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# STEEL

The Magazine of Metalworking and Metalproducing

# OCTOBER 16, 1944

Volume 115—Number 16

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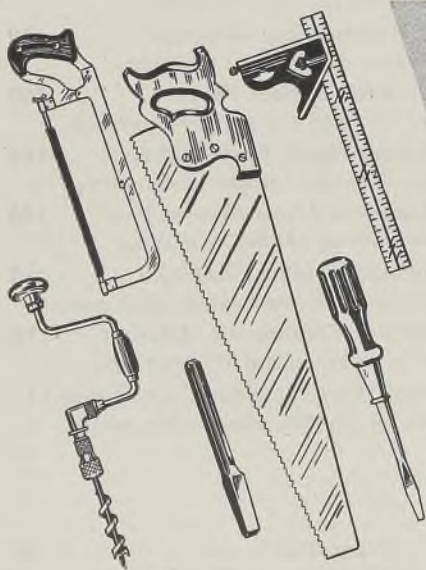
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# T OOLS TO REBUILD A WOR



Soon the artisans of the world will be busy using millions of tools of steel.

Here is another great opportunity — just one of many — for steel producers who look ahead now, and plan with Morgan to be equipped to *produce and sell and profit*. Morgan Rolling Mill engineering today can insure capacity, speed and price to meet the intensive competition of postwar production in steel strip, skelp, wire rod and merchant shapes.

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## Which Path?

Speaking before the North Carolina State Bar on Oct. 22, 1943, Malcolm McDermott, professor of law at Duke University, expressed grave concern over the undermining of constitutional freedom in this country. To emphasize his point, he enumerated the "12 steps into state socialism" by which Hitler induced the German people to accept his program and called attention to the "deadly parallel" between the Hitler technique and "what has transpired here in the United States during the past decade." Paraphrased for brevity, the 12 steps are:

1. Make the people feel their inability to solve their own problems and encourage them to turn to an all-wise leader for help.
2. Wipe out the principle of local self-government.
3. Make the central government (while appearing to represent the people) dutifully register the will of the leader.
4. Sweep aside constitutional guarantees.
5. Undermine faith in law and respect for courts.
6. Intimidate and rebuke the law-making body so as to undermine public confidence in it.
7. Keep the people ground down economically by high taxes.
8. Build up a great public debt so that the state is virtual receiver for the nation.
9. Keep alive a general distrust of private business and industry so that the people cannot rely upon their own resources.
10. Set up government bureaus to control practically every phase of a citizen's life; strive for government by men rather than by laws.
11. Nationalize education.
12. Fortify the foregoing with a steady stream of propaganda extolling those who bend the knee and vilifying those who dissent.

The address, abstracts of which have been given wide circulation by the Committee for Constitutional Government Inc., touches upon a question of transcending importance at this time. It is a question which should be pondered carefully by every citizen before he votes on Nov. 7.

The question is whether this nation shall continue on its present course paralleling so closely that which led Germany to ruin, trusting to luck that we may escape a similar fate, or shall it travel a path that will lead back to the certain safety of constitutional government?

**PRICE TENDENCIES:** Every manufacturer will be interested in the study of inflationary and deflationary factors presented by Price Administrator Chester Bowles. He compares cost of living, wholesale prices and industrial prices during the present war with those of the corresponding period of World War I. This indicates that the restraints imposed during the past few years have been markedly effective.

Then he summarizes the counter-influences which

may be expected after V-E Day. On the inflationary side are the reservoir of savings, high individual incomes and the temporary scarcity of civilian goods. On the deflationary side are the closing of war plants, temporary loss of employment in the transition period, reduction of income due to loss of overtime, uncertainties as to permanent peacetime employment and later on the flood of civilian goods offered for sale.

Offhand, the opposing forces seem to be more

evenly balanced than these were at the end of the first World War. We have no serious wartime inflation to be dealt with after the war ends. We will need certain price controls for some time but the sooner we can go back safely to the law of supply and demand, the better for all concerned.

—p. 75

**PROGRESS PENDING:** Considering all of the restricting factors surrounding present productive efforts, the fact that steel ingot production for the first three quarters of 1944 broke all previous records is a noteworthy achievement.

It reflects great credit not only upon those immediately responsible for steelmaking operations but also upon those who supply the materials for steelmaking. Among these latter are the blast furnace and coke oven superintendents who attended a joint meeting of their associations in Chicago on Oct. 6 and 7.

This meeting was of unusual interest because the program dealt with progress reports on experimental work on blast furnace and coke oven practice, some of which is of extreme significance. Everybody who attended the sessions came away with the conviction that co-operative research in blast furnace practice is beginning to pay dividends and that, as a result, tremendously important developments in the production of pig iron are imminent.

—pp. 70, 164

**GHOST WALKS AGAIN:** An unexpected change of attitude on the part of the Federal Trade Commission has revived interest in a 20-year old steel basing point case.

In 1924 FTC ordered the United States Steel Corp. to "cease and desist" from the practice of quoting Pittsburgh plus prices. In 1938 when the commission took steps to make the order final, U. S. Steel asked to have the order set aside. Since that time, the respondent has asked several times for delays in the trial and the commission has joined in the requests for delay, first on the plea of awaiting another court decision and more recently on account of war conditions. But when on Oct. 6 U. S. Steel petitioned the court for another delay, FTC—reversing its previous policy—refused to concur. Instead, it now is pressing for a decision.

Just what purpose will be served by this action, aside from clearing the docket, is in doubt because the steel industry long ago discarded Pittsburgh plus and adopted in its place a system of multiple basing points.

—p. 65

**EUROPE'S WORKSHOP:** Reports from this publication's British correspondent indicate that the outlook for Germany's iron and steel industry is exceedingly gloomy. Entirely aside from whatever steps the victorious Allied Nations may take to control Germany's industrial activities after the war, if the present Nazi policy of resisting to the inevitable end persists the result will be an almost total destruction of blast furnaces, steelworks and manufacturing plants.

As for facilities in France and Belgium liberated by recent Allied advances, the enemy loses a sizable tonnage of productive capacity. However, it is doubtful whether much of this capacity can be utilized by the victors in time to figure importantly in the war. Iron and steel works in the vicinity of Caen were totally destroyed before the Allies gained possession. Other furnaces and mills in France and Belgium which may have escaped serious military damage probably are in such a state of delapidation through inability of the Germans to maintain them properly that they cannot be used effectively for some time.

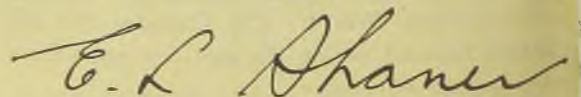
—p. 63

**FOR PRIVATE TRADING:** "International trade on as full and free a basis as possible is necessary not only as a sound economic foundation for the future peace but it is also necessary in order that we may have fuller production and employment at home."

This excerpt from a letter written by President Roosevelt to Leo T. Crowley, coupled with assurances that government controls over foreign trade will be relaxed after V-E Day, is encouraging in view of the contradictory information that has been coming from Washington. There have been hints that foreign trade would have to be handled through government channels for an indefinite period.

About 40 nations now maintain government purchasing commissions in the United States. Many will continue to buy through government agencies after the war ends. We probably cannot chop off Lend-Lease commitments summarily. However, we can and should work toward an early resumption of private international trade. It is gratifying that our government now seems to support this policy.

—pp. 66, 67



EDITOR-IN-CHIEF



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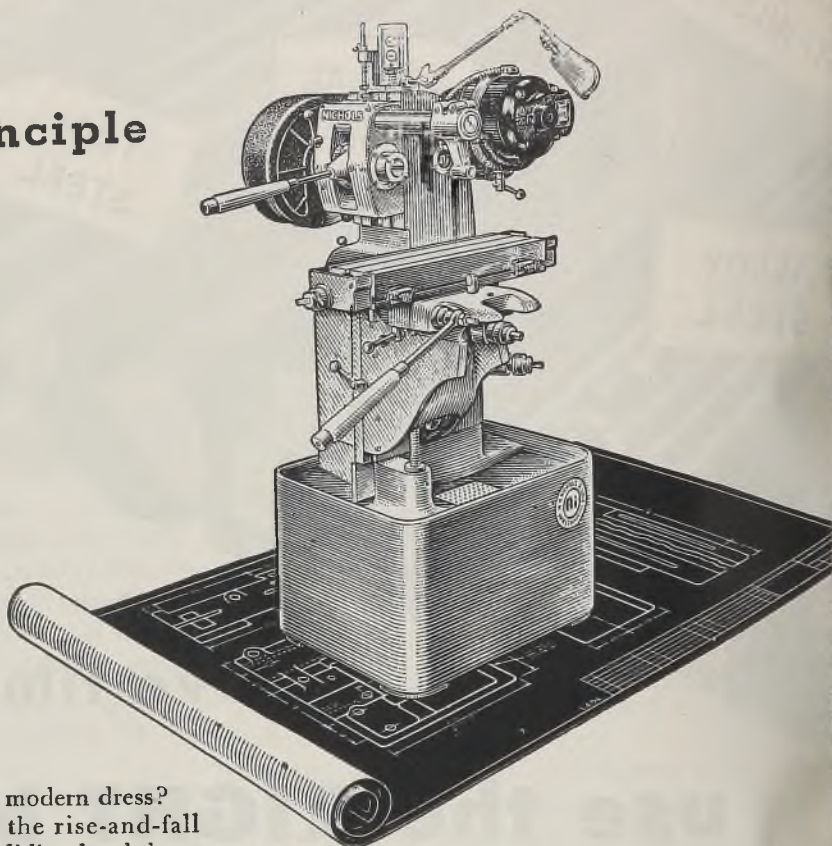
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STEEL

# Nazis' War Industries Blitzed

Outlook for postwar German industry gloomy with Reich cities and towns being systematically battered by Allied air forces. French and Belgian steelworks, though damaged, may be available soon to United Nations. Britain fears it lags in reconversion race

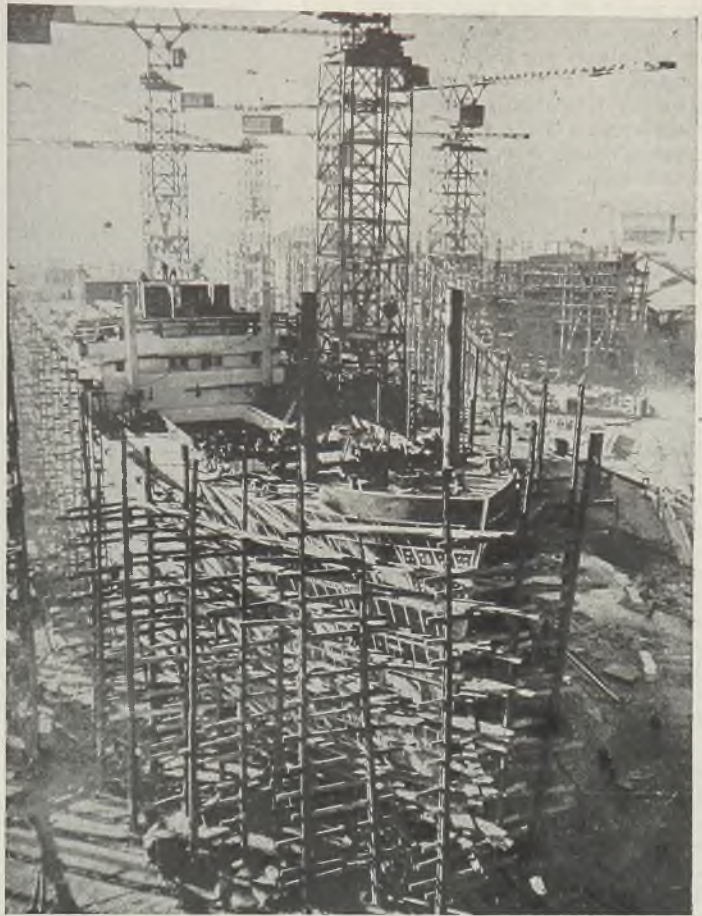
By J. A. HORTON  
British Correspondent, STEEL

## BIRMINGHAM, ENGLAND

RAPID strides made by the forces of the United Nations in the past three months towards the liberation of the occupied countries of Europe are an indication that the war, in that sphere at any rate, may soon come to an end.

It is still uncertain, however whether the Nazi chiefs will defend the Reich to the last man, adopting a "scorched earth" policy as their armies fall back, or give up the struggle in the near future and save the destruction which must inevitably come, first from the Allied air forces, and later from the ground forces. The latest measures of mobilization ordered by Goebbels are a portent, it is as if it is intended to wage a struggle to the bitter end, in which case the outlook for German industry is indeed a gloomy one, for the United Nations will not hesitate to carry on with their plans, already carried out with telling effect, for the systematic bombing of German industrial centers, stopping at nothing short of final destruction.

Meanwhile, the battering which these cities and towns are getting seems to be resulting in lowering the morale of German workers, and particularly the "slave-workers" imported into the Reich during the last four years. Stories of strikes and disturbances are filtering through, though as yet too much credence cannot be placed upon them. If, as it is suggested in some quarters, the big industrialists are at the back of the military chiefs, they may throw their weight in on the side of those who would call a halt before it is too late.



Shipbuilders at the famous Clyde yards in Scotland are optimistic over prospects for postwar vessel construction. Above are shown two merchant ships under construction. NEA photo

A recent German broadcast indicated that Dr. Albert Vogler, chairman of the Vereinigte Stahlwerke, representing the whole of the Rhenish and Westphalian steel works, had informed the German government that a policy of laying Germany waste in the case of the steel works would represent a national misfortune. It would deprive hundreds of thousands of German workers of their employment and would grievously prejudice Germany's postwar reconstruction.

### Steel Plants Near Caen Destroyed

Another aspect which comes to the fore is the possibility of turning France and Belgium's production capacity in favor of the United Nations. This will depend, among other things, on how far the plant is usable. In France, it is known that the iron and steel works near Caen, where bitter fighting raged for several weeks, have been totally destroyed and therefore cannot be of immediate use.

Incidentally, the loss of steel output in France and Belgium is a severe blow to Germany. In 1939 it was believed that France produced 7,826,000 metric tons of pig iron and 8,402,000 tons of steel; Belgium produced 3,068,000 metric tons of pig iron and 3,036,000 tons of steel. Taking into consideration the fact that

Germany must have experienced considerable difficulty in maintaining blast furnaces and steel works during the war, owing to the lack of raw materials and labor, it would not be surprising to find that much of the plant is in a dilapidated state and likely to be unworkable for some time.

The future of Germany's iron and steel industries will no doubt be discussed at an early date by the Allied governments. Already suggestions are being made that her means of industrial production, mines, heavy industrial equipment and her natural assets of raw materials be transferred to the United Nations, severally or jointly for the purpose of repairing not only the havoc deliberately effected by Germany in European countries but also to maintain in efficient working condition the industries of those countries for a fixed term of years. Russia is asking for much of the equipment of the German industries to rehabilitate her own ruined plants. France and the Low Countries are also likely to make similar claims. In any case, efforts will assuredly be made to insure that the vast output of Central Europe shall not be used as a basis of destruction and ruin to the rest of the world for a very long time.

According to reports from Stockholm,

the market for high grade Swedish steel has been shrinking in recent months and manufacturers are looking eagerly to a resumption of export trade with those countries which have been banned to them because of the war. Pig iron production, on the other hand, has reached record levels because of an increase in the output of charcoal pig iron.

In Britain, it is curious that while everyone has been elated with the progress of military events there has been a decided falling off in trade which can only be accounted for in one way, namely that enormous stocks of war materials have been accumulated and until some of these are liquidated there can be no hope of any large scale resumption. Many war contracts have been cleared up and manufacturers have a gap to cover until they can start on such new ones as have been placed for future delivery. The lull in new business is common to all districts and steelworks are not now fully employed, with the exception of rerolling mills where full activity is assured to the end of the year. What manufacturers are waiting for is undoubtedly a lead from the government in the matter of export business

For some time, traders up and down the country have been pressing for some light on a position which at present remains obscure. Exporters complain that they cannot even make plans for postwar export trade because of the lack of information as to labor and raw materials, where they realize that in America and elsewhere labor and raw materials have already been diverted for that very purpose. There is a strong feeling that in these circumstances Britain will lag behind in the race which is already beginning.

Postwar prospects for shipbuilding are regarded with optimism in Scotland. Although there is less urgency about business to-day than there was twelve months ago, production is high. David Kirkwood, MP, formerly a Clyde marine engineer, after completing a tour of the Clyde district recently, expressed the view that he had the definite assurance that there would be plenty of work during the next five years for all the local industrial establishments. Combined with this encouraging forecast is the knowledge that the yards are well equipped to take a leading place in the postwar production.

As in other branches of the heavy industries, manufacturers will doubtless seek the earliest opportunity of contacting their customers in markets cut off with suddenness at the beginning of hostilities. As far as the European continent is concerned, there cannot be much hope of an early resumption of trading conditions. It will be interesting to see how soon industrialists in Belgium, France and Holland will be able to make a beginning in resuming relations with British interests.

One section of the steel industry can be certain of an immediate boom when the war is over, namely that devoted to constructional products.



Rubble and wreckage caused by shelling and bombing fill the streets of liberated towns in Europe, emphasizing the tremendous postwar reconstruction job that awaits the Allies. Above scene is in Nijmegen, Holland. Signal Corps photo from NEA

## Warns Pay Hike Means Higher Pri

John A. Stephens, in national broadcast, says granting of workers' wage demands would be inflationary factor. V have adverse effect on postwar job opportunities

A WARNING that wages cannot be increased without increasing prices and thus contributing to the inflationary spiral was sounded last week by John A. Stephens, chairman of the Steel Case Research Committee, and a vice president of the United States Steel Corp. in a national radio broadcast.

Mr. Stephens' appeal to hold the stabilization line coincided with deliberations by the War Labor Board on the voluminous testimony presented by the steel companies and the United Steelworkers over past months on the union's demand for a 17-cent advance in hourly rates and other concessions which are estimated to cost the companies an additional 17 cents an hour. While the board is scheduled to report its findings to the President this week, Washington observers close to the White House believe the President may withhold action on wages until after the election.

Mr. Stephens said there are two simple anchors for holding the line against inflation—stable prices at one end and stable wage rates at the other. "You simply cannot move one anchor without moving the other."

Postwar jobs will depend to large extent on what is done now with the Little Steel formula, Mr. Stephens said. "If we are to enter now upon a period of higher wages and higher prices, we must certainly come to the day of reckoning with

its deflation and unemployment. V nessed that after the first wor None of us wants that experience

The steel companies believe i wages, Mr. Stephens contended. wages come from increased produ This is a fundamental belief of all ican industry. There is no shor prosperity."

Refuting a contention by CIO Pr Philip Murray that the Little formula holds wages to a level c per cent above the January, 194 and that this works great hard the workers "because the cost of has increased 45 per cent," Mr. S said:

"The Little Steel formula provi a minimum straight-time hourly rate increase of 15 per cent abo level existing in January, 1941. I d freeze wages. Since January, 1941, wages—not rates—of steelworker increased over 36 per cent and weekly wages—the amount in t envelope—have increased 62 per c this a freeze working an unjusti

"Even though Mr. Murray's sta that the cost of living has been inc 45 per cent since 1941 were true, it is not, the weekly pay envelope steelworkers has risen 17 per cent than that amount. It is clear that workers have gained, not lost."

WLB has decided to leave to the



# Trade Commission Presses for Court Ruling in Basing Point Case

*Declines to agree to further delay in court hearing of action stemming from its cease and desist order of 1924. Steel corporation moved to have order vacated in 1938. Hearing has been postponed several times*

WHEN United States Steel Corp. attorneys on Oct. 6 petitioned the Third Circuit Court of Appeals at Philadelphia for another delay of one year in considering the steel basing point case, Federal Trade Commission attorneys for the first

time refused to concur. The commission originally joined in requests for trial delays, first to wait for a decision in the cement basing point case, now before the Seventh Circuit Court in Chicago, and later because of war conditions.

The steel basing point case dates back to 1924 when the Commission ordered United States Steel Corp. to cease and desist from the practice of quoting Pittsburgh plus prices. In 1938 when the commission took steps to make the order final with penalties to be imposed for violations the Steel corporation asked to have the order set aside. The Commission's attitude now is that the steel basing case should be tried on its own merits.

Whereas respondents in the cement case petitioned the Seventh Circuit Court, Chicago, last summer to set aside the Commission's order that they cease and desist from quoting base prices plus, progress made to date indicates that at least another year will elapse before the case actually will come to agreement.

The Philadelphia court has not yet ruled on the Steel corporation request for another postponement but should the court declare against further delay it would take at least one year for the case to come to the trial stage. In the meantime the Supreme Court is expected to issue important basing point decisions some time this winter involving the commission's cease and desist orders to Corn Products Refining Co. and A. E. Staley Mfg. Co.

In these cases the Chicago court issued conflicting decisions.

The Supreme Court decision is expected to have important bearing on the outcome of the cement case in Chicago and that of the steel case in Philadelphia.

## OPA Has No Formal Steel Price Increase Request

The iron and steel industry has made no formal application to the Office of Price Administration for price increases, it was authoritatively stated last week. The recent report on steel prices, which leaked out of OPA and which the United Steelworkers Union tried to capitalize on in its argument before the War Labor Board for a wage increase, was said to have been based simply on general field price figures and not on any confidential information from OPA files. OPA Administrator Bowles denied the price report represented official OPA views.

dent the question of whether new legislation is needed to change the Little Steel formula, Chairman W. H. Davis said last week.

The board issued the following statement:

The War Labor Board will not include any document that it may send to the president or the director of economic stabilization any advice or assumption about the extent of the President's power under the stabilization act of Congress to modify the wages policy. That question has been discussed in the proceedings before the board but it obviously is not a question to be decided by the War Labor Board."

Mr. Davis said the attorney general is available for consultation with the President on the question.

## Present, Past and Pending

### THREE NEW CONTRACT SETTLEMENT REGULATIONS ISSUED

WASHINGTON—Office of Contract Settlement issued the following regulations last week: No. 5, dealing with statement of cost principles forming a part of the "Uniform Termination Article for Fixed Price Supply Contracts;" No. 6, delegating authority to all war contractors to make final settlements of net claims for less than \$5,000 where claimant keeps or disposes of all inventory; No. 7, dealing with fair compensation.

### ADDITIONAL STEEL ALLOTTED FOR CIVILIAN GOODS

WASHINGTON—Supplemental allotment of 58,428 tons of steel has been provided for WPB's Office of Civilian Requirements to increase a number of civilian production programs in the fourth quarter, bringing the total to 278,203 tons.

### CONTRACTORS INTERESTED IN BUYING DPC PLANTS

WASHINGTON—Secretary of Commerce Jones revealed last week that 252 contractors that are operating 325 Defense Plant Corp. plants have indicated an interest in leasing or purchasing the plants; 77 contractors, operating 120 plants, stated they have not reached a decision; 39 contractors, operating 55 plants, state they would not be interested in either buying or leasing.

### DISPOSAL OF SURPLUS WAR PROPERTY INCREASES

WASHINGTON—Dispositions of surplus war property by five disposal agencies amounted to \$27,815,000 in August, an increase of \$11,360,000 over July. The August total includes \$3,262,000 of property sold to other federal agencies. Inventories in the hands of disposal agencies increased \$115,000,000 in August to a total of \$348,000,000.

### NEW METHOD FOR MEASURING TEMPERATURE OF STEEL

BALTIMORE—Rustless Iron & Steel Corp. has developed a method for accurately measuring the temperature of large masses of molten steel up to 3000 degrees Fahrenheit in an electric furnace.

### DEVICES AUTOMATIC METHOD OF PEENING SQUARE RIVETS

NEW YORK—An automatic method of peening square rivets into small steel cams in less than two minutes has been devised by the Fairchild Camera & Instrument Corp., this city. The job took 25 minutes until the automatic operation was devised.

### CARNEGIE-ILLINOIS CUTS OPERATIONS AT MINGO WORKS

MINGO JUNCTION, O.—Departments at Mingo Works, Carnegie-Illinois Steel Corp., producing bessemer ingots, synthetic scrap, and pig iron will discontinue operations Oct. 31. Ordnance department operations will continue, employing about 700, nearly half of the present working force at the plant.

### LA SALLE STEEL GRANTED PATENT ON NEW PROCESS

CHICAGO—La Salle Steel Co. has been granted a patent covering such steels as are made under the trade name of "Stressford." The patent covers the method as well as the resultant products. The new method of cold-finished steel bar production, consisting of a combination of cold-finishing and thermal treatments, is most applicable to the modified pearlitic manganese steels.

# Government To Relax Controls Over Exports, Imports on V-E Day

*President writes Crowley that international commerce should be returned to private lanes as rapidly as possible. Lend-lease transactions to be curtailed when Germany is defeated*

GOVERNMENT controls over United States foreign trade will be relaxed as soon as the war in Europe ends, a letter from the President to Leo T. Crowley, foreign economic administrator indicates. Many observers also see in the letter a promise that lend-lease will be curtailed sharply.

The new program, says the letter, is to become effective "when the military resistance of Nazi Germany is overcome." The program is described in the letter as follows:

"With a view to encouraging private trade without interfering with the successful prosecution of the war against Japan, the FEA should relax controls over exports to the fullest extent compatible with our continuing war objectives, particularly that of defeating Japan as quickly and effectively as possible.

"International trade on as full and free a basis as possible is necessary not only as a sound economic foundation for the future peace, but it is also necessary in order that we may have fuller production and employment at home. Private industry and private trade can, I am sure, produce a high level of international trade, and the government should assist to the extent necessary to achieve this objective by returning international commerce to private lanes as rapidly as possible."

Interested government men believe that the letter to Mr. Crowley merely is a preliminary expression and that the full program in regard to foreign trade will not be revealed until the President issues an executive order establishing an overall agency to exercise control of our foreign trade activities. This agency, as indicated by the President at the time he accepted the resignation of Donald M. Nelson as chairman of the War Production Board, probably will be headed by Mr. Nelson.

The pattern to be announced, it is expected, will set the government agency up for the purpose of formulating and carrying out broad, national policies. Under the head of policies will come such matters as kinds of commodities we will wish to import, countries from which these imports will be permitted, ques-

tions of stockpiling, details of financing, whether our ships or those of some other nation will be used, etc.

It is expected that the projected foreign trade policy will prove satisfactory to many American foreign trade interests who have expressed fears lately that continued functioning of foreign government purchasing commissions here after the war eventually would tend to make errand boys out of them.

## Russians Prepare for Postwar Trade

Most of the foreign government purchasing agents now in the United States were set up to do business under the lend-lease program; their establishment was approved by our State Department after it had been shown that their existence was necessary to expedite the war objectives of the respective countries. Signs already are noted that these commissions will not be maintained, at least in their present form, after the war. During the war, for instance, the Russians set up the Soviet Government Purchasing Commission with headquarters in Washington to handle lend-lease business. Now, with the volume of lend-lease business due for a sharp reduction in the fairly near future, the Russians already have transferred many people from the Soviet Government Purchasing Commission to the old Amtorg Trading Corp., New York, to prepare that outfit to take care of a large amount of foreign business.

Just what form our foreign trade with the British will take after the war is not yet clearly indicated, except that recent British white papers reveal an intention on the part of the British to exercise stringent government controls. In these white papers the British take the attitude that their exports must be substantially greater after the war than before; the inference is that imports at all times must bear a relation to exports. At the same time, these white papers indicate a strong disposition to leave actual buying and selling to foreign traders under some sort of a permit system.



LEO T. CROWLEY

The expectation prevails in informed quarters in Washington that it should not take long after Germany collapses to develop a sizable business in many American products for export; that is, soon as materials, manpower and facilities become available for their manufacture. The Latin American countries right now are good markets for many of our capital goods items, as machine tools and other industrial equipment, rails and railroad rolling stock, electric generating equipment, etc. The Russians are planning similar purchases here on a large scale, and are said to look to the United States in connection with the restoration of some 50 per cent of their prewar electric generating capacity.

In fact, inquiries have come from over the world. Two Chinese missions in the United States, one representing the government and the other private interests in that country, are anxious to buy many types of industrial equipment up to the limit of their financial capacity. Numerous inquiries are emanating from the French provisional government in Washington for equipment and supplies for France's rehabilitation. Australian interests are inquiring, among other things, for steelworks equipment, including batteries of by-product coke ovens and equipment for producing tin plates and galvanized sheets.

At some point, either in the peace treaties, or in negotiations between governments, it is expected, we will evolve import policies that will have a bearing on our ability to export.

In addition, there remains the question as to what, if anything, the United States as a government will do with respect to trade agreements of the cartel type with other governments, notably the British. In some informed quarters the belief prevails that our future policies will not be based on the present antipathy of the Department of Justice to the idea of cartels. Steel men have pointed out, for example, that without some such sort of protection for our markets we might witness the postwar importation of British

## Postwar Problems Discussed at Gray Iron Founders' Conference

*Sixteenth annual meeting of society at Cincinnati well attended. Labor relations, costs, statistics, contract termination, postwar prospects among topics discussed. Importance of castings in war program stressed*

PROBLEMS relating chiefly to reconstruction and the postwar period predominated as subjects for discussion at the sixteenth annual meeting of the Gray Iron Founders' Society held Oct. 10-11 at the Overland Plaza hotel, Cincinnati. More than 250 members attended.

Walter L. Seelbach, Forest City Foundries Co., Cleveland, and president of the society, reviewed the past year's activities of the organization and the contributions of the industry to the war effort. In the matter of wage adjustments in the foundry he urged foundrymen in individual regions to get together and attempt to obtain wage levels on a regional basis rather than attempt to act individually in an effort to obtain an advantage in securing labor through upping wage differentials that have been in existence for some time.

Adequate training of personnel in the handling of contract terminations was recommended by Lieut. Col. Francis W. Sawyer Jr., chief, Training Division, Readjustment Branch, Army Service Forces, Washington. Outlining the steps that have been taken at Washington to assure prompt and fair winding up of war contracts, he stated: "The smaller the contract the more important does training become, for until each and every subcontractor has trained himself to do his share of the job, he is a bottleneck to contract completion. Until every one has done his share, no matter how small his share, the contract cannot be settled."

Effective use of available statistics will greatly aid industry in the postwar period, was stated by Owen C. Gretton, acting chief, Metals, Machinery, Equipment and Ordnance Section, Industry Division, Bureau of Census, Washington. Pointing out that more statistics on industrial production will be published in the future than was true before the war, Mr. Gretton explained that by watching the unfilled orders-to-shipments ratio of those products in which gray iron castings are used, the gray iron industry may avoid those damaging conditions which are prevalent immediately before almost every depression.

Discussing "The Gray Iron Foundry Industry in the Postwar," Donald J. Higgins, Metallurgical Branch, Steel Division, War Production Board, outlined the possible extent of competition that may be provided by other materials in coming peacetime markets. Both magnesium and aluminum, he pointed out, have higher costs and inferior qualities for many applications to overcome in competing with gray

iron. Aluminum may take an increasing share of the automotive use of metals. In general, the eventual use of gray iron will depend in a large measure upon what steps are taken toward extending further the marked improvements which have occurred in properties of gray iron castings in recent years, he stated.

Speaking at the Tuesday luncheon, Frank G. Steinebach, editor, *The Foundry*, Cleveland, traced the rising importance of gray iron castings in the war production program to its recent position as one of the most critical products. Reluctance of war agencies to make earlier use of gray iron in larger amounts he attributed largely to failure of the industry to give a true and complete picture of the properties and adaptability of its product. He urged the industry to take advantage of the increased recognition that has resulted from its part in the war production program.

In other talks Dr. Charles Reitell, Stevenson, Jordan & Harrison Inc., New York, stressed the importance of adopting cost control systems attuned to the changed conditions that will prevail after the war, and Lieut. Comm. Lester B. Knight, Bureau of Ships, Navy Department, Washington, emphasized the need for watching the good housekeeping aspects in foundry mechanization. A program for job evaluation and wage incentives was described by W. B. Estes, head management relations executive, WPB, Cleveland.

### Control, Not Ruin of Enemy Industry Advised

Proper treatment with respect to the future economy of the Axis nations should be one of control, not riddance of German and Japanese industrialism, Eugene P. Thomas, chairman and president, National Foreign Trade Council, said last week at the thirty-first national foreign trade convention, New York.

He emphasized this country's best markets always have been those of highly industrialized nations. "Both enemy countries are lacking strategic materials necessary for war purposes. Added to the effective control of their exports and imports, shipping and aviation, for years to come, the long term task is one of extermination in both countries of the spirit of fascist militarism.

Turning to cartels, Mr. Thomas declared it is unlikely that this country

can persuade other countries to abandon cartels, particularly in the postwar period. He called on Congress "to remove any uncertainties" as to the interpretations of the Webb-Pomerene act which frees export trade from the restrictions of the Sherman act.

### Post-V-E Day Civilian Steel To Exceed 1937

Indications are there will be, after V-E Day, more steel available for civilian production than in 1937, Hiland G. Batcheller, chief of operations, War Production Board said last week. His statement followed a survey of the impact of cutbacks in the military program on V-E Day.

In the cases of copper and aluminum, he said, amounts available for civilian use after that date would be substantially higher than in 1937. That year, he recalled, saw the highest steel production in peacetime.

### Columbium Is Removed From WPB List of Scarce Metals

Forty-two materials, the supply of which has increased, have been removed from group I in the fourteenth and final Material Substitutions and Supply list. Materials in group I are those of which the supply is insufficient to satisfy war and essential industrial demands. The only metal which has been removed from the list is columbium while the following are still placed in that group: Steel castings (medium and small), rope wire (high carbon 0.057 and smaller), wire rope.

Tantalum and zinc were included in the fourteen materials which have been placed in Group III because these materials are in excess of current industrial needs.

### Magnesium Association Elects New Officers

Edward S. Christiansen, vice president, Apex Smelting Co., Chicago, was re-elected president of the Magnesium Association at its first annual meeting at New York, Oct. 3-4. C. C. Loomis, president, New England Lime Co., Canaan, Conn., was again elected vice president; Clayton E. Larson, operations manager, White Metal Rolling & Stamping Co., Brooklyn, N. Y., treasurer; and Perry D. Helser, New York, secretary.

New directors are: Wiser Brown, American Magnesium Corp., Cleveland; Leo Grant, Dow Chemical Co., Midland, Mich.; Jack Barrington, Dominion Magnesium Ltd., Toronto; D. A. Rhoades, Permanente Metals Corp., Oakland, Calif.; Irving T. Bennett, Revere Copper & Brass Inc., New York; and H. E. Sheppard, Rupert Die Casting Co., Kansas City, Mo.

STEEL INGOT PRODUCTION STATISTICS

# Ingot Output in First 9 Months Sets New Record

*Steel production in period tops that in like 1943 months by substantial margin. September total below August.*

**NEW YORK**

PRODUCTION of steel ingots and steel for castings during the first nine months of 1944 established a record at 67,199,467 net tons, the American Iron and Steel Institute reported last week. Last year during the comparable period 66,395,130 tons were produced.

The nine months' output this year exceeded total production for the full year 1940, when 66,982,686 tons were made.

Production during September this year at 7,193,496 tons was below August output of 7,469,800 tons and also was less than the tonnage produced in September, 1943, when 7,514,339 tons were turned out. During September, the steel industry operated at an average of 93.4 per cent of capacity, compared with a revised average of 93.7 per cent in August and 100.7 per cent in September a year ago.

Average weekly production was 1,680,723 tons in September, against 1,686,185 tons per week in August and 1,755,687 tons per week in September, 1943.

During the nine-month period this year, the industry operated at an average of 95.7 per cent, against 98.1 per cent of capacity in the comparable part of 1943. Calculated weekly production was 1,716,900 tons against 1,702,439 tons per week in the nine months of 1943.

Production during the third quarter of this year totaled 22,137,593 tons, against 22,508,679 tons in the third quarter of 1943. The industry operated at an average of 93.7 per cent of capacity during third quarter, with calculated weekly production of 1,686,031 tons, against an average of 98.4 per cent of capacity and calculated weekly production of 1,714,294 tons in third quarter of 1943.

## Steel Industry Payrolls Rise Slightly in August

Steel industry payrolls increased during August to \$143,900,100, compared with \$141,794,000 in preceding month and \$139,855,000 in corresponding 1943 period.

Wage earning employees received an average of \$1.169 per hour in August, against \$1.20 in July and \$1.113 in August, 1943.

The industry employed in August an average of 569,200 workers, compared with 571,400 in July. During August,

**1944**

	Open Hearth		Estimated Production—Bessemer		All Companies—Electric		Total		Calculated weekly production, all companies Net tons
	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	Net tons	Per cent of capac.	
Jan.	6,769,438	97.2	439,551	85.4	377,751	83.3	7,586,740	95.6	1,712,582
Feb.	6,410,338	98.5	409,781	85.2	368,555	87.0	7,188,674	96.9	1,736,395
March	6,976,450	100.1	455,368	88.5	388,408	85.7	7,820,226	98.5	1,765,288
1st qtr.	20,156,226	98.6	1,304,700	86.4	1,134,714	85.3	22,595,640	97.0	1,738,126
April	6,768,895	100.3	437,517	87.8	362,118	82.5	7,568,530	98.5	1,764,226
May	6,860,532	98.5	428,980	85.3	380,960	84.0	7,680,472	96.8	1,733,741
June	6,452,087	95.6	418,117	83.9	347,028	79.0	7,217,232	93.9	1,682,338
2nd qtr.	20,081,514	98.1	1,294,614	85.6	1,090,106	81.9	22,466,234	96.4	1,726,844
1st hlf.	40,237,740	98.4	2,599,314	86.0	2,224,820	83.6	45,061,874	96.7	1,752,483
July	6,723,994	96.3	415,593	80.9	334,710	73.7	7,474,297	94.0	1,691,017
Aug.	6,691,262	95.6	429,637	83.5	348,901	76.6	7,469,800	93.7	1,686,185
Sept.	6,464,631	95.6	398,028	80.0	330,837	75.2	7,193,496	93.4	1,680,723
3rd qtr.	19,879,887	95.8	1,243,258	81.5	1,014,448	75.2	22,137,593	93.7	1,686,031
9 mos.	60,117,627	95.7	3,842,572	84.5	3,239,268	80.8	67,199,467	95.7	1,716,900

Percentages of capacity operated in 1944 are calculated on weekly capacities of 1,571,287 tons open-hearth, 116,182 tons bessemer and 102,350 tons electric ingots and steel for castings, total 1,793,819 net tons; based on annual capacities as of Jan. 1, 1944, as follows: open-hearth 82,223,610 net tons, bessemer 6,074,000 tons, electric 5,350,880 tons.

1943, the total number of employees was 625,200.

Wage earners worked an average of 47.5 hours a week during August, against 45.4 hours in July and 43.1 hours a week in August, 1943.

## 64th Strike Disrupts C-I Operations at Chicago

Approximately 10,000 tons of ingots and 6000 tons of coke were lost Oct. 9 when 180 day-shift employees at the coke oven of Carnegie-Illinois Steel Corp., Gary, Ind., went on an unauthorized strike, forcing down 23 of 47 open hearths, most of the merchant mills and five blast furnaces. The strike was the sixty-fourth at the company's Chicago district mills this year.

## J. & L. Plants Set New Records During September

In September, a thirty day month, which also included a holiday for some finishing departments, Jones & Laughlin Corp. plants at Pittsburgh, McKeesport, Pa., and Cleveland, established new high production records.

The Otis Works, Cleveland, established a new record for total iron and steel products shipped which was nearly 2500 tons higher than its best record of September, 1943. The Otis blast furnaces bettered their record established only a month ago and the 77-inch hot strip mill bettered its record of March, 1944.

At Pittsburgh Works, the No. 4 blast furnace broke its best record, that of October, 1942, and the fragmentation bomb line bettered its August, 1944, record by more than 60 per cent.

At McKeesport Works ordnance plant the production of 8-inch shells for the famed "Black Panther" and the big howitzer was increased by more than 35 per cent.

## Plans To Resume Production Of 105-Millimeter Howitzers

United Engineering & Foundry Youngstown, O., Works will resume making 105-millimeter howitzers for the Army about Jan. 1.

United now is putting in new equipment, the War Production Board authorized \$473,000 worth of equipment for the department.

United's Youngstown Works previously had produced thousands of the howitzers for the Army.

## Steel Corp. Shipments Set Record for Nine Months

Finished steel shipments by the United States Steel Corp. for nine months ending Sept. 30 set a new record at 15,846,666 net tons, compared with 15,069,900 in the comparable 1943 period.

The prior record was set for the first three quarters of 1942, with 15,761,476 tons.

September shipments were 1,738,000 tons, a decrease of 9883 tons from August and a gain of 69,025 tons over shipments in September, 1943.

Though total shipments were below those of August the daily average for September was 66,677 tons, compared with 64,574 tons per day in August.

(Inter-company shipments not included Net Tons)

	1944	1943	1942	1941
Jan.	1,730,787	1,658,992	1,738,893	1,682,582
Feb.	1,755,772	1,691,592	1,616,587	1,548,895
Mar.	1,874,795	1,772,397	1,780,938	1,720,895
Apr.	1,756,797	1,630,828	1,758,894	1,687,895
May	1,776,934	1,706,543	1,834,127	1,745,895
June	1,737,769	1,552,663	1,774,068	1,668,895
July	1,754,525	1,660,762	1,765,749	1,666,895
Aug.	1,743,485	1,704,289	1,788,650	1,753,895
Sept.	1,733,602	1,664,577	1,703,570	1,664,895
9 mo.	15,846,666	15,069,644	15,761,476	15,137,895
Oct.	1,794,968	1,787,501	1,851,895	1,851,895
Nov.	1,660,594	1,665,545	1,624,895	1,624,895
Dec.	1,719,624	1,849,635	1,846,895	1,846,895
Total	20,244,830	21,064,157	20,458,895	20,458,895
Adjustment		*449,020	*42,895	*42,895
Total		20,615,137	20,416,000	20,416,000

\*Decrease.

# Steel Landing Mat Needs Drop

Present military schedules reduce demands by estimated \$20 million during period extending through next March. Plan to lay off 585 workers

CHANGING needs of the war have caused a cutback of future production of steel landing mats, the Army informed the Production Executive Committee Staff, War Production Board, last week.

Present schedules for steel landing mats will be reduced by more than an estimated \$20,000,000 during a period extending through next March. The cutback will affect 21 plants scattered throughout the country and will cause a gradual layoff of an estimated 585 employees in the plants affected.

Principal cutbacks were made in areas of labor shortage where the workers released can move quickly into other war jobs, the PEC staff, which approved the cutback, reported.

Six of the plants affected by the cutback will absorb all of the labor which has been producing this material, in other departments of these works. They are Empire Plow Co., Cleveland; Bethlehem Steel Corp., Lackawanna, N. Y.; Cecco Steel Products Co., Cicero, Ill.; Equipment Steel Products Co., Blue Island, Ill.; Butler Mfg. Co., Kansas City, Mo.; and Lennox Furnace Co., Syracuse, N. Y.

Estimated layoffs, extending into November, in other plants, are: Commercial Shearing & Stamping Co., 40 workers; Truscon Steel Co., 20; Youngstown Metal Products Co., 30, all in Youngstown, O.; Standard Railroad Equipment Co., New Kensington, Pa., 90; National Gypsum Co., Niles, O., 65; Wheeling Corrugating Co., Wheeling, W. Va., 30; Round Oak Co., Dowagiac, Mich., 10; E. F. Hauserman Co., Cleveland, 35; Despatch Shops Inc., East Rochester, N. Y., 10; Clark Grave Vault Co., Columbus, O., 100; Lynn Metal Products Co., Aurora, Ill., 10; General American Transportation Co., East Chicago, Ind., 5; Morton Manufacturing Co., Kansas City, Mo., 40; U. S. Fabricators Inc., Wooster, O., 90; U. S. Gypsum Co., Chicago, 10.

## AAF Terminates P-75 Fighter Contract

Expected termination of Army Air Forces contract with Fisher Body division, General Motors Corp., for production of P-75 fighter planes at the company's No. 2 plant at Cleveland airport was forthcoming Oct. 7, ascribed reason being "changes in military requirements." In announcing termination of the production schedule, still in its early stages, Col. Alfred H. Johnson, Central Procurement District supervisor for the Air Technical Service Command, indicated the

AAF would continue experimental development of the secret fighter plane.

Company officials at the plant stated 40 per cent of the Fisher Body employees in Cleveland have been working on the new plane. Some of those displaced will be transferred to other high-priority aircraft work which will be assigned the plant; others will be transferred to production of components for the B-29 Superfortress in process at the plant for some time.

The Fisher No. 2 plant originally was built to assemble the complete B-29, but before this got under way, contract for the P-75 fighter was assigned the plant and the B-29 schedules were reduced to the fabrication of certain components for an assembly plant in Omaha, Nebr. The P-75 design has never been disclosed in detail, but it is reported to be an all-General Motors ship (engine, propeller, airframe, etc.), created by Don Berlin, former designer and engineer for Curtiss, and his staff at Fisher Aircraft. Berlin is credited with design of the Curtiss P-40.

In aviation circles it is reported early flight tests on the P-75 were disappointing, being somewhere near 20 per cent off from anticipations. One explanation suggested was that the design was rushed through with such speed that no time was available for wind tunnel testing; hence no accurate gage of performance was possible. An accident on one of the first test flights, during which the tail section broke and the plane crashed, added another discouraging note.

Original concept of the P-75 was as a long-range fighter escort for the B-29 Superfortress, but meanwhile other fighter planes have been modified suitably for this purpose.

## Youngstown War Plants Laying Off Workers

Changing conditions of the air war have resulted in laying off or will result shortly in the laying off more than 1000 Youngstown, O., district war workers.

About 750 workers—575 women and 175 men—were dismissed last week by the Mackenzie Muffler Co., Youngstown, O., which has received some sharp cutbacks in its orders for droppable aircraft fuel tanks.

General Fireproofing Co., also has had some cutbacks and is reducing its labor force.

## POSTWAR PRELUDES

**EUROPE**—Countries devastated by German Army expected to make claims against heavy industries to repair damage. See page 63.

**JOBS AND WAGES**—Postwar employment opportunities will be affected by what is done now with Little Steel formula. Steel spokesman predicts sharp wage increase would be followed by postwar deflation and unemployment. See page 64.

**FOREIGN TRADE**—Government controls expected to be relaxed when war in Europe ends. Lend-lease likely to be curtailed. See page 66.

**WEST COAST**—War production in West expected to be maintained at high level between V-E and V-J Days. See page 68.

**CONTRACT TERMINATION**—Navy's program for settling canceled war contracts aimed at speedy termination. See page 72.

**RECONVERSION PRICING**—Greatest threat to the stabilization program will come after the war, according to OPA chief Chester Bowles. Deflationary and inflationary pressures to exist side by side. See page 75.

**SOUTH AMERICAN RAILWAYS**—Numerous projects south of Rio Grande will go forward when rails, rolling stock and materials again become available in quantity. See page 90.

**STEEL PURCHASING METHODS**—In the future, the steel buyer will be able to specify steel to closer limits through use of hardenability band data along with chemical analysis which already is available for some steels. In other words, steel may be selected in terms of how it will perform as well as what elements it contains. See page 98.

**FLUORESCENT PENETRANT INSPECTION**—Nonmagnetic and nondestructive testing locates minute surface faults. Recent developments in fluorescent inspection forecast significant improvements leading to wider application. See page 100.

# Contract Termination Policies Outlined by Navy Department

*Capable men from industry needed to help with settlements. Many procedures still must be formulated. Terminations handled in past are too few to provide authoritative guides. Task likened to washing dishes after the banquet*

PLANS for terminating and settling war contracts were outlined recently by H. Struve Hensel, general counsel of the Navy Department. Much of the planning now has been completed, according to Mr. Hensel, and the time for action now is at hand.

"Fortunately we are better prepared than we were for the war. An enabling statute—the contract settlement act—has been enacted. In my opinion that statute is sufficiently flexible to meet all problems which can now be envisioned. A director of contract settlement has been appointed and is at work. The services and other governmental agencies concerned have issued regulations and established procedures designed to meet the test which the Army will encounter in major force when victory over Germany is won.

"Nevertheless, this country is facing a new experience. The terminations handled in the past are too few to provide authoritative guides for the future. The lessons of the last war are not too helpful. Never before has this nation so completely converted its industry and manpower to a joint war endeavor.

"The road back will not have the inspirational impulses of the road to victory. The termination problem has the unappealing characteristics of washing the dishes and cleaning the kitchen after a banquet. The men engaged in this work will see no end products such as ships, tanks and guns. They will not be spurred on by being able to see the translation of their efforts into assaults upon the enemy. Their end products will be paper work. Their goal will be the avoidance of disaster and it is difficult adequately to feel or describe the avoidance of anything.

"Capable men must be induced to volunteer for this public service. New men are particularly important. The procurement officers who have served during the entire war must be supplemented by fresh minds and vigor.

"Some possible hazards have already come to our attention. Because of psychological and other reasons—principally to avoid audit of termination settlements by the General Accounting Office—considerable emphasis has been placed on precision in the determination of amounts to be paid contractors upon termination. Unconsciously we seem to be drifting toward a cost accounting approach in termination to a greater ex-

tent than we did in procurement. Whether that will be justified from the standpoint of the overall economy should be continuously re-examined. Because of the imperative demands of our fleets and troops we purchased billions of dollars of war materials for agreed flat sums. These fixed prices were determined through negotiation after a consideration of what, in the light of the detailed termination claims, seem to be rough estimates. As we gained in experience, we continuously revised our prices. Nevertheless, we needed and still need the price adjustment boards to eliminate excessive profits. It was not that we made glaring mistakes but rather that precision was impossible—and undesirable—in view of the demands for speed.

"Frankly, I am puzzled when I compare, on the one hand, our assumed ability to agree upon a fixed price for complete 40-mm. gun mounts with nothing before us but experience and estimates on two or three sheets of paper and, on the other hand, our assumed inability to agree on lump sum settlements for partially finished gun mounts without reams of paper, hours of accountants' time and a multifold collection of detailed figures.

### Speedy Termination Sought

"If a quick method of disposing of termination claims is available to some, i.e., contractors with sufficient excessive profits, I feel it is only a question of time when an equally speedy method must be found for all contractors. I have already suggested one possible method—the procurement approach of a lump sum based on judgment, experience and agreement after consideration of general cost estimates. I have one other possibility to suggest. But before passing to that, I again want to urge everyone to search for ideas. There must be enough fertile brains in the country to develop the needed ideas. For instance, it may be possible to work out some means of settling termination claims through credits against federal income tax payments.

"The other suggestion which I would like to offer for your careful consideration is the use of what I have called "self-liquidating termination clauses." By that I mean an agreement by the contractor and the government at the start of the contract on the lump sum or the lump sums to be paid in the event of termination. Liquidated sums



H. STRUVE HENSEL  
General counsel, Navy Department

could be agreed upon in the event of cancellations at varying stages of performance.

"Definite sums are usually estimated with respect to each item. The time of incurring the various items of expense can also be estimated. If an agreement can be reached on the price per plane for 100 planes, it would seem that a similar agreement could be reached on the price for 50 planes plus preparation for the production of 50 more planes or for one plane plus preparation for the production of 99 planes. The price so agreed upon for a lesser number of planes should be just as accurate as the prices agreed upon for the 100 planes—may be no more accurate but certainly no less.

"If such a program could be made workable, the amount to be paid on termination would be fixed in advance. The government would not be required to deal extensively with subcontractors except in the event of insolvency of the prime contractors. This is the pattern of procurement and there is no reason for the government to deal with subcontractors if their settlements can be adequately handled in another manner. Likewise under this program the problem of surplus property can be largely shifted to industry which is far more capable of dealing with it than the government. The prices could be fixed on the assumption that all inventory would belong to the contractor.

"It may well be that the self-liquidating termination clause cannot be used in every contract. That is not, in my opinion, conclusive against its trial. The termination problem is so vast that many types of procedure may be usable. The fixed-price contract was not applicable to every type of procurement. We used the cost-plus-a-fixed-fee contract, the time and material contract, and the incentive contract. All fulfilled their function and, taken together, met the procurement problem. The same may well be true in connection with termination."

The CONE AUTOMATIC MACHINE COMPANY



sees many

GOOD THINGS AHEAD

It is reported that . . . . .

A recent survey shows that 89% of the tire and rubber companies and 86% of the paper companies will have new products to offer after the war. 58% of all manufacturers questioned have something entirely new for post-war customers.

get ready with CONE for tomorrow

A new heat-treated glass is in production that resists thermal shock and temperatures to 650° F.

get ready with CONE for tomorrow

One of the large tire manufacturers has just patented a tubeless, uninflated automobile tire.

get ready with CONE for tomorrow

Bimetallic cylinders for internal combustion engines, in which a copper sleeve is bonded to a cast iron cylinder, promise to lessen greatly the problem of heat transfer that has always interfered with high performance.

get ready with CONE for tomorrow

Indium, once worth \$20,000 an ounce, now costs \$7.50.

get ready with CONE for tomorrow

A plant has just been opened to rebuild completely automobiles by the production line method to new war standards.

get ready with CONE for tomorrow

Aircraft engineers imagine that the big airlines of the future will dispense with landing gear entirely and will be electronically guided into a wheeled cradle at each landing field.

get ready with CONE for tomorrow

The same type of mechanism now used to stabilize the guns of moving tanks could be used to provide smoother riding trains.

get ready with CONE for tomorrow

Foam rubber is expected to replace familiar upholstery construction in automobile seats, saving nearly a foot in the length of the body.

get ready with CONE for tomorrow

One big national picture magazine plans to print entirely in full color after the war.

Factory roofs actually supported solely by air blast from ventilating fans are in use and are the subject of serious experiment.

get ready with CONE for tomorrow

Snap-on molded rubber covers are now being used to mask those parts of electro-plated objects which must remain bare.

get ready with CONE for tomorrow

San Francisco has a plan for a 25 million dollar "World Trade Center" covering twelve blocks of its water front and including a free trade zone.

get ready with CONE for tomorrow

Glass jewels, for instrument bearings, can now be turned out automatically at the rate of 3,500 per day. They are preferable in some respects to natural sapphires.

Through careful research and improvement, one familiar office machine has had 94 per cent of its noise eliminated or absorbed.

get ready with CONE for tomorrow

Electrically conductive rubber is being used to heat aircraft guns and propellers.

get ready with CONE for tomorrow

By the use of a resin extracted from Southern pine, foundries have been able to reclaim old sand and reduce their consumption of new sand as much as 75 per cent.

get ready with CONE for tomorrow

A new filtering material, made of pure rubber latex, has as many as 6,400 holes to the square inch.

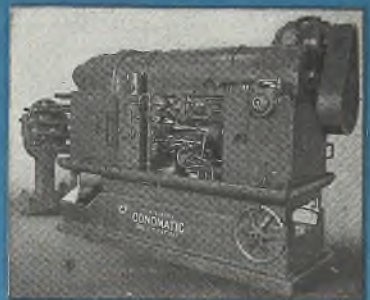
get ready with CONE for tomorrow

A new adhesive bonds wood to metal, making possible a new product consisting of a 1/48" ply of wood combined with a thin layer of sheet steel. This material can be readily cut and bent, and is decorative, durable, and fireproof.

Automatic Production  
at  
automatic-cannon speed



The 1 5/8" 8-Spindle Conomatic produces these 20mm. tracer bullets in 8 seconds each. Production like this keeps shell supplies ahead of the requirements of rapid firing guns. Conomatics, in wartime, are a military necessity — in peacetime, an economic necessity.



CONE

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

# Navy Procurement Policies Are Fitted to Wartime Conditions

*Competitive bid buying of peacetime replaced by negotiated purchasing. Program required training of large staff of executives in cost analysis. Navy's procurement program will continue unabated until Japan is defeated*

TRANSITION of Navy procurement policies from the "horse-and-buggy" days of peacetime to the streamlined "B-29" operations during the present global war were described recently by H. Lionel Noah, assistant chief, Office of Procurement and Material, Navy Department.

"The transition from peacetime competitive bid-buying to wartime negotiated purchasing required a complete revision of procurement methods. This included the training of a competent staff of business executives, the collection of vast amounts of costing data, followed by a detailed analysis of such information. The exercising of sound business judgment in negotiating a price was an important phase of this operation. The difficulties experienced in proper pricing in connection with this tremendous war program may well be appreciated. These difficulties are easily seen when you consider that the Navy during the last war spent a maximum in any one year for shipbuilding of 263 million dollars. In this war the Navy's bill for construction of ships in the fiscal year of 1943 was \$6 billion and the 1944 figure will be higher.

"Of course, with the changing phases of the war, there have come corresponding changes in the phases of procurement and with the cessation of hostilities in Europe will come, or I should say have come, definite problems for the Navy which we are endeavoring to meet on the most realistic basis possible. As the secretary has indicated on several occasions the Navy's problem, which has run almost parallel to the Army's up to now, will be quite different from that of the Army when the European hostilities cease. We still have a major war to fight in the Pacific and to that end many ships and planes are now in the process of construction. To fight that war, we will have to continue our procurement to a far greater extent than will the Army.

"You might very well ask why that should make the Navy's problem any different than it has been. I think we could very readily answer that it makes a great difference, because the production lines of contractors are going to be thrown out of balance either by the cut-back, or the failure to renew, the very large Army contracts which may be running in the same plants. While a portion of this production will be taken up by a resumption of civilian production by these same contractors, there is not only the lead time necessary for them to resume



LIONEL J. NOAH  
Assistant chief, Office of Procurement and Material, Navy Department

civilian production, but there is also the vast difference in volume between war and civilian production. These things all tend to throw out of balance the overheads and other general charges in the contractor's costs.

"These factors, therefore, place grave doubts in the minds of contractors as to what their prices should really be, particularly as they cannot estimate the many contingencies that will be so fundamental in the pricing of their goods, and all of these uncertainties must be met on a realistic basis in order that we may be fair with them, get them to produce what will be needed to carry on the war in the Pacific and, at the same time, secure those things which the Navy needs at a fair and reasonable price.

"Generally, our procedure in negotiating a contract is to determine all actual costs of producing the article to ascertain what anticipated changes affecting costs the contractor has considered. If these contingencies warrant consideration, we will include in the contract adequate clauses to permit adjustment in the price in the event such contingencies occur.

"By this contractual arrangement, contractor and the contracting office subsequently can sit down and consider whatever difficulties or contingencies have arisen and reconcile these differences on a mutually satisfactory basis. This gives the contractor the necessary protection for conditions such as I mentioned and, at the same time, protects the government from including contracts generous cushions to cover contingencies which may never arise whole or may only become real in

"There have been, and still are, other devices which the Navy has in the making of contracts. One in particular is the incentive type contract wherein we agree with the manufacturer on a predetermined schedule of profit for the items which he has to make, under the terms of which his profit ceases as his cost declines. In reverse his profit decreases as the most ceases.

"To illustrate: On the basis of available cost information we determine that \$200 was a reasonable cost to meet for an article. On this cost we agreed with the contractor that a profit of 8 per cent was fair. We agree to protect him up to \$250, but his profit would decrease in direct relationship such increased cost so that at \$250 he would receive no profit. Conversely, if every dollar that he reduced his cost below the set cost of \$200 we would increase his profit by 20 per cent of savings. If his costs should go down to \$150 he would receive his base profit of 8 per cent or \$16, plus 1/5 of savings which would be an additional \$10, or a total profit on the transaction of \$26 or 17 per cent on costs. There is present the incentive to reduce costs and increase efficiency with reward of increased profits in so doing.

## President Signs Reconversion Bill

*Measures providing for disposal of surplus property and establishment of Office of War Mobilization and Reconversion become law. Clayton resigns as SWPA director*

PREPARATIONS for reconversion are moving ahead in several sectors, although the progress is not as satisfactory as many industrialists desire.

Two bills dealing with the problem have been signed by the President, although he termed both of them inadequate.

The War Mobilization and Reconversion act provides for the establishment

of an Office of War Mobilization and reconversion which will co-ordinate activities of the various agencies dealing with problems of reconversion—consolidations, surplus property disposal, employment and vocational training, employment compensation and public works construction.

James F. Byrnes, director of the Office of War Mobilization, which is supplied



# Bowles Sees Greatest Inflation Threat After Victory in Europe

*Deflationary and inflationary pressures will exist side by side after V-E Day. OPA's objective will be to maintain stabilization until the forces of supply and demand have chance to make themselves effective*

GREATEST danger to the government's stabilization program will be encountered in the period following the defeat of Germany when industry will partially reconvert to peacetime production and the country will face rapidly changing economic conditions. Chester Bowles, price administrator, last week forwarded a summary of pricing objectives in the reconversion period to the 8100 members of OPA advisory committees, seeking their continued co-operation in solving the new economic problems.

It is estimated that within three months after defeat of Germany plants now producing 40 per cent of our war goods can be freed for the manufacture of civilian goods. More than 4,000,000 war workers will be made available for the production of goods for which the American people are waiting.

The federal government has made it clear that industry will be assisted and encouraged to resume the manufacture of civilian goods as rapidly as possible. To this end, War Production Board will lift controls over most materials and manufacturing immediately after V-E Day while the Manpower Commission will lift all manpower controls except in relatively few areas where they are essential to continued war production.

"A weak price policy during the next few months," it was pointed out, "can set in motion all the powerful inflationary forces that surround us. A rigid price policy in which no allowance is made for legitimate increases in costs could stifle employment and production and head us straight for a major depression."

Mr. Bowles said that in his own personal opinion the basic answer to our economic future lies in the maximum hourly production on the part of labor; high

wage rates, low unit profits and the greatest possible volume on the part of industry; the maintenance of high farm income; and the joint realization of all groups that the prosperity of each depends on the prosperity of the others.

He said it is unlikely after the war our people, including over 11,000,000 returning servicemen, will tolerate any economic system which does not provide reasonably full production with reasonably full employment at a high standard of wages and farm prices. He cited an estimate by the Department of Commerce that if in 1946 we were to go back to 1940 total production at 1940 hours of labor there would be 19 million unemployed and a cut of more than 30 per cent from the present level of production. This would be accompanied by shrinking markets, falling prices and the dangers of another disastrous depression.

### Would Create Broad Demand

On the other hand, if full production is attained in 1946 with a corresponding increase in the national purchasing power, we would be able to spend 40 per cent more for food, 45 per cent more for clothing, 65 per cent more for household electric appliances, 90 per cent more for new farm machinery and 250 per cent more for new homes than in 1940.

Whereas during the war, OPA's efforts have aimed solely at checking inflation, on V-E Day the picture will change. When the telegrams go out canceling war orders, the forces of deflation will begin to develop. From that day until full production is achieved and supply and demand come into reasonable balance, the forces of inflation and deflation will exist in our economy side by side.

The huge inflationary pressures which

the OWMR, will head the new agency temporarily until Congress reconvenes. The permanent director of the OWMR will be named by the President for a term of two years and the appointment will be confirmed by the Senate.

signing the bill, Mr. Roosevelt criticized the measure as being inadequate and "with the human side of reconversion." He objected to the deletion of the program from the original George Washington which was opposed by the "liberals" (being too conservative) of such programs as unemployment compensation and transportation costs to return war workers to their homes.

The Surplus Property act authorizes setting up of a three-member board of activities shall be co-ordinated with the programs of the armed services for the purposes of disposing of surplus property. The act sets forth "methods of disposition" of war plants, surplus commodities, stockpiles and land.

The bill was signed by the President with considerable reluctance," declaring "elaborate restrictions imposed by the bill will in many instances delay rather than expedite reconversion and reemployment."

The Chief Executive's views on the measure were shared by William L. Clayton, resigned as surplus property administrator in protest against the meas-

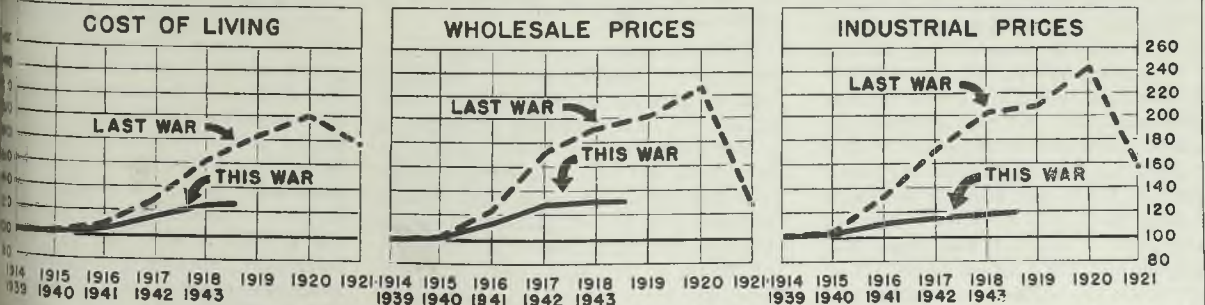
## Industry Advisory Groups to Help WPB on Cutbacks

More than 750 industry advisory committees of the War Production Board will play an important role in the program for cutting back military production after "Victory in Europe" was announced last week.

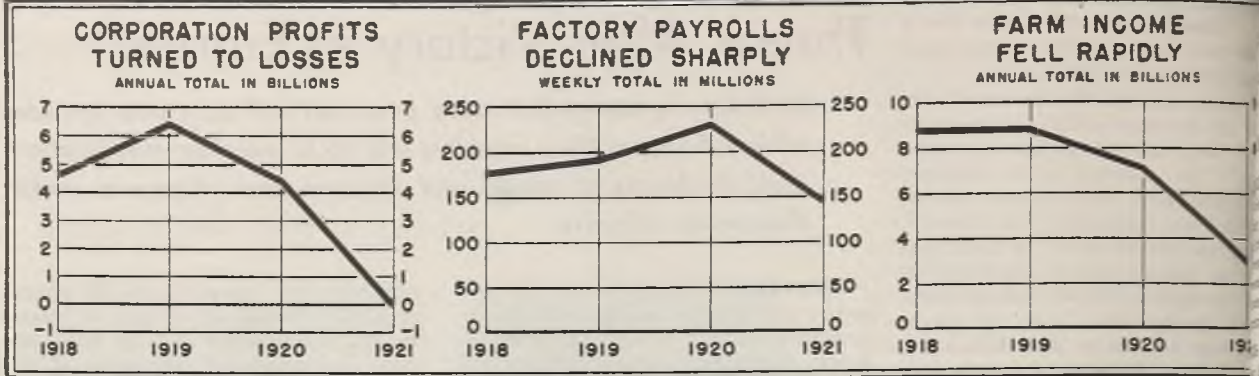
W. G. Batcheller, operations vice president, issued an instruction to all bureau and division directors for discussion by industry advisory committees of military cutback inaction and for recommendations to be made by the committees as to particular products that should receive military priority first.

## PRICES: LAST WAR AND THIS WAR

INDEXES: LAST WAR-1914=100, THIS WAR-1939=100



WHAT HAPPENED WHEN INFLATED PRICES CRASHED 1918 - 1921



will be ready to push prices up as soon as the war in Europe ends were summarized in Mr. Bowles' report in part as follows:

"By the end of 1944, \$100 billion of wartime savings will be waiting in the hands of people who have been unable to buy many of the things they wanted most . . . Obviously, it will be impossible to produce all of these articles in sufficient quantities immediately . . . The pressure of buyers with good jobs and a backlog of wartime savings will be tremendous.

"Merchants will be anxious to be among the first to offer new goods for sale . . . Every manufacturer, too, will want to be among the first to produce these goods. The competition for materials will be considerable. To back up this competitive desire for inventories and raw materials are billions of dollars in wartime reserves."

**Dangerous Deflationary Factors**

The deflationary pressures, some of them inescapable and some of them potential, are equally dangerous and were summarized in part as follows:

"The closing of plants built only for war production . . . will require an estimated 2,000,000 people to look for peacetime jobs elsewhere. Millions of others will face temporary unemployment while the plants in which they work set up their new production lines for civilian goods.

"In all plants changing over to civilian production, the return to the 40-hour week will reduce the worker's weekly take-home pay. Even a 10 per cent cut in hours . . . will cut salaries and wages by something like \$12 billion in a year.

"Adequate unemployment compensation will help to some degree to hold up purchasing power. Our huge backlog of savings will also serve as an anti-depression asset. But fear of prolonged unemployment can make people hesitant to spend their savings except for necessities . . . Up to now business and industry have been able to absorb the men (more than 1,250,000) who have been mustered out of the armed forces. However, when our soldiers and sailors start coming home after V-E Day there may

be more men than jobs until industry hits its stride.

"If reconversion is slow, the national income will be dangerously down while millions of workers are waiting to return to work. Slowness in reconversion would also mean a letdown in demand for basic raw materials.

"The government has been spending about \$70 billion a year for war materials and construction, and that money has provided good jobs at high wages. Within three months after the defeat of Germany it is estimated that this will be cut to about \$40 billion. To a major extent, that's money out of our pockets until we get civilian production going on a comparable scale."

Behind these dangerous economic forces lie the psychological factors of over-optimism on the one side or fear on the other. Both of these are products of uncertainty, the most dangerous of which is uncertainty about prices. It could lead to a wild speculation or to a drying up of purchasing power. That is why OPA is determined to do all in its power to hold prices stable during the months ahead.

The pricing policy on the reconverted civilian products must accomplish the following, the report said:

It must encourage maximum production, permitting prices which yield good profits for business on the basis of high volume production; must be easy to apply; must encourage the continued payment of high wage rates; must continue to protect the public against general increases in the cost of living; must not contribute to any repetition of the farm collapse which followed the inflation in prices after World War I; and must call for the elimination of price control as rapidly as possible.

The principal consumer items now under price control have an estimated 1943 retail value of \$73 billion, or 85 per cent of total consumer expenditures in that year. Present price controls on these items will be continued in substantially their present form in view of their favorable past record. OPA will expect absorption of cost increases on less profitable items, as well as on more profitable items, by industries which manufacture several lines and whose total profits are

satisfactory. OPA will continue to a prices in cases of individual hardship and will continue to allow price increases to industries whose profits have fallen below the level of the 1936-39 period. But in most of these consumer lines in production, volume should increase as war restrictions are removed and raw materials become more plentiful.

Overtime payments will probably increase and more efficient labor will come available, resulting in a decline in unit production cost. Most firms, therefore, which now are manufacturing peacetime products will continue to prosper under present ceiling prices.

**Metalworking Industries Cited**

Industries that may need new ceiling prices will be largely in the metalworking industries in the consumer durable goods fields, industries which for the most part have been out of civilian production since early 1942. The retail value of the products made by these industries in 1941 was \$6.5 billion, representing only about 8.5 per cent of total consumer expenditures in 1941.

Fewer than a dozen types of goods make up over 85 per cent of the value of all items which may need a reconversion price. These are automobiles, parts, refrigerators, sewing machines, washing machines, vacuum cleaners, other electrical household appliances, radios, phonographs, pianos, heating and cooking equipment, clocks and watches.

About a score of companies manufacture 80 per cent of all the items which soon will be coming back into production. The remaining 20 per cent are produced by about 25,000 additional firms.

In general, OPA says its objective in setting ceiling prices for these new goods will be the manufacturer's own prices which, with few exceptions, the ceilings in effect today for any manufacturer still producing the same similar goods. Wartime experience, summary said, has shown that increased wage rates and material prices need be fully reflected in price increases of the finished product. There are some companies, however, and perhaps a few industries whose costs have risen so

(Please turn to Page 184)

# 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

## M ORDERS

### INSTRUCTIONS

**STEEL BOILERS:** Only those manufacturers of steel boilers who are still primarily engaged in filling military orders are required to report their proposed shipping schedules to WPB. Operations reports that summarize monthly shipments, however, will be required of those manufacturers who have been relieved of scheduling restrictions.

**BED SPRINGS:** Bedding manufacturers may use coil, flat or fabric bed springs to make a spring only within the box spring quotas assigned them under order L-49. WPB has ruled that a manufacturer who attaches a wooden frame to an unused complete coil, flat fabric bed spring and then upholsters it covers it with ticking "produces" a "box spring" under the order. WPB also ruled that the construction of spring units for bedding products is not covered by L-49.

**CHEMICAL PRODUCERS:** Chemical producers who need mechanical labor-saving devices to compensate for losses in manpower now must submit detailed information requested in order P-89. Producers requesting an up-rating to AAA must observe the following requirement: "When application is made for an AAA rating, or from an equivalent delivery directive, it is essential that the following information be added: All relevant purchase order numbers, including the fabricator's job number; the delivery date promised on the basis of the requested special rating; and a list of all suppliers from whom quotations have been requested, together with their names."

## L ORDERS

**ELECTRIC LAMPS:** Order L-28, issued to control production of incandescent, fluorescent and other electric discharge lamps, has been revoked. Production will still be controlled, however, through WPB allocation of tungsten, nickel, molybdenum and copper in about the same quantities as previously. (L-28)

**HAIRPINS AND BOB PINS:** Order L-104, issued to control manufacture of metal hairpins and bob pins, has been revoked but production will continue to be controlled by the allotment of steel under CMP. Production at the present rate (50 per cent of the 1941 rate) is about 850 tons of carbon steel per quarter. (L-104)

**PORTABLE CONVEYORS:** Order L-287, restricting production of portable conveyors, has been revoked. Portable conveyors have been added to the list of equipment covered by order L-123. Temperature controllers, regulators and meters, control and recording instruments have been deleted from the definition of "manufacturing equipment" in subdivision 24 of the order. (L-123; 287)

**MILITARY INSIGNIA:** Order L-131, issued to control manufacture of military insignia, has been revoked. Production will still be controlled through the restrictions on the use of silver and copper contained in conservation orders M-199 and M-9-c, respectively. (L-131)

**CHURCH GOODS:** Order L-136, issued to control the use of critical materials in the production of church goods, has been revoked. Use of materials that are still critical will continue to be controlled by the applicable conservation orders. Use of iron and steel to make these items will still be controlled through allotments under CMP. Use of other metals are controlled as follows: Copper, M-9-c; tin, M-43; tin plate, M-21-e; zinc, M-11-b; lead, M-38, with appeal available under priorities regulation No. 25; and chromium chemicals for plating iron and steel, M-18-b. (L-136)

**LIGHTING FIXTURES:** Order L-168 which controlled the manufacture and sale of black-out and dimout lighting fixtures has been revoked. (L-168)

**CONDUIT:** Restrictions on the installation of electrical conduit, electrical metallic tubing and raceways have been removed from order L-225. The amount of metal (by weight) that

## INDEX OF ORDER REVISIONS

Subject	Designations
Church Goods	L-136
Conduit	L-225
Conveyors, Portable	L-123; 287
Cooking, Plate-Warming Equipment	L-182
Cryolite	M-198
Dental Equipment	L-249
Fixtures, Lighting	L-168
Hairpins, Bob Pins	L-104
Insignia, Military	L-131
Lamps, Electric	L-28
Lithium Compounds	M-191
Magnesium	M-2-b, 2-c
Metal Scrap Processors	P-136
Tinned Scrap	M-325
Trucks, Power	L-112-a

### Price Regulations

Automotive Parts	Nos. 452; 453
Castings, Nonferrous	Nos. 125; 377
Machine Tools	Nos. 1; 67
Machinery, Machine Tools	Nos. 1; 136; 375; 465

may be used in the manufacture of this equipment is still limited by the order on the basis of the amount used in 1941. Sales by manufacturers and distributors are still restricted to those with preference ratings of AA-5 or better. Manufacturers are still required to make monthly reports to WPB on sales and shipments. (L-225)

**COOKING AND PLATE-WARMING EQUIPMENT:** Distribution controls have been removed from commercial cooking and food and plate-warming equipment. Manufacturers may distribute their production equitably through normal distribution channels, although WPB reserves the right to direct the distribution of specific amounts from any manufacturer's output to meet emergencies. Eighteen specified items of equipment have been removed from schedule 1 of the order, which had prohibited their production. (L-182)

**DENTAL EQUIPMENT:** Order L-249, which restricted shipments of dental units and chairs for civilian use to 88 per cent of manufacturers average annual shipments during 1938, 1939, and 1940, has been revoked. (L-249)

**POWER TRUCKS:** Manufacturers of industrial power trucks have been authorized to manufacture a limited number of additional models as follows: Atlas Car & Mfg. Co., Cleveland, five; Baker-Raulang Co., Cleveland, four; Clark Equipment Co., Battle Creek, Mich., seven; Crescent Truck Co., Lebanon, Pa., two; Elwell-Parker Electric Co., Cleveland, three; Erickson Special Equipment Mfg. Co., Minneapolis, Minn., one; W. F. Hebard Equipment Co., Chicago, two; Ross Carrier Co., Benton Harbor, Mich., two; Towmotor Corp., Cleveland, one; Yale & Towne Mfg. Co., Philadelphia, seven; Lift Trucks Inc., Cincinnati, four. (L-112-a)

**MAGNESIUM:** All government controls on the use of magnesium for civilian products have been removed by revocation of order M-2-b. Simultaneously, WPB issued order M-2-c, which provides that all restrictions on the use of magnesium contained in other WPB orders no longer apply. However, restrictions in other orders as to the quantity of an article which may be made or as to its size or type remain applicable, even if the article is made wholly or partly of magnesium. The new order, M-2-c, states that persons wishing to obtain aluminum or aluminum products may place rated or unrated purchase orders on their supplier without securing approval of WPB or the aircraft scheduling unit, Aircraft Resources Control Office. Orders so placed are subject to priorities regulation No. 1. The order calls for monthly reports to WPB by certain industries. (M-2-b, 2-c)

**LITHIUM COMPOUNDS:** Order M-191 governing allocation of lithium, has been revoked. (M-191)

**CRYOLITE:** All restrictions on the use of cryolite have been removed through revocation of order M-198. (M-198)

**TINNED SCRAP:** Use of salvaged tin cans for the manufacture of bottle caps and crowns is now prohibited. All authorizations permitting the delivery or acceptance of tinned scrap for the manufacture of caps and crowns have been revoked. Material that is now in the possession of the user or manufacturer may be used for the production of these items until Jan. 1, 1945. (M-325)

## P ORDERS

**METAL SCRAP PROCESSORS:** Order P-136, assigning preference ratings to processors of metal scrap for maintenance, repair and operating supplies, has been revoked. Scrap dealers now may use the ratings assigned by CMP regulation No. 5 to obtain MRO supplies. Deliveries already rated under P-136 will be completed but no additional application of these ratings may be made. (P-136)

## PRICE REGULATIONS

**MACHINE TOOLS:** Previous exemption from price control given to blanket leases of machines and parts by the Defense Plant Corp. of the Reconstruction Finance Corp. also applies to similar leases of machine tools. (Nos. 1; 67)

**USED MACHINERY, MACHINE TOOLS:** Provisions that required sellers of used machinery and machine tools to file inventory and sales reports have been suspended for the period from Oct. 1 to Dec. 31, 1944. Dealers and those engaged in buying and selling used machinery and machine tools are still required to register with OPA under licensing order No. 3, and it will also be necessary to continue to maintain complete inventory and sales records. The forms to which the suspension applies are OPA form 100-1 (Second-Hand Machine Tool Reports), and form WPB-2574-OPA 2:10:P1 (Used Equipment and Machinery Inventory and Sales Report). (Nos. 1; 136; 375; 465)

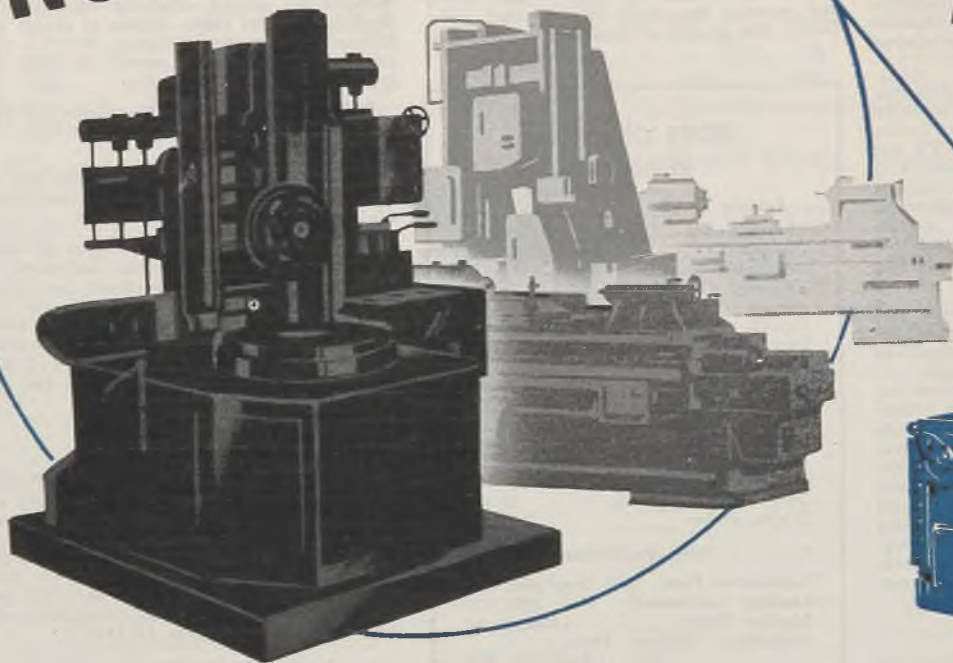
**NONFERROUS CASTINGS:** In computing prices for nonferrous foundry products and die castings by means of their pricing formulas, sellers may figure their metal costs on the basis of OPA ceiling prices instead of on the basis of current metal prices as formerly required by the two regulations covering these castings. (Nos. 125; 377)

**AUTOMOTIVE PARTS:** Automotive battery cable and wiring harness, top material, fender welt, traction sanders, jacks and cranks have been added to the list of automotive parts already covered by OPA orders Nos. 452 and 453. Labor rates to be used in computing prices are those that were either in effect on March 31, 1942, in the manufacturer's plant or for the labor rates that were made retroactive to or before that date by an order of the NWLB for classifications of labor in the manufacturer's plant. (Nos. 452; 453)

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MULTI-PURPOSE MACHINES CAN BE

100%  
AUTOMAT



*A revolutionary new production principle makes automatic control as versatile as manual control*

The Bullard "MAN-AU-TROL" principle of automaticity focuses at a finger tip the ability to get out of a machine anything that man's mind and muscles can get out of it . . . without human or cumulative error.

Applied to a machine this principle would make possible the production of one part as long as required with continued accuracy . . . *then in a few hours, not days* . . . you could reset the control to turn out an entirely

different part . . . any size, any shape within the machine limits.

So you see, the Bullard "MAN-AU-TROL" combines for the first time, the greater production and lower cost of special-purpose automatic machines with the multi-purpose advantages of manually operated machines . . . *plus* manual operation at a moment's notice.

The Bullard Company, Bridgeport 2, Connecticut.

*The automatic control that is as versatile as manual control*



100% automaticity . . . no man or cumulative error control to closest tolerance — a tremendous cost advantage in competitive markets!

# MIRRORS of MOTORDOM

**Automotive manufacturers' enthusiasm for pushing ahead with reconversion cools as progress of European war slows. WPB says war production needs preclude assignment of high priorities to industry's machine tool needs**

KEENLY attuned to the shifting fortunes and speed of war and as usual either overly optimistic or disconsolate, Detroit has seen a sharp slackening in sentiment for pushing ahead with reconversion to automobile production. Slowdown of the drive against the Nazis has put a definite damper on discussions of changeover problems, parts requirements, material specifications and the like, just in the past two weeks, and where a short time ago industrial executives were cheered by reports from Army officers returning from Europe that the fight would be over by Oct. 1, they are now becoming resigned to a much more protracted campaign. Reason for this sudden change is that if the war had been over by Oct. 1, then the reconversion timetable would have been badly delayed, but if months more of campaigning lie ahead, then things are about on schedule.

Statement by WPB's "Cap" Krug to the effect mounting war production needs preclude the possibility of assigning priority ratings to the industry's key machine tool requirements was termed "back" and a "welcome start toward clarification." However, it might be pointed out that most of the motor companies have a pretty good idea about the trend of war production and may know even better than Mr. Krug what the machine tool companies could supply if the formality of an official WPB sanction were forthcoming.

Actually, what bothers industry far more than the purchase of a few hundred machine tools is the snarling mass of bureaucratic red tape in which all dealings with Washington are enmeshed, whether they be for material, manpower, equipment, prices or whatnot. Alfred P. Sloan Jr., chairman of General Motors, told a story to the New York State Chamber of Commerce ten days ago which illustrates the point. He said he was talking to a dealer friend who related a number of his current troubles, most of which arose from confused relations with the OPA, the WMC, the SEC, internal revenue collectors, etc.; and on top of it all the dealer had a store which nearly burned out his place in business.

"George," said Mr. Sloan, "you have worked hard all your life and you are pretty well fixed. Why do you put up with it?" "Well, Mr. Sloan," he said, "really, I just want to know what the hell is going to happen next."

That is about the position of the automotive industry—it just wants to know what next.

In reviewing the postwar outlook, Mr. Sloan called attention to confusion which is evident in the minds of many

regarding postwar jobs. It has been estimated that business in this country will have to provide jobs for something like 55 million persons in order to realize a high standard of employment. The average individual, when he thinks of the term "job," thinks of a job in industry, failing to realize that only 25 per cent of the jobs to be established fall in the industrial category, and further that only half of these jobs, or one-eighth of the total, lie in those industries producing consumer durable or semidurable goods like automobiles. The others lie in the capital goods industries.

### Urges Industry Do Its Part

"I cannot emphasize," Mr. Sloan added, "my recognition of the fact that this question of jobs for those who want to work must be provided. I am thoroughly satisfied that if we of business fail to measure up to our full responsibility, government will come in through political action, will demand it and will do the job that we are unable to do.

"And if you stop to figure it out, I think you will find it very clear that, considering the magnitude of the postwar demands from the standpoint of national income, we must have to support the economy as it now exists, it will be impossible for government to contribute anything important without going into direct competition with private enterprise system, and when that happens then the private enterprise system is finished.

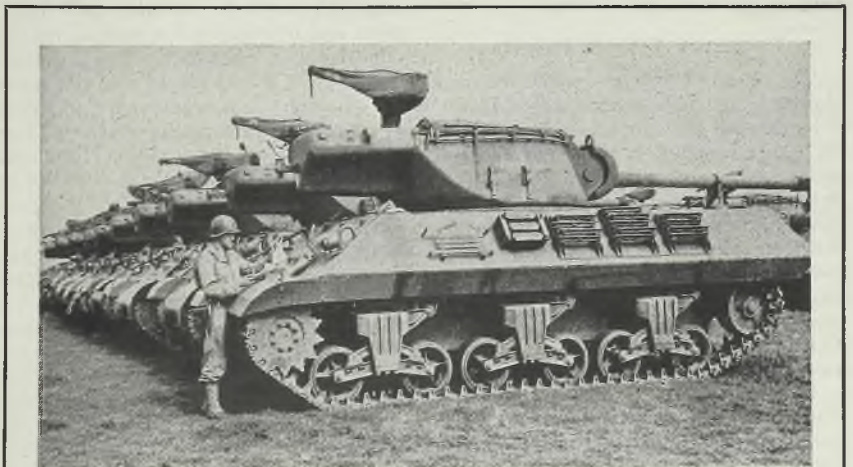
"If the economic national policies of the prewar thirties are to be continued

into the postwar forties, the picture would look dark indeed. But I do not think that is going to happen. Our position in GM is that we are willing to spend a large aggregate of money in expanding and developing because of conviction that there is opportunity and confidence that our people have changed their point of view."

Mr. Sloan predicted industry would face much more than a 40 per cent cut in war production on V-E Day or when the war with Germany ends, estimating the probable cut would be nearer 70 per cent.

The Ford V-8 tank engine is now standard equipment on tanks built by five manufacturers, and company spokesmen point out the engine was developed from a design conceived and tested personally by Henry Ford in his private laboratory at Dearborn. The original design was a V-12 with cast aluminum block and crankcase and a simplified dual camshaft system which eliminated complicated gear arrangements. Starting in 1940, company engineers set to work to adapt these principles to a V-12 aircraft engine, spending about \$1,500,000 over the following 18 months. Several pilot models were built, giving sensational performance on test. The engine was rated at 924 horsepower at 3200 r.p.m. at sea level atmospheric pressure. Supercharged, it would have developed an estimated 1500 horsepower and weighed only 1400 pounds. Early in 1942, when Ford started to build M-4 tanks, it was decided to try to adapt the new engine to powering the tank. Four cylinders were taken off, but the basic design was unchanged.

Easily serviced in the field, the Ford engine comprises five major assemblies—crankshaft and flywheel, cylinder block including main bearing caps and all studding, cylinder head with cam and valve arrangement, assembly drive with five power takeoffs, and oil pan assem-



**READY TO GO AGAIN:** Army ordnance officer inspects fleet of tank destroyers damaged in battle and repaired at an ordnance depot in France. NEA photo

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**SALVAGE:** Acres of jeep engines from damaged vehicles have been accumulated by ordnance officials in Italy and will be overhauled and returned to service. NEA photo

bly. Use of carburetors instead of fuel injectors and lower crankshaft speed are major operating differences between the tank engine and the aircraft unit. Cylinder barrels are centrifugally cast steel, and crankshafts are cast alloy steel.

Another key figure in the Ford industrial family was lost last week with the death of Peter E. Martin who began work with Mr. Ford at the age of 22 some 40 years ago. He was hired by the late C. Harold Wills and was one of the first five ranking executives until his retirement a few years back because of ill health. However, he was a frequent visitor around Ford plants and was considered to be chief engineer, although he never actually held the title, being first vice president at his retirement.

#### Progressive Veterans Program

The Ford company, with the enthusiastic and able support of its youthful executive vice president, Henry Ford II, has developed a well-rounded program for rehabilitating and rehiring returning veterans, latest figures showing 43,000 former Ford employes now in the services. Keynote of the plan is the provision of work for all, handicapped or not, within the framework of the organization, and wherever possible a job that eventually will be a better one than that held before the war by the veteran.

Five other aspects of the plan are noteworthy: 1. Establishment of a veterans' department to work with returning servicemen until they are refitted to employment; 2. expansion of the 500-acre Camp Legion, school and home open to all veterans given medical discharges; 3. granting of "bonus" vacations to all former employes returning to the payrolls; 4. opportunity for veterans in

Ford dealerships and eventual ownership of their businesses; and 5. a general wage increase for all Ford employes, based on Mr. Ford's confidence in returning veterans and his faith in high productivity of his workers in the postwar period.

Limited manpower has been freed by the WMC for work preparatory to production of metalworking equipment, tools and fixtures in the local region. Manufacturers of machine tools were extended permission to assign 1 per cent of their personnel to tasks of production engineering and layout, design of tools, attachments, jigs and fixtures, and to preparation of bills of material necessary for their manufacture. In addition the United States Employment Service is to consider such engineers and technicians for referral on the same basis as comparable men for non-priority war jobs. Where a larger number of employes is required for this type of war work, the manufacturer is free to seek special authorization from the WMC for such additional manpower.

This action closely parallels the plan put into effect for automobile manufacturers, which authorized them to use 1 per cent of their manpower for preparatory engineering work, and to expend up to \$25,000 a month on such work. There is no particular objection being voiced to the restrictions on number of men who may be assigned such work, but there is an inclination to regard the expenditure ceiling as just a little silly. As one engineer put it, "Why, we would spend \$25,000 on the redesign of a radiator ornament."

Recent statement by radio commentator Upton Close to the effect, "Now that the Fisher brothers are coming to the West Coast to set up manufacturing,

etc." was a puzzler to many listeners until they noted that the permissible papers of the two new Fisher companies incorporated in Delaware were filed in Oregon and Michigan. Obviously such a filing guarantees no intention to begin manufacturing in Oregon any more than in Delaware, but the conclusion was too pleasing not to be leaped to. To date, Fisher spokesmen continue to smile at the flood of rumors being spread about their plans, stoutly holding the position that such plans have been formulated as yet.

Looking to future automotive markets, H. C. Doss of Nash-Kelvinator Corp. says his staff is conjecturing conservatively that following the close of the war there will be a sellers' market lasting about three years, followed by a two or three-year buyers' market which is anticipated, during which sales will drop somewhat but continue steadily and finally leveling off. He expects total auto sales to run between 25 and 30 million in these 5-6 postwar years. Nash has developed production schedules based on tripling peak pre-war output.

Edw. G. Budd Mfg. Co. has planned a tonnage of reinforcing steel bars for a new plant project in Detroit, tending to confirm speculation the company's building activities in Detroit may be due for appreciable expansion, permitting the Philadelphia plant to concentrate on railroad car work, and reinforcing Budd's position as a body supplier.

Ypsilanti Reed Furniture Co. is planning production of station wagon bodies for General Motors divisions and Chrysler at its Ionia, Mich., plant.

#### Fisher To Install X-ray Machine at Grand Blanc

A 1,000,000-volt X-ray machine will be installed soon at the Grand Blanc, Mich., tank plant of the Fisher Buick division, General Motors Corp. The machine, to be housed in a new plant addition authorized by WPB will be used to examine armor plate, castings and weldments for porosity or other defects. It will be in operation about Jan. 1.

WPB has authorized expenditure of approximately \$140,000 for the project.

#### Chevrolet Completes Plant Expansion at Anderson, Ind.

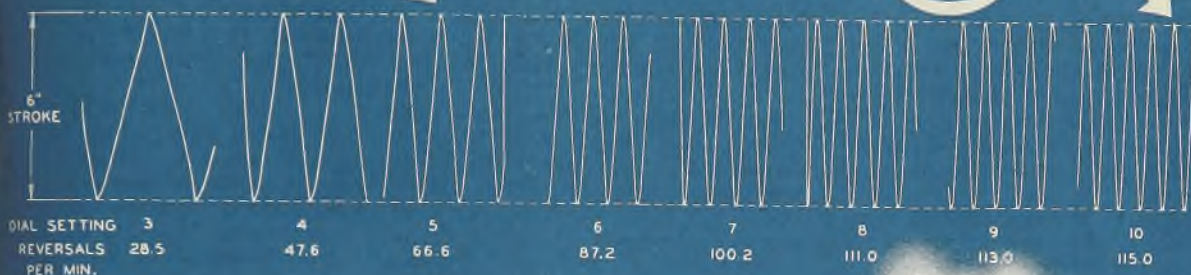
Completion of an extensive plant expansion program coinciding with the start of forged aluminum alloy cylinder head production by Chevrolet at Anderson, Ind., has been disclosed. The expanded plant provides more than 55,000 square feet of additional floor space, permitting large-scale output of cylinder heads for R-2800-C, 18-cylinder Pratt & Whitney aircraft engines. More than half of the plant's floor space is devoted to machining operations, a large portion of which is of an intricate and complex nature.

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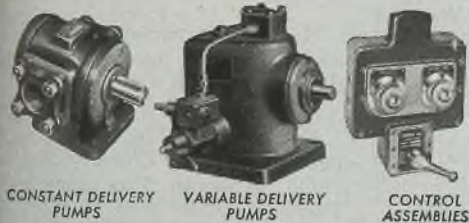
**OVERRIDE  
PRACTICALLY  
ELIMINATED**

**SMOOTH REVERSALS  
AT ALL SPEEDS**

Note Uniform Length  
of Stroke



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CYCLE" CONTROL PANELS**



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for Every Hydraulic Power  
and Control Function**

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# MEN of INDUSTRY



K. D. SMITH



A. J. M. BAKER



J. FRENCH ROBINSON



W. RUSSELL POOLE

K. D. Smith has been appointed manager, Worcester Wire Works division, National Standard Co., Worcester, Mass., succeeding George W. Palmer, who becomes a company consultant. Formerly Mr. Smith was Washington representative of B. F. Goodrich Co., Akron, O.

Edward F. Mulhern, formerly executive vice president, Birtman Electric Co., Chicago, has been elected president, succeeding H. R. Butz, who has been made chairman, a newly-created position.

L. J. Henderson has been appointed assistant general sales manager, and Gene P. Robers has been named sales promotion manager, Weatherhead Co., Cleveland. Mr. Henderson has been assistant manager of the company's Aviation Sales division since 1938, and Mr. Robers has directed the company's advertising activities since 1942.

Leo E. Taylor has been named chief inspector of the Pratt & Whitney aviation engine project of Chevrolet Motors division, General Motors Corp., with headquarters in Buffalo, succeeding M. K. Hovey, recently appointed general plant manager of Chevrolet plants in Flint, Mich.

Laurence E. Cooney, formerly Cleveland district sales manager, the Austin Co., Cleveland, has been appointed vice president and general sales manager.

V. K. Stalford has been appointed district merchandising manager in Detroit for Graybar Electric Co. Inc., New York, succeeding J. P. Wear Jr., now Philadelphia district merchandising manager.

Merton R. Hartnell, formerly plant manager, Connelly Iron Sponge & Governor Co., Chicago, has been appointed assistant to the president, Drake Electric Works Inc., Chicago.

Robert A. Olen has been named general manager, Four Wheel Drive Auto Co., Clintonville, Wis., succeeding his

father, Walter Olen, who remains as president. R. C. Schmidt has been named vice president in charge of sales.

A. J. M. Baker has been elected a director and vice president, E. W. Bliss Co., Brooklyn, N. Y. Mr. Baker formerly was assistant vice president, Joshua Hendy Iron Works, Sunnyvale, Calif., and manager of that company's division, Crocker-Wheeler Electric Mfg. Co., Ampere, N. J.

J. French Robinson, president, East Ohio Gas Co., Cleveland, has been elected president of the American Gas Association.

Frederick W. Smith, for 19 months chief of the WPB's General Industrial Equipment Division, Special Equipment Branch, will become associated with Carrier Corp., Syracuse, N. Y., Nov. 1.

Alvan D. Peabody heads the newly-formed rural development department in the Electric Appliance division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Frederick K. Lovejoy has been appointed manager of the Kansas City district sales territory of American Machine & Metals Inc., East Moline, Ill.

William J. Gravlin has been appointed assistant traffic manager, American Steel & Wire Co., Cleveland.

O. C. Tabbert has been appointed assistant manager, P&H Welding Equipment division, Harnischfeger Corp., Milwaukee.

Ward R. Schafer, previously sales manager of the western region for Edison General Electric Appliance Co., Chicago, has been appointed general sales manager.

R. E. Fisher, vice president, Pacific Gas & Electric Co., has been named vice chairman of the San Francisco Bay Region Council, which represents in-

dustrial, labor and civic groups of San Francisco, Alameda and seven Bay counties in planning regional postwar economy.

W. Russell Poole, former works manager, Barden Corp., Danbury, Conn., has joined Corbin Screw Corp., Britain, Conn., as works manager.

J. K. Thompson has been named assistant manager, Gary, Ind., plant American Bridge Co., United States Steel Corp. subsidiary.

Clarence L. Riegel has been elected secretary and assistant treasurer, Lacombe Airplane Corp., Trenton, N. J. Previously he was assistant district auditor in New York city for General Electric Co., Schenectady, N. Y.

Carl Schweinfurth, president, Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill., has been elected president, Illinois State Chamber of Commerce.

Henry E. Butterfield has been named assistant general manager, Harrington Richardson Arms Co., Worcester, Mass.

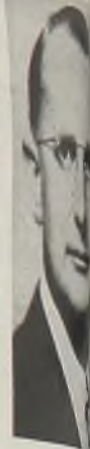
Frederick H. Gay has been named purchasing agent, Cowdrey Machine Co., Fitchburg, Mass.

Fred C. Teufel, former district manager in Cleveland of the Storage Battery division, Philco Corp., Philadelphia, has been named midwestern sales manager of the division.

Ellis L. Spray has been elected vice president and general manager, Westinghouse Electric Elevator Co., Jersey City, N. J. Mr. Spray will continue as assistant to the president in charge of the headquarters manufacturing division of the parent company, Westinghouse Electric & Mfg. Co.

R. B. Golling has been named representative in Ohio, western New York and western Pennsylvania for Bound Brook





W. W. GREENWAY

HAROLD A. HINTZ

W. S. WILBRAHAM

HERBERT B. LEWIS

Less Bearing Co., Bound Brook, N. J., and W. K. Swift has been appointed company representative in eastern Pennsylvania, southern New Jersey, Maryland, Delaware and Virginia.

William W. Greenway has been appointed production engineer for Mt. Vernon Car Mfg. Co. and J. P. Devine Mfg. Co., divisions of H. K. Porter Co. Inc., Pittsburgh. Prior to joining these Porter companies, Mr. Greenway had been associated with Austin Western Co., Aurora, Ill., as production specialist.

A. E. Greco, editor of the company publication of Youngstown Sheet & Tube Co., Youngstown, O., has been elected to membership in the Publications division of the American Public Relations Association.

Frederick K. Krell, associated with Tube Steel Tubes Co., Milwaukee, has been appointed chairman of the trade promotion committee, United States Chamber of Commerce.

Cornelius E. Burkey, formerly division manager of A. W. Hecker Co., Cleveland, has been named chief engineer, Designers Industry Inc., Cleveland.

H. L. Benner has been appointed Detroit technical representative of the Electric division, E. I. du Pont de Nemours & Co. Inc., Wilmington, Del.

Edwin C. Hyatt, formerly chief industrial hygienist for the Missouri State Health Department, has joined the staff of Industrial Hygiene Foundation at Mellon Institute, Pittsburgh.

Ken Hathaway has been appointed manager, Radio Distributor division, Ward Leonard Electric Co., Mt. Vernon, N. Y., and will establish headquarters at 83 West Jackson boulevard, Chicago.

Montague A. Clark, formerly director of the War Manpower Commission in Michigan, has joined the Management

Engineering Division of the Labor Relations Institute and will direct labor relations and negotiations activities in behalf of employers in Michigan and Ohio.

Harold A. Hintz has been appointed manager of the newly-opened Los Angeles district office of H. K. Porter Co., Inc., Pittsburgh. Previously Mr. Hintz had represented Axelson Mfg Co., Los Angeles, as field sales engineer.

William S. Wilbraham has been appointed production manager, Lukenweld Inc., division of Lukens Steel Co., Coatesville, Pa., and George L. Snyder, since 1938 chief engineer of Lukenweld, has been named assistant to the general manager, continuing as chief engineer. Paul Sikora is plant accountant.

William A. Minkler has been appointed application manager for air conditioning, Westinghouse Electric Elevator Co., Jersey City, N. J.

C. L. Davis and A. E. Walbridge have been appointed district managers for the New York region of De Soto Motor Corp., Detroit.

Henry F. du Pont has resigned from membership on the board of General Motors Corp., Detroit, and Lamot du Pont Copeland, a member of the finance committee of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., has been elected to fill the vacancy.

C. V. Pattison has been elected president, Pattison Supply Co., Cleveland, succeeding the late W. H. Smith.

Philip Carey Mfg. Co., Cincinnati, has announced the following appointments: Harold D. Bates, advertising and sales promotion manager; Chester L. Owens, assistant general sales manager, and George B. Johnston, general merchandising manager.

John L. Johnson has been appointed appliance manager for the northwestern district, Westinghouse Electric Supply

Co., New York, and E. M. Lacey succeeds Mr. Johnson as eastern district appliance manager, with offices in New York. C. M. Mackey has been appointed manager of the Southwest district, with offices in Dallas, Tex.

Herbert B. Lewis, who was associated with Brown & Sharpe Mfg. Co., Providence, R. I., for 25 years, having organized and managed that company's experimental department, and later served at different times as manager of two manufacturing divisions, has joined Lukens Steel Co. and divisions, By-Products Steel Corp., and Lukenweld Inc., Coatesville, Pa., as manager, Machinery division.

J. D. A. Morrow, president, Joy Mfg. Co., Franklin, Pa., Arthur S. Knoizen, vice president of that company, and George M. Gillies Jr., president, Adams Express Co., have been elected to the board of Sullivan Machinery Co., Michigan City, Ind.

Benjamin Schwartz, executive vice president, New York Commodities Corp., New York, has been elected president of the New York Chapter, Institute of Scrap



SCOTT RUSSELL

Who has been appointed general manager of the Aeronautical Chamber of Commerce, reported in STEEL, Oct. 2, p. 56.

Iron & Steel Inc. **Joseph A. Moskowitz**, Samuel Sons Iron & Steel Co., Brooklyn, N. Y., retiring president of the chapter, was elected board chairman. Other officers elected include **Charles J. King**, Charles J. King Scrap Iron & Steel Corp., first vice president; **William Frost**, Percy W. Bowers Co., second vice president; **Albert Raphael**, secretary, and **George Alper**, Queensboro Structural Steel Co., treasurer.

**F. A. Chidsey** has been appointed district sales manager of the Washington office, Jones & Laughlin Steel Corp., Pittsburgh, succeeding **H. B. Shepherd**, who is on temporary leave of absence.

**Howard B. Carpenter**, assistant vice president in charge of operations, Republic Steel Corp., Cleveland, has resigned and will open an office in Cleveland as consultant in steel mill operations. **E. M. Richards**, also assistant vice president in charge of operations for the

company, will assume charge of the operations of Republic's steel districts, and **W. M. Kelley**, formerly works manager, Youngstown, O., plant of Truscon Steel Co., Republic subsidiary, has been transferred to Cleveland to take the position of assistant to the vice president in charge of operations and will have charge of Republic's manufacturing divisions.

**Albert R. Zelt**, ranking vice president of Oil Well Supply Co., Dallas, Tex., has been transferred from Oil City, Pa., to Dallas, **Ralph W. Rager** has been named comptroller of the company, and **Byron Hinderer** has been made assistant comptroller. Mr. Rager succeeds **Russell M. Braund**, whose transfer to American Steel & Wire Co., Cleveland, became effective Oct. 1. Both companies are subsidiaries of United States Steel Corp.

**A. F. Sprankle** has been appointed metallurgical engineer, Timken Steel &

Tube division, Timken Roller Bearing Co., Canton, O. Formerly he was manager of the alloy bureau, Carnegie-Ill Steel Corp., Pittsburgh district.

**C. E. Plass** has been named district engineer in the electrical sales division of the Chicago office, American Steel & Wire Co., Cleveland. **Victor Siegel** succeeds Mr. Plass as chief research engineer of the Electrical Cable Works, the company's South Works, Worcester, Mass.

**Royal G. Parks** has been elected comptroller, National Malleable & Steel Castings Co., Cleveland. Mr. Parks succeeds **W. H. Anderson**, who has moved to the office of the accounting firm of **Anderson & Co.**

**Edwin V. Hale** has been appointed district manager in Cleveland for the construction Sales Co. Inc., Albany, N. Y. His headquarters are in Terminal City, Cleveland.

## OBITUARIES

**J. Ramsey Speer**, 74, former prominent Pittsburgh industrialist, died Oct. 1 in Easton, Md., where he recently had been in retirement. Mr. Speer began his career with Schoenberger Steel Co., Pittsburgh, in 1893, and when that company was purchased in 1899 by American Steel & Wire Co., which operated it as an independent company for about 18 months, he became vice president and general manager, operating the business for American Steel & Wire until the fall of 1900. Joining his brother, he purchased in 1899 the S. Jarvis Adams Co. and served as its vice president until 1911 when the name was changed to Pittsburgh Iron & Steel Foundries Co. and he became president. In 1920 he was elected chairman of the board, continuing until 1922, when the company merged with Mackintosh-Herphill Co., and the A. Garrison Foundry Co., Mr. Speer remaining as president. In addition, Mr. Speer served as president of American Adamite Co.; helped organize and served as president of Brownsville Glass Co., Morgantown, W. Va., later sold to the Mississippi Wire Glass Co. of New Jersey; served as vice president of Midland Steel Co. from its inception until 1911 when it was sold to Crucible Steel Co. of America, and was president, Liberty Products Co.

**James G. Switzer**, 77, secretary-treasurer, Curtis Turbine Engine Co., New York, died Sept. 29 in East Orange, N. J.

**Lee Kahn**, 62, widely known in the nonferrous metal business in Chicago during the past 40 years, died Oct. 30. He was an executive of R. Lavin & Sons Inc. at the time of his death. Prior to his association with that company he had been affiliated with S. Birkenstein & Sons and with L. A. Cohn & Bro., serv-

ing as vice president of the latter.

**Dr. Fin Sparre**, 65, director of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del., and head of its development department for 25 years before he retired Aug. 31, died Oct. 7 in Wilmington.

**William E. Taylor**, 61, president, Taylor & Co. Inc., Brooklyn, N. Y., died Oct. 6 in Hewlett, Bay Park, Long Island. Mr. Taylor was president of the Gray Iron Founders Association of Greater New York.

**Robert M. Leith**, 63, traffic department, Republic Steel Corp., Cleveland, died Oct. 7 in that city.

**William H. Shepard**, 86, former Cleveland industrialist who was one of the founders of Crucible Steel Casting Co., Cleveland, and who had been associated with T. H. Brooks & Co., Cleveland, died Oct. 7 in Chardon, O.

**Otto R. Stocke**, 43, assistant manager of the Nashville, Tenn., division, Consolidated Vultee Aircraft Corp., died Oct. 1 in Nashville.

**Everett O. Van Gundy**, 49, employment supervisor, Caterpillar Military Engine Co., Decatur, Ill., died Sept. 26 in St. Louis.

**Walter M. Saunders Sr.**, metallurgist, who had been associated actively with the New England foundry industry as a consultant most of his lifetime, died recently in Providence, R. I. Mr. Saunders was in his middle 70's and was a veteran member of the New England Foundrymen's Association.

**Fred C. Kuhnle**, formerly president, American Brass Novelty Co., Grand

Haven, Mich., died Sept. 30 in that city.

**Samuel M. Thomle**, 62, traffic manager, Challenge Co., Batavia, Ill., died Oct. 3 in Geneva, Ill.

**Dr. Carl Claus**, 60, chief engineer, vice president in charge of research, Bound Brook Oil-Less Bearing Co., Bound Brook, N. J., died Oct. 5 in that city.

**Alexander Robertson**, 67, who died in 1936 after 16 years as works manager of the Alliance, O., plant, American Foundries, Youngstown, O., died recently in Youngstown.

**Peter E. Martin**, 62, one of the five associates of Henry Ford and vice president of the Ford Motor Co., Dearborn, Mich., from 1924 until he died Oct. 8 in Detroit.

**Cecil F. Herington**, for many years associated with Amsler-Morton Co., Pittsburgh, having charge of the company's activities in connection with the production of pulverized coal, died Sept. 30 in Toledo, Ohio.

**Bert L. Webb**, 64, district representative in Cincinnati for L. S. Starrett Precision Tool Co., Athol, Mass., died Oct. 2 in Cincinnati.

**John Williams Converse**, 66, director, Baldwin Locomotive Works and General Steel Castings Corp., Eddystone, Pa., died Sept. 30 in Rosemont, Pa.

**Carl S. Bassett**, 72, retired head of Cherry-Burrell Corp., Chicago, died Oct. 8 in Philadelphia.

**Philip L. Bannan Sr.**, who organized the Pacific Gear & Tool Works, San Francisco, early in this century, died Oct. 7 in San Francisco.

# Dedicates New Laboratories at Whitemarsh, Pa.

Pennsylvania Salt Mfg. Co. converts mansion to research quarters. . . Kettering of General Motors is guest speaker

WITH befitting ceremonies, Pennsylvania Salt Mfg. Co., Philadelphia, formally opened its Whitemarsh Research Laboratories in what was formerly the mansion of the late Edward T. Stotesburg at Hopedale Oct. 4 at Whitemarsh, Pa., 10 miles north of Philadelphia.

Leonard T. Beale, president, formally presented the key to the laboratories to Dr. S. C. Ogburn Jr., manager of research and development. C. F. Kettering, vice president in charge of research, General Motors Corp., Detroit, spoke as guest speaker declaring he thought the practical way of looking at research was to regard it as a type of insurance, "insurance against being surprised some day by a competitor."

The occasion, attended by more than 100 guests, was first of a series which extended over several days Oct. 7.

The Stotesbury mansion, known as "Whitemarsh Hall," for many years had been one of the residential show places of the country. It was completed in 1920 at a cost of \$2,500,000. By converting the structure, the company saved considerably over its original plans for newly constructed laboratories. Alterations in the mansion have not been extensive.

The first floor is utilized chiefly for

offices, conference room, patent division quarters, library and lunch room. The seminar room, locker rooms, chemical and apparatus storage rooms, shops, ice plant and boiler rooms are on lower floors. Laboratories occupying the entire second floor are devoted to research in organic and inorganic chemicals, physical and chemical analyses, fundamental and exploratory projects, electrochemicals, textile processing, detergents, agricultural chemicals, disinfection and sanitation, pulp and paper chemicals, product improvement studies and sales service work in special chemicals.

Other rooms on this floor include staff offices, balance rooms, dark rooms, first-aid, etc. Laboratories for electroplating work, laundry and dry cleaning, ceramics and glass pouring are located on other floors. For large scale studies of new processes, a pilot plant laboratory, three stories in height, is located in one wing of the building. Services provided in the laboratories include water, gas, compressed air, vacuum, low and high pressure steam, distilled water and alternating and direct current electricity.

The Pennsylvania Salt Mfg. Co. was founded in 1850 when the first plant was built at Natrona, Pa., for the manufacture of lye and the alkaline salts of soda. A separate research and development department was organized in 1908 at its plant in Wyandotte, Mich. Two years later the activities of this department were transferred to the Greenwich plant in South Philadelphia, but as this work expanded it became apparent that existing laboratory space and facilities, even though increased over the years, were inadequate. Plans were drawn up for a new laboratory at a previously acquired plant site. However, due to the critical labor and material shortage developed by World War II this new construction program was not possible, and the acquisition

of the Stotesbury mansion proved to be the answer.

The Stotesbury estate at Whitemarsh covers 308 acres and of this, the Pennsylvania Salt Mfg. Co. acquired about 30 acres which surround its laboratories.

Approximately 80 workers comprise the research and development staff.

## Draper Corp. Purchases Massachusetts Foundry

Draper Corp., Hopedale, Mass., builder of textile mill equipment, has acquired through purchase the Framingham, Mass., foundry owned jointly by B. F. Sturtevant Co., Hyde Park district, Boston, and Niles-Bement-Pond Co., Pratt & Whitney division, Hartford, Conn. The plant, consisting of five buildings on a 10-acre site, has a capacity of 100 tons a day which will be added to the Draper capacity for castings.

## Milcor Steel Co. Buys Osborn Co. of Cleveland

In line with plans for expanded operation after the war, the Milcor Steel Co., Milwaukee, subsidiary of Inland Steel Co., Chicago, has purchased the J. M. & L. A. Osborn Co., Cleveland.

The Osborn company is one of the country's pioneer manufacturers and distributors of sheet metal products, having been established in 1859. It operates branches in Buffalo, Detroit and Cincinnati.

Plans are to continue operations as the J. M. & L. A. Osborn Co., Division of Milcor Steel, with the present Osborn organization remaining intact.

## Udylite Corp. Celebrates Silver Anniversary

Udylite Corp., Detroit, will celebrate this month completion of 25 years of activity in the field of metal finishing. During the 25 years the corporation grew from a mere idea in the minds of a group of men, to one of the largest manufacturers and distributors of metal finishing equipment and supplies. L. K. Lindahl is president.

## Predicts Large Postwar Business for Weatherhead

In a talk to 6000 Weatherhead Co. employees, Cleveland, and members of their families, A. J. Weatherhead Jr., president, predicted a postwar volume of business for the company which would be just about three times what it was before the war, with employment at approximately its present high level.

Mr. Weatherhead based his estimate largely on the anticipated volume of business from the automotive industry, in peacetime the company's largest customer.



Three prominent executives shown at the dedication ceremonies of the Pennsylvania Salt Mfg. Co.'s Whitemarsh laboratories are shown talking things over. They are, left to right, Leonard T. Beale, president of the company, C. F. Kettering, General Motors' research chief, and Dr. S. C. Ogburn Jr., manager of research and development, Pennsylvania Salt Mfg. Co., who was presented the keys to the laboratory by Mr. Beale

# WING TIPS

**Air Technical Service Command, Wright Field, O., reveals first B-29 Superfortress constructed at cost of \$3,392,396. Current models rolling off production line cost approximately \$600,000. B-29 had minimum of changes**

THE FIRST B-29 Superfortress cost \$3,392,396.90, the equivalent of 180,928 \$25-denomination war bonds, headquarters of the Air Technical Service Command, Wright Field, O., announced recently. Current production models are costing the government approximately \$600,000.

In citing the B-29 as an example of the enormous cost of a new warplane, Brig. Gen. Kenneth B. Wolfe, ATSC chief of engineering and procurement and the man who practically nursed the battle colossus of the air from drafting board to the skies over Japan, gave facts and figures to show how tremendously difficult, expensive, and time consuming is the task of development.

General Wolfe was in charge of the B-29 production program from its inception and at the time of the first raid on Japan was commanding general of the 20th Bomber Command of the 20th Air Force, with headquarters in the China-Burma-India theater.

"Into the cost of the first model of any warplane go all the years of engineering, experiments, tests and changes," General Wolfe explained. "The very time it takes costs money and the minimum time from the first design of a new plane to the completion of the

first production model is about three years. Sometimes it takes five years.

"Even before the original contract for the first B-29s was let, \$84,150 was spent in obtaining preliminary engineering information, which necessitated wind tunnel models, long and costly tests and the building of mock-ups, which are full size wooden models never designed to fly but intended for use in the laboratories and at the factory in determining the interior arrangement of guns, seats, bunks, radio equipment, etc.

"The original contract was let for \$1,804,840, later reduced to \$1,674,880 when the government assumed certain flight risks. But this sum did not include the government-furnished equipment, which cost approximately \$493,300. Changes are always necessary before production can be started. On the B-29, which had a minimum of changes, it cost \$95,241 for tests to alter the tail, \$72,500 for enlarging the bomb bay, and \$15,600 for new propeller tests. Incidental changes to perfect the model ran the total up another \$94,897.90.

"Before the first Superfortress could be built on the production line, it was subjected to a final series of static tests in the aircraft laboratory of the Air Technical Service Command at a cost of

\$861,828. A complete airframe was on the rack and tested for stress strain until it was completely destroyed," General Wolfe said.

The changes as a result of test expensive, Gen. Wolfe pointed out they pay for themselves. They that volume production will be highest quality and that the plane be the best that American ingenuity know-how can produce.

Once a new plane starts coming the production line in quantity, it drops rapidly as the manufacturer efficiency through experience with particular model and finds a hundred ways to speed production and cut man-hours, General Wolfe explained.

## C-46 Increases Speed, Payload by Shedding I

The huge Curtiss C-46 Commando, famed workhorse of the Army Air Corps, is flying faster and with a bigger payload these days. It's all because the camouflage paint is being eliminated from the Commandos that are moving, in increasing numbers, off the long assembly lines in the Buffalo, and Louisville plants of the Airplane Division, Curtiss-Wright Corp.

The Commando, world's largest engine transport, is reduced in weight approximately 75 to 100 pounds by eliminating the camouflage paint. Removal of the paint also adds substantially to the Commando's speed, as aerodynamic surface of the paint is eliminated.

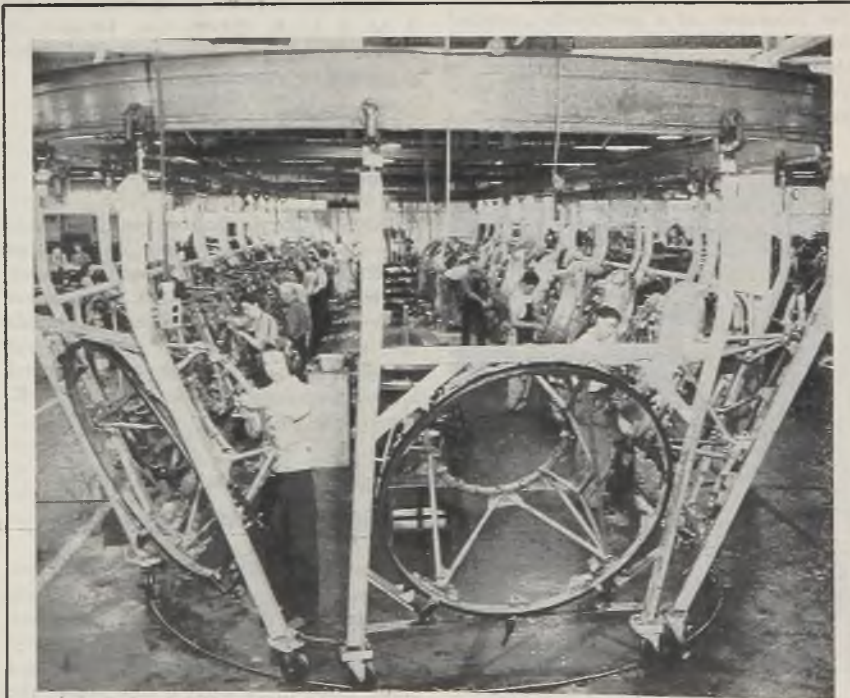
The weight saved by eliminating camouflage paint means that from 100 more pounds of vital war material can be flown into combat areas in big planes. Too, the increase in speed allows greater payload since line consumption—and weight of fuel—is cut.

## Reveals More Facts About Jet-Propelled Planes

General Electric Co. engineers, Schenectady, N. Y., recently disclosed of the advantages of the jet-propelled planes which the company is equipping with gas turbine engines, among the fact that the propellerless craft take-off almost from scratch, without warm-up required by conventional engines.

Full thrust from the gas turbine is available in approximately 30 seconds after they are started, thereby eliminating any delay for warming up the engine. Disclosure of this and other information about the jet plane power plant was permitted by the War Department concurrent with announcement of the new Allied jet-propelled planes have been used successfully by the British against the German robot bombs.

General Electric is building the gas turbines for the American version of



**MOVING ASSEMBLY LINE:** This moving oval jig is used for assembly of fixed cowlings and associated parts on engine mounts for B-17 Flying Fortresses. The assembly line operates on a track suspended from the ceiling and guided by another track on the floor

# PHILCO IS READY TO REDUCE YOUR POST-WAR BATTERY COSTS



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Storage battery purchases made from now on, are essentially a post-war investment. So be sure to keep posted on this sensational post-war Philco Battery development—the new Philco Thirty that gives 30% longer life! Here, at last, is a really revolutionary new long-life construction—employing a brand new principle of FABRICATED INSULATION!\* It's available now in certain types and limited quantities. And as rapidly as war time restrictions are eased, Philco will make it possible for every user of electric industrial trucks to share in the new economy and more efficient operation of this great new battery. Write today for information. \*Patent Applied for

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revolutionary-type aircraft, described as a single-seater, high-altitude fighter.

Jet plane turbines operate satisfactorily with either kerosene or gasoline, the former fuel having less tendency than gasoline to ignite in the open air. When the jet plane is in full flight, no visible flames come out of the exhaust. And because continuous ignition is not required, radio interference and high-altitude ignition problems are eliminated.

The turbine is a compact, self-contained unit which has only one moving part. Air is taken into the turbine, compressed, and passed into chambers where its temperature is increased by the combustion of fuel, creating hot gases which are discharged through a tailpipe nozzle.

Forward thrust of the plane is developed as the reaction to this high-velocity discharge in accordance with the physical law that for every action there is an equal and opposite reaction. A common example of this principle is the rotary lawn sprinkler.

Because this thrust power is produced directly without requiring gearing or a propeller, vibration is minimized, and reduced weight per horsepower is made possible, the G-E engineers explain. Thrust produced by the turbine is easily regulated and overhauls may be accomplished quickly when necessary.

The gas turbines for the American type jet planes were developed by General Electric on modifications of a British design. Six months after the project was assigned to G-E by the Army Air Forces in 1941, the company successfully modi-

fied, developed, and produced the first jet-propulsion gas turbines in America.

The first successful flight in this country was made in October, 1942. Since then the jet-propelled plane has been undergoing great development. Recently, Gen. H. H. Arnold pointed out that great hopes are being held for it for future commercial as well as military use.

Although production schedules for jet propelled planes have not been revealed, the company was permitted to announce last July that it was converting its second largest wartime plant of more than 600,000 square feet of floor space for the exclusive production of jet propulsion aircraft turbines.

### Redesign Thunderbolt For Pacific Operations

Currently in process at plants of Republic Aviation Corp., Long Island, N. Y., is a gradual changeover to a new Thunderbolt fighter plane model, identified as the P-47N, a longer-range model particularly designed for operation in the Pacific theater. As this new model goes into production, assemblies of the previous design, the P-47D, are being tapered and will be concluded by February of next year.

Production rate on the "N" model will not be as high as on the "D" model, but no substantial reduction in employment is expected, in view of certain subcontracting operations being returned to the Republic plant. First step in this

direction is the calling back of wing manufacture from Murray Corp. of America, Detroit.

Under AAF plans for V-E Day, aircraft cutbacks will come first in non-aircraft plants, such as Murray, Ford, Nash, Chrysler, etc., thus permitting these companies to move into reconversion to automobiles at a better pace. Second, curtailment will take place in plants owned by the government, but operated by non-aircraft contractors. The third phase will apply to subsidiary aircraft plants operating in government-owned facilities. Final retrenchment will be in the plants of parent aircraft companies.

While this is reported to be a general policy, there may be some deviation particularly when consideration is given to the size and efficiency of certain government-owned plants.

The WLB has approved renewal of the incentive bonus plan in force at Republic Aviation plants for some months, covering the three regular bonus periods following Sept. 1. Renewal carries on all features of the original plan based on a standard of 8900 hours per plane, with a ceiling of 40 per cent bonus as tops. When these three periods are completed, production of the above mentioned "N" model will be in full swing, and a new standard will be worked out, which will probably be variable in nature depending upon the amount of subcontracting in force.

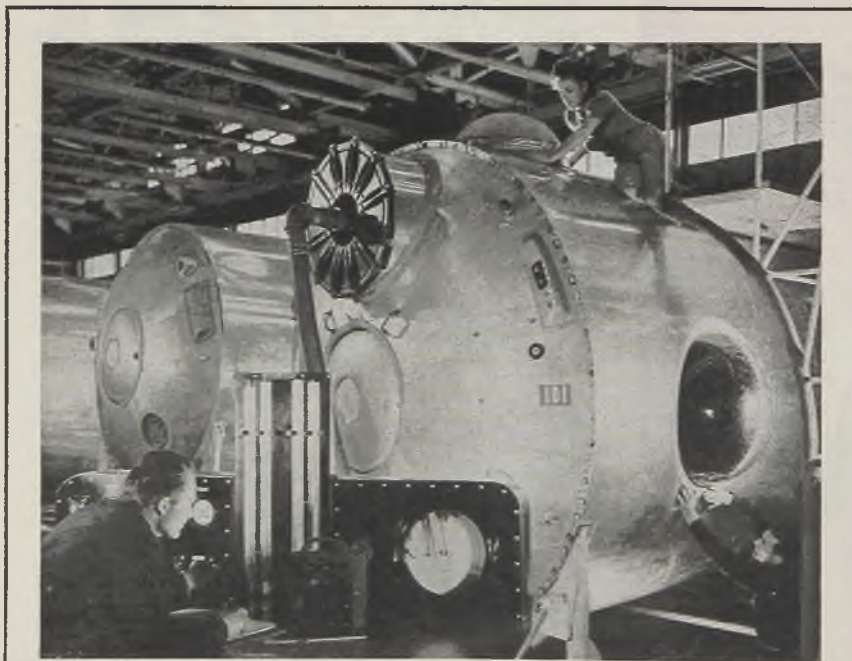
Incidentally, it is reported the I public working force "hit" the incentive bonus ceiling of 40 per cent for the last three periods—the tenth, eleventh and twelfth—the latter being from Aug. 5 to Sept. 1.

### Propose Change in Riveting On Pressurized Sections

Proposed change in riveting method on the pressurized fuselage sections of the Boeing B-29 Superfortress may result in the saving of 1581 feet of sealing tape now used in all joints, and a concurrent saving of over 11 pounds, the weight of this tape. Change is predicated on the success of a new type of rivet with a locking or sealing ring formed under the head in the upsetting of the rivet.


Idea was developed by Gerald Eckberg, co-ordinator of manufacturing at Boeing-Seattle, working in conjunction with C. P. Keeble, engineering process unit chief, and Lou Goldman, rivet supervisor. The new rivet has been dubbed informally the "KEG"—initials of the three engineers.

Customary method of sealing the cabin sections has been to use impregnated tape or brushing compounds. Surface must be cleaned before the sealant is applied, and after it is applied, rivet holes must be punched or reamed through the tape and the holes then cleaned up before riveting. It is a troublesome and messy job, and often results in gumming up tools in use.



**B-29 PRESSURE TEST:** Each of the three sections of the B-29 Superfortress which are under pressure is separately pressure tested. When the plane is completely assembled and ready to roll out the door, another test is given the three sections of a unit. Here the gunners' compartment is being subjected to a test. In the foreground an operator sits at the pressure testing instrument board, while two other employees search for leaks

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# Latin American Carriers Transport Heavy Volume of Wartime Traffic

*Numerous projects south of the border will be pushed ahead when steel rails, rolling stock and other materials become available. Twenty republics now have more than 90,000 miles of trackage. United States technicians assist in planning and constructing rail systems*

RAILROADS in the other Americas, as in the United States, are performing a double wartime duty. They are carrying the food and other essentials necessary to the economies of those countries and also are transporting a tremendous load of strategic materials destined for the United Nations' war factories.

Railroads in Mexico, Brazil, Ecuador, Chile, Peru and the other American republics are carrying copper, nitrates, bauxite, tin, lead, zinc, iron ores, mahogany and other war essentials in heavy volume, according to Robert J. de Camp, director of rail transportation, Office of Inter-American affairs.

Lack of maritime transportation facili-

ties first burdened the railroads of Latin America with traffic that normally would travel by sea. This was particularly the case in Brazil, Mexico, and Central America. Shortages of shipping and the submarine menace made it imperative to ship as large amounts of war materials by rail from Mexico to the United States as the railroads could carry. In Brazil much of the coastwise shipping was sunk in the early months that followed Pearl Harbor. Consequently the

Brazilian railroads, wherever possible had to take over the burden of trans-

Then shortages of gasoline, tires replacement parts—which cut down truck and automobile transportation—added to both the passenger and freight traffic load of the railroads in Latin America.

On top of this came the flood of materials arising out of the huge development and purchase programs launched to supply the ever-increasing need.

*Terrain imposes many difficulties in railway construction South America. Circle shows tunnel construction needed on the Sao Paulo railway in Brazil. Right below. Guayaquil Quito railway in Ecuador, showing the famous Devil's Elbow rising in the center of the picture*







*Shortage of fuel has caused Brazilian railroads to use wood for fuel. The country hopes to avoid this ineffective source of power by electrifying its roads*

the United Nations' war industries.

And finally the railroads in other American republics were called upon to transport materials and personnel in connection with the building, maintenance, and supply of large military, naval and air bases.

This flow of vital traffic over the 90,000-odd miles of track in the 20 countries was not without stress and strain. Shipping shortages plus shortages of manpower, locomotives, freight and passenger cars, and other railroad equipment and maintenance material, including rails, precluded expansion or strengthening of existing railroad facilities except in the most critical cases. This resulted in railroad traffic congestion in the other Americas perhaps more acute than that in the United States.

Certain roads, especially in Brazil and Argentina, had difficulty obtaining fuel and had to resort to wood, corn and other substitutes for coal and oil. Even such railroads as those in the State of Sao Paulo, Brazil, which customarily use 18,000 cubic meters of wood per day, had difficulty because supplies of wood near their rail lines had become depleted. In some instances, Brazilian

railroads were using as much as 40 per cent of their rolling stock in assembling and distributing wood fuel.

In general, there was little extension of railway mileage during 1943 in either Central or South America because steel for rails and bridges was difficult to obtain.

However, construction is being undertaken by the Mexican government on the Southeastern railway and on the Sonora-Lower California railway to link the two peninsulas of Yucatan and Lower California with the interior as the materials become available. On the Sonora-Lower California railway, construction is proceeding on the remaining 155-mile gap between Punta Penasco and Benjamin Hill, a new village being constructed as a terminus of the line where it connects with the Southern Pacific railroad. On the Southeastern railway, construction is proceeding on the remaining 217-mile gap between Tenosique and Minatitlan to complete the connection between the United Railways of Yucatan and the Tehuantepec line of the Mexican National Railways system.

A United States railway mission, including mechanical, maintenance and

traffic technicians was sent to Mexico to help that country strengthen its rail system.

Similar, though smaller, technical missions have been supplied by the Office of Inter-American Affairs at the request of Colombia, Bolivia and Ecuador to advise them in handling their transportation problems.

In Brazil, work progressed on the rehabilitation of the 348-mile railway operating from the Itabira iron mines through the mineral-rich Rio Doce valley to the port of Vitoria. About 100 miles of this railway have been relocated by United States and Brazilian engineers with the aid of part of a \$14,000,000 Export-Import Bank loan plus \$10,000,000 contributed by Brazil to date. These funds also were employed to erect modern facilities at the port of Vitoria to expedite iron-ore loading and dispatch of iron-ore freighters. Twelve locomotives and 250 ore cars from the United States were delivered to this railway in 1943. The Brazilian government has given the United States and British governments preferential rights for the purchase annually of 750,000 tons of iron ore each for three years. The Caue Peak mountain in this region is said to be the largest single hematite iron ore deposit in the world.

### Purchase Facilitated by Credits

Brazil's federal and state-owned Sorocabana railway is being equipped with 20 electric locomotives and switching equipment from the United States, whose purchase has been facilitated by credits from the Export-Import Bank. The electrification of this railway has been pushed despite wartime obstacles because of a fuel crisis this railway faces.

In 1940 the Sorocabana railway contracted with a United States-Brazilian group for electrification of 90 miles of its main double track line between Sao Paulo, largest manufacturing center of Brazil, and the city of Santo Antonio. The electrification project is expected to cost about \$10,000,000 and is the largest under way in the other Americas.

Other railroad electrification going on in Brazil is the extension of the double track electrified line on the Central Brazil railway from Nova Iguassu to Barra do Pirai and electrification of the single track line between Barra do Pirai and Saudade. These new electrified lines in the mountains will connect with the electrified line finished in 1940 between Dom Pedro II Station in Rio de Janeiro and Nova Iguassu.

Electrification of Brazil's railways has been promoted in recent years partly because of Brazil's deficiencies in coal and oil for railroad needs. In 1940 Brazil had 433 miles of electrified track, representing 2.5 per cent of her total railroad mileage.

Brazil's networks of railroads, spreading fanwise into the interior from the large ports along the coast, lack to a large extent connecting north-south links with each other. Hence, the submarine

warfare that crippled coastwise shipping in the months following Pearl Harbor had an especially serious effect on Brazil's economy.

The war crisis drove home the dramatic necessity of equipping Brazil with land communications between the extremes of her far-flung territory, which is larger in area than continental United States.

The Brazilian government is attempting to accelerate the rail and highway construction that had been initiated four years earlier to provide connections be-

## THE SOURCE

Robert J. de Camp, who supplied the information in the accompanying article, has had a varied experience in the building of railroads and other heavy construction work. For more than ten years, he traveled extensively in Latin America and in Europe managing financial transactions for many projects. He joined the War Production Board in December, 1941, and a year later was called to the Office of Inter-American Affairs as director of rail transportation. For the past two years he has had charge of all matters pertaining to rail transport south of the Rio Grande.

tween the southern and northeastern sections of the republic. About 5000 men have been working from both ends on a new 379-mile railroad line between Montes Claros, terminus of the "Central do Brasil" railway in the state of Minas Geraes, and Bom Jesus do Meiras, railroad of the "Leste Brasileiro" railway in the state of Bahia. This new line will complete rail connections between Bahia (Salvador), major seaport on the southern side of the "bulge", and Rio de Janeiro, some 800 air miles to the south. The construction of another new line is being undertaken between Palmeiras dos Indios and Collegio in the state of Alagoas, to close a gap in rail connections between Bahia (Salvador) and Recife and Natal. Completion of these two new lines will make possible all-rail transportation for some 2393 miles between Rio de Janeiro and Natal on the tip end of the "bulge".

The general strategy of communications in Brazil as in most of the other American republics has, in the past, been concerned with bringing raw materials or commodities from the interior to the coastal seaports for export to foreign markets, and bringing back manufactured products from seaports to the interior.

About two-thirds of the capitals of the countries of Central and South America are in the mountains of the interior, and only one-third on the coast. The tendency has been to build communications to these interior capitals from the coast, or, in some cases, to build short

lines from the coasts to some interior points of major production areas.

South of the United States there is only one true transcontinental latitudinal railway running from east to west. This railway is the one between Buenos Aires, Argentina, and the seaport of Valparaiso in Central Chile.

In Mexico there is rail connection between Vera Cruz, on the Gulf of Mexico, and Mexico City and from there to Manzanillo and to Mazatlan on the Pacific, but these lines are really lines between the coast and the capital rather than through lines and no trains or cars are usually run through from coast to coast, though they could be. There also is a railway from the oil port of Tampico, on the Gulf of Mexico, to the Central plateau, which, via Mexico City, affords communication to the Pacific. A 125-mile railroad crosses the Isthmus of Tehuantepec in southern Mexico, connecting the ports of Coatzacoalcos on the Atlantic and Salina Cruz on the Pacific, but this is a trans-isthmian rather than a transcontinental railroad.

There is a route across Guatemala from Puerto Barrios on the Caribbean over the central range of mountains to the ports of San Jose and Champerico on the Pacific, but this also is really communication between the coasts and the capital. There is likewise a line from Puerto Barrios via Zacapa to San Salvador and from there rail connection is available to the ports of Acajutla and La Union. Here again, these lines are connections from the ports to the capital rather than through lines.

In Costa Rica there is a rail line across the Republic from Port Limon via San Jose to Puntarenas on the Pacific, but this, like the railway in Guatemala, is a connection between the two ports and the capital—not a through line.

### Railway Owned by U. S.

The Isthmus of Panama, of course, has had a railway across it since 1855, but here again this railway, which has more commercial and strategic importance than other east and west routes, is a trans-isthmian rather than a transcontinental railway. This railway is 48 miles in length, 5-foot gage, and is owned and operated by the United States government.

There are no transcontinental lines in Colombia, Ecuador, or Peru, but a 2367-mile transcontinental rail line has been proposed that would run from Santos, Brazil, on the Atlantic Coast, to the port of Arica, Chile, on the Pacific Coast via Corumba, Brazil, and Santa Cruz, Cochabamba and La Paz, Bolivia.

Construction of this rail line, at present, is projected only as far as Santa Cruz in south-central Bolivia from Corumba on the Brazilian border. Corumba is 58 miles north of the present railroad at Porto Esperanca, which has rail connections with Rio de Janeiro, Sao Paulo and Santos. Brazil has agreed to construct the necessary link between

Porto Esperanca and Corumba, including a 6594-foot bridge to span the Paraguay river. Between Corumba and Santa Cruz, a distance of 455 miles, track has been laid 100 miles west of Corumba, according to the statement of the Bolivian-Brazilian commission supervising construction of the railroad. A section of almost equal length, extending the line to Robore, is scheduled to be completed in 1944, if rails can be obtained.

A railroad line will have to be constructed over the 225-mile gap between Santa Cruz and Mizque, present terminus of the rail line east of Cochabamba and Vila Vila, before all-rail travel will be possible between the coffee port of Santos on the Atlantic and Arica on the Pacific. Construction is now under way east of Mizque.

Brazil has agreed to provide funds for the construction of the railroad line between Corumba and Santa Cruz as a result of her acquisition of the Acre Territory from Bolivia by the Treaty of Petropolis in 1903. Brazil hopes to get oil from the territory traversed by the railway. In addition to the projected 1596-mile route from Santa Cruz to Santos, the Brazilian-Bolivian treaty signed on Feb. 25, 1938, also contemplated construction of a branch from the Corumba-Santa Cruz line to connect with Porto Grether on the Ichilo river, a tributary of the Amazon. This would link the Corumba-Santa Cruz railway with the famous Amazon "rubber railroad"—the 230-mile Madeira-Mamore railway—and provide an outlet for Bolivian oil and other production by way of the Madeira and Amazon rivers to the Amazon valley and Atlantic Ocean ports.

However, a second transcontinental railroad appears likely to begin operating in 1945 or 1946 between Antofagasta, Chile, and Salta and Buenos Aires, Argentina.

Engineers in charge of construction of the Chilean portion of the 563-mile Antofagasta-Salta railway have reported progress on both sides of the border. They expressed confidence that, if the Chilean division received the rails, the line would be completed early next year. On the Chilean side, the track has been laid to within 37 miles of the border and the roadbed to within 12 miles. The Chilean press reported a \$500,000 contract was approved in March, 1944, for construction of this last gap. On the Argentina side, the railway is open to traffic from Salta to Tolar Grande, a distance of 238 miles. Tolar Grande is only 116 miles from the Socompa pass on the frontier, and about one-half of the roadbed on this remaining 116-mile stretch has been completed.

Completion of this second Trans-Andean railroad in Chile will provide four all-rail routes between Chile and Buenos Aires. It is possible to travel from Arica, in northern Chile, via Viacha (La Paz), and Villazon, Bolivia, or from Antofagasta, Chile via Uyuni, Bolivia, to reach Buenos Aires, Argentina, on



*Brazil hopes to electrify more of her railroads, due to the shortage of coal. Above is a scene along the electrified section of the Paulista railroad near Sao Paulo*

the Atlantic coast. These two latter rail routes, however, are too circuitous to be called transcontinental railways.

There are several international railroad lines in the other Americas running north and south, but here again, nothing comparable to the longitudinal railroad systems of the United States, Canada or Europe exists in the other Americas.

#### Outlook Is Clouded

The outlook for railroad development in the other Americas is clouded by problems, such as mountainous terrain, arroyos and jungles that are all too real, and by air and motor transport potentialities whose competitive effects on railroads cannot be fully determined until after the war ends.

Beginning with the first steam railroads built in Cuba in 1837, railroad developments were being generally pushed in the other Americas up to about 1920. Some construction continued during period 1920-25, and a little even up to 1930. By 1920, however, the automobile and the highway had caught the public's imagination and during the late 20s highway construction was favored. Railway construction almost ceased by 1930. The depression and its attendant economic difficulties stopped rail construction almost entirely until the end of the decade when better economic conditions and growing industrialization and economic development resulted in a revival of railroad construction.

In the last few years there have been extensive developments in air services and in highway construction in Latin America. These rival transportation systems will have some effect on

future railroad developments in Latin America. By the end of 1944 there will be more than 2100 airports in the other Americas, of which between 300 and 400 are capable of handling the twin-engine 21-passenger plane which is in general use on the Latin American main air routes. As for highway construction, equally important progress has been made, particularly in closing gaps in the Inter-American highway between the United States and the Canal Zone and in the Pan American highway between the Atlantic port of Turbo in north-eastern Colombia, and Buenos Aires, via La Paz, Bolivia, or Santiago, Chile.

"A phase of the railroad situation that merits study is the co-ordination between highway, air, water and rail transport in the other Americas so that transportation services will be integrated with each other," says Mr. De Camp. "Trucks and buses came to the other Americas long before railroads had developed to any great extent, which is very different from what happened in the United States. And now, similarly, air has caught up in the republics to the south at a time when neither highways nor railroads have fully developed. Thus, in the future economic expansion that is going to take place in these republics, all forms of transportation will be available, and without any one form having a monopoly period of expansion. There will be no need for unwise expansion of railroad development as occurred in the United States at a time when there was no competition from other forms of transportation. On the contrary, the other Americas will have an ideal opportunity to co-ordinate air, water and land transportation."

# THE BUSINESS TREND

## Must Step-up Output To Meet 1944 Goals

DESPITE progressive lowering of production sights for 1944 from \$72 to \$67.3 billion, pressure for delivery of the great majority of war goods items continues unabated and output in a number of key programs must be materially stepped-up if current overall schedules for this year are to be met. The lagging war items are those that were suddenly increased long after 1944 production schedules were drafted.

Little fluctuation in industrial indicators has been recorded in recent weeks, although a slight downward tendency is in evidence. The national steel rate, loans and investments, and truck assemblies are somewhat below levels of the like period a month ago. Other business barometers are generally unchanged from the levels recorded during the first half of September, except for a slight seasonal rise registered in electric power consumption, revenue freight carloadings and the production of bituminous coal.

Headway is being made against order backlogs in an increasing number of industrial lines, reflecting cutbacks in some war programs and concerted efforts of manufacturers to reduce inventories to a workable minimum as a hedge against possible early termination of the European war.

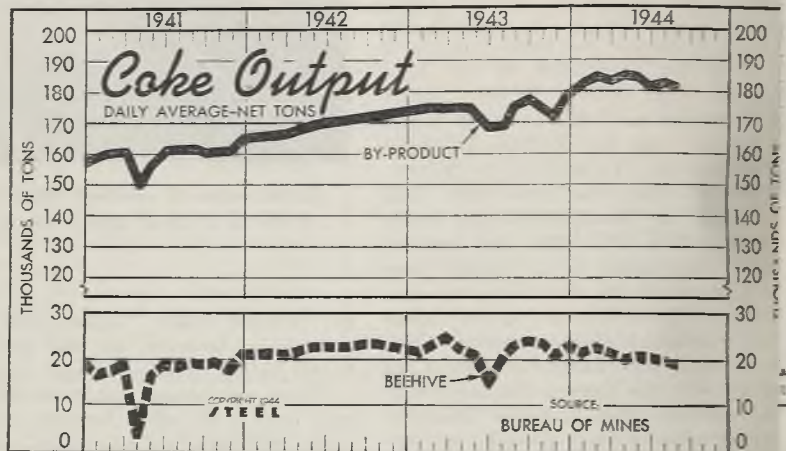
**COMMODITY PRICES**—The second consecutive decline occurred during August in the United States Bureau of Labor's wholesale commodity price index. Preliminary index figures for July and August stood at 104.1 and 103.9 respectively, compared with 104.3 recorded during June. However, the index remains slightly above that registered in the comparable month last year. The bureau's cost of living index advanced for the fifth consecutive month during August to 126.3. This compares with 123.4 and 117.5 in the like months of 1943 and 1942.

**RAIL TRAFFIC**—No overall decline in freight traffic is expected to follow the

defeat of Germany. There may be some drop in total tonnage moved, but this will be offset by the greater distances over which the bulk of war freight will have to move to the Pacific coast. Switching the major traffic load from the east to the west coast will be one of the "greatest tasks of the war" for the railroads, Defense Transportation Director Johnson states. Freight carloadings in the fourth quarter are expected to register a 0.5 per cent increase over loadings for same 1943 period.

**COKE OUTPUT**—By-product and beehive coke production during August totaled 6,209,012 net tons, to exceed the July output total by 6573 tons and August, 1943 production by 159,665 tons. August coke output was augmented by the addition of 75 new Wilputte ovens, having a daily coke producing capacity of 1100 tons.

Stocks of coking coal at by-product plants Sept. 1 totaled 5,927,586 tons.



Coke Output  
Bureau of Mines  
(Daily Average—Net Tons)

	By-Product		Beehive	
	1944	1943	1944	1943
January	182,226	174,044	21,933	21,444
February	184,384	175,099	22,248	23,987
March	183,123	175,051	21,529	24,366
April	185,259	175,857	20,457	22,947
May	184,071	174,400	20,783	21,200
June	181,891	168,900	20,472	14,000
July	181,506	170,100	19,531	20,400
August	181,718	176,600	18,572	23,110
September		178,090		23,630
October		175,492		23,490
November		171,594		20,450
December		179,042		22,940
Average		174,465		21,790

## FIGURES THIS WEEK

### INDUSTRY

	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	95.5	95.3	96	99.5
Electric Power Distributed (million kilowatt hours)	4,375	4,366	4,228	4,342
Bituminous Coal Production (daily av.—1000 tons)	2,010	1,975	1,929	2,030
Petroleum Production (daily av.—1000 bbls.)	4,775†	4,762	4,689	4,390
Construction Volume (ENR—unit \$1,000,000)	\$26.5	\$30.8	\$25.4	\$37.8
Automobile and Truck Output (Ward's—number units)	16,865	20,935	17,285	20,635

\*Dates on request. †Preliminary.

### TRADE

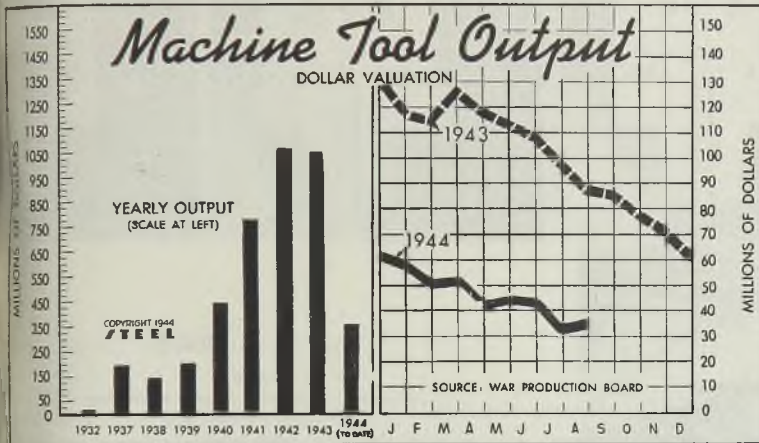
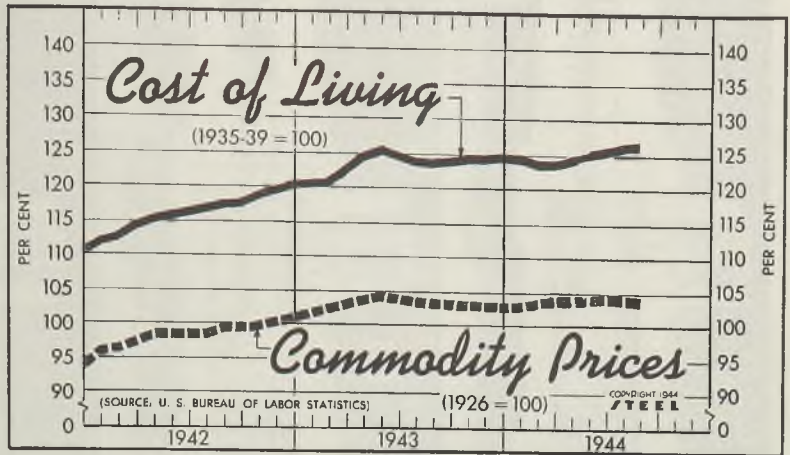
	Latest Period*	Prior Week	Month Ago	Year Ago
Freight Carloadings (unit—1000 cars)	910†	913	826	906
Business Failures (Dun & Bradstreet, number)	27	15	9	42
Money in Circulation (in millions of dollars)†	\$23,881	\$23,678	\$23,432	\$18,883
Department Store Sales (change from like week a year ago)†	+9%	+9%	+18%	+2%

†Preliminary. †Federal Reserve Board.

**Wholesale Commodity Price—  
Cost of Living Indexes**

	—Commodities— (1926 = 100)			—Living Costs— (1935-39 = 100)		
1944	1943	1942	1944	1943	1942	
Jan.	103.3	101.9	96.0	124.2	120.6	
Feb.	103.6	102.5	96.7	123.8	120.9	
Mar.	103.8	103.4	97.6	123.8	122.8	
Apr.	103.9	103.7	98.7	124.6	124.1	
May	104.0	104.1	98.8	125.1	125.1	
June	104.3	103.8	98.6	125.4	124.8	
July	*104.1	103.2	98.7	126.1	123.9	
Aug.	*103.9	103.1	99.2	126.3	123.4	
Sept.	103.1	99.6	100.0	123.9	117.8	
Oct.	103.0	100.0	100.3	124.4	119.0	
Nov.	102.9	100.3	100.3	124.1	119.8	
Dec.	103.2	101.0	100.3	124.4	120.4	
Ave.	103.2	98.8	100.0	123.5	118.5	

\*Preliminary.

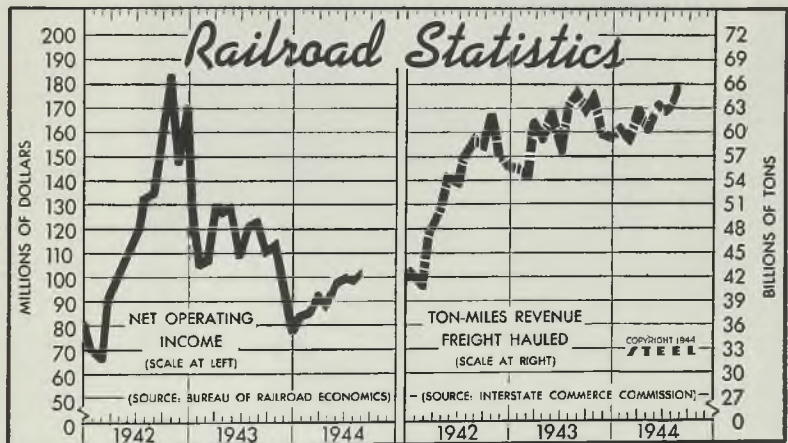


**Machine Tool Output  
(000 omitted)**

	1944	1943	1942
Jan.	\$56,363	\$117,384	\$ 83,547
Feb.	50,127	114,594	84,432
Mar.	51,907	125,445	98,838
Apr.	41,870	118,024	103,864
May	41,819	113,859	107,297
June	41,471	108,736	111,000
July	32,753	97,428	113,596
Aug.	35,041	87,405	117,342
Sept.	85,842	85,842	119,883
Oct.	78,300	78,300	130,008
Nov.	71,811	71,811	120,871
Dec.	60,861	60,861	131,980
Year			
1942			1,321,862
1941			812,462
1940			450,000
1939			210,000

**Statistics of Class I Railroads**

	Net Operating Income			Ton-Miles Revenue Freight		
	1944	1943	1942	1944	1943	1942
	(millions)			(billions)		
Jan.	\$82.8	\$105.3	\$66.8	60.5	55.1	43.0
Feb.	84.5	105.8	64.4	59.3	54.4	40.8
Mar.	92.5	129.7	90.6	63.0	61.2	48.3
Apr.	87.7	128.7	101.6	60.4	59.1	50.0
May	98.5	129.5	109.7	64.0	62.1	54.2
June	99.8	109.0	118.7	62.0	58.0	53.9
July	98.6	127.8	133.6	62.8	63.7	57.0
Aug.	101.4	132.3	135.9	65.9	65.1	58.6
Sept.	110.2	155.1	155.1	62.5	58.2	58.2
Oct.	113.1	184.8	184.8	65.0	62.2	62.2
Nov.	96.4	149.0	149.0	59.6	57.0	57.0
Dec.	76.9	174.4	174.4	59.4	55.0	55.0
Ave.	\$113.5	\$122.9	\$122.9	60.5	53.2	53.2



**FINANCE**

	Latest Period*	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	\$10,542	\$10,040	\$8,034	\$9,230
Federal Gross Debt (billions)	\$210.8	\$210.8	\$211.2	\$164.4
Bond Volume, NYSE (millions)	\$43.2	\$33.5	\$34.2	\$40.7
Stocks Sales, NYSE (thousands)	4,634	3,764	4,725	3,342
Loans and Investments (millions)†	\$54,673	\$54,766	\$55,700	\$50,998
United States Government Obligations Held (millions)†	\$40,731	\$40,860	\$41,675	\$36,210

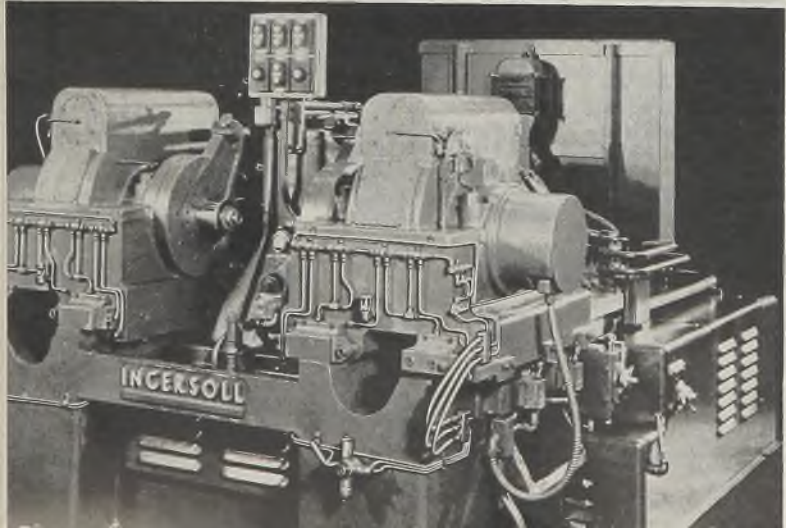
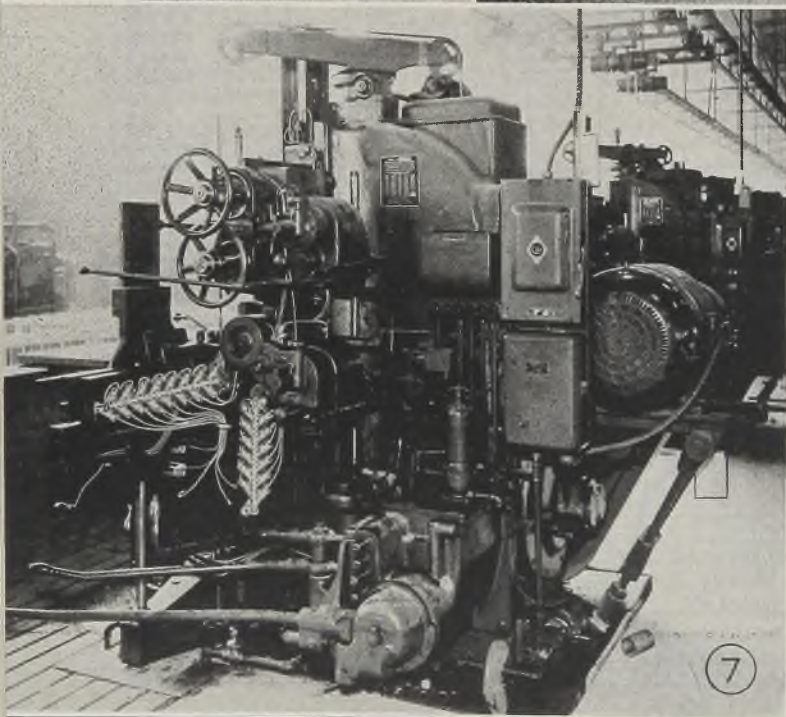
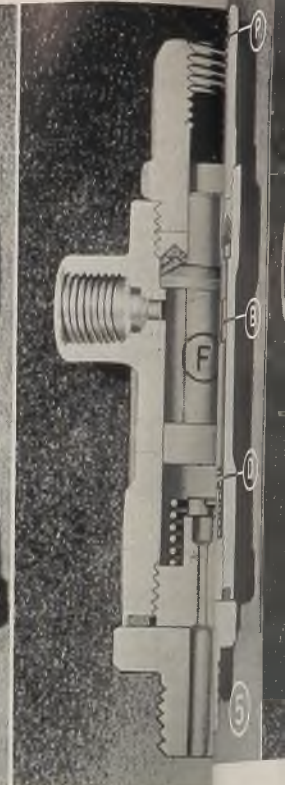
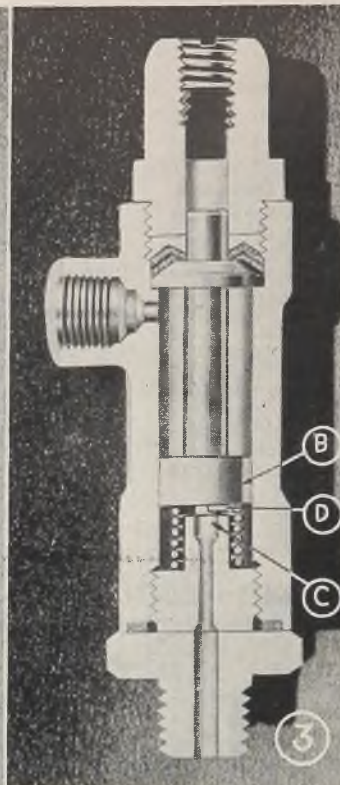
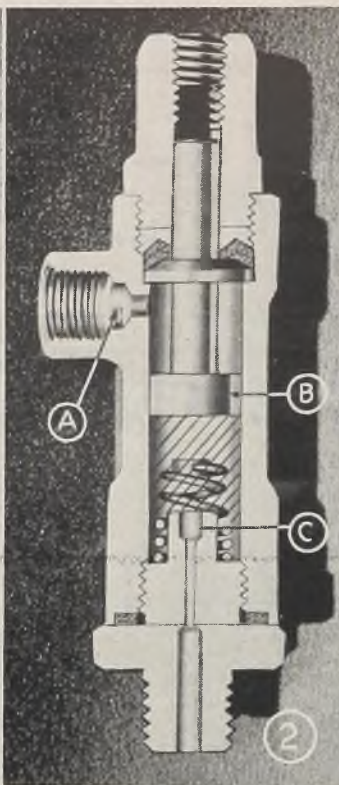
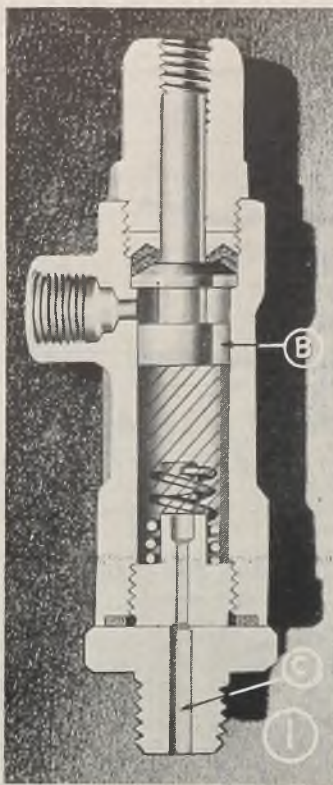
\*Member banks, Federal Reserve System.

**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)†	253.3	253.2	249.6	247.8
Industrial Raw Materials (Bureau of Labor Index)†	113.2	113.3	112.7	112.5
Manufactured Products (Bureau of Labor Index)†	101.1	101.1	101.1	100.3

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





By C. I. KRAUS

Manager  
Alemite Industrial Lubrication Division  
Stewart-Warner Corp.  
Chicago

Fig. 1—Series showing operation of LubroMeter feed valve. Here valve is in normal loaded position preparatory to delivery of measured charge of lubricant

Fig. 2—Lubricant, under pressure, is introduced through single feed line at port "A" to drive piston "B" down, forcing out measured charge of lubricant

Fig. 3—Piston "B" has been driven to complete stop. Valve "D" has closed port "C" sealing outlet

Fig. 4—Increased pressure in feed line forces lubricant past piston "B" through small channel, driving piston up because of greater effective force acting on bottom of piston

Fig. 5—Piston "B" continues to move upward until indicator stem reaches adjustment screw "P"

Fig. 6—Releasing pressure in feed line at the pump allows spring "E" to lift valve "D" off outlet port "C". Unit is now ready for next lubricating cycle

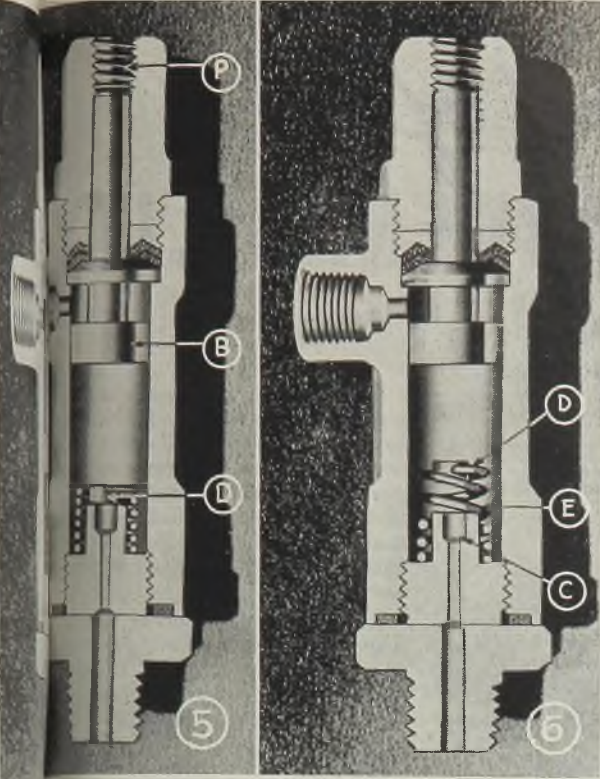
Fig. 7—One of battery of Bullard 36-inch vertical turret lathes equipped with Alemite Progressive system of centralized lubrication

Fig. 8—Ingersoll milling machine with Alemite Dual Progressive system employs "inlet block" at lower right for connection to pressure gun

Fig. 9—Schematic diagram of complete centralized lubrication system showing various accessories

# Centralized Lubrication

... offers important economies by reducing manhours required to service machines, by cutting "down" time of machines, by affording better protection of enormous investments in plant equipment, by increasing production through fewer breakdowns. Power consumption also can be reduced, bearing life increased. Savings in lubricant and manpower pay for one installation every 93 days



**THE IMMEDIATE** postwar period promises to be the most competitive the world has ever known. There will be a tremendous race to fill the pent-up demand for items not available during the war. And in the metalworking industries this is perhaps more true than in others. Every possible device will need to be utilized to cut manufacturing costs as producers jockey for favorable price positions.

Likewise, machinery manufacturers will need to build into their machines greater assurance of uninterrupted operation and minimum field servicing in order to provide the user with increased output per man-hour.

In the 12 years from 1929 to 1941, the nation's industrial output per man-hour increased 34 per cent. Any manufacturer who wishes to keep step with the parade, or who wishes to forge to the front, must produce more goods for more people at a lower cost, must strive to increase his output per man-hour by at least this figure every 10 years.

Many manufacturers are finding that one excellent method of increasing their production efficiency is to follow through every cost-saving possibility. At one time, if an improvement paid out in 5 years, it was considered worthwhile; if it paid out in 1 year, it was almost a sure-fire sales proposition. Yet today, there are various improvements that pay out in a few months.

New systems now put high pressure centralized lubrication in this last class.

Before describing an installation that pays out every 93 days, let's see what is meant by the term, centralized lubrication. Briefly, it is any system which permits lubrication of two or more points

from a common central station, using hydraulic pressure to conduct the lubricant through piping to the point of application. Most systems include means which afford positive indication that each lubrication point is serviced as well as metering valves which automatically discharge only an exact predetermined amount of lubricant into the bearing. Systems are available for handling all points on a machine or for lubricating an entire bank of machines simultaneously.

**Reduce Human Element:** One of the principal advantages of centralized lubrication systems is that they largely eliminate the human element, for the design of the system assures that not only will every bearing be serviced but that it also will receive exactly the right amount of lubricant.

Significance of this positive lubrication is reflected in reduced number of breakdowns from bearings that formerly were overlooked, increased production that results, longer bearing life, and lower power consumption because of less frictional drag.

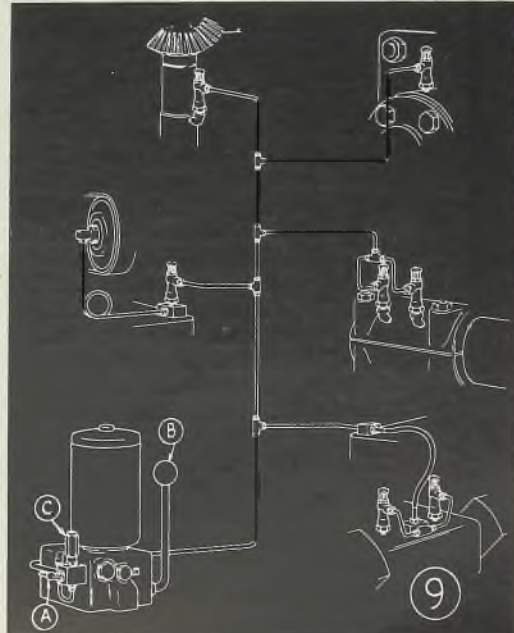
**Added Safety:** No longer is it necessary to shut down moving machinery when applying lubricant in order to avoid hazards to workmen from the moving parts. A centralized lubrication system permits all points to be serviced while the machine is operating, and with perfect safety to the operator who need not approach any of the moving parts.

**More Efficient Use of Manpower:** Centralized lubrication systems permit 100 bearings to be lubricated in the same time formerly required to fill a

single grease cup. Obviously, this brings about important economies in use of manpower available. At the same time it effectively cuts maintenance costs.

Just how significant these savings in manpower can be is well illustrated by the case of a plant which had an installation of 153 vertical lathes. The old method of lubrication involved application of oil once each shift, three times daily. This work required 16 minutes on each shift for each machine, or 48 minutes per machine per day.

For the total of 153 machines, this amounted to 7344 minutes, or 122½ (Please turn to Page 119)



# The Development of CONTROLLED HARDENABILITY

Practicability of using hardenability bands already demonstrated in case of NE-8600 and 8700 steels, SAE-4130 to 4150 inclusive, 4340 and 4620 but the problem of incorporating these bands intelligently into specifications for various applications now is presented. Purchase of steels to hardenability requirements for many uses not contemplated

FOR SOME time many alloy specifications have covered mechanical properties as well as chemical composition, but not until recently was thought given to the direct measure of the potential hardening capacity of steel upon which the response to treatment and the mechanical properties both depend.

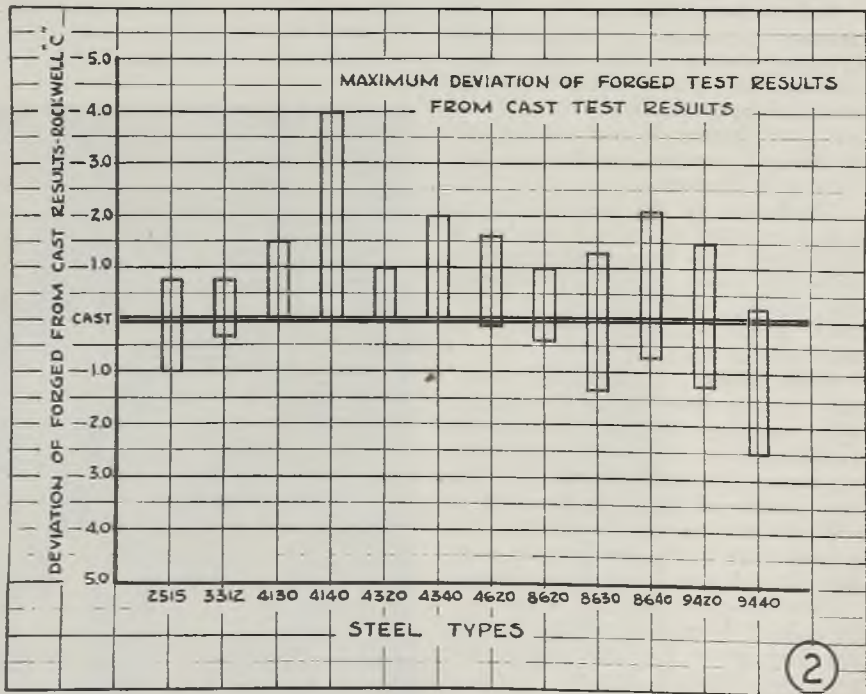
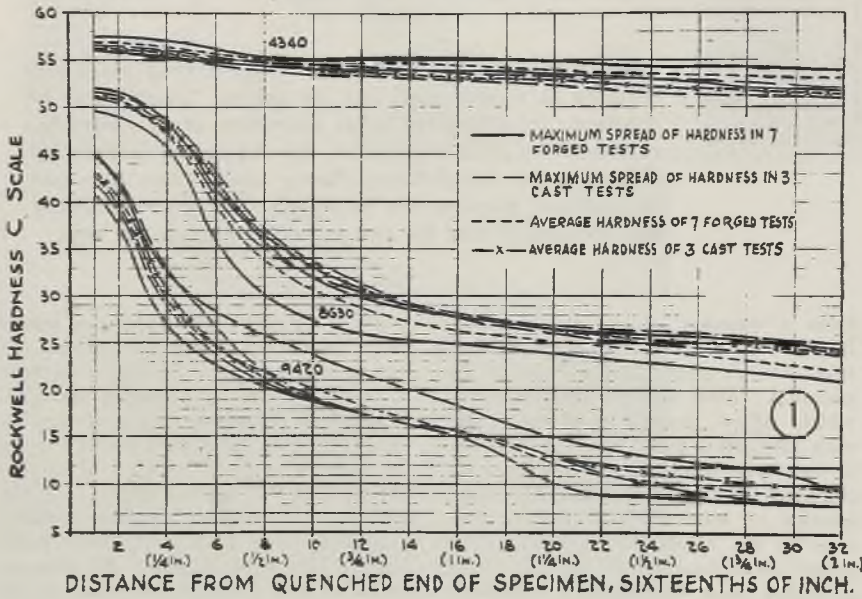
The simple expedient of varying chemical analysis to meet required mechanical properties of steel after treatment has long been practiced in industry. Although the relative hardening effects of the common alloying elements in steel were until recently known only in a general way, the composition of any steel could be modified with respect to the principal hardening elements to improve the material for particular use.

Virtually all the standard steels have been subjected to modifications of kind with the result that a very large number of new compositions have evolved over the years. However, in spite of this apparent flexibility in the development of the analysis of the steel for a given purpose, experience has shown that a certain response to hardening cannot always be assured on the basis of the chemical composition alone.

The occasional heat of steel which developed hardening characteristics inconsistent with its analysis led to the adoption of a wide variety of hardening tests on the part of steel consumer. In attempting such tests the attempt was always made to duplicate production conditions in the laboratory, both as to size of specimen and heat treating conditions. All such hardening tests were open to several important objections. They failed to differentiate between external heat treating conditions and inherent hardening power or hardenability of the steel; laboratory conditions were rarely a reasonable facsimile of production operations; and they placed a serious burden on the producer forcing him to perform a variety of related tests in his laboratory.

This confused situation began to be resolved when means were established for measuring the hardenability of steel as an inherent property independent of the quenching conditions. Two different methods were devised independently and almost concurrently. Grossman

CAST VS. FORGED TESTS



Illustrations courtesy American Iron and Steel Institute



By **W. G. BISCHOFF**  
 Metallurgical Engineer  
 Steel and Tube Division  
 Timken Roller Bearing Co.  
 Canton, O.

value of "ideal critical diameter" measured the hardenability of the steel in terms of the diameter of specimen which would just half harden at the center in a theoretical quench of infinite cooling speed. The other approach, developed by Jominy,<sup>2</sup> provided for the quenching of a single specimen with a continuous variation in cooling rate, the available range being considerably greater than those ordinarily experienced in production quenching. The latter method, now familiarly known as the end-quench test, has become established as the accepted method of hardenability determination. It has been refined and developed to the point where tentative standard procedures have been published by both the Society of Automotive Engineers and the American Society for Testing Materials.

#### Platform Cast Tests

The next important forward step from the standpoint of the steel producer was the discovery that, by proper manipulation, end-quench test specimens could be cast on the melt shop pouring platform during the teeming of a heat which would yield hardenability results in good agreement with those obtained from rolled or forged bars. This procedure has the advantages of obtaining adequate data at a very early stage in the processing of the heat as well as by its very nature providing an average hardenability value of the heat which encompasses the variations due to incidental segregation. The extent of the agreement between cast and rolled specimens is illustrated in Figs. 1, 2, and 3, while additional data have been published elsewhere.<sup>3</sup>

The most recent advance in this field has been the development of quantitative information on the effects of the various alloying elements on hardenability. Such data, originally published by Grossmann<sup>4</sup> and augmented by others<sup>5</sup>, permit the calculation of hardenability from a knowledge only of the chemical analysis and grain size. Such calculations yield estimates of hardenability which are in reasonably good agreement with the results of actual hardenability tests.

After it had been established that the hardenability of a heat of steel could be determined on a cast Jominy specimen, and could also be estimated from the chemical analysis, the consumers began to be interested in the variation of hardenability from heat to heat to be expected in commercial deliveries of steel supplied to the regular composition ranges in the standard types. This led to efforts on the part of the steelmakers and steel users to place reasonable upper and lower limits on the hardenability of the standard steels as expressed by the Jom-

iny curves. The result was the so-called "hardenability bands" that are characteristic of the different types of steel.

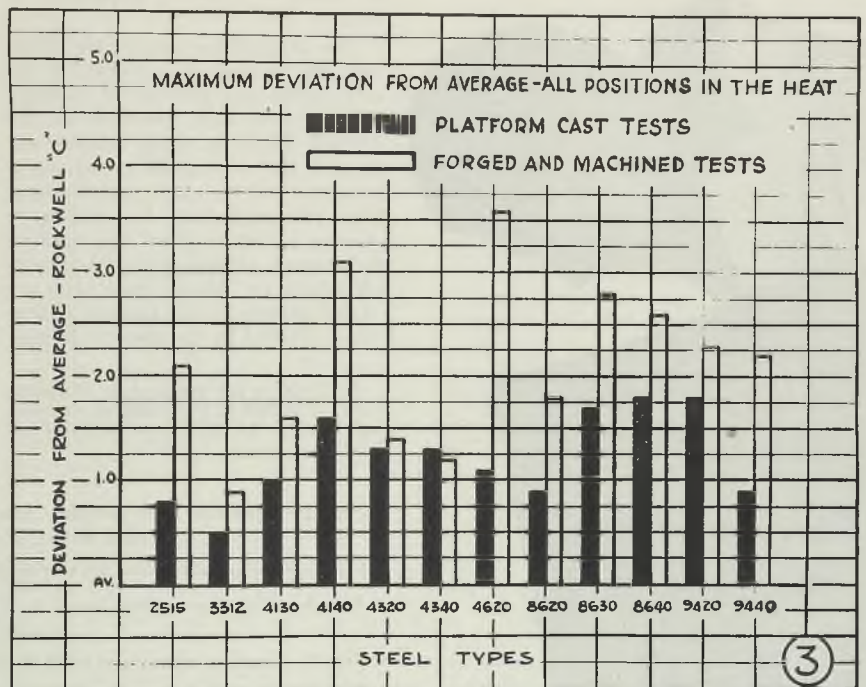
Standardization of hardenability bands for a few alloy steels was initiated by the American Iron and Steel Institute through the Technical Committee on Alloy Steel. The work was undertaken co-operatively by the Iron and Steel Committee of the War Engineering Board, the Society of Automotive Engineers, and the American Iron and Steel Institute. The satisfactory agreement between the calculated hardenability and the Jominy end-quench test was capitalized in devising the hardenability bands. Ladle analyses of heats taken from the melting records in the steel industry were avail-

able to construct hardenability curves for a selected group of popular alloy steels.

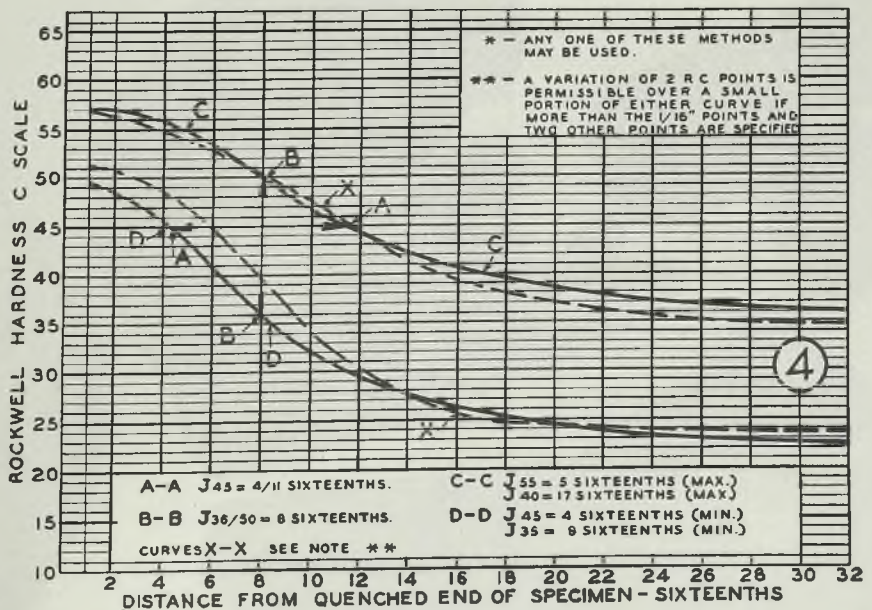
From the beginning of this project it was evident that the users of steel would not be greatly interested in hardenability bands based on curves calculated for the composition of a steel when all the hardening elements were taken first on the high side and then on the low side of the range. Even though such extreme combinations of the hardening elements are improbable, necessity of having somewhat narrower bands was recognized.

In the scheme finally adopted, the width of the hardenability band for a particular steel was narrowed until the proportion of heats melted in regular

(Please turn to Page 139)



#### ILLUSTRATION OF METHODS\* OF SPECIFYING REQUIREMENTS



# Fluorescent Penetrant

Methods for nonmagnetic and nondestructive testing to determine minute surface faults have been greatly improved by recent developments, some of which are outlined here with details showing typical applications

By GREER ELLIS  
Magnaflux Corp.  
Chicago

FLUORESCENT penetrant inspection (frequently referred to as Zyglo<sup>®</sup> inspection) was first developed by the Switzer Brothers in Cleveland prior to filling their patent application in August, 1938.

The original purpose of the Switzers was to develop a method to locate cracks and porosity in castings. One of their first variations of the method which is rather unique was to soak the casting in a fluorescent penetrant and then after removal from the bath, sand blast the casting to remove penetrant from the surface. Subsequent examination under near-ultraviolet or "black" light then revealed defects by the brilliant indications afforded by the penetrant fluor-

escing under the near-ultraviolet light. Another successful variation of method was described in STEEL, J. 12, 1944, 94.

For a long time there has been need for a nondestructive method of testing surface faults in highly stressed parts. Magnetic methods are, of course, excellent for steel and other magnetic materials but are not applicable to nonmagnetic materials such as aluminum, brass and magnesium, plastics, ceramics and the like.

For this reason, the fluorescent penetrant method is becoming increasingly important, for it affords means of detecting the most minute surface faults either in the form of pores or cracks. In effect, it magnifies the size of the fault by the indication afforded.

**How It Works:** First the part coated with a fluid which has the properties of penetration and fluorescence un-

<sup>®</sup>ZYGLO—is the trademark of Magnaflux Corp. as applied to its equipment, materials and methods for fluorescent penetrant inspection.



Fig. 1—Operator uses portable black light unit to check for leaks through welded seams in thin sheet metal tanks

Fig. 2—Zyglo indications of shrinkage crack in cast aluminum aircraft bracket

Fig. 3—This is a cooling crack in a molded plastic part as revealed by Zyglo under black light

Fig. 4—Crack in aluminum weld is indicated here, same method of examination

Fig. 5—Black light and Zyglo show service fatigue cracks inside cast aluminum aircraft engine piston



# Inspection

near-ultraviolet rays. For easy removal a water washable material is often used. It is applied to the work by spraying, dipping or brushing.

After application, the parts are set aside for a period of time which may vary from a few minutes to several hours depending upon the nature of the defect to be detected. The smaller the cracks, the longer the time required for penetration. Also there are other factors such as the presence of foreign matter within the cracks which affect the time required. Excess penetrant drains off during this period and is recovered.

Rinsing off the surface film of penetrant and subsequent drying follow. The standard Zyglo penetrant requires only a water spray rinse under normal line pressure.

At this point an important recent development is often used. An absorbent developing powder is applied to the surface and the excess shaken off. This developing powder soaks up the penetrant like a blotter, drawing the penetrant out of the flaws to the surface. At the same time, the powder reduces the fluorescence of any surface background, increasing the contrast between the de-

fect and the material surrounding it.

Another developing medium which is gaining in popularity is a water bath colloidal suspension of powdery materials. Parts are dipped into this wet developer immediately after rinsing and then are placed right into the recirculating hot air dryer. A uniformly deposited developing film is formed on the parts. Inspection is made under near-ultraviolet light as soon as convenient after removal from the dryer.

Inspection in a darkroom under illumination from a "black" light which provides radiation in the near ultraviolet band around 3600 angstroms causes any flaws to glow brightly, affording positive identification of the defect as well as its size and character.

**Detecting Leaks:** Another very useful variation of the process is the detection of through leaks in welded joints and porous sections of tanks and equipment without the use of pressure. In this method, the penetrant is applied on the opposite side of the surface to be examined. Any leaks are indicated by the penetrant after it travels through the joint and appears on the opposite face. Extremely rapid results are obtained on

section thicknesses up to  $\frac{1}{8}$ -inch. Good results after longer penetration times have been obtained on sections up to  $\frac{3}{4}$ -inch.

Heretofore, detection of leaks in vessels has included testing by air pressure, water pressure and use of liquids of low viscosity and surface tension such as kerosene, either with or without internal pressure. These methods require the penetration through the leaks of a considerable amount of test material in order to assure visibility. With the fluorescent penetrant method, only an extremely small amount needs to travel through the leaks to assure positive indication.

When a leak is detected, the excess penetrant is wiped off and the spot re-welded and retested.

Various penetrants are available to produce different color indications under "black" light. The standard penetrant gives a yellowish-green indication while a red type is available for special applications, particularly for leak indication in vacuum tubes made of green fluorescing glass. Another use for red penetrant is on welds where welding flux and foreign oil on the surface may be confused with the yellow-green color of the standard penetrant.

For example: Use of kerosene for testing leaks requires extremely long seepage time if small leaks are to be detected. A manufacturer of open tanks for holding a thin oil formerly employed kerosene and often had the experience of finding leaks in final inspection after a tank had been painted and built into an assembly where it was surrounded by electrical equipment. Fluorescent penetrant testing of these tanks completely eliminates any need for further repairs after final assembly. It also greatly decreases the necessary testing time.

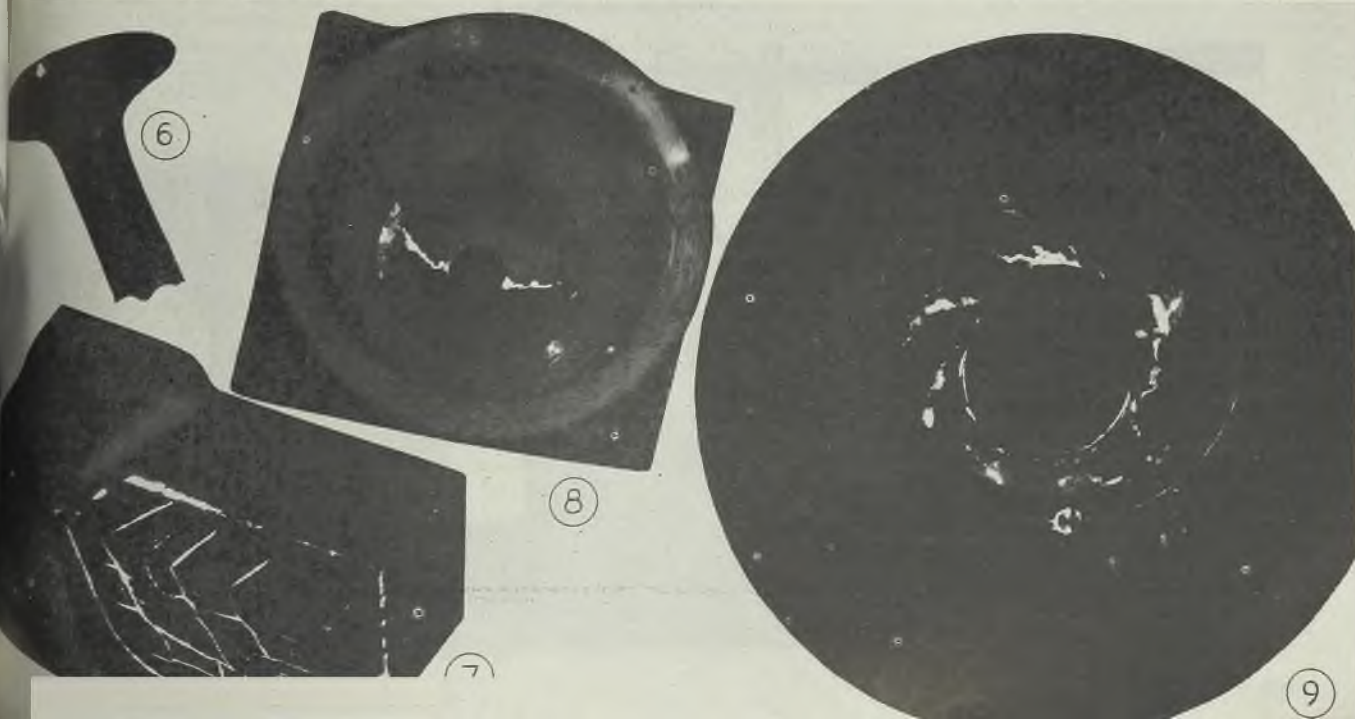
Gasoline tanks formerly tested by air pressure while submerged in water were

Fig. 6—Bright light spot on valve head indicates porosity at junction of welded Stellite hard surfacing metal and base metal of this aircraft engine exhaust valve

Fig. 7—Zyglo indications showing cracks on tungsten carbide tool bit as seen under black light

Fig. 8—Here a seam (end view) is revealed in a part machined from aluminum bar stock

Fig. 9—Shrinkage in cast bronze pump impeller is indicated here



frequently passed only to be found defective later on in service. The new testing method avoids this difficulty.

Vacuum tube manufacturers also use fluorescent penetrant testing for slow leaks which would allow the vacuum to decrease. Minute longitudinal cracks in the tungsten wire leads passing through the glass seal of the tube are a major cause of "gassy" electronic tubes. By testing the leads with fluorescent penetrant prior to incorporating them into the tube, a large percentage of "leaks" can be caught before they leak.

Microscopic inspection here does not allow differentiation between cracks and harmless surface scratches, while fluorescent penetrant inspection does. The method is so sensitive that the number of defective tubes has been cut greatly.

### Process Has Many Possibilities

Possibilities of the process are best illustrated by actual examples shown in the accompanying illustrations.

Fig. 7 shows cracks detected in a tungsten carbide tool bit. Checking tungsten carbide tool bits is important because of the large number of tools which become cracked during mounting and grinding, particularly during grinding. The cracks resulting are so fine that most of them cannot be detected by a magnifying glass. Often fluorescent penetrant inspection will find that fully 50 per cent of a given lot of tools are badly cracked. If these tools had been used on a job, their subsequent breakage could easily have caused serious trouble.

Fig. 2 reveals a shrinkage crack in a cast aluminum aircraft bracket, as seen under black light. Shrinkage cracks are quite common. Although difficult to see with the naked eye, they are readily visible under fluorescent penetrant inspection.

As an indication of the significance here, one propeller manufacturer put \$22 worth of machining on each aluminum casting before it was possible to inspect

for defective material. Now it is possible to inspect the raw casting as it is received from the foundry. Fluorescent penetrant inspection thus not only saves machining costs but the foundry gives credit for returned unmachined castings whereas they would not after castings had been machined. Of course, the result is that now the foundry has fluorescent penetrant inspection.

The small dots seen across the ends of the castings are shrinkage porosity which has not localized itself in a definite area.

Fig. 5, shows service fatigue cracks inside a cast aluminum aircraft engine piston as seen under black light. Aircraft overhaul stations are beginning to use the new inspection method, for results are better than at first was expected. It was anticipated that the oil, dirt and varnish films would plug fatigue cracks so penetrant would not indicate.

### Finds Hair-Line Cracks in Welds

However, this apprehension proved groundless because consistent results are being obtained on all types of aircraft engine parts cleaned in the regular manner at various overhaul stations.

Fig. 4 shows how a crack in aluminum weld appears under black light. This indicates the possibility of determining extremely fine hair-line cracks in and around welds.

Fig. 8 is a part machined from aluminum bar stock with a seam showing up under black light. Since this is an end view, the defect is a seam and not a crack. This has not been a common defect, at least as far as has been recorded to date. However, it is an interesting example of what can be done with fluorescent penetrant inspection on this type of problem.

Fig. 9 shows shrinkage in a cast bronze

Fig. 10—Typical arrangement of Zyglo equipment for inspection of small heavy parts

pump impeller as seen under black light. This is a striking example of the excellent indications afforded by the fluorescing material.

Fig. 3 indicates the important possibilities in examining plastics, for this illustration shows a cooling crack in molded plastic part as seen under black light. Even the most minute cracks on interior and irregular surfaces show up strongly.

Fig. 1 illustrates application of the method to examining welded seams in sheet-metal tanks for leaks. This method is so sensitive that it will actually show up smaller leaks than can be found by immersing the tank and using pressures of 5 to 10 pounds per square inch. No preparation of the surface is needed before applying the test and cleaning is necessary after the test before rewelding. Perfect repair weld result when the molten metal is started 1/2-inch or so to one side of the leak and carried the same distance beyond.

### Inspect Valves in Rough-Machined State

Fig. 6 shows porosity at junction welded stellite and base metal of an aircraft engine exhaust valve as seen under black light. It is quite common to have face the rim of exhaust valves of aircraft engines by gas welding a bead around the rim. At the junction of the full circle of the bead, there is likely to be a "burned" spot causing fine porosity which is very difficult to see but which can lead to a burned out valve service.

A leading valve manufacturer previously inspected by first machining the rim and ending with a fine polish grade. The valve faces then were inspected under binocular microscopes by skilled inspectors. The work was very tedious and the accuracy not very great.

Installation of fluorescent penetrant inspection two years ago has met with excellent results. Valves are inspected the rough machined state and little

(Please turn to Page 164)



# NEW

## Carpenter HEAT TREATING GUIDE

TOOL STEEL	HARDENING TREATMENT	EFFECT OF DRAWING TEMPERATURE ON HARDNESS (Drawn 1 hour)	
		400° F.	500° F.
K-W WATER WORN	Brine Quenched from 1600° F.	64	65
11 SPECIAL WATER HARD	Brine Quenched from 1450° F.	67	62
SOLAR WATER HARD	Brine Quenched from 1350° F.	57	64
HAMPDEN WATER WORN	Pack Hardened from 1776° F. in Oil	62	63
STENTOR OIL HARD	Oil Quenched from 1450° F.	60	61
R. D. S. OIL HARD	Oil Quenched from 1625° F.	55	56
STAR-ZENITH OIL HARD	Oil Quenched from 2350° F.	64	64
SPEED STAR OIL HARD	Oil Quenched from 2300° F.	63	63
D. Y. O. OIL HARD	Oil Quenched from 2178° F.	64	64
EXCELO OIL HARD	Oil Quenched from 1700° F.	67	67

**TO DRAW**

The real purpose of drawing is to remove internal strains and increase toughness. A procedure should therefore be adopted which will give the best toughness with the least possible sacrifice of hardness. On this chart "one hour draw" means one hour SOAK at temperature. Be sure to allow sufficient time for the tool to reach the proper temperature and then start counting time.

### APPROX. TIME TO REACH DRAWING TEMP. IN A HOT AIR OVEN, WITHOUT FORCED CIRCULATION

Drawing Temperature	Approximate Time at the Top of	
	Cutlery or Substrs.	Long Shapes or Chisels
300° F.	15 min.	30 min.
400° F.	20 min.	40 min.
500° F.	25 min.	50 min.
600° F.	30 min.	1 hr.

### IN A CIRCULATING AIR OVEN, OIL OR WATER

Drawing Temperature	Approximate Time at the Top of	
	Cutlery or Substrs.	Long Shapes or Chisels
300° F.	15 min.	30 min.
400° F.	20 min.	40 min.
500° F.	25 min.	50 min.
600° F.	30 min.	1 hr.

\*Oil bath should not be used above about 500° F. If drawing above 500° F. in a hot air oven, a hot air oven should be used. A hot air oven should be used for drawing above 500° F. in a hot air oven. A hot air oven should be used for drawing above 500° F. in a hot air oven. A hot air oven should be used for drawing above 500° F. in a hot air oven.

THE CARPENTER STEEL COMPANY

READING, PENNA.



## To Select Heat Treating Data Quickly, Accurately

Men responsible for tools will find this new Heat Treating Guide issued by The Carpenter Steel Company a great convenience and time saver for themselves and the heat treating department. This is because it gives complete information on the heat treatment of all Carpenter Matched Tool Steels in handy, easy-to-use form.

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## X-Ray Inspection Reveals

# Stopper Head Defects

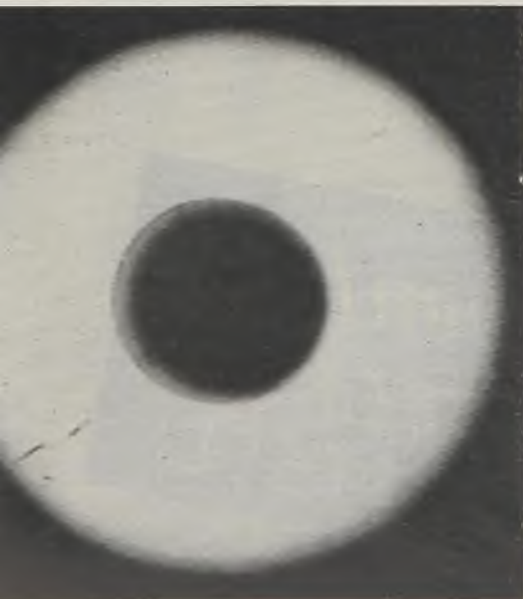
Successful pouring of heats of steel is dependent on stopper rod assembly. Inspection of stopper heads with long wavelength, low power X-rays uncovers defects which may result in troublesome pouring. Short exposure is sufficient for satisfactory negative



Exograph showing circumferential discontinuity in stopper head

REFRACTORY properties of ladle nozzles and stoppers are of great importance to the successful handling of molten steel. These parts must function properly throughout the pouring period, giving clean shutoffs and opening easily. Choice of the proper degree of refractoriness of the nozzle and the stopper head is delicate and important. If the nozzle is sufficiently hard and refractory to withstand the erosion of the steel, the stopper head may not seat easily. A leak started in a hard refractory material is difficult to stop, and usually the leak tends to get worse. The seat of the nozzle must be soft enough to permit the stopper head to be pressed into it, otherwise there will be a tendency to leak. The nozzle, on the other hand, cannot be

Example of radial discontinuity which sometimes occurs in stopper heads



By CLYDE B. JENNI

Plant Metallurgist  
General Steel Castings Co.  
Eddystone, Pa.

too soft or a leaker will result from the erosion of the molten steel.

Molds which are poured with a leaky stopper obviously are not poured in the proper manner. Defects such as scabs, cold-shuts, and splashes are encountered frequently as a result of the faulty pouring technique.

Several factors must be controlled to insure the successful handling and pouring of molten steel. All mechanical equipment of the ladle must be in proper working order. Wearing parts should be inspected frequently by competent maintenance workmen. The nozzle must be placed properly in the ladle. The stopper rod and head must be assembled carefully and dried properly. Sufficient allowance must be given to expansion when assembling the stopper rod. This is accomplished by tightening a nut on the end of the stopper rod until the refractory sleeves are tight; the nut "backed-off" approximately 1/16-inch per foot of sleeve length, thus allowing for the expansion which will result when the rod is subjected to the temperature of the molten steel.

Setting of the stopper rod assembly must be accurate. Allowance must be made for the ferrotatic swirling action of molten metal flowing through a funnel-like orifice. The stopper head should be ground to fit the contour of the nozzle with which it is mated. A test with sand to insure complete tightness should be made before a prepared ladle is used. Sufficient metal must be poured on the first opening of the ladle to allow the refractory nozzle and stopper head to become slightly softened. If this precaution is not taken a leaky stopper is likely to result.

Since internal defects of castings disclosed by nondestructive testing, such as gamma-ray or X-ray examination, a similar study was proposed for the inspection of stopper heads. Short wavelength gamma rays were found to be satisfactory for the examination of materials of densities of graphite-clay mixtures than the long wave-length, low power X-rays. Satisfactory results were obtained using the X-ray unit employed for chest examinations in dispensary. This is a 200-milliamperere fluoradex made by Westinghouse X-Ray Corp.

### Three-Second Exposure Sufficient

The ladle stopper under inspection is placed perpendicularly in the position of application to the rod, on a cassette containing the X-ray film. A 3-second exposure is sufficient for a satisfactory negative which readily discloses any internal defects in the stopper head.

The degree of evaluating the negative of course becomes strengthened by experience. Minor voids may be tolerated depending upon their size, distribution and location. Stopper heads whose X-rays show large defects, or defect forming planes of weakness, or combination of defects which could prove troublesome, are discarded.

All stopper heads used in our plant are numbered serially, and are inspected by the X-ray method. The storekeeper and supervisor of ladlemen are given a list of stopper heads which have been examined showing the serial number of the heads satisfactory for use; the serial number of those not satisfactory for use. At the time this system was instituted the percentage of rejects was high. In recent months the percentage of rejects has declined sharply. This, no doubt, has been brought about by more rigid inspection and closer production controls by the manufacturer of stopper heads.



*That's what we're shooting for!*

Szelepka, Herd, Tallerico, Sauchak,  
Goldstein, McMahon—maybe it  
sounds like a Notre Dame line-up.  
One thing sure—it's All-American.  
For whether it's at our plant or  
yours, they are Americans, regard-  
less of their race, color or ancestry.  
An equal opportunity for every-  
one; that's the American way,  
that's what we're shooting for!



*The* **LEVINSON** *Steel Company*

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33 Pride Street, Pittsburgh, Pa.

# Armor Plate

## DEVELOPMENTS

DIE QUENCHING of heat treated homogeneous armor plate produced in Ford steel mills has been developed by Ford Motor Co. engineers to facilitate the straightening of plate after heating and prior to drawing.

Accompanying illustrations show the heating furnace used, and the roller conveyor on which the heated plate is moved to the quenching press. Another view shows the 2500-ton hydraulic press, with waffle-grid platens which hold the plate flat while it is cooled by the sprays emerging from the "studs" of the platens. By this method the use of water tanks, sprays and straightening machines is

avoided and the entire heat treating process speeded.

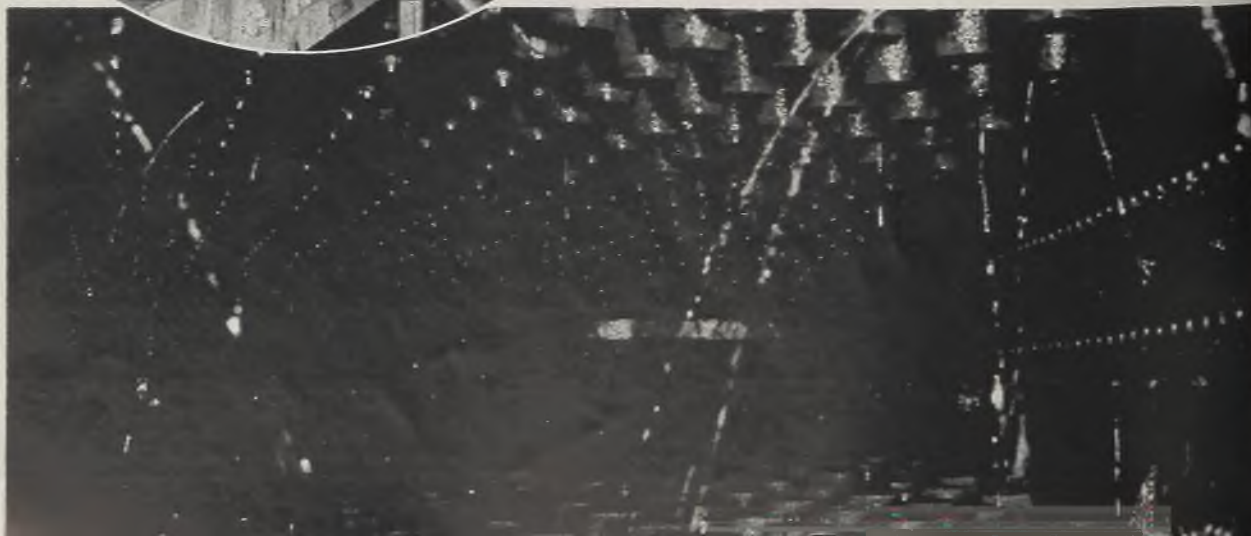
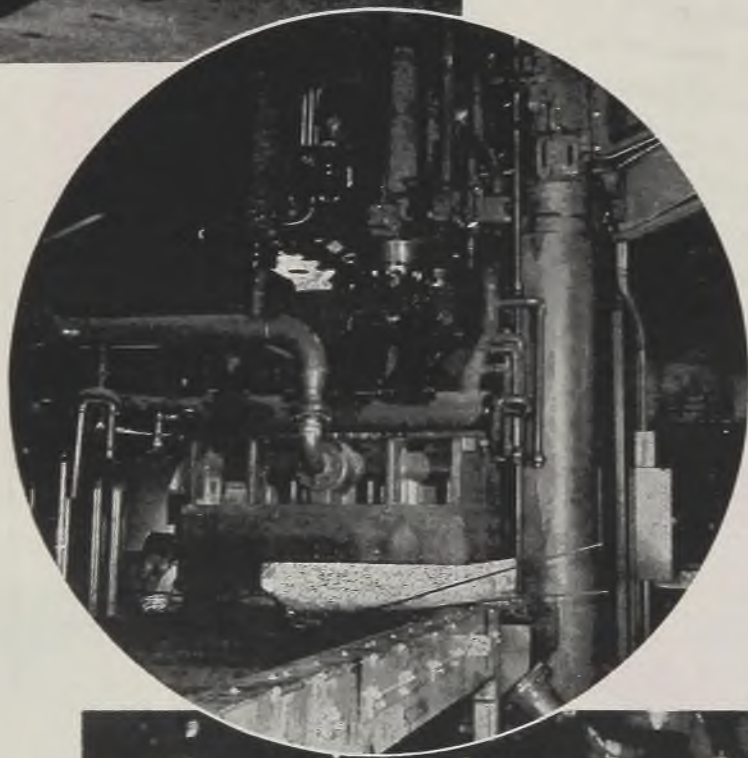
The technique of die quenching is new but hitherto has been applied to armor plate in considerably smaller sizes than those now processed by Ford in armoring tanks. A number of armor plate rolling mills follow the practice of quenching heated armor plate in sprays or immersions which serve to produce rapid cooling but often result in warping or buckling of the plate. In event the plate must be trueed up by straightening machines, a time-consuming process which is not readily adaptable to continuous production methods.

The Ford press-quenching process is accomplished in 3 to 8 minutes, depending upon the length, width and thickness of the plate. The plate is heated in a furnace for 2 to 4 hours and in 15 to 20 minutes is transferred to the press. A few minutes later the plate is black and ready to be drawn back to proper tensile strength.

*Charging end of gas-fired furnace for heating armor plate prior to die quenching. A plate may be seen on the roller conveyor about to enter the furnace*

*Special waffle-grid platens on this 2500-ton hydraulic press spray water from above and below to extract heat from plate as it is gripped by the closed platens and held flat. Only 3 to 5 minutes are required for the cooling and straightening operation*

*Closeup of opened press platens showing waffle-grid construction and water sprays draining from a number of the "studs"*

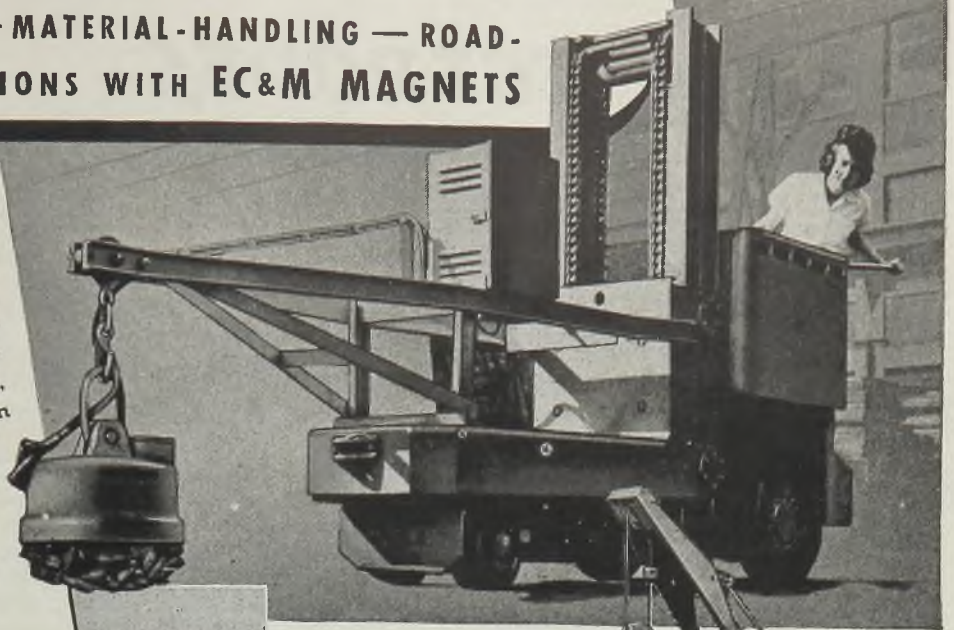




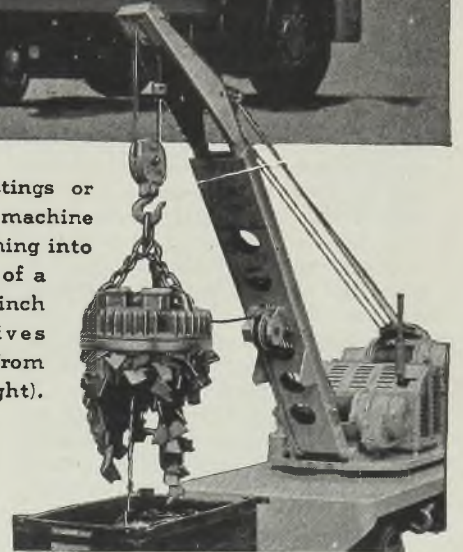
# Getting Things Done Quickly...

FLOOR-SWEEPING — MATERIAL-HANDLING — ROAD-SWEEPING OPERATIONS WITH EC&M MAGNETS

● For sweeping the production lanes of industry—removing nuts, bolts, turnings, and other tire-injuring scrap from aisles, ways, between machines, from roadways between plant buildings, etc. This 18-inch diameter magnet is operated from battery of standard high-lift truck (right).



For lifting castings or forgings onto machine tool beds—reaching into remote corners of a plant, this 29-inch magnet receives power directly from crane truck (right).

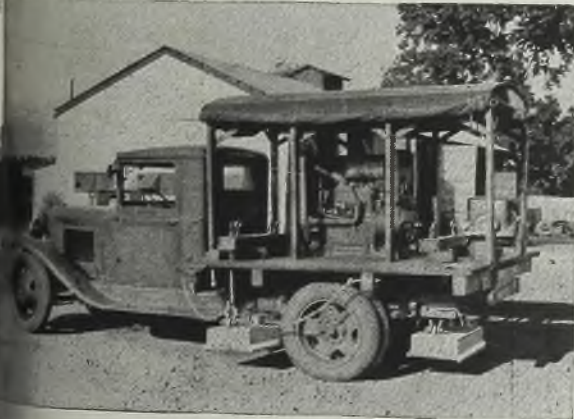


Where large tonnages are handled, the EC&M No. 6D, 65-inch diameter magnet is available. Especially suited for open hearth stockyards—for shipboard use to reduce handling time in ports. EC&M Circular Magnets come in 10 sizes for all industrial needs. Bulletin 900 gives complete data and shows many interesting installations. Bulletin 910-2M gives road-sweeping magnet information. Ask for your copies to-day.

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Mobile units for loading scrap into gondola cars. Boom can be retracted and lowered to enter box cars for loading or unloading finished material. 36-volt power-generating unit on truck crane supplies direct current for this 29-inch diameter magnet. "Lift" and "Drop" push buttons are conveniently located adjacent to operator.



Road-sweeping magnets for removing puncture-producing material from highways, parking lots around industrial plants, etc. Also efficient for clearing airfields of shrapnel and similar tire-damaging material. Gas-engine-generator unit, on truck, supplies voltage for these 3 Type M magnets which cover 8-foot wide section of roadway.

# Aluminum ELECTRODES

By HAROLD LAWRENCE  
Metallurgist and  
Welding Engineer

Coated arc welding electrodes now prevent interference of aluminum oxide in production of slag-free welds in aluminum. Both wrought and cast aluminum parts readily fabricated by arc welding, except 24S alloy which loses high physical properties at and around the weld. This concludes series on arc welding electrodes

PRECEDING sections which covered welding by means of carbon steel or low alloy electrodes followed the AWS-ASTM A233-43T specification for filler metals. Subsequent articles in the current series including stainless steels, surfacing materials, cast iron, nickel and nickel alloys and copper and copper alloys made no mention of filler metal specifications. Thus far there are no rules governing electrodes in these fields although it is understood that committees are working on these subjects.

But the aluminum filler metal specification is available, it being AWS-ASTM B184-43T, and the first part of this discussion will be devoted to a critical review of the filler metal specification in line with points mentioned in the opening article on metallic arc welding electrodes.

## Two Types Filler Metal Specified

Coated electrodes are used with the coating especially compounded to permit solution of the tightly adherent aluminum oxide which otherwise might interfere with the production of slag-free welds. Two types of filler metal are specified, one being a pure aluminum and the other containing about five per cent of silicon. Complete analyses are shown in Table I.

Both types of electrodes are available in standard diameters and lengths which differ from steel electrodes primarily in the fact that 14-inch lengths are carried through the 1/4-inch diameter. Standard sizes are given in Table II.

Weld tests are specified in detail to enable any fabricator to check the quality of the electrode he is using. Tension and bend tests are outlined to check the strength, ductility and soundness of the weld deposits. In these tests the 5/32-inch diameter is used to determine the properties of all sizes 5/32-inch and smaller while the 1/4-inch electrodes are selected as a check on the 1/8-inch and larger diameters. In this feature the aluminum electrode specification offers an advantage over the ferrous metal requirements where many diameters must

be investigated. Of course classifications Al-2 and Al-43 must be tested independently of each other.

Butt welds are made in 3/8-inch plate welding from one side only. Plates are preheated to 350 to 400 degrees Fahr. before the welding is started. No stress relieving or other heat treatment is needed after welding. As is customary with the welding of any test plate, the material should be

TABLE I—CHEMICAL COMPOSITION OF CORE WIRES IN ALUMINUM ELECTRODES, PER CENT

Element	Electrode Classification	
	Al-2	Al-43
Copper, max. ....	0.2	0.4
Iron, max. ....	0.6	0.8
Silicon .....	0.5 max.	4.5 to 6.0
Magnesium, max. ....	0.05	0.05
Zinc, max. ....	0.05	0.2
Manganese, max. ....	0.05	0.3
Titanium, max. ....	0.03	0.2
Nickel, max. ....	0.03	
Aluminum .....	99.0 min.	remainder
Total other impurities ...	0.1	0.3

TABLE II—STANDARD SIZES AND LENGTHS FOR ALUMINUM ELECTRODES

Electrode Classification	Diameter	Length
Al-2 and Al-43	3/32	14
	1/8	14
	5/32	14
	3/16	14
	1/4	18
	5/16	18

so jigged or clamped as to prevent a warpage of more than 5 degrees. A backing bar may be used to aid in getting 100 per cent penetration. Should the plates warp more than 5 degrees, they must be straightened cold before testing.

Two reduced section tensile specimens and two guided bend specimens, one for the face bend and the other for the root bend, are machined from the heart of the test plate leaving discards of almost 2 inches on either end of the weld. These specimens are made in accordance with the standard dimensions covered by the American Welding Society's Standard

Methods for Mechanical Testing of W

Tension tests must exceed 14,000 pounds per square inch for welds from electrodes of the Al-2 classification and 14,000 pounds per square inch for deposits from Al-43 electrodes. Tests must meet the usual requirements of a full 180-degree bend with no or other defect exceeding 1/8-inch in direction. Cracks occurring in the core of the specimens, which incidentally rounded to minimize this chance, are a cause for disqualification.

Grip ends of the electrodes must be bare for not less than 1 inch nor than 1 1/4 inches to provide full contact with the electrode holder. To permit striking of the arc and yet furnish a coating protection, the end of the electrode should be bare but no more than one core wire diameter or 1/8-inch, whichever is smaller, should be free of coating.

## Must Consume Coatings Uniformly

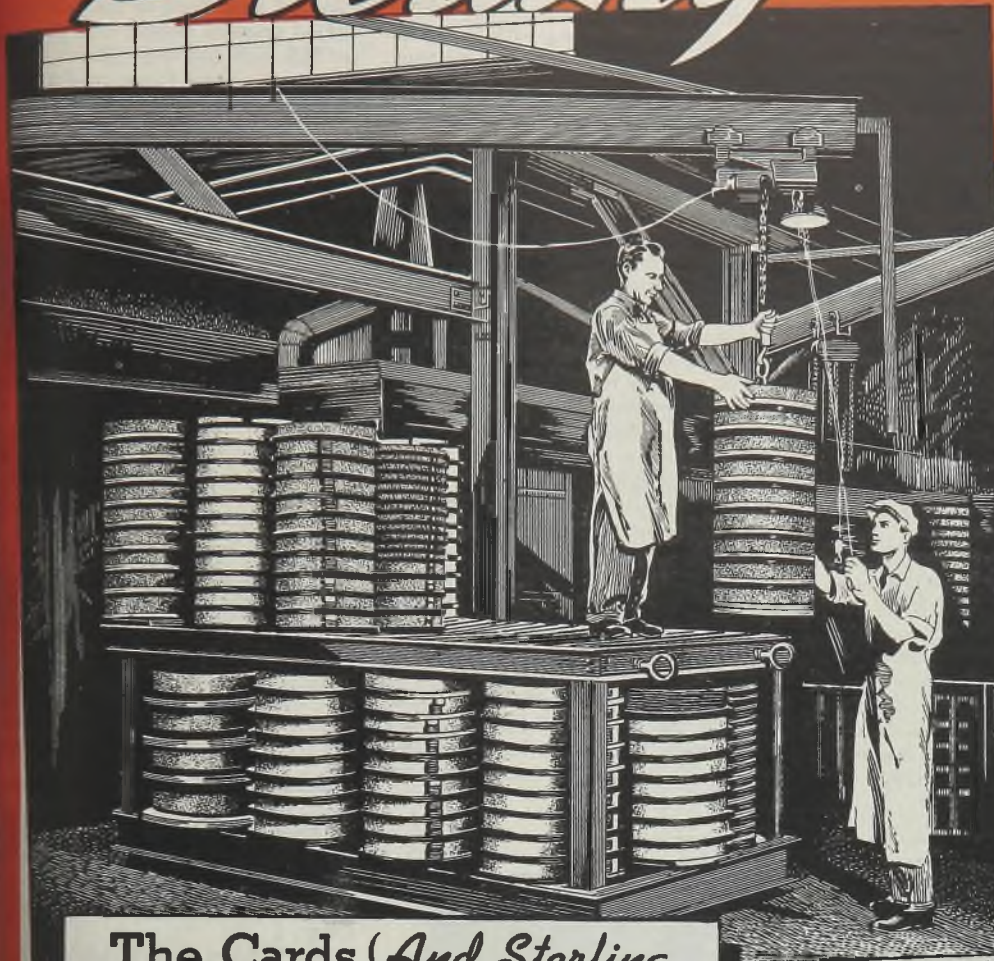
Core wire diameter should be maintained within plus or minus 0.002 from the nominal diameter although dipped electrodes this variation might be as important as for extruded electrodes where the amount of coating is determined by the relationship between die size and core diameter. The length should not vary by more than plus or minus 1/8-inch from that specified though this restriction is of little importance except to establish a limit somewhere as such small differences in length have no practical welding significance.

Minimum requirements are for coating that will make suitable butt welds in flat and vertical positions and fillet welds in the flat position. Some electrodes weld in all positions with the overhead welds being made by means of a stringer bead technique. A dielectric resistance of 100 volts below 100 degrees Fahr. is required.

The coatings must be consumed uniformly during welding but there is no limit other than this placed on electrode conductivity. No blistering of the coating burning back from the core wire is allowed. Slag produced must be readily removable. Fumes given off from covering, when the electrodes are used in a well-ventilated place, shall not be injurious to the health of the welding operator. The coatings were supplied by the author and might well be used in specification. Fluorides are included in coatings on aluminum electrodes, as indeed they are on some copper, nickel, stainless steel materials, and general ventilation is needed to protect the welder. Lastly the coating should not blister when heated to 400 degrees Fahr.

Electrode cores should be of g

# Sterling



## The Cards (And Sterling Wheels) Are Stacked Against Our Enemies!

Sterling workers are stacking the "Wheels of Industry" against the best effort our enemies can muster. We realize that battles cannot be won in factories, but that they can be lost there! We know, too, that there is hardly any product for war that does not depend upon excellent grinding to get it into action faster. That is why Sterling Grinding Wheels are going into our furnaces faster than ever before . . . why, in spite of wartime difficulties, you are receiving your wheels quickly.

We believe it is worth a lot to have Sterling quality doing its share for victory in your plant. Hundreds of users of Sterling Grinding Wheels have seen them push up production and turn out better work. They have seen operator fatigue lessened and wheel-life lengthened. Costs, before and after Sterling Wheels are used, are the final, good reason for specifying them. Case histories of what has happened in various industries after Sterling Wheels have been put on the job will be given by our engineers. Take advantage of this experience in planning your production for war—or peace. Your letter will bring an engineer at no obligation. Write it today!



Sterling Catalog No. 44 is just off the press, offering important information about old and new items that department heads will want to study.

• STERLING ABRASIVES •

THE  
**STERLING GRINDING WHEEL DIVISION**  
 OF THE CLEVELAND QUARRIES COMPANY  
 TIFFIN, OHIO

THE WHEELS OF INDUSTRY



quality free from injurious segregation, oxides, pipe, seams, slivers and other irregularities although this is a matter that is best left to the electrode producer. Coverings should not be damaged by ordinary commercial handling. They shall be of uniform thickness, again a matter for the manufacturer to control as he is obligated to supply material that will give good welding performance, and shall present a workmanlike appearance.

Packaging of electrodes must consider two factors—mechanical damage and moisture absorption. Mechanical damage is controlled by normal packing methods while moisture proof wrapping is specified for standard 1 and 10-pound packages. One-pound packages are placed in moisture-resistant wrappings and 10 such bundles in a hermetically sealed container make up the 10-pound package.

**ALL PACKAGES SHALL BE DATED AT THE TIME OF PACKING.** Again "caps" are provided by the author and this statement suggests a deterioration of the electrodes with time, even if they are suitably protected against moisture. Use of fresh electrode stocks, no matter what kind, will give the most satisfactory welds. Consumers of electrodes might well scrap all odds and ends in their electrode storage at the end of each year as a part of their inventorying procedure. Using old

and perhaps inferior electrodes may cost a great deal in damaged reputations should anything go wrong with the weld. Or at best such electrodes often consume more extra labor than is warranted by their value.

No guarantee is made for aluminum electrodes as is the case with other electrodes. Periodic tests are made by the manufacturer who is sure that the specification requirements are being met. Otherwise the producer's liability is limited to the replacement of any electrodes that do not conform to the specification. In registering a protest it is well to be sure that the electrodes were properly tested as valuable time will be lost securing a replacement if the original electrodes were satisfactory and the replacement only serves to show up a testing fault in applying the specification.

Turning now from the ruling specification for aluminum electrodes to some considerations of the materials that can be welded by the metallic arc process and matters of technique these will be considered briefly.

Among the weldable aluminum alloys are found 2S, 3S, 52S and 53S with chemical compositions outlined in Table III. 2S is the most weldable aluminum material with 3S, an alloy having greater strength as a result of its manganese con-

tent, being a close second. 3S is standard alloy used in the fabrication of unfired pressure vessels. Less widely used are 52S, 53S and 61S. 52S is subject to cracking along the fusion zone and for reason butt or edge welds rather than lap or fillet welds are suggested, 53S and 61S are used for structural work and furniture where high strength is desirable. The strength is attained through heat treatment.

Physical properties of the weldable aluminum materials are presented in Table IV.

**TABLE III—CHEMICAL COMPOSITION WELDABLE ALUMINUM ALLOYS**

Alloy	Composition
2S	Min. of 99% Al
3S	Mn 1.25%. Balance Al and impurities
52S	Mg 2.5%, Cr 0.25%. Balance Al and impurities
53S	Si 0.7%, Mg 1.25%, Cr 0.25%. Balance Al and impurities

**TABLE IV—PHYSICAL PROPERTIES WELDABLE ALUMINUM ALLOYS**

Alloy	Yield Strength psi	Ultimate Strength psi	Elongation % in
2S	5,000	13,000	3
3S	6,000	16,000	3
52S	14,000	29,000	2
53S	7,000	16,000	2
61S	8,000	18,000	2

IV. Only the values for the soft material are reported because the heat released during the arc welding operation is sufficient to anneal the material in the heat affected zone.

Arc welding is not restricted to any particular form of aluminum as wrought and cast parts are readily fabricated themselves or to each other. Die castings are the lone exception. However there are several precautions to be observed which will be mentioned later. For the welding of clad aluminum alloy is not practical as the pure aluminum surface is destroyed at the joint and the corrosion resistance attribute is thereby lost. Nor can the regular 24S alloy with the cladding be joined by arc welding because of a much weaker weld and affected zone.

Table V shows the relationship between parent metal and filler metal gives the best all around results. Cladding Al-43 containing about 5 per cent of silicon has a substantially lower melting point than Al-2. Thus the weld metal stays molten longer than the parent metal and permits some of the stresses set up during solidification and thermal contraction to be dissipated. In jig welding weld cracks and transition zone cracks will be minimized through the selection of Al-43 electrodes.

Metallic arc welding has the usual advantage of high heat concentration which leads to speedy fabrication with a small amount of distortion. Because of the time-temperature relationship that prevails, there is less distortion with the process than with the other fusion welding.

(Please turn to Page 150)



**PORTABLE STEEL GRATINGS:** These gratings easily placed in heat treating furnaces are speeding production of small steel parts at New England Metallurgical Corp., Boston. Parts to be treated at 1050 degrees Fahr. were formerly loaded on fixed steel grates in the furnaces. Developed by Irving Subway Grating Co. the removable gratings, 36 inches square, can be loaded outside and pushed into the furnace. While one batch of parts is being treated another can be made ready for the furnace

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 Balance is air  
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There will be no finer postwar present than a home generously equipped with electrical servants—*provided* there is sufficient electrical capacity for efficient performance.

Don't take past electrical experience as a guide. The huge increases in electrical usage in the future are certain to surprise you. Plan *reserve* capacity now and avoid costly,

troublesome alterations later. Industrial Plants! The same applies with equal weight to your electrical set-up. Why not talk it over now with your electrical contractor, utility power engineer, plant power engineer. In home or plant, planned wiring will cost a lot less than unplanned wiring. It's always wiser to Wire Ahead!



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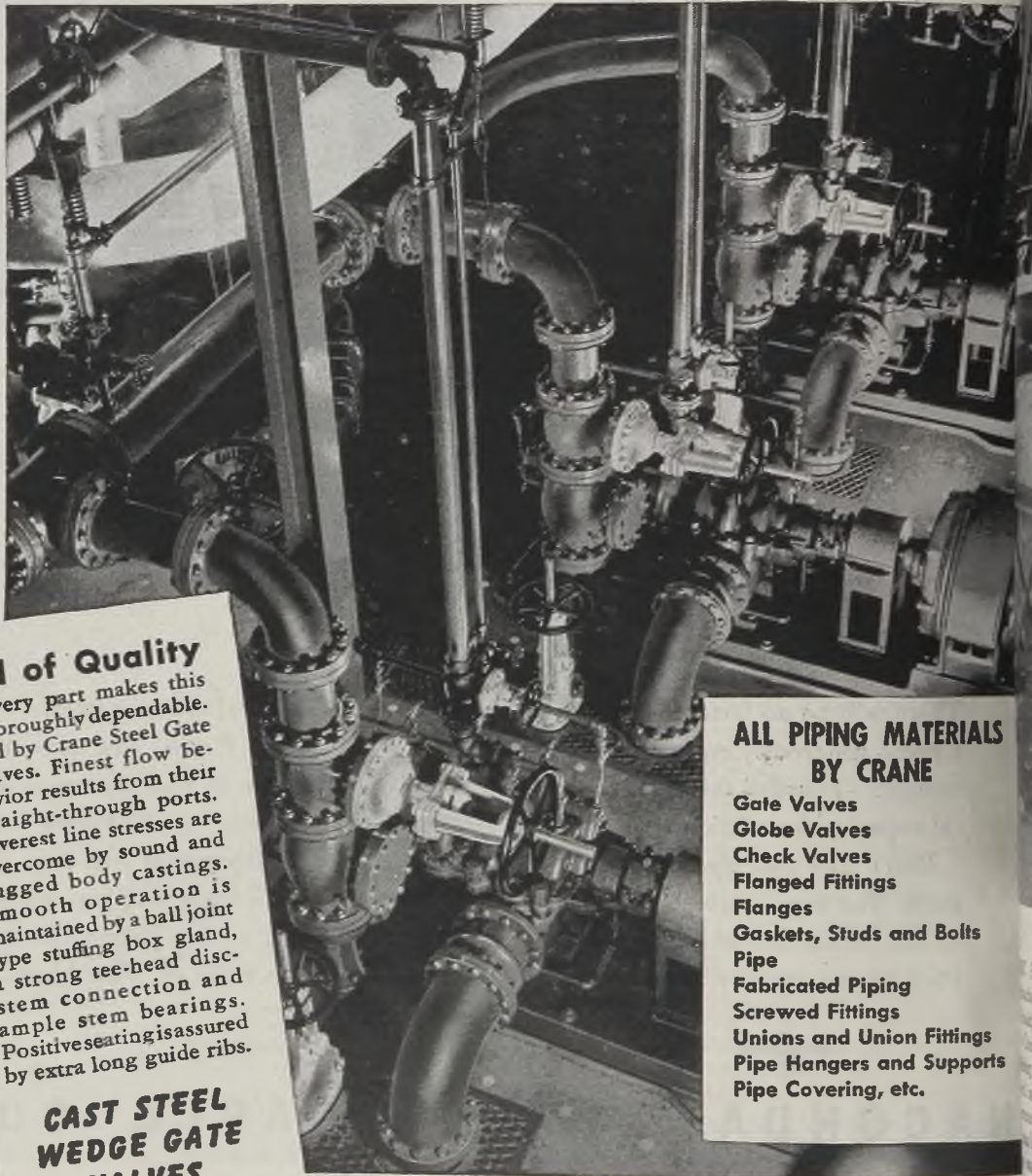
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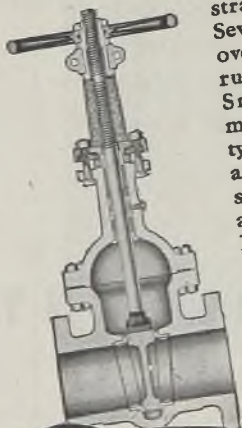
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WEDGE GATE  
VALVES**

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Covering, etc.



80-ton heat of electric furnace steel being tapped in Timken Roller Bearing Co. melt shop, Canton, O.

# ELECTRIC FURNACE STEELMAKERS

*Consider Operating Problems*

*Melters cautioned on use of shell scrap from battlefields. Clean roofs stressed. Handling of refractories and electrodes described. Next year's meeting in Cleveland to be held in December*

ELECTRIC furnace steelmakers are facing a situation full of opportunities, W. McQuaid, chairman, Electric Furnace Steel Committee, American Institute of Mining and Metallurgical Engineers, stated in opening the second annual conference of the Committee at the William Penn hotel, Pittsburgh, Oct. 5-6. Attendance was 25 per cent greater than a year ago, totaling 540. Next year's annual meeting of the Committee will be held at Hotel Statler, Cleveland, Oct. 4-5.

Seven million tons of electric furnace capacity should be working, Mr. McQuaid stated. We have been concentrating on the severe requirements of the airplane industry and have never

had the opportunity of operating at top production on all-quality heats. Electric furnace steelmakers are at the crossroads and if we are to make progress, a spirit of co-operation must prevail between power producers, power equipment manufacturers and ourselves.

Introduction of rotating furnace controls made necessary a change in some melting procedure, it was announced by L. W. Long, Allis-Chalmers Mfg. Co., Milwaukee. For example, in foundry practice at one plant, the transformer impedance used was approximately 30 per cent during the meltdown period when the electrodes were controlled with a contactor-type control but with the rotating control this impedance

was cut down to 12.5 per cent. In a large ingot furnace, more efficient operation was obtained during the refining period with a longer arc. There was a lower carbon content in the bath and a shorter time was required for the complete refining period. Using oversized winch motors in conjunction with rotating controls has improved performance and continued experimentation will improve melting and refining practice.

He suggested that it would be better to install a standard circuit breaker to perform duties for which it is designed and add a separate unit for frequent closing and opening of the circuit demanded by an arc furnace. He recom-

mended that a switching device sufficiently strong to withstand frequent operation be used as the disconnecting device. This device should have limited rupturing capacity but should never be called upon to clear a fault greater than that created by a fault within the furnace.

Opening and closing the circuits with the electrodes not withdrawn is a bad practice, but is followed by many operators. The speaker cautioned that the electrode should always be withdrawn before the circuit is opened. Application of automatic control has been suggested to make it impossible for the operator to break or open his circuits until the electrodes are raised. Perhaps the electrical manufacturer should include such controls.

Some of the troubles with which the maintenance man is faced according to H. J. Miller, American Rolling Mill Co., Middletown, O., are mechanical and friction losses, bearings and lubrication. Dirt also is an enemy and in this respect it is essential that commutators should be kept clean. He traced many main-

tenance worries to weak connections, water supply for cooling motors, electrodes and their operating mechanisms and dust.

F. W. Brooke, vice president, Swindell-Dressler Corp., Pittsburgh, directed attention to the fact that circuit breaker failures largely occur in pinions and bushings. In discussing the rotation regulator, which usually is built in line, the speaker recommended that regulators of this type be built one over the other. He also suggested that a spare unit be installed so that if failure occurred the plug may be pulled out and put in the spare to permit the continuance of melting.

Many helpful suggestions on the care and handling of refractories were offered by H. M. Parkhurst, sales engineer, General Refractories Co., Pittsburgh. He advocated the use of tongs where inexperienced workers are involved. Adequate storage space should be available in order to keep the refractories clean and dry. If drying becomes necessary, it should be done below 212 degrees Fahr. to prevent the brick being dam-

aged by steam. Use of conveyors saves time and reduces breakage. Brick piled on skids can be handled conveniently by lift trucks; those intended for sidewalls can be handled conveniently and quickly in boxes.

Practice of handling brick in the plant of Republic Steel Corp., S. Chicago, was explained by R. J. McCurdy, melting shop superintendent. Bricks when received at the plant are stored in iron boxes and are handled in these containers directly to the furnace. All roof brick for the tilting open hearth are handled in this manner.

A. C. Texter, melting superintendent, Atlas Steels Ltd., Welland, Ont., mentioned that roof bricks are handled at his plant on a concrete slab to keep them dry. The roof bricks are piled to four high on a steam-heated slab protected by a sheet iron roof and by following this procedure, the first spalling is eliminated and roof life increased approximately 30 per cent.

Silliminite roofs on 50-ton electric furnaces are averaging 133 heats at the plant of the Bethlehem Steel Co., according to V. Cladden, Bethlehem, Pa. plant. Silliminite roof always gives a warning before a cave-in occurs, he asserted, and when it starts to sag, about three or four additional heats can be made before complete failure occurs.

#### Roof Life Is Prolonged

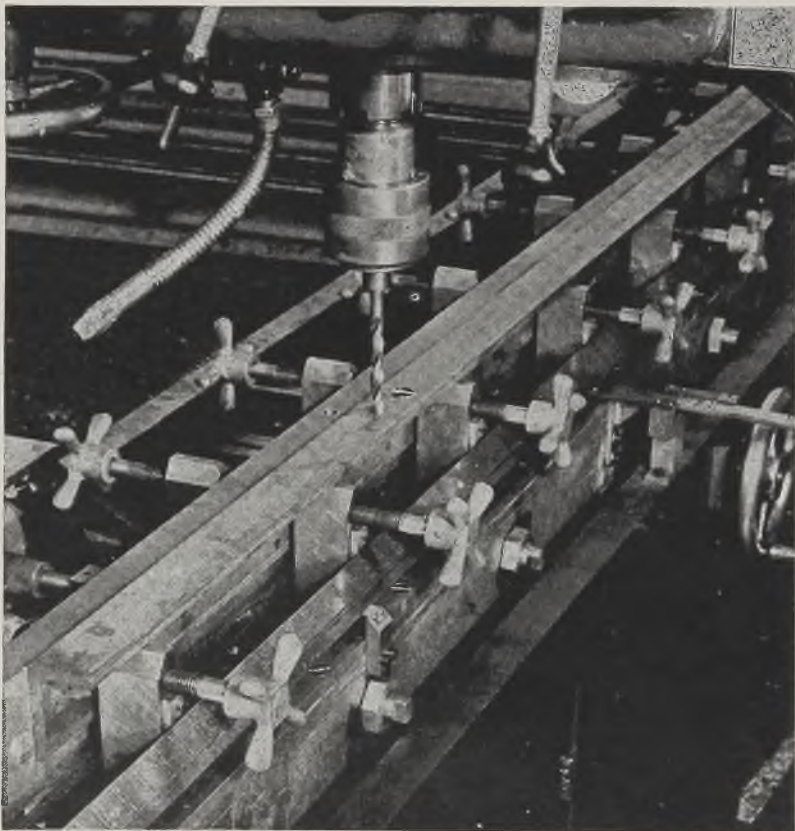
In discussing the care of roofs, M. J. Meinen, superintendent of electric furnaces, Crucible Steel Co. of America, Midland, Pa., emphasized that a new roof should be preheated before being placed on the furnace. He stated that blowing dust or dirt off the roof after every heat increases its life about 35 per cent.

Another speaker mentioned that roof life is extended by increasing the diameter of the electrode holes about 1 inch. By enlarging the holes on one furnace from 18 to 20 inches in diameter, about 12 per cent more roof life was obtained.

A warning was sounded by F. W. Brooke, vice president, Swindell-Dressler Corp., Pittsburgh, on the use of oily scrap and turnings which lead to explosions during the boiling down period. Melting down oil turnings, with the door of the furnace closed, sets up a dangerous condition. When the door is opened the explosive gases mix with air and burst into flames. The speaker also warned that for perhaps the next five years explosive pieces of scrap will be delivered to the steel industry in the form of shells and duds. At one plant a bonus of \$10 is being paid scrap inspectors for locating scrap of this nature.

In speaking on troubles usually encountered with melt shop auxiliary equipment, A. MacQueen, Atlas Steels, Ltd., Welland, Ont., pointed out that good crane runways are essential. The joints usually are welded to eliminate damage from bumpy runways. Collector troubles

(Please turn to Page 142)



**DRILL FIXTURE:** T-bar holding assembly for drilling holes in structural angles up to 10 feet in length features quick, easy and accurate indexing of work in both directions. It rides on rollers located in a channel, with side acting as a guide. Crosswise movement is accomplished by means of worms operated by the handwheel at right. Piece is held by hand clamps shown, but air clamps are employed to lock entire assembly in position for drilling. Operators at General Electric's Pittsfield Works, where device is in use, are provided with chart for each job showing center position of holes to be drilled.

This corresponds to longitudinal and lateral scales on front of fixture



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# NEW ASTM STANDARDS

MANY new specifications and tests for engineering materials and important changes in existing standards have been approved by the American Society for Testing Materials, acting through its committee on standards procedure. Materials involved include steel forgings and castings; gray iron castings; malleable iron flanges; copper electrical conductors; cement; clay pipe; soil cement mixtures; veneer, plywood, etc.; glass insulators; and embrittlement testing of boiler waters. In all, 15 new standards were approved for publication as tentative and 30 revisions of previous specifications.

Society's standardization program provides for a continuing outflow of material from some 60 standing technical committees, on which over 2500 materials authorities are active. Several actions will supplement material to be published in the 1944 Book of Standards of 6000 pages to be issued in December.

## New Standards for Steel

Four new standards developed by

Committee A-1 on steel cover carbon-steel and alloy-steel blooms, billets, and slabs for forgings, and methods of magnetic particle testing and inspection of heavy forgings and commercial steel castings. Billet specifications include considerable material not heretofore included and also bring up to date the list of chemical compositions covered. Emergency provision giving a complete list of the NE steels goes with it.

Eventually, the steel committee hopes to issue a so-called monograph on magnetic particle testing, with specification practice applicable to various steel products. Intricacies of forgings, castings and methods of evaluating defects have prevented the inclusion of any specific acceptance or rejection standards.

Among numerous revisions in steel standards are some affecting austenitic or stainless alloys in the pipe and tubing field and projected changes in the commercial bar specifications, both hot rolled and cold rolled, where eventually revised chemical compositions will be

given. There also will be added data physical properties and suggestions appropriate uses of various grades.

## Wrought Iron and Cast Iron

A change in wrought iron plate specifications A 2 will permit modifications yield point value the same as now provided for tensile strength.

Committee A-3 on cast iron is completing new specifications for material for pressure-containing parts to be used up to 650 degrees Fahr. Tentative specifications for light-weight and thin sectioned gray iron castings were approved replacing existing standard A 1 to clarify intent on physical testing.

During the war period, emergency specifications were issued covering use of malleable iron castings for flange pipe fittings, and valve parts. They now being issued as regular ASTM specifications.

## Nonferrous Metals

New method of determining resistance of copper and electrical conductors of copper alloy should be of considerable help to the industry, because there are no previous ASTM or other nationally recognized standards other than for wire. New method covers apparatus, test specimens, and methods to permit accuracy of 0.50 per cent for material with resistance of 0.00001 ohm or more.

Other actions on nonferrous metal include the withdrawal of a number of emergency specifications and tests as in the case of Braden copper, establishment as regular practice.

## Cement and Clay Pipes

Existing standard for masonry cement C 91, is being continued. New tentative specifications include an increase in the flow of 100 to 115 per cent instead of 65 to 80 per cent; compressive strength requirements are raised to present value 400 and 750 pounds square inch, respectively, for the 28-day strength requirements compared with 350 to 600 pounds square inch. Water retentivity is to be greater than 70 per cent, instead of the current 65 per cent.

Two recommendations on clay pipe involve a new tentative standard for extra strength material and revised specifications for standard strength clay pipe. New specifications will unify standards of the society with similar Government specifications.

## Paint and Petroleum Products

Change in the standard covering weather panels for use in weather tests of paints and varnishes will, when adopted, include redwood panels to facilitate uniformity in specifications. Four general classes will be western red cedar, certain types of white pine, southern yellow pine, and redwood.

Committee D-2 on petroleum products and lubricants has developed an emergency alternate provision in D 97, making it suitable for expediting evaluation of very low pour points. New emergency method of test for isopent benzene, and their inorganic insoluble

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## Ohio Blast Furnace Opens The "Hunting Season"

By JOHN D. KNOX  
Steel Plant Editor, STEEL

NOT many years ago a familiar statement heard on the cast house floor of a blast furnace when it came time to cast the furnace was "Shoot the hole." Not many days ago it was actually done. It happened at an Ohio stack. The iron notch was drilled in the regular manner but instead of using an oxygen lance to bring the iron, the furnace superintendent aimed a deer gun at the iron notch, sent a sharp nosed bullet through the skull and out came the iron—at a saving of oxygen and several lengths of pipe. At the moment the furnace crew is engaged in devising a gun that will send a bullet through the iron skull by means of compressed air.

When this story was made known it brought to mind another along the same lines as related by Dr. F. C. Frary, director of research, Aluminum Co. of America, at the twenty-fifth anniversary celebration last December at New Kensington, Pa. He stated that tapping a furnace containing a considerable amount of molten alumina is often extremely dif-

icult because of the high strength of solid alumina even at temperatures close to its melting point. Opening the tap hole in such a furnace always involves from five to ten minutes of hard work by two men with sledges and steel bars; sometimes even 30 minutes of sledging fails to open it.

The suggestion was made that the furnace could be simply and quickly tapped by using a small charge of black powder and shooting into the tap hole a projectile made of a sharpened piece of 2-inch shafting. An improvised gun was made by drilling a larger piece of 2-inch shafting and the experiment was tried. Sure enough, it tapped the furnace, but the projectile passed through the molten mass and struck the hard, strong, sloping wall of fused alumina opposite the tap hole. It was deflected upward, passed through the top of the building, turned and fell back, to land exactly between the footprints of the man who had pulled the trigger on the gun. It is obvious that the method is not one to be recommended.