.1	101.2	100.3

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



# The Selection of INDUSTRIAL RUBBER

Five types of synthetics now being used in the manufacture of belting, hose, packing, linings, abrasive wheels and the like for the metalworking industries not only are proving generally satisfactory substitutes for natural rubber but have earned permanent place for many applications. Data are presented on physical characteristics and types best suited for products

By Irwin H. Such

Engineering Editor, STEEL

CONQUEST of the natural rubber producing areas of the Far East by the Japanese in 1941 and 1942 brought the United States sharply to the realization that it must find adequate and satisfactory rubber substitutes not only to meet the enormous requirements of the armed services but to care for essential civilian and industrial needs.

That these requirements were largely met, is evidenced by the current estimate that synthetic rubber production for 1944 will be 811,037 gross tons, more than the normal peacetime consumption of natural rubber and almost three and a half times the 1943 synthetic rubber production of 234,244 tons. Synthetic rubber production in 1944 also will be supplemented by some 118,000 tons of crude rubber brought in from areas not under enemy control, representing a substantial increase over the 56,000 tons made available in 1943.

The metalproducing and metalworking industries naturally are primarily interested in the industrial rubber products used in their plants and in the products they sell, especially from the standpoint of (1) which types of synthetic compounds are suited for each specific purpose, (2) how they may be expected to stand up in service and (3) whether they may become permanent replacements for the familiar products of the past fabricated from natural rubber. All of these questions will be answered to the extent possible, based upon the information now available. However, before doing so, some background information pertaining to the present situation may be found of interest.

Synthetic rubber was not developed by any one man, or laboratory, but is the outcome of work of chemists in France, Germany, Russia, Great Britain

and the United States over a long period of years. In 1826, Michael Faraday of Britain showed that natural rubber was composed of five atoms of carbon and eight of hydrogen and therefore was a hydrocarbon along with gasoline, benzene, natural gas and fuel oil.

Additional work was done with rubber all through the balance of the eighties and on into the current century. In 1910, the search for synthetic rubber was intensified by the popularization of Henry Ford's Model T when the price on natural rubber shot up to \$3 a pound. The Russians worked on synthetics through the last war until interrupted by the revolution. In 1915, the Germans actually built and operated a synthetic rubber plant with a capacity of 150 tons a month but the process was long and expensive for they did not have the present technique for accelerating polymerization. Research was continued after the war but the plant went out of production.

## Research Progresses In America

Rubber companies in the United States also engaged actively in synthetic rubber research, including the United States Rubber Co. which invited the eminent Russian chemist, Dr. I. Ostromislensky, to join the staff in 1921. In the following year, butadiene was produced synthetically from ethyl alcohol and acetaldehyde by the doctor and his associates and in 1923 a method was evolved in the laboratory for turning the butadiene into synthetic rubber through emulsion polymerization in a soap solution. At the same time, a synthetic plastic was produced by polymerization of styrene, which is the second most important ingredient in buna-S or GR-S (government rubber-styrene) as it is more correctly

termed. Further studies subsequently were given to the determination of cheap raw materials and the improvement of physical properties through exploration of the physical chemistry of polymerization.

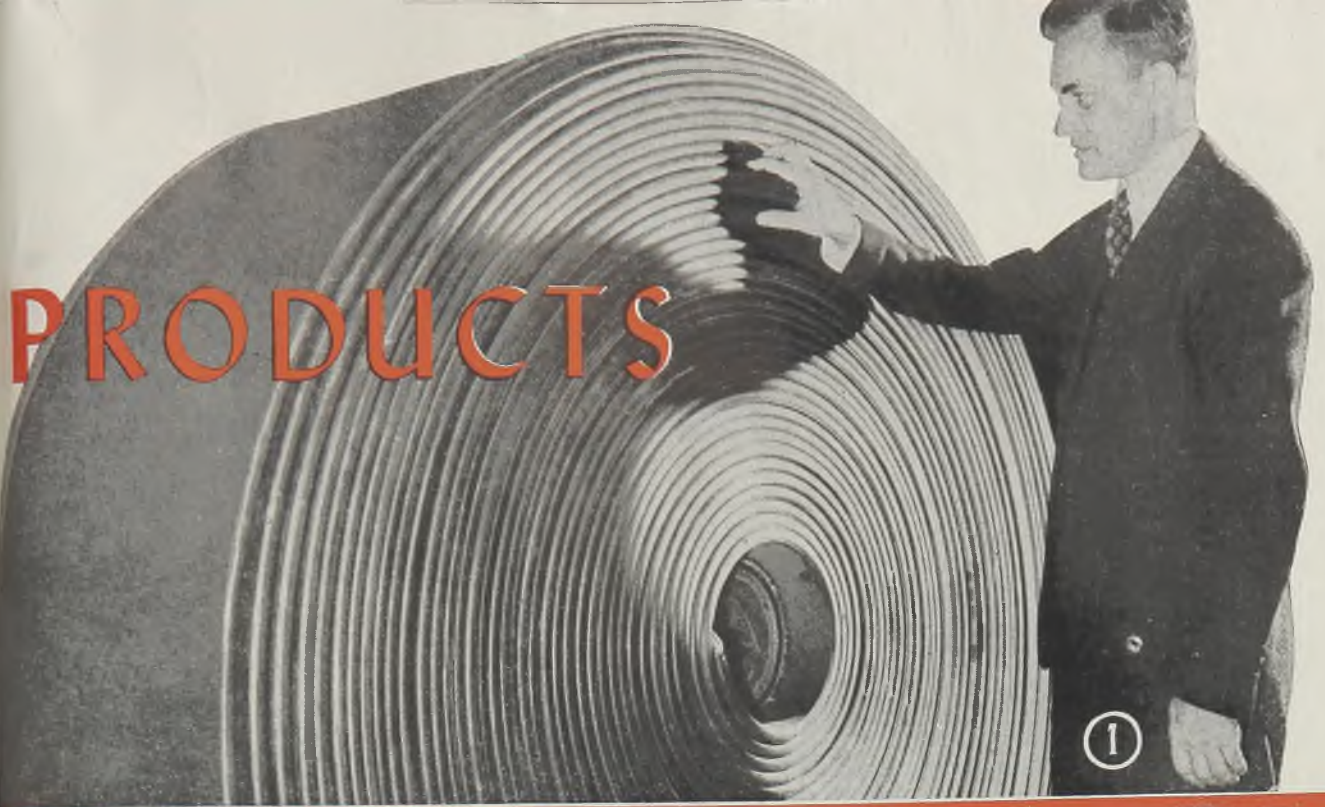
Thiokol was introduced as the first commercial synthetic rubber in 1930 and was followed four years later by neoprene. The buna rubbers, polymers and copolymers of butadiene, were first produced in Germany in 1935. Today, under the emergency program, five types of basic synthetic rubbers are being produced in quantity in the United States and are converted into perhaps 5000 compounds used in the actual production of rubber goods. Each of these five types will be discussed individually.

**Buna-S (GR-S):** This is a copolymer of butadiene and styrene and is the volume substitute for natural crude rubber with production scheduled at the annual rate of 900,000 tons in the current quarter. Production in 1943 was 184,781 tons. Plants are operated by Firestone, Goodyear, B. F. Goodrich, U. S. Rubber, National Synthetic Rubber, Copolymer Corp. and General Tire. Under government subsidy, GR-S sells for 18.50c per pound compared with 22.50c for natural rubber just before the war.

Buna-S or GR-S is most nearly like natural rubber in processing and performance characteristics. It may be vulcanized with sulphur and rubber accelerators and can even be cured to hard rubber. Resistance to atmospheric deterioration is slightly higher than for natural rubber. GR-S must be compounded with carbon black to bring out its best physical properties which means that black is the most prevalent color. It is also being compounded with light pigments such as titanium dioxide and



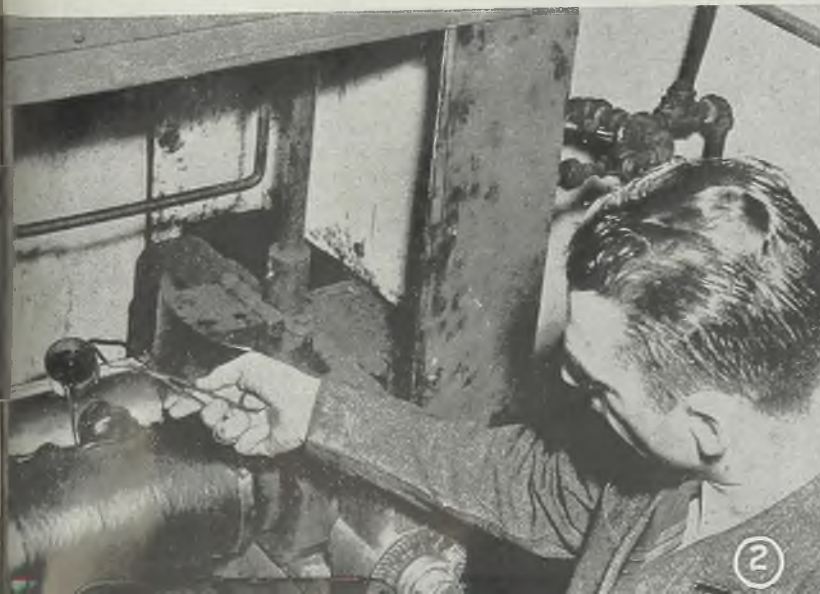
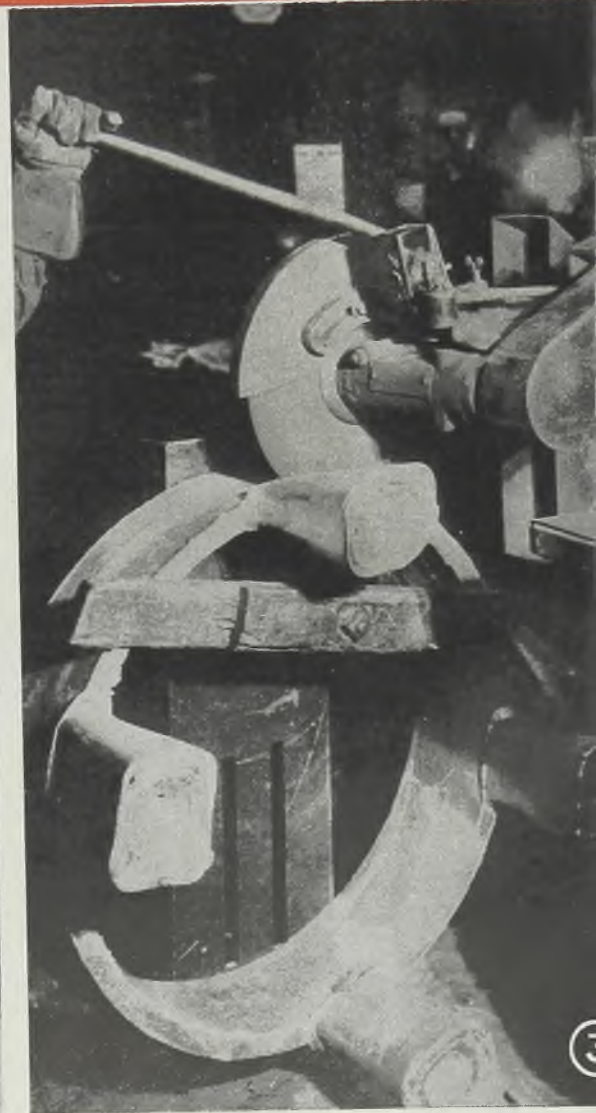
# PRODUCTS



*Fig. 1—General purpose conveyor belts, such as this one ready for shipment to an eastern manufacturing plant, are being fabricated from buna-S. Neoprene or buna-N are preferred for severe service*

*Fig. 2—Crude synthetic rubber must be compounded with other ingredients to provide the required physical properties for specific applications. Here, a softener is being added to a batch on a laboratory mill. The compounded stock then is molded, extruded, calendered or otherwise fabricated and vulcanized into finished products*

*Fig. 3—Synthetic rubber abrasive cut-off wheels are proving superior to those made with natural rubber. In this case, risers with a cross section of 21 square inches are being removed from the manganese bronze castings in 45 seconds*







calcium silicate, which provide satisfactory physical properties.

**Butyl:** This synthetic is a copolymer of isobutylene and small amounts (2-5 per cent) of other unsaturated hydrocarbons such as butadiene or isoprene and is a development of the Standard Oil Co. of New Jersey. Production now is at the rate of 48,000 tons annually. Only 1373 tons were produced in 1943. The base price is 15.00c per pound.

Butyl rubber is processed in the same manner as natural rubber but has less adhesion and requires much longer curing time. It may be softened by milling with plasticizers, vulcanized with sulphur and ultra acceleration but cannot be vulcanized to hard rubber. Resistance to deterioration may be described as good and resistance to oxygen and acid very good but its physical properties are lower than those of natural rubber. Butyl rubber has been given the designation of GR-I.

This material may be used to advantage in applications where resistance to chemicals and oxidation are more important factors than such properties as tensile strength and resistance to cold flow. It is even less resistant to oil than GR-S and cannot be used for industrial applications where such contact is inevitable. One of the principal uses is for inner tubes.

**Neoprene:** The neoprenes are polymers of chloroprene (chloro-butadiene) and have been well known for some time as one of the developments of E. I. du Pont de Nemours & Co. Actually, neoprene, of which there are about a dozen types, constitutes a good general purpose rubber although it was originally developed as a "specialty". Production this year is running at the rate of 53,200 tons annually against actual output of 33,603 tons in 1943. The base price is 27.50c per pound for GR-M made in government plants. The price range for other types made in private plants is around 40.00c to 70.00c.

Neoprene is resistant to many oils and chemicals and also displays excellent resistance to air and light, as well as to temperatures up to 212 degrees Fahr. without softening. It will not support combustion and therefore has found sub-



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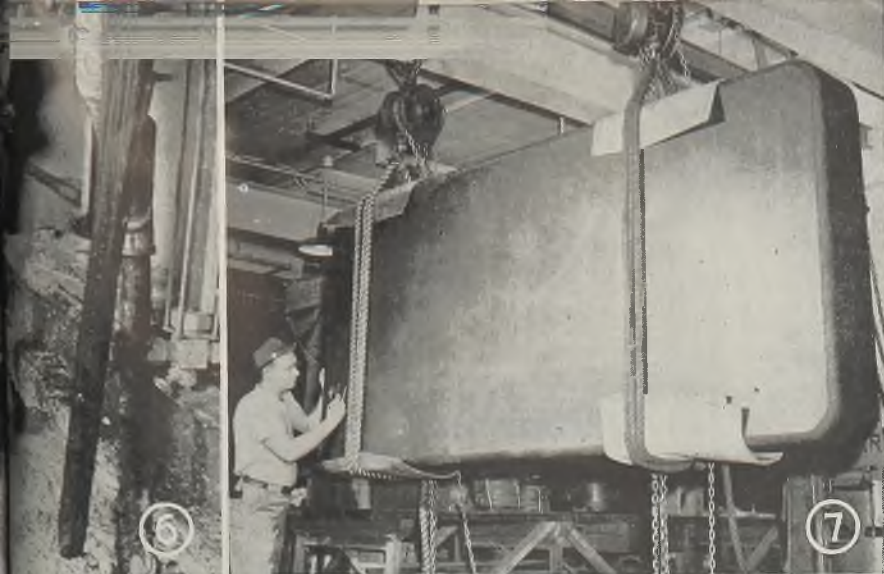


Fig. 4—This machine is covering buna-S hose with braid. Other types of synthetic rubber also are used for hose, depending upon the service requirements

Fig. 5—Synthetic rubber has earned a permanent place in the tank lining field. Workmen here are using an electrical testing unit to check for possible pinholes in the lining

stantial applications such as for the jackets for electric wires and cables although electrical properties are lower than for natural rubber.

Neoprene can be readily processed on the same type of equipment as natural rubber. However, it does not require sulphur for vulcanization and cannot be cured to hard rubber.

This synthetic is being used for oil resistant hose, belting, sheet goods, tubes, tape, foam sponge rubber for tank crash padding, barrage balloons, and cements. Earlier in the war, it was used experimentally for truck and bus tires and inner

tubes. It also is being used for coupling gaskets for connecting sections of light weight pipe for the portable lines carrying gasoline and water to the fighting fronts.

**Buna N:** These types (also designated GR-A) are copolymers of butadiene and acrylonitrile (vinylcyanide) and include the following: Perbunan, made by Standard Oil Co. of New Jersey; Butaprene by the Firestone Tire & Rubber Co.; Hycar, by the Hycar Chemical Co., owned by the Phillips Petroleum Co. and the B. F. Goodrich Co., and Chemigum,

(Please turn to Page 156)

Fig. 6—In the early stage of its manufacture, synthetic rubber resembles milk. Here this "milk" has been curdled or coagulated by the addition of salt and acid. The coagulated rubber then is washed and dried, usually in the form of sheets or blocks, for shipment to makers of rubber products. Figs. 2, 3, 6; courtesy Hycar Chemical Co. Figs. 1, 4, 5, 7 courtesy U. S. Rubber Co.

Fig. 7—This huge synthetic rubber forming pad for a hydraulic press is ready for shipment to a metal fabricating plant

## A GUIDE FOR THE SELECTION OF INDUSTRIAL RUBBER PRODUCTS

The data presented cover only generalized types of synthetic rubber. Individual properties may be developed by special compounding, as suggested by the ranges shown in the table. The data are intended to provide the user of mechanical rubber goods with general information about synthetic rubber and should not be used as the basis for making specifications. Definite recommendations as to the exact type of compound for a specific product should be left to the rubber product manufacturer.

	NATURAL RUBBER	BUNA-S (GR-S) TYPE	BUNA-N (GR-A) TYPES	NEOPRENE (GR-M) TYPES	BUTYL (GR-I) TYPE	THIOL POLYSULFIDE (GR-P) TYPES
<b>PROCESSING PROPERTIES:</b>						
Form in which available	Latex and Solid Forms	Latex and Solid Forms	Latex and Solid Forms	Latex and Solid Forms	Solid Form	Dispersion, Solid & Powder Form
Breakdown	Very Good	Good	Fair	Good-Very Good	None	Slow
Plasticity Range after Breakdown	High-Low	High-Low	High-Medium	High-Low	Medium	High-Low
Building Tack and Cohesion	Excellent	Fair	Fair	Very Good	Good	Fair-Good
Vulcanizability	Very Good	Very Good	Very Good	Very Good	Fair-Good	Fair
General Processability	Very Good	Good	Fair	Good	Fair	Fair
<b>Physical Properties:</b>						
Extensibility	Excellent	Good	Good	Excellent	Excellent	Good
Resilience	Excellent	Good	Fair-Good	Very Good	Low	Good
Tensile	Excellent	Fair-Good	Very Good	Fair	Good	Fair
Electrical Properties	Excellent	Excellent	Fair-Poor	Fair-Poor	Excellent	Fair
Impermeability to Gases	Good	Good	Very Good	Good	Excellent	Excellent
Impermeability to Water	Good-Very Good	Fair-Good	Fair-Good	Fair-Good	Very Good	Very Good
<b>Resistance to:</b>						
Plastic Flow	Excellent	Good	Good	Fair	Fair	Poor
Abrasion	Very Good	Good-Very Good	Excellent	Good	Fair	Poor
Tear	Very Good	Poor-Fair	Fair-Good	Good	Fair-Very Good	Fair-Good
Heat	Fair	Very Good	Excellent	Fair-Good	Fair	Poor
Cold	Very Good	Very Good	Fair-Very Good	Fair-Very Good	Good	Fair-Good
<b>CHEMICAL PROPERTIES</b>						
<b>Resistance to:</b>						
Air	Fair	Good	Good	Excellent	Excellent	Excellent
Ozone	Inadequate	Inadequate	Fair	Excellent	Excellent	Excellent
Light	Fair	Poor	Fair	Excellent	Excellent	Excellent
Petroleum	Poor	Poor	Excellent	Good	Poor	Excellent
Aromatic Oils	Inadequate	Inadequate	Fair-Good	Poor	Inadequate	Excellent



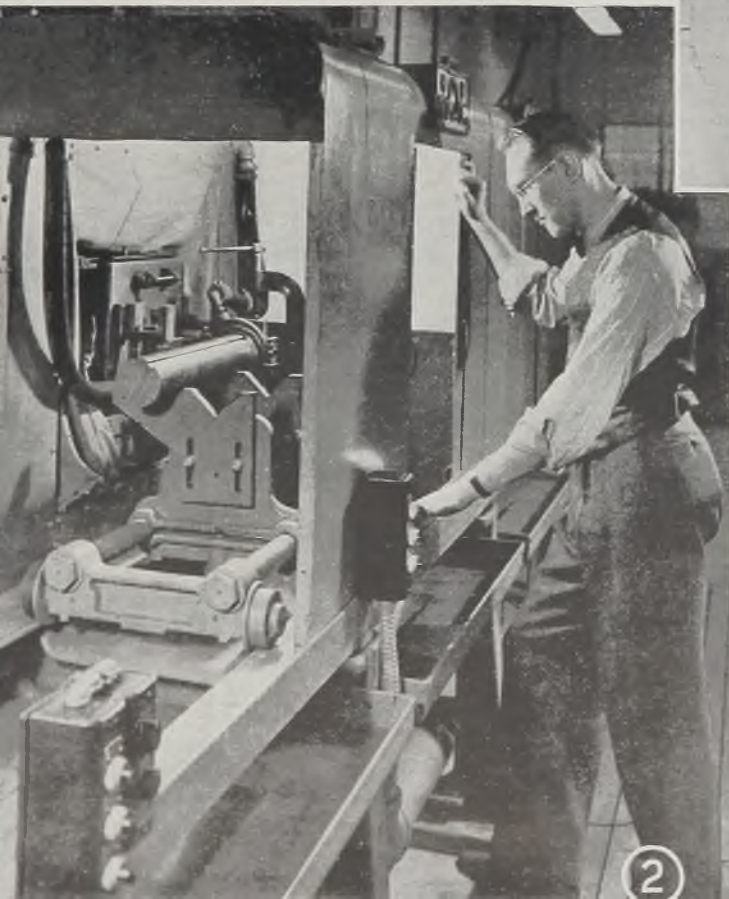
# Builds New **ELECTRIC**



Fig. 1—Specialized fixture for hardening unusual pieces such as the bevel gears shown. Operates from a 9600-cycle 100-kilowatt Tocco unit. Work is rotated to improve results

Fig. 2—"Tunnel" line with 3000-cycle power supply. Here a bearing on an eccentric shaft is being hardened. Line is used primarily for heat treatment of large size parts

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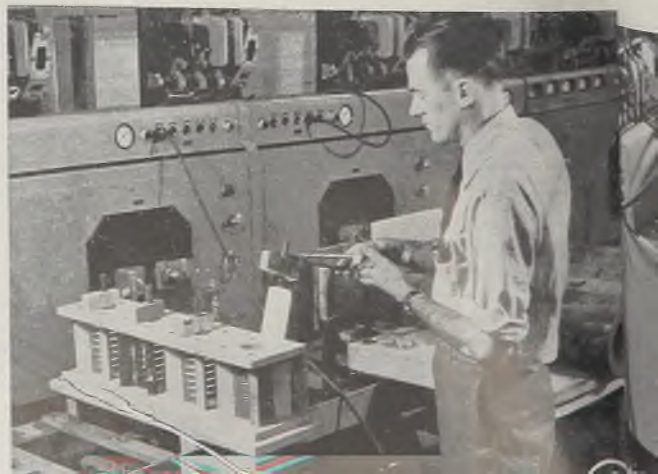
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Fig. 3—Vertical progressive hardening of parts such as shafts is done on this automatic fixture operating on 9600-cycle power supply. The inductor block moves at a pre-determined rate. Note quench water flowing

Fig. 4—Technician removes hot slug from a 4-station 4-inductor heating coil in experimental setup



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Laboratory to Explore and Engineer...

# INDUCTION HEATING

RECENT completion of a new high-frequency induction experimental laboratory by the Tocco Division of the Ohio Crankshaft Co., Cleveland, emphasizes the enlarged industrial acceptance being accorded electric induction heating. Reported to be the most versatile and largest laboratory of its kind devoted solely to induction heating advancement, the new facility covers 20,000 square feet of floor space and is equipped with 24 test heating stations now supplied by 2000 kilowatts of power, having a frequency range varying from 960 to 1,000,000 cycles.

Official announcement of the new

laboratory coincides with the 24th anniversary of the founding of the Ohio Crankshaft Co. in Cleveland in 1920 for the purpose of machining automotive and diesel engine crank and camshafts. It was the need for improving crankshafts that resulted in the development in 1932 of Tocco induction process by William C. Dunn and Francis S. Denneen, co-founders of the company and today its active heads.

Said Mr. Dunn in commenting on the recent expansion, "Industry has accorded induction heating such a place that only with increased research facilities could one keep abreast and ahead of the trend. It is our belief that the future of induction heating is brighter today than at any time before. War work has proved the process so that now many plans involving induction heating are destined to revolutionize long established practices."

## Wide Range of Equipment

Facilities of the new laboratory enable full experimental work on applications for the hardening, brazing, annealing or heating for forming of ferrous or non-ferrous parts both large and small.

Experimental induction machines are of varied styles and capacities, the most distinctive being an 8-station panel-type unit of 9600 cycles, 25 feet long and 6 feet high, having work pan and automatic controls. Each station is equipped with a different turn ratio transformer for maximum experimental usefulness. Here various tests can be run simulta-

neously without interference or delay. Physical dimensions of the work area of this large unit coincide with standard machines facilitating development and testing of new fixtures and inductors.

The progressive hardening of bars and tubing is carried out on two machines, one hydraulic and the other mechanically controlled. In the mechanical style the piece remains stationary while the inductor moves up along the bar to be treated. These two units which really are fixtures operating on 9600 cycles received direct from the generator, have facilities for obtaining maximum range of speed and power depending upon requirements of parts under test.

Experiments on big parts, crankshafts, steam-hammer rods, generator shafts and the like, are made on what is termed a "tunnel line". This is a 4-station unit, 20 feet in length, ruggedly constructed and equipped with a moving cradle set on a track to hold test parts positioned in the water-cooled inductors. Each station is equipped with automatic and manual control devices. Power frequencies of 1000, 2000, 3000 and 10,000 cycles are available.

Another special unit is for gear hardening. This is a 5-foot square box-like fixture, 5 feet high with full automatic control devices, and with the circular inductor (which can be changed to accommodate a new size) and quenching mechanism set in the center. Water or oil quenching is provided.

A battery of five standard induction-heating machines with 9600-cycle power



Fig. 5—Machine tool operator turning outside diameter of a solid copper inductor block for an experimental job

Fig. 6—Large 26-inch gear ready for hardening in special experimental unit. Inductors can be changed to accommodate different work

Fig. 7—Zeiss "Neophot" machine for microstructure observation, both photographic and visual—portion of metallurgical laboratory

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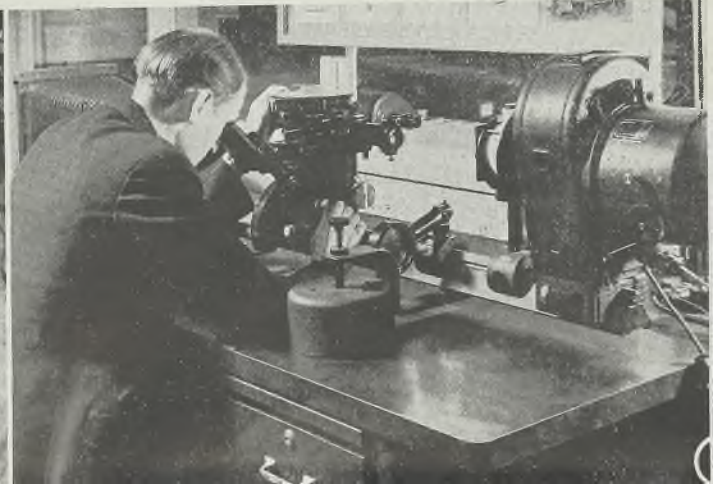
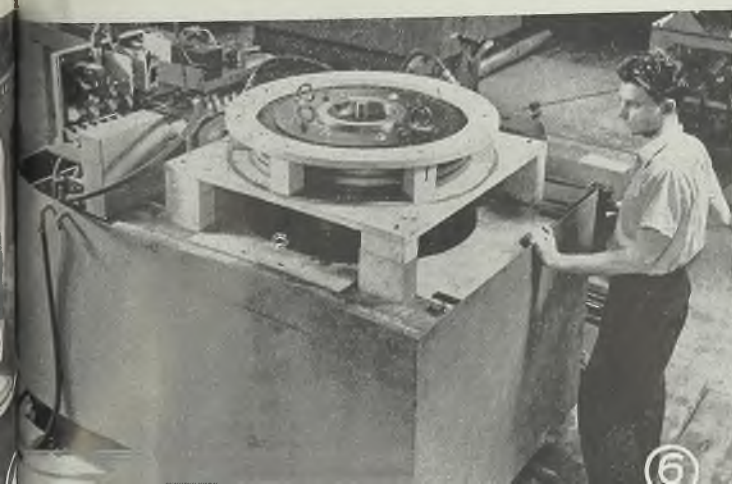
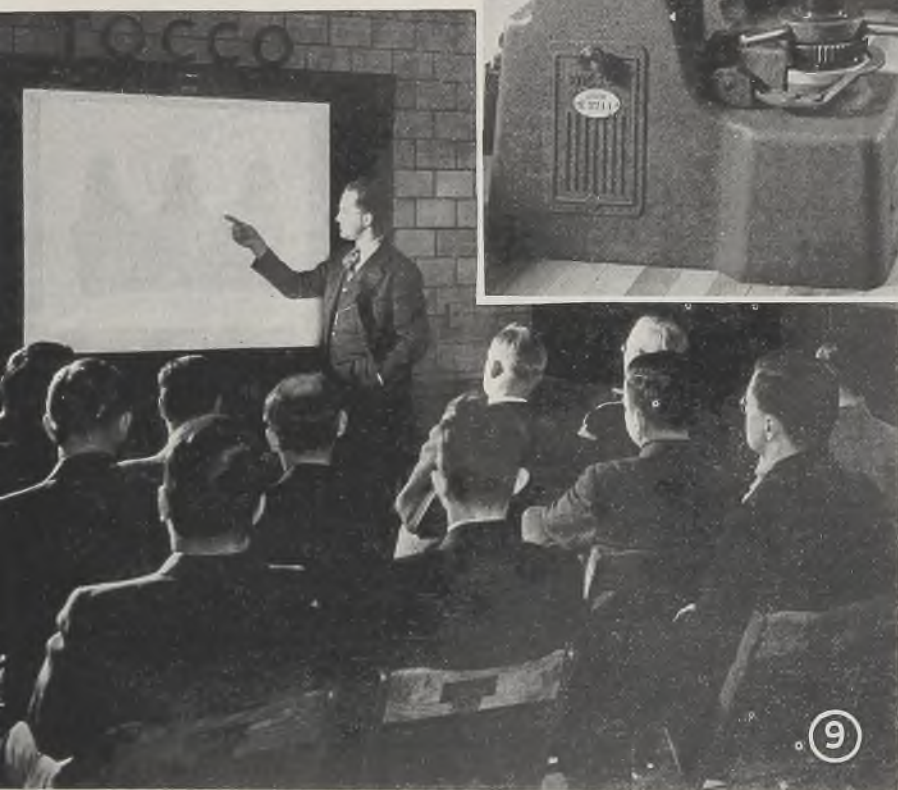
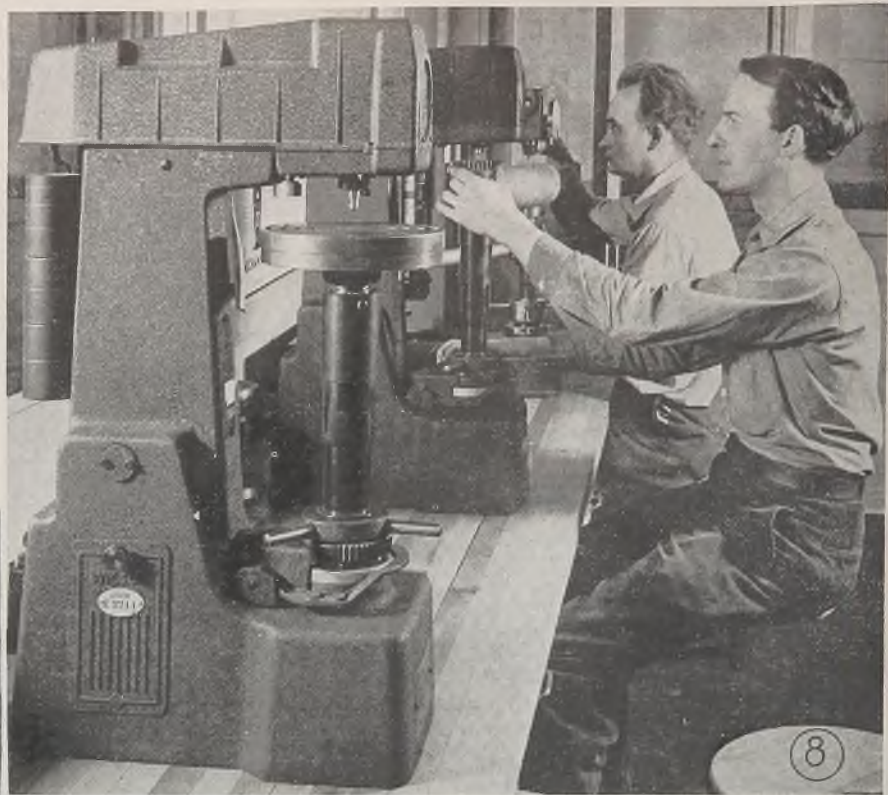




Fig. 8—Superficial and standard hardness testers are part of laboratory's extensive auxiliary equipment for checking physical properties of heat-treated parts

Fig. 9—Dr. Harry Osborn Jr., research and development engineer, in engineering discussion room describes new induction heating developments and explains improved heat treating procedures



are available for experiments involving specially designed fixtures or where production runs are being simulated. In fact, small emergency production jobs have been actually performed on these machines which have ratings of 15, 20, 50, 100 and 150 kilowatt output. Plans call for immediate installation of a special 500 kilowatt hydrogen-cooled motor-generator for work on massive parts having intricate surfaces, such as large gears. This will increase the laboratory power supply to 2500 kilowatts.

Running beneath the floor, in a covered trench, is the quench and water-cooling system. Water is led from this central supply line via underfloor ducts to the various machines and back by means of a recirculating system that passes the water at 90 pounds pressure through filters placed on the discharge side of a 500-gallon-per-minute pump. Included in the return system is a settling tank. Another feature is a 5000-gallon supply

tank that automatically maintains water level control and providing constant temperatures ranging from 80 to 90 degrees Fahr. Located in the water system trench, conveniently placed at 10-foot intervals are connections for compressed air, city water, hot water and natural gas.

Adjacent to the main laboratory is a compact electronic experimental department for the development of new electronic equipment. Numerous tube oscillator type machines ranging from 2½ to 100 kilovolt-amperes for test purposes are distinctive because of their output capacity and frequency range from 100,000 to 1,000,000 cycles. Commercial experimental projects are conducted for industrial users.

Important division of the laboratory is the machine shop completely equipped with conventional precision machine tools for turning out experimental inductors, fixtures and feeding mechanisms.

A metallurgical laboratory for checking

microstructure, hardness and related physical properties, and chemical analysis works in conjunction with the chemical "lab" wherein ferrous and nonferrous materials are analyzed and tests are conducted revealing hardenability of steels and the comparisons between induction and furnace treatment. Serving these departments is a modern photographic dark room fully outfitted.

In the metallurgical section outstanding equipment consists of a Zeiss "Neophot" machine for microstructure observation, both photographic and visual, standard and superficial Rockwell hardness testers and Brinell and scleroscope machines. A magnaflux unit is also available. Equipment in the chemical department includes cutting machines for polishing and etching cross sections for macroscopic or microscopic study.

A novel feature of the new laboratory is the lecture room. This 15 by 23 foot room equipped for slide projection and display purposes, is available for engineering and sales talks to technical and customer groups.

The laboratory facilities described and illustrated here are not all new—some of the developmental equipment having been in use here since inauguration of the first induction heating equipment built by Ohio Crankshaft Co. However, the new laboratory with its greatly enlarged facilities now permits an expanded scope of investigations to be handled. Too, more special types of heat treatment jobs can be set up and studied for determining most effective methods. Figs. 1, 2, 3, and 6 are typical of the more specialized setups that now are being developed for handling work not suited to the standard equipment such as the bank of standard units shown in Fig. 4.



*Air ducts fabricated from Revere Magnesium Alloy Sheet for airplanes which are being built at Consolidated Vultee Aircraft Corporation, Fort Worth, Texas, Division.*



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WELDABILITY	Excellent	Good	Excellent	Excellent
DEEP DRAW	Excellent	Good	Fair	*
FORGEABILITY	Excellent	Excellent	Excellent	Excellent
MACHINABILITY	Excellent	Excellent	Excellent	Excellent

\*Heat-treatable extrusion or forging alloy

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# DIVERSIFIED MANUFACTURING

By G. ELDRIDGE STEDMAN

*Heavy equipment of many types is produced at western plant specializing in construction from details of design to finished product*



*Fig. 1—Finished pistons for marine diesel engines are produced by another company division*

A LARGE copper company once needed 52 classifiers as soon as possible. One of the best bids promised first delivery in 6 weeks and the remainder at 2-week intervals. At this rate, more than 2 years would have been required to complete the order. After some careful planning, the General Iron Works Co. plant of Stearns-Roger Mfg. Co. at Englewood, Colo., 7 miles south of Denver, offered completion of the first machine in 3 weeks, with another machine every other day. A lack of assembly space made it necessary to set up outdoor assembly floors which were served by a locomotive crane. The planning proved to be sound and delivery was made on time.

The facility shown by this company in meeting unusual requirements for a wide variety of industrial equipment is based upon its somewhat unusual development since 1885. Company has extended its activities in engineering, contracting and manufacturing into many fields, including mining, oil, gas, sugar, power, and general engineering. Despite the comparatively remote location of its plant on the eastern slope of the Rocky Mountains, at considerable distance from major sources of industrial supplies and production, this company has enjoyed a

steadily expanding market since its inception.

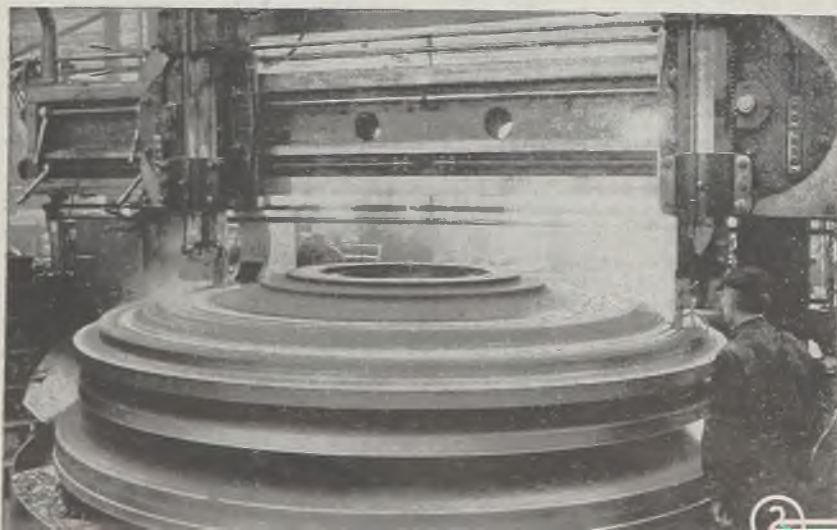
Equipment is constructed for many types of installations, including amalgamation, cyanidation, concentration, flotation, chemical and magnetic separation plants; absorption gasoline plants, pressure maintenance units; gas compressor stations; distillate recovery and diethylene glycol gas dehydration plants; beet and cane sugar factories; pulp dryer, pressing and alfalfa dehydration plants; power plants, (steam and diesel); railroad shops; helium plants; cement plants; air conditioning, heating and ventilating system.

Staff organization consists of engineers specializing in many branches of industry. Their combined experience enables Stearns-Roger Co. to analyze, design and construct practically any type of processing equipment or industrial plant, and much of the required equipment is custom-built in its own shops.

It manufactures steel products, forgings, Meehanite castings, metallurgical and mining machinery, gas and oil equipment, power plant equipment, sugar refining installations, and other heavy equipment. Many machine tools are of its own design and construction.


The pattern shop is equipped with modern woodworking tools, individually motor driven. It makes most plant patterns, one exception being those for locomotive cylinders. Many types of patterns are made, including those for hoists, rod mills, ball mills, separators, door machines, flocculators and sewage disposal equipment. A 96-inch diameter ball mill head pattern has been made.

Three cupolas melt metal for castings.



*Fig. 2—Machining a ball mill head with a 12-foot vertical boring mill in the General Iron Works plant at Englewood, Colo. The two heads on cross rail are working simultaneously, facing two different surfaces*





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## SHAPE DIES



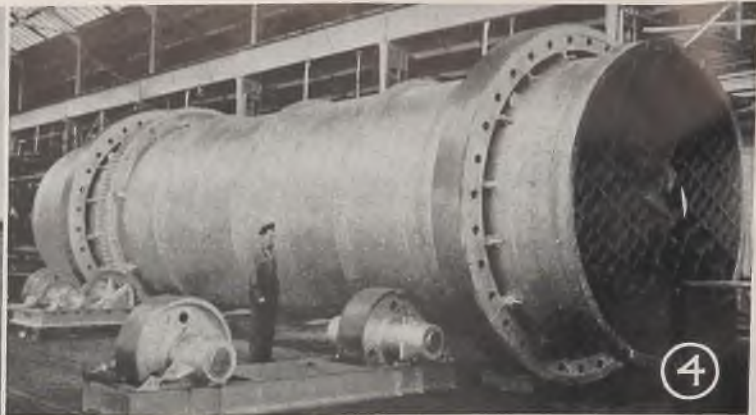


Fig. 3—Stress relieving furnace, showing sectional construction, and the railroad track alongside for loading and unloading

Fig. 4—Pulp drier, 44 feet long and 10 feet 6 inches wide

Cupolas are charged by placing a layer of coke on the bottom for a fire bed, then a layer of metal, mostly scrap, in a Meehanite-mix formula, then another layer of coke and so on in alternating layers. The bottom coke bed is fired by an oil torch. The air blast is turned on when molten iron is ready to pour, and the temperature is reduced in 4 to 5 minutes. Metal is drawn off into a pouring ladle, as each layer is melted, and at the same time additional charges are added at the top. The foundry has a maximum capacity of about 1,500,000 pounds of castings per month. Cupola blast, to maintain a constant volume of oxygen, is controlled by a meter compensating for changes in temperature and barometric pressure. Plant altitude (5300 feet) causes considerable atmospheric variation.

Four core ovens are used: One a tray type, 21 feet wide and 7 feet deep; a small car type, 8 feet wide and 16 feet deep; and two large car-type ovens, each 18 feet wide and 30 feet deep. Pouring ladles are handled by two 25-ton cranes. Most heavy work is done in the ma-

chine shop main bay, which houses large boring mills, planers, lathes, gear cutters, thread cutters and milling machines. An internal gear shaper, originally used to cut lock machinery gears for the Panama Canal, cuts either internal or external gears up to 25 feet in diameter. It now is used in cutting gears for mining and sewage equipment.

#### Special Departments Provided

Boring mills from 30 inches to 12½ feet in diameter are used for worm gear blanks, herringbone gear blanks for hoists, ball and rod mill shells and heads, and cylinders and bushings for tanker ship pumps.

A boring mill department is off the main bay of the machine shop. The turret lathe section is installed in another bay. Drill press, gear cutting and assembly departments are located in other wings.

Before Pearl Harbor, Army Ordnance needed a shop to produce specially designed Acme turret lathes, as Acme Machine Tool Co. of Cincinnati then had insufficient capacity available. Complete prints were received at Stearns-Roger on Jan. 2, 1941, and work started immediately on patterns, jigs and fixtures. Being unable to purchase forged steel spindles for lathes at once, the shop cast them of Meehanite metal. Working around the clock, seven days per week, shipment of complete lathes started on the first of April, and 30 to 50 per month were made thereafter. Approximately 800 lathes were manufactured, some with special large heads to accommodate 15-millimeter shells; others were of standard 2½-inch bar types.

When necessary, special machine tools are designed and built. Several special high speed horizontal boring mills were recently constructed for turning out pump bushings and cylinders and lathe head stocks.

A large floor-type horizontal boring mill for boring and facing locomotive cylinder castings is fitted with milling heads for facing flat surfaces. Most milling tools throughout the plant are carbide tipped. In Fig. 2 appears a 12-foot vertical boring mill machining a ball mill head. This unit can handle work up to 12 feet 5 inches in diameter and 6 feet high.

The pit lathe, designed and built by company engineers, has a face plate that will accommodate a 30 foot fly wheel. Its tail stock can move 40 feet from the headstock. It will take a baker cooler 10 feet in diameter and 40 feet long, for example, and turn journals on each end. Recently, this machine handled singly 50 Stratford petroleum contractors—welded pressure vessels approximately 10 feet in diameter by 18 feet high, previously X-rayed and stress-relieved. After as-

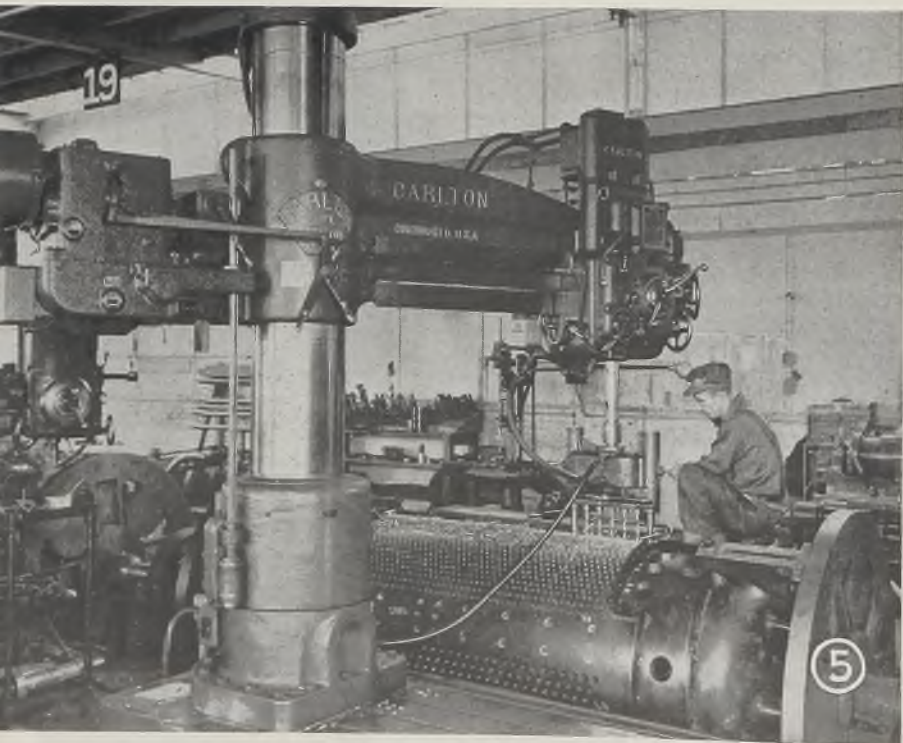
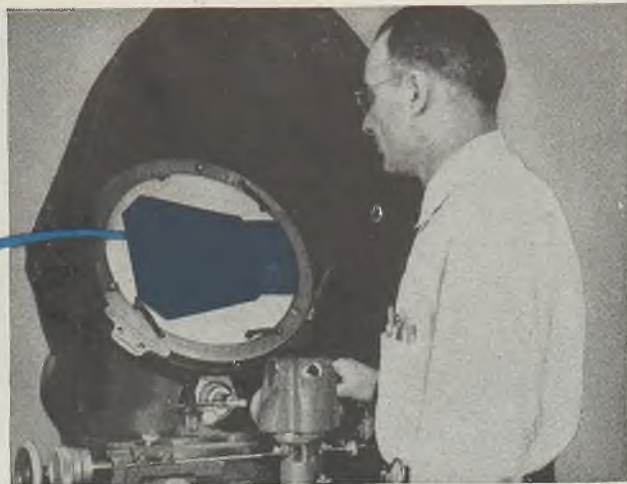


Fig. 5—Marine boiler drums being drilled on a pit rig with clamps and rotating devices below a 6-foot radial drill arm with multiple head adjustments





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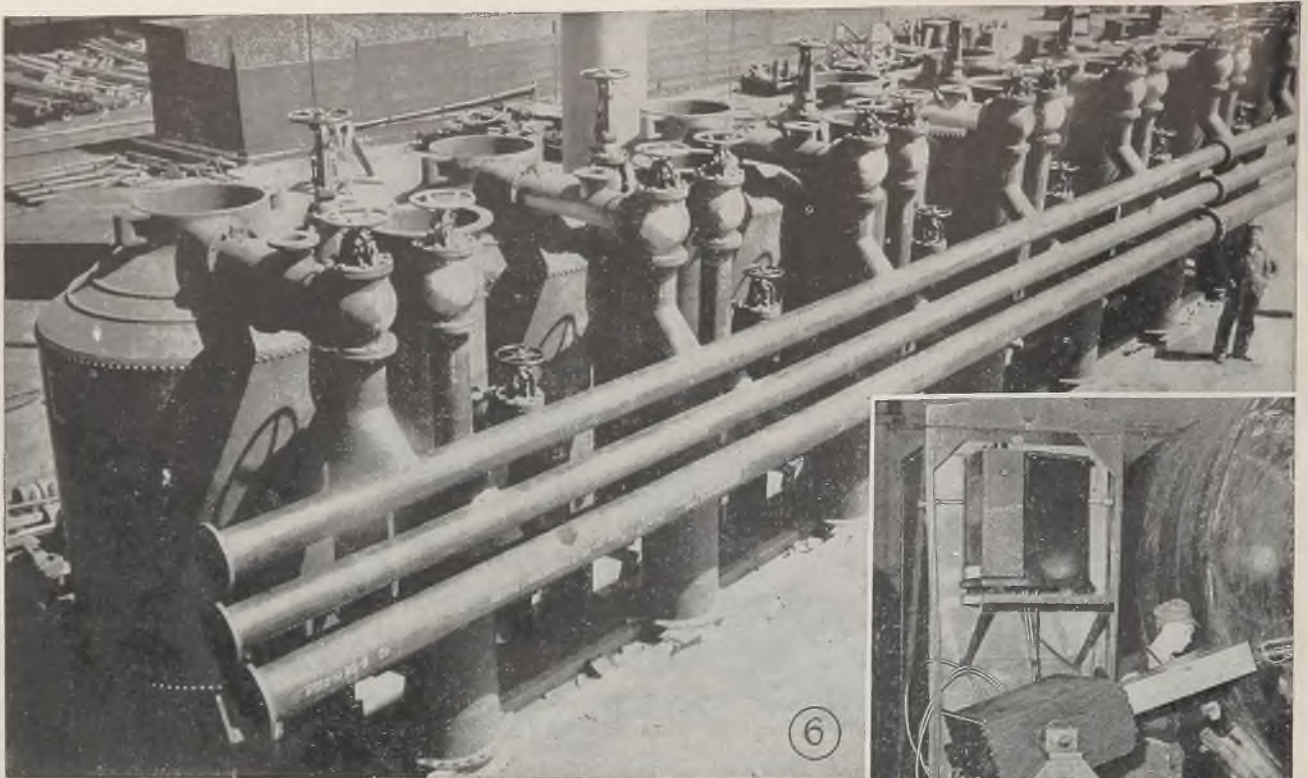
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*Fig. 6—Diffusion battery of 14 cells for large sugar refinery, complete with headers and piping*

sembly and welding these are mounted on a spider in the pit lathe. All parts must be machined concentric and in correct relation to each other, to secure required precise dimensioning in field construction.

The general assembly floor at the north end of the machine shop often holds simultaneously various rubber diaphragm pumps, classifiers, flocculators, electric and steam hoists, stern tubes for ships, ball mills, and other heavy machines. A large forge shop includes 5500-pound and 1500-pound steam hammers, a bulldozer, several sizes of forging machines, and numerous oil furnaces. There also is electric furnace heat treating equipment for small steel parts. Some forgings now in the shop are parts of turnbuckles used on vessels built in West Coast shipyards. Threaded parts are of 3-inch diameter solid bar steel. The assembled turnbuckle is approximately 6 feet long. Until this shop started production, such items were so critical that they were shipped by express from the eastern manufacturers, with inevitable delays incident to wartime transportation.

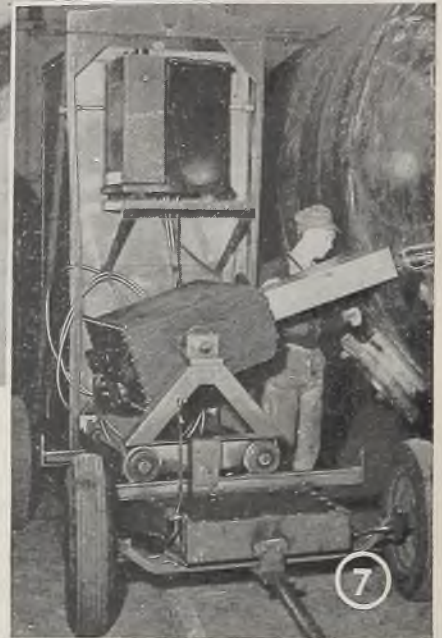
The general iron shop is 215 feet long and 105 feet wide, and is equipped with modern machines, including large and small plate rolls, gates and rotary shears, pantograph oxy-acetylene cutting equipment, punches, bending machines, electric fusion welding machines, 250,000-volt portable X-ray (See Fig. 7) and magnaflux equipment. The shop is equipped to make difficult types of fusion welded, fired or unfired pressure vessels in accordance with ASME and API-ASME codes.

Special rigging to accommodate steam boiler drums has been installed in part of the shop, making the drilling of hun-

dreds of holes for tube insertion easier. It consists of clamps and rotating devices mounted in a pit within reach of a 6-foot radial drill, as shown in Fig. 2. The arrangement uses multiple head adjustments, with considerable saving in manhours. A plate planer, with 11 air operated clamps, trues and squares plates 24 feet long. The main plate shop rolls handle steel plate up to  $1\frac{1}{4}$  inches. An automatic welding machine is mounted for both inside and outside welding on diameters up to 12 feet. A series of power driven rollers is placed below the operating head. It is possible to weld longitudinal or circumferential seams of practically any size with this unusual setup.

#### **Furnace Has Unusual Flexibility**

A stress-relieving furnace, in conjunction with the plate shop and shown in Fig. 4, will take vessels up to 11 feet in diameter and 70 feet long but can be adjusted for comparatively small vessels and castings. It is made of a series of portable sections forming the top part of a firing tunnel, lifted into position by a locomotive crane operating from a railroad track alongside the heat treating furnace. Material can be lifted into the furnace by the crane, or rolled from flat cars standing alongside. When steel and insulation covered sections are positioned



*Fig. 7—Portable X-Ray equipment, capable of handling plates up to 3 inches thick*

and adjustable end sections put in place, oil burners are fired to obtain the desired furnace temperature. A 6-point recording pyrometer makes a continuous record of stress-relieving operations. Compared to ordinary all-brick car-type stress-relieving furnaces, maintenance is not high, and excellent performance is shown by pyrometer records.

Bubble trays; absorbers (5 feet 6 inches inside diameter by 56 feet 6 inches long, of  $1\frac{1}{2}$ -inch steel plate); steel classifier parts; aftercoolers of 106 seamless steel condenser tubes with forged steel heads welded to the shell; gas scrubbers; butane storage tanks (of  $\frac{3}{4}$ -inch steel plate, 12 feet in diameter by 63 feet long); gasoline dewatering tanks; ore coolers; 13-spindle laboratory roasters; automatic skip hoists; ball and rod mills; mine timber framers; single and double drum hoists; flotation machines; vacuum pans; juice heaters for beet sugar factories; pulp presses; beet flume controls; beet washers; sugar granulators; pineapple bran driers; and evaporators, are among the great variety of products made at this plant. Conclusive evidence of the spread in type of fabrication is presented in Figs. 3, 5 and 6, showing respectively, an inspection station for marine diesel pistons; a 44-foot pulp drier; and a special installation for sugar refinery.



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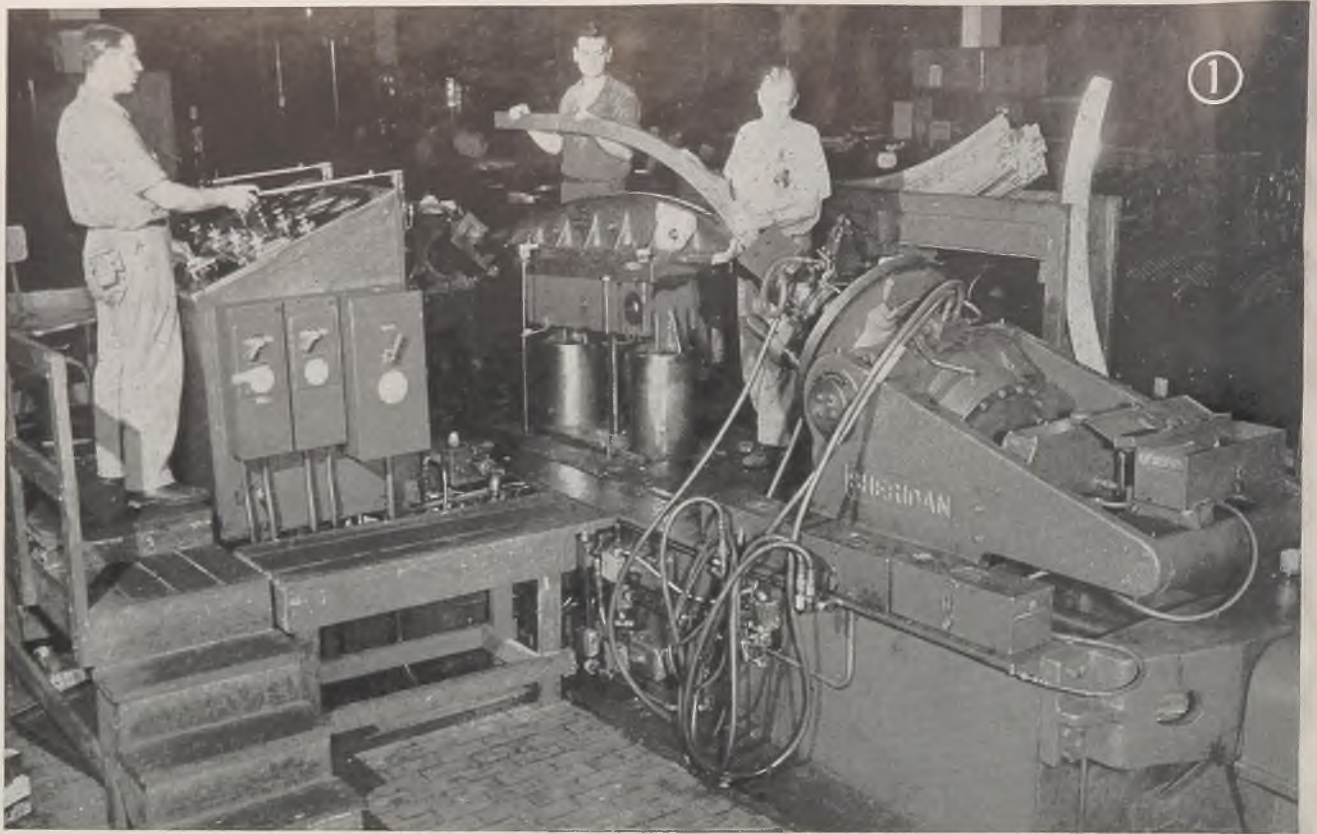
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# Stretch Forming...

**of odd-shaped sections is easily accomplished on unusual machines at Ford's Willow Run Plant**

STRETCHING and forming of aluminum alloy sections used in B-24 bombers built at the Willow Run plant of Ford Motor Co. is accomplished in a number of unique machine units, including several designed by Ford engineers. Stretching is a conventional technique with aircraft structural sections, carried out to straighten, strain-harden and strengthen parts; in combination with forming operations it provides a means of shaping ribs, stringers and other structural sections which could not

be accomplished easily by any other method.

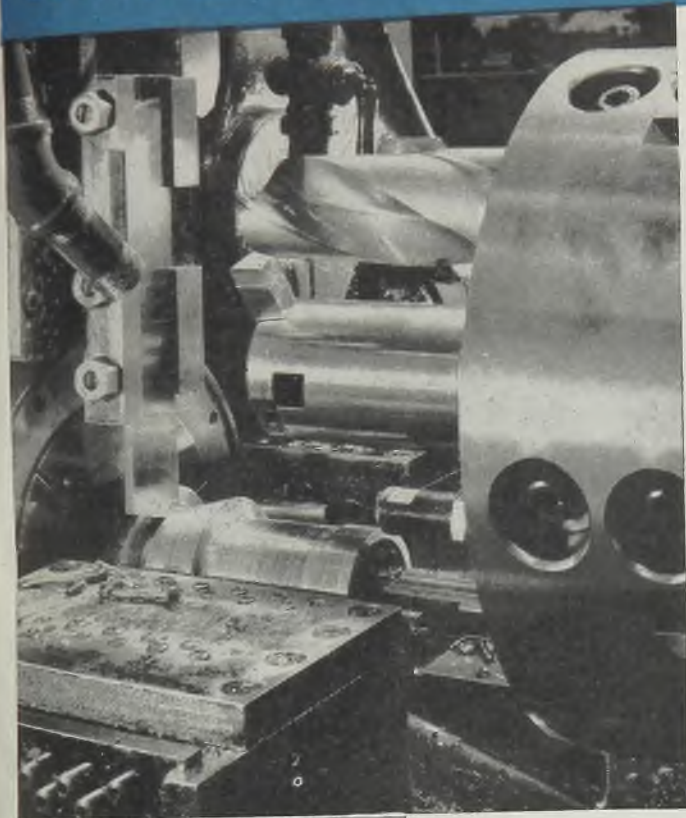
Originally, aluminum stock such as hat stringer sections, was stretched 3½ per cent of its length primarily as a means of straightening and strengthening. Ordinary restrike dies in large presses were used for final forming operations. However, it was found that many parts could not be formed efficiently by restrike dies in presses—springback of the material indicating the need for drawing or forming under pressure into

*Fig. 1—Stretch forming extrusions and heavy-gage aluminum structural sections in the B-24 is done in this Sheridan stretcher. Operators are inserting a heavy reinforcing part for one of the center wing bulkheads into the jaws of one of the cylinders prior to the stretching operation. The machine can develop a 35-ton pressure at the end of each stretching cylinder. The "pull" on the material is downward as each cylinder moves outward. The operation is controlled from the switchboard, and the machine will handle material from 0.020-inch to 0.500-inch in thickness and will stretch-form stock from straight to nearly one-half circle contour*

*Fig. 2—Four stringer stretching machines such as the hydraulic pressure stretcher shown here were Ford-designed for straightening and hardening rolled aluminum stock after heat treatment. The machine shown is stretching heavy-gage hat stringers used in the center wing section of the B-24*



# Sets Up Quickly Runs Profitably on CLEVELAND AUTOMATICS with UNIVERSAL CAMMING



**T**HE job shown in work in the photograph at left was processed on a Cleveland *Single Spindle Automatic*. The savings made, in cost and in production time are typical of savings anyone concerned with production wants to make, so give a moment's consideration to this case history . . .

**Stock** . . . 6½ inch bar, 4160 steel, hot finish.

**Operations** . . . Gauge, rough drill, rough turn O.D. in two stages, form O.D. complete, rough bore, finish bore, ream and cut off. Finish length 9<sup>1</sup>/<sub>16</sub> inches. Length of body (formed with one tool) 6½ inches.

**This Job Was Set Up Quickly** . . . because every operation on a Cleveland Automatic is controlled by standard cams, easily reached and quickly set to any position with the aid of an exclusively Cleveland universal adjustment feature. All control settings are simplified by quick-reading calibrations which reduce original set-up time to a remarkable minimum, also make it possible to retool accurately for a re-run.

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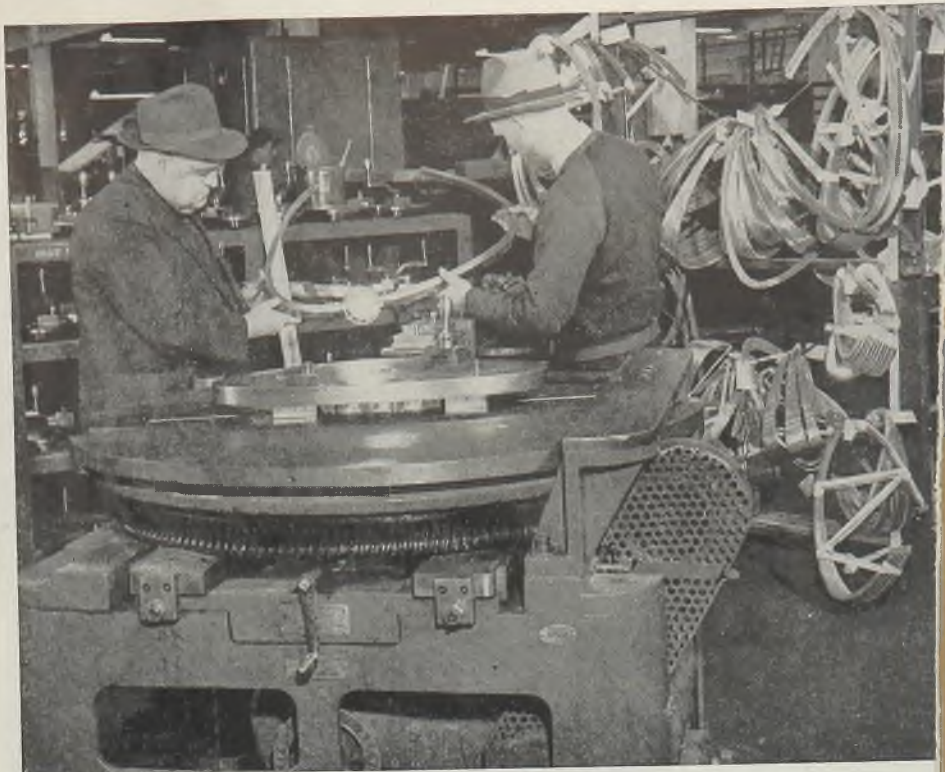
- a series of Kennametal compositions, of varying degrees of hardness, strength, and toughness, exactly suited for machining various types of steel, as well as tough, stringy non-ferrous alloys.
- a new, highly abrasion-resistant tungsten carbide Kennametal composition that cuts cast iron at greatly accelerated rates, with amazing tool life.
- a complete line of machining tools, designed to make fullest utilization of possibilities inherent in Kennametal compositions.
- Kennametal lathe files, that outlast steel files up to 200 times, and produce a superior finish.
- a wide variety of wear-resistant products, including lathe and grinder centers, pump valve balls and seats, gage tips, etc.
- negative-rake carbide milling cutters, notable among which is the widely used inserted-blade Kennamill step-cutter.

Research—looking to still further improvement in the properties and applicability of Kennametal—will continue, and expand, so long as the useful products of inventive genius are protected under an uninhibited American system of free enterprise.





*Fig. 3—Five Apex power benders are used in the draw bench department to form stringers. The operator inserts a straight strip into a revolving form block attached to the platform of the machine; a die or mandrel presses against the rim of the fixtures and the edge of the strip, forming it into the desired shape. The mandrel is held in place by a compression chamber and is stationary while the form block revolves*



the desired shape and the required size.

In order to provide means whereby parts could be formed on a production basis, Ford tool design men combined the hardening and forming operations into one process called stretch-forming, using a stretcher die (similar to a press die) in a hydraulic stretching machine.

Stock is rolled in the annealed condition, or in heat treated condition, preformed in rolls or a preformer, and then sent to heat treat. After heat treatment, a preformed channel, extrusion, or Y-section is gripped by specially fitted jaws, and stretched by hydraulic pressure over or around the stretcher die.

At Willow Run, there are 11 hydraulic stretchers and a large Sheridan machine for heavy extrusions. The machines are semiautomatic, fast and much more efficient than some machines previously used in aircraft plants. They are hydraulically operated and have pneumatic jaws operated by air pressure.

#### Stretcher Provides Tremendous Pressure

A 75-ton hydraulic pressure stretcher, believed to be the most powerful stretching machine in the aircraft industry, is used at Willow Run to stretch the heavy-gauge hat stringers used in the center wing section of the B-24 bomber. The machine was designed by Ford tool experts and built at the Rouge plant. It comprises three tubular tie rods about 35 feet long with cast iron supports at each end. The hydraulic unit is attached to the jaw at one end, and develops a pressure of 75 tons. The jaw at the other end is attached to a movable tail stop which can be set at various locations along the tie rods by clamping an interlocking washer into notches in the tie rods. The jaws are pneumatically operated. It is estimated that the machine will stretch 20,000 linear feet of the heavy hat-shaped stringer sections in nine hours.

Another type of machine originally

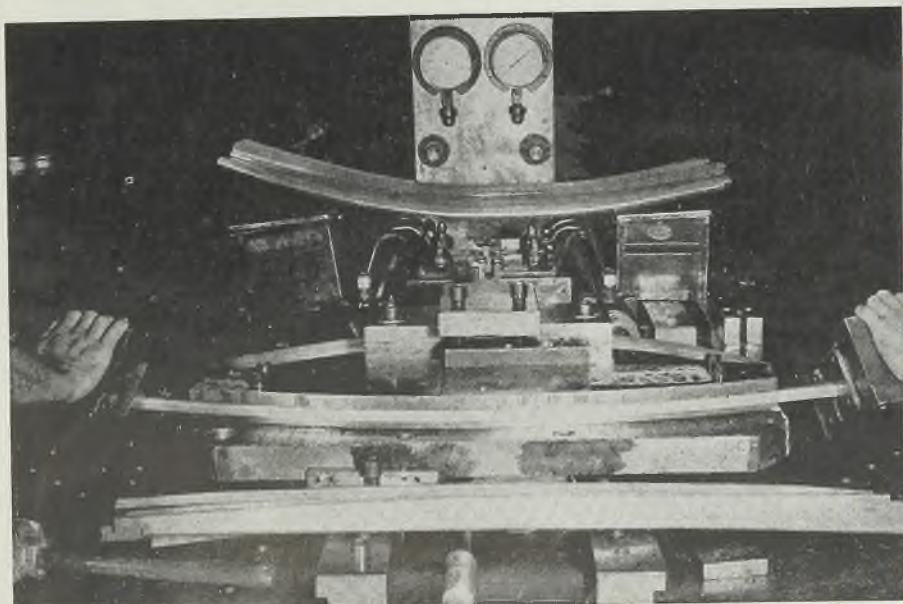
*Fig. 4—This Ford-designed hydraulic unit is stretch-forming a stringer used in B-24 wing tips. Hydraulic jaws grip the stock and exert stretching pressure on the ends. The die then is moved forward to form the stock to the desired contour, thus stretching and hardening the piece*

developed by Ford at Willow Run for forming parts is the Apex bender. A removable steel form block designed in the shape of the piece desired, is fitted to the power machine. Stock is held against this form block and a hydraulic nose, or mandrel, is pressed against it, catching the stock between the two. When it is adjusted properly, the operator presses the button and the fixture rotates.

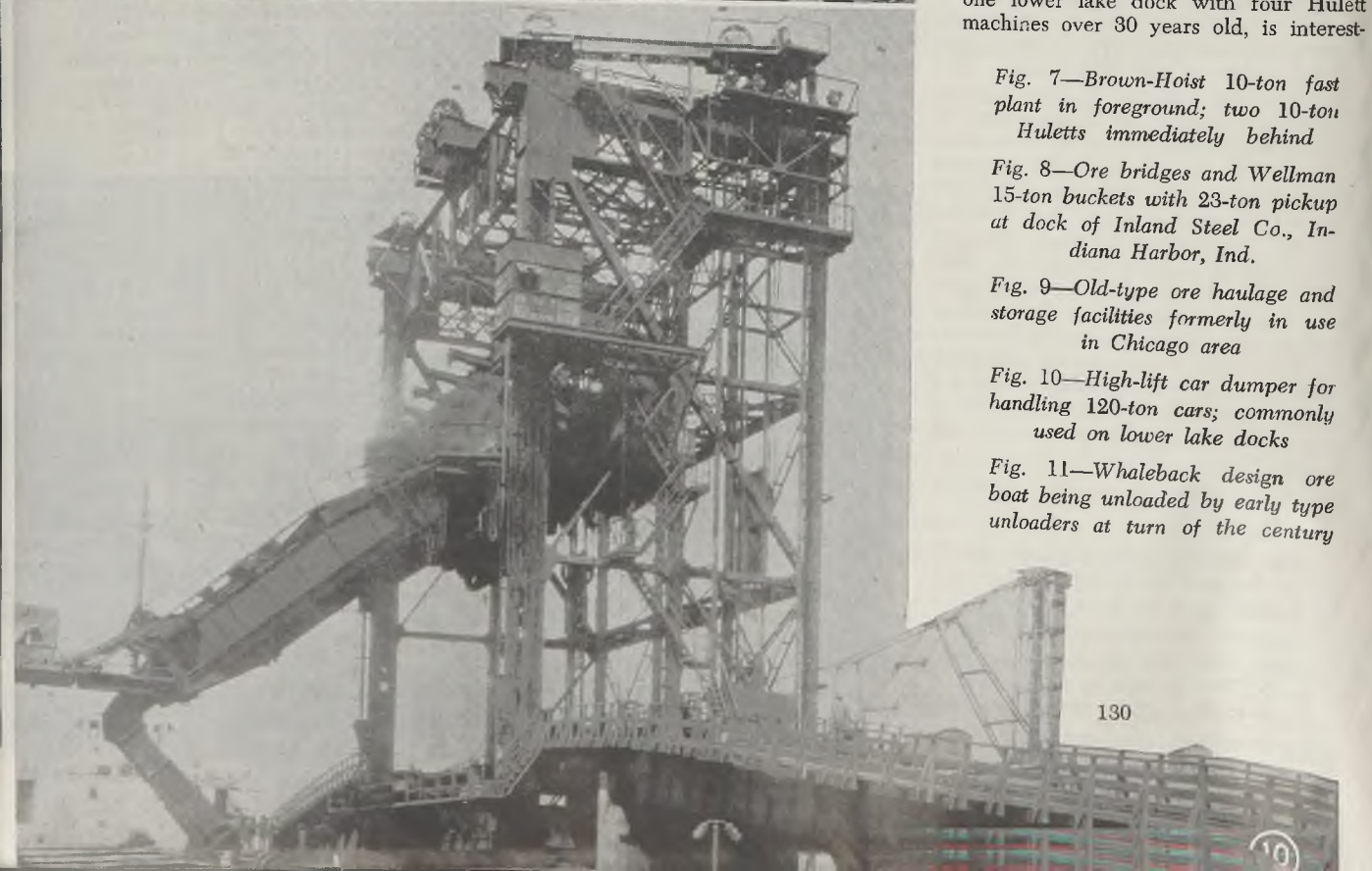
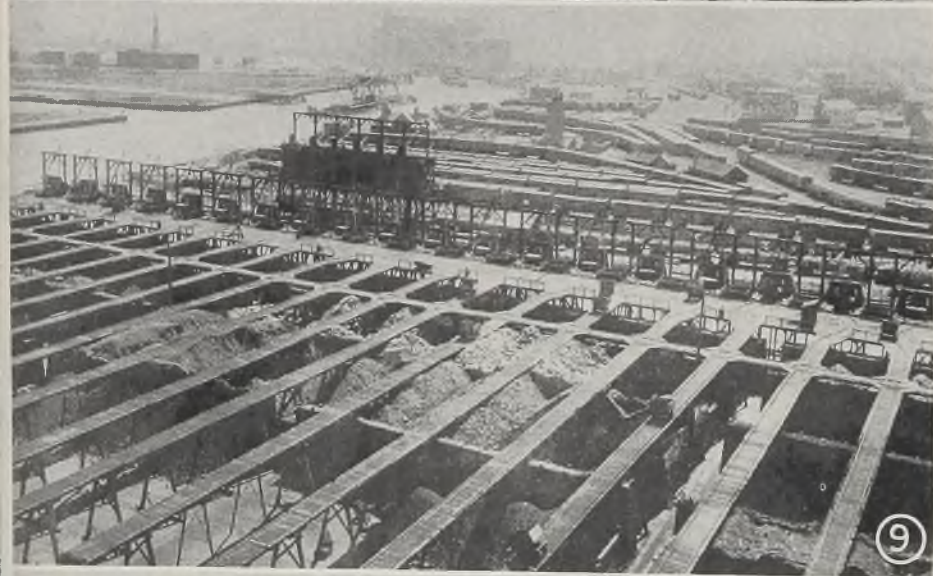
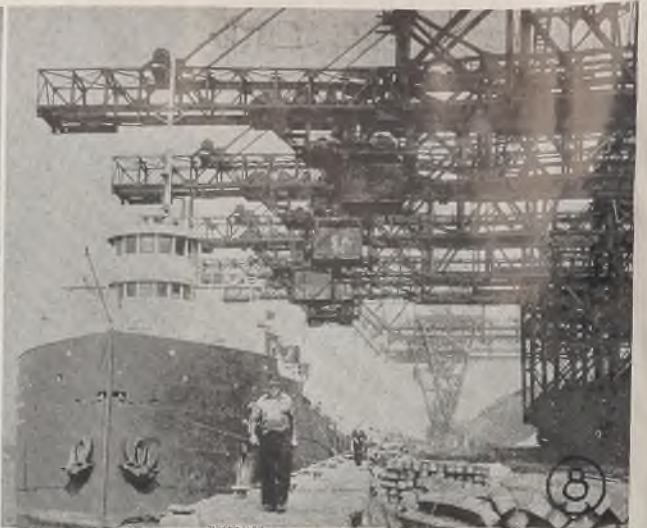
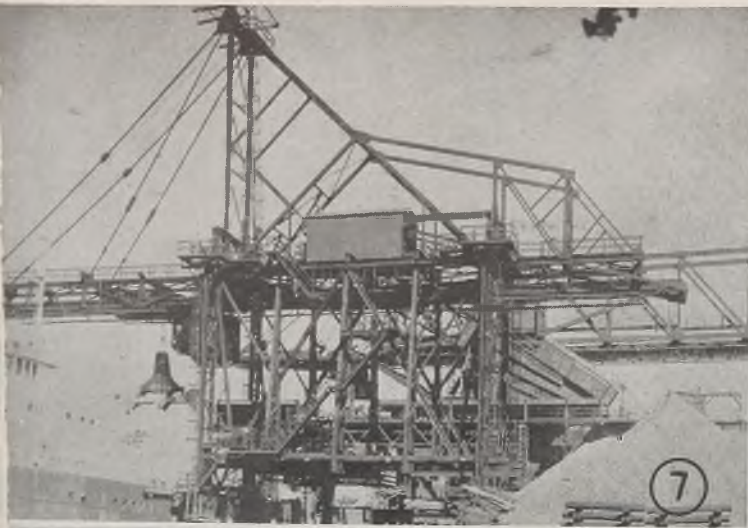
The pressure of the mandrel against the stock bends or forms it tightly around the form block. When the mandrel is released, the stock springs back somewhat, although retaining the circular or curved shape of the form block. A form block has to be built for each part desired, but after it is built, a relatively

inexperienced man can operate the machine and turn out well-formed parts.

These machine units for shaping aircraft parts (some of which are similar to those used by Goodyear Aircraft Corp., as described in STEEL, July 10, 1944) have eliminated most of the costly handwork formerly required to construct the unusual shapes which frequently are necessary in aircraft and other design. They also permit production of these vital parts at speeds providing all of the economies to be found in mass production. Contours of parts formed by these hydraulic stretchers and benders are smooth and uniform, with dimensions held to close tolerances. Thus all aluminum alloy forms are interchangeable and suited to assembly line production.







# Ore and ON THE

## Part II

THE DOCKS at Conneaut, O. have the reputation of being the fastest and most efficient on the Lakes. The record of ore unloaded per Hulett machine per hour exceeds that of any other plant. As representative, the record of one lower lake dock with four Hulett machines over 30 years old, is interest-

Fig. 7—Brown-Hoist 10-ton fast plant in foreground; two 10-ton Hulett's immediately behind

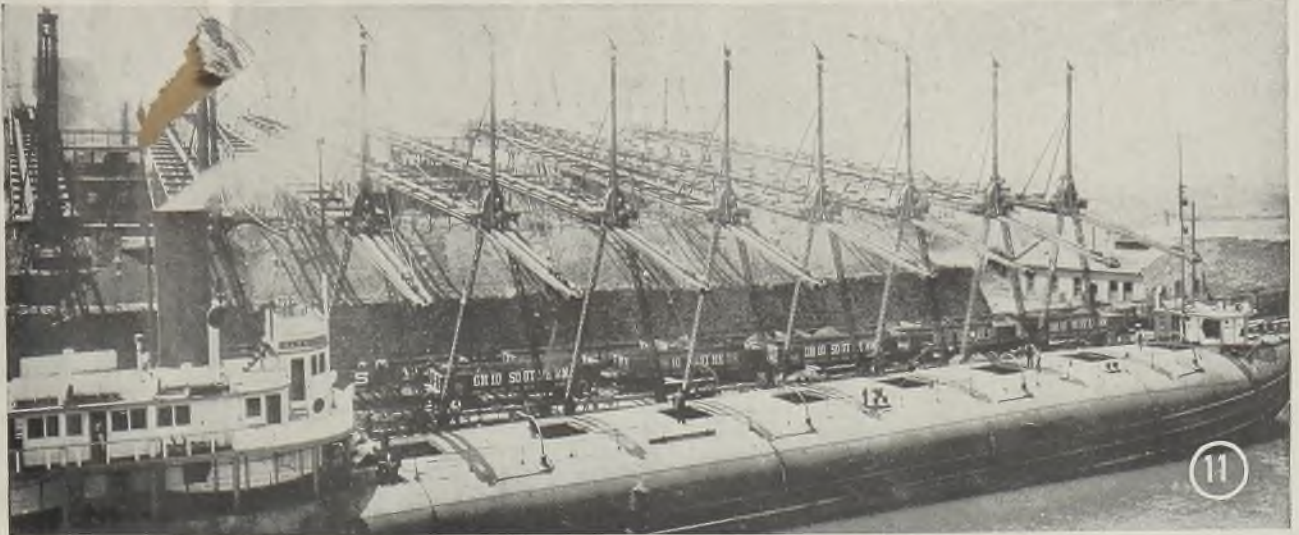
Fig. 8—Ore bridges and Wellman 15-ton buckets with 23-ton pickup at dock of Inland Steel Co., Indiana Harbor, Ind.

Fig. 9—Old-type ore haulage and storage facilities formerly in use in Chicago area

Fig. 10—High-lift car dumper for handling 120-ton cars; commonly used on lower lake docks

Fig. 11—Whaleback design ore boat being unloaded by early type unloaders at turn of the century





# Coal Handling TOWER GREAT LAKES

By A. E. GIBSON\*

President  
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ing. In the 32 years of its existence, this dock has unloaded 120,834,647 gross tons of ore. This amounts to 944,000 gross tons per year per machine. The all-time record of this plant was made on Nov. 16, 1943 in unloading the S.S. Col. J. Pickands with 11,680 vessel bill of lading gross tons in three hours and 15 minutes, or an average of 898.5 gross tons per hour per machine, and a dock average for the four machines of 3594 tons per hour.

During the past season this dock unloaded four of the new 67-foot beam boats at tonnages varying from 760 to 825 gross tons per hour per machine. This is a remarkable record for machines having insufficient span to completely reach the outside of the ships. These hourly rates compare favorably with those obtained in unloading 58 and 60-foot beam boats on which high records of slightly under 887 gross tons per hour per machine were made. The 30 odd years' experience of this dock goes into the records as follows:

Year	Avg. gr. tons hr./machine
1912	325
1916	498
1917	441
1929	520
1930	556
1931	610
1943	637

For heavy equipment to better its record almost continuously year after year for 32 years is almost beyond belief and especially so for machines subject to such tremendous loads. Credit

for this goes mainly to the dock management whose experience and resourcefulness in devising further refinements have made this possible.

Referring to the foregoing tabulation, the increasing record up to 1930 resulted solely from the efforts of management and from efficient operators. In 1930, the electric current furnished the machines was increased in voltage, making possible faster speed and an increase in tonnage per hour per machine of 36 tons, or say two additional cycles of operation per hour.

### Rearrangement Speeds Handling

In 1931 the receiving hopper was lowered 1 foot and brought forward 12 feet. This increased the hourly average another 54 tons per hour. The docks' record in 1943 of 637 tons per hour was another increase of 27 tons over that of 1931. There was no change in equipment or operation to account for this increase. Little lost time due to breakdowns, continued excellent management and some advantage from larger average cargoes (9189 gross tons per ship in 1942, and 9998 gross tons per ship in 1943) all played a part in establishing the record.

Interruptions to operations in a season at the same dock and for the peak year 1942 in unloading 1081 ships, are sur-

prisingly low. Time lost per machine per ship follows:

Cause	Minutes
Railway delays	0.05
Mechanical repairs	2.67
Electrical repairs	0.52
Car haulage delays	none
Miscellaneous	1.85
Total	5.09

The splendid service of the railroad industry is shown in this record. In a war year of great demands the average ship was delayed but 0.05-minute per machine, or a total of 0.2 minutes for lack of cars. This is remarkable.

Perhaps no other industrial equipment is given more attention in the off-season than ore unloaders.

Each Hulett's crew consists of the following persons:

An operator who controls the opening, closing and revolving of the bucket, lowering into and hoisting out of the ship and traveling of the trolley for dumping the ore into the receiving hopper.

A larry man who rotates the hopper to discharge the ore into the larry, weighs the ore, travels the larry to dump the ore into cars or the receiving trough.

An oiler for each machine, four shovelers for cleaning up the hull of the ship, one laborer for clearing up the spilled ore on the deck, and a water-boy. Three mechanics and two electricians service the four machines. Four locomotives or shunters spot cars, with one operator on each. The foregoing crew works 11½ hours and there are two turns per day.

A considerable number of bridge-type unloaders are in use on the Great Lakes

\*An address prepared for the July 1944 annual meeting of the American Society of Civil Engineers, Cleveland. The meeting was canceled at the request of the Office of Defense Transportation. The first installment was presented in last week's issue.



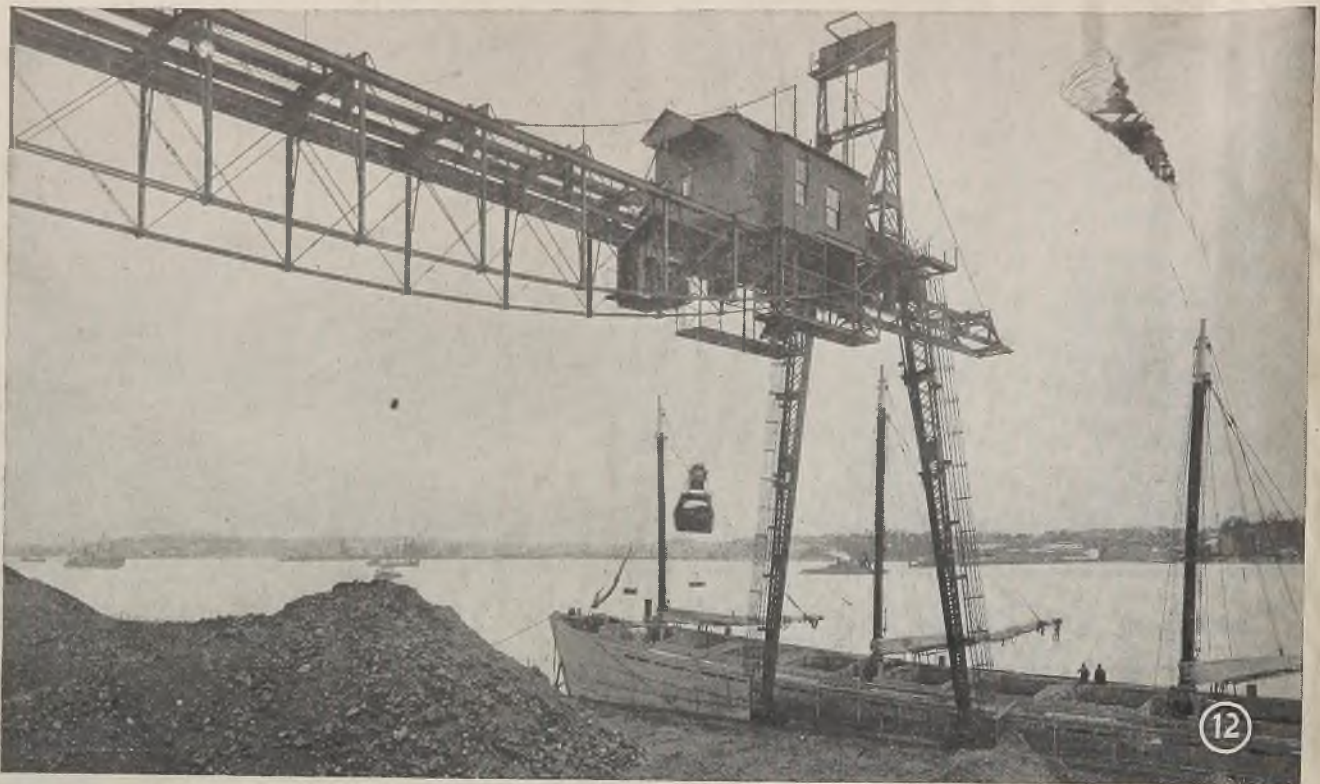


Fig. 12—Early-type coal unloader handling coal from sailing vessel to storage pile

in some instances because the quantity of ore handled is small and in others, notably Inland Steel Co., Indiana Harbor, Ind., because of preference. At the latter plant, modern clam shell buckets rated at 15 tons but of actually larger capacity are in use and the record of the dock is good. Other situations exist where the dock layout will not permit installation of such wide span machines as Hulett unloaders, notably the South Chicago docks.

Generally, the choice of equipment is predicated on tonnage to be handled, cost of unloading, and capital investment. While bridge-type unloaders are much the cheaper type of equipment the main difficulty is in keeping the rope-operated clam shell bucket from turning when being raised or lowered through the hatch. When a clamshell bucket picks up its load of ore, it is generally necessary to raise it off the cargo and let it come to rest in the hold of the ship before hoisting. This naturally consumes time and offsets the higher traveling speed over stiff-leg unloaders.

The main advance in late years, in bridge-type unloaders has been in the design and construction of buckets. The new low-alloy steels of 45,000 to 60,000-pound yield and 70,000 to 90,000-pound ultimate strength, have played an important part in their development. These materials, fabricated by welding and thermal stress relief, have made possible the building of buckets with long life, exceedingly low upkeep cost and low weight per ton of ore handled. These ore buckets handle many million tons of ore without repairs except to move the manganese trays nearer together after wear.

In the field of ore rehandling, newly designed bridges have come to the fore in plants of two of America's largest steel mills. This development was the result of the combined engineering staffs of the American Bridge Co., and the Wellman Engineering Co. In addition to the heavy wide flange construction of the bridge structure, the main trolleys are supported by ten 33-inch diameter wheels with four of the five axles individually motor and worm driven. The hold and hoist mechanisms are placed on a substructure suspended from the trolley and likewise are worm driven, as are the main travel wheels. Wheel loads are kept to a minimum by using 16 wheels under each corner of the bridge. This new type of bridge, with 20-ton capacity welded clamshell buckets; while high in first cost promises low operating and upkeep expense, which justify its selection.

#### Initial Coal Handling Methods

The loading of coal into ships at the lower lake docks has a background similar to the unloading of ore boats. The boat shipment of coal up the lakes dates back to 1850. The first cargo came to Cleveland from the Mahoning Valley in canal boats, was unloaded by hand into wheelbarrows and stored on the dock, whence it was rehandled into wheelbarrows and dumped into the hatch of the boat. This was the reversal of the earliest operation of unloading ore from ships at lower lake docks. The development of coal handling progressed to the use of whirleys with 1-ton tubs and was in use from 1875 to 1885. By 1892 the size of the tubs was increased to 5 tons. In 1890 the first car dumper

was installed on the Cleveland, Canton & Southern Railway docks, Cleveland, for handling coal cars of 10 to 20 tons capacity.

The first lifting car dumper was installed in 1896 and was highly successful. The operation of lifting car dumpers consists of pushing a loaded car onto a cradle, where it is clamped to the rails by heavy clamps which press against the top of the car, holding it onto the rails of the cradle. The cradle is elevated and then inverted so that the coal runs out of the car onto a pan from which it flows by gravity into a chute which directs the coal into the hold of the ship. After dumping the coal from the car, the cradle is brought back to its vertical position and lowered to the starting point. The coal car then is bumped out of the cradle by the next incoming loaded car and the empty car runs down the discharge track into the empty storage yard.

The modern high-lift car dumper follows closely the original design. Originally, they were steam machines; many still are in operation. The first electrically-operated dumper was installed at Baltimore in 1921 by the Western Maryland Railway Co. This was a Wellman development. In 1926 the first electrically-operated high-lift dumper on the lakes was installed at Toledo for the Ohio Central Railway Co. The cradle and mule car motions employ Ward Leonard control and the cradle is over counterbalanced so that power required to raise the loaded car is approximately the same as to lower the empty one. The Toledo dumper and those following were designed to handle 120-ton

(Please turn to Page 166)



