December 28, 1942

STEEL

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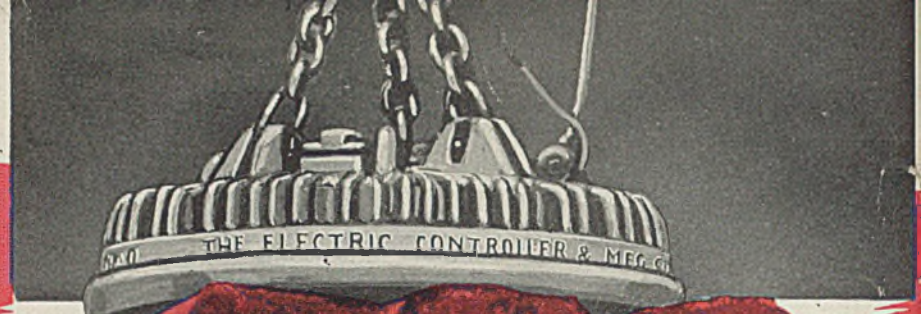

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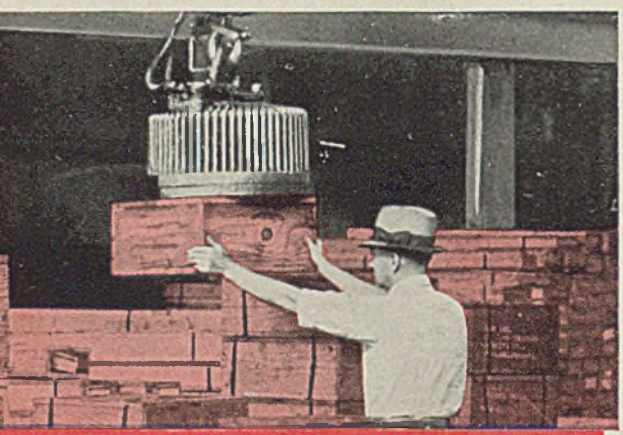

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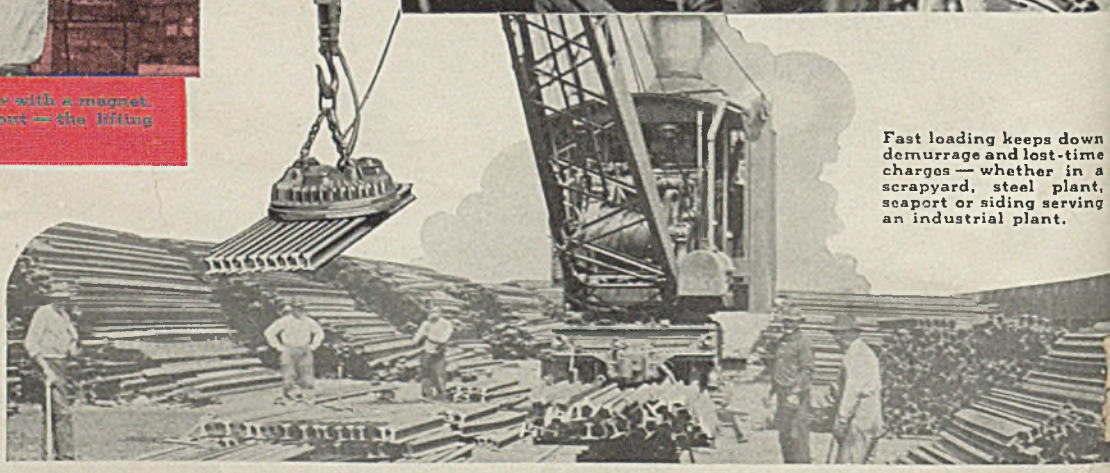

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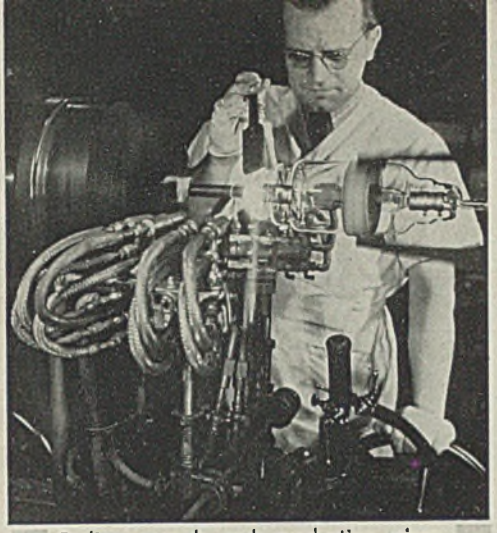

Radio research and production given great impetus by war. See page 78

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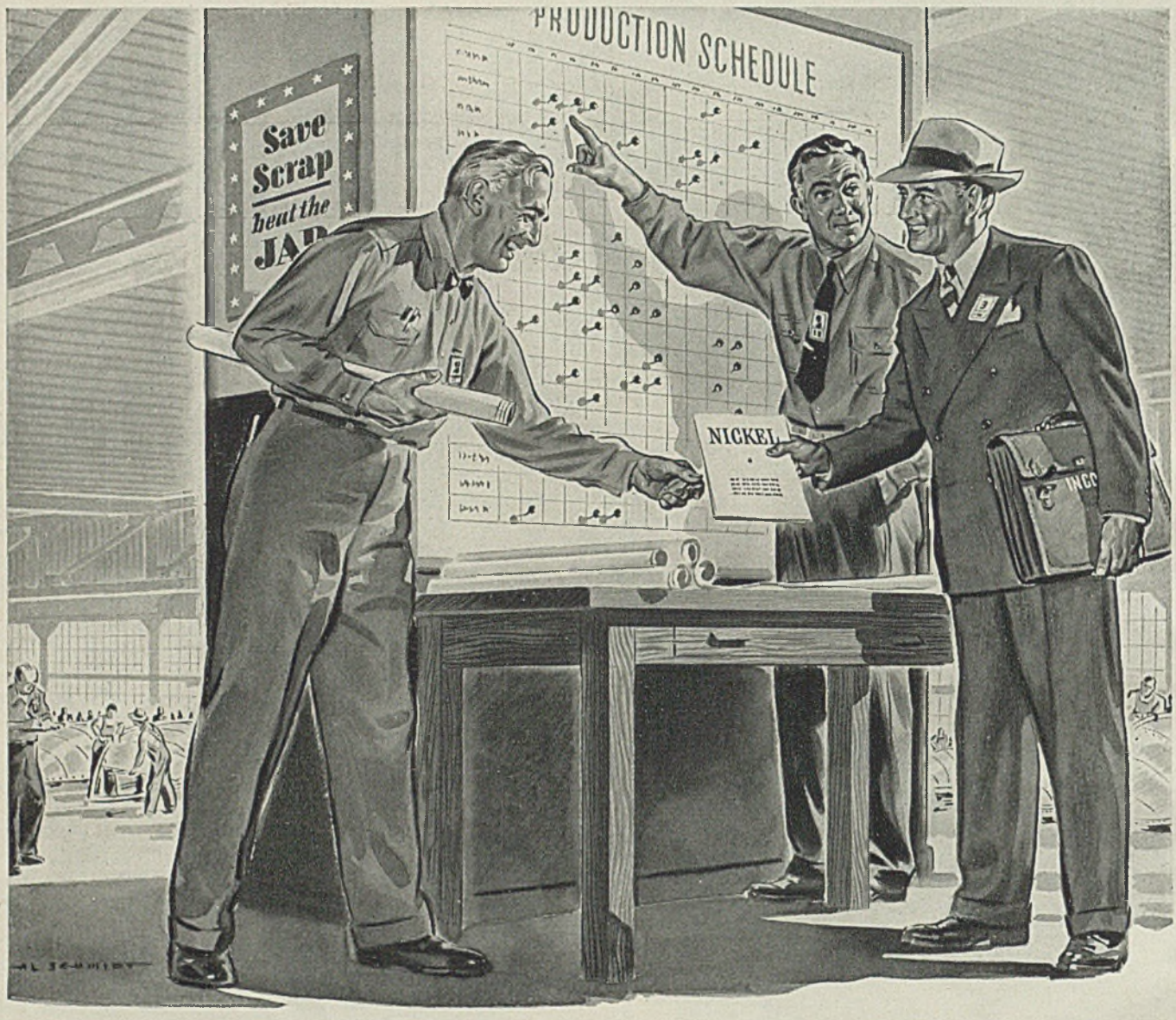

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HIGHLIGHTING

this issue of STEEL

NEWS Now in the making is the War Labor Board's decision as to whether Little Steel should accede to the CIO request for a pay increase of $1 per day and for the closed union shop. "Little Steel" made a strong protest against allowance of this increase, saying it would be an "invitation to inflation" (p. 48); it expressed doubt of the board's authority to render such a decision, particularly because it would be contrary to President Roosevelt's recent declaration that wages must be stabilized. Protest also was filed against the closed shop demand. E. L. Shaner, STEEL's editor-in-chief, believes the country is in for serious trouble should wages be determined by employers' "ability to pay" (p. 45).

A new advisory committee has to do with transportation on the Great Lakes (p. 54); more industry advisory committees have been appointed in the metalworking field (p. 61).

Large cargo planes now are under consideration as potential media for solving the problem of long-range transportation of troops and military supplies—also oil and motor fuel (p. 66).

A new air-raid siren produces the "loudest sustained noise ever produced by mechanical means" (p. 64).

STEEL again has revised its Guide to Priorities, Allocations, Prices. It appears as Part 2 of this issue. Additional changes since Part 2 went to press appear in Part 1, p. 53.

PRIORITIES War orders will be rerated to permit of more flexibility in the priorities system (p. 57). New ratings will be AAA, AA-1, AA-2 and so on. As a result A-1-a soon will be a low rating.

PRODUCTION Steel ingot production lost 1 point last week, dropping to 97½ per cent (p. 51). Need for repairs accounted for some of the loss but the major cause was lack of scrap. Scrap outlook for next Fall and Winter are rather gloomy. On the other hand the nationwide drive for iron and steel scrap, to begin this month, and to be spearheaded by a gigantic advertising campaign to be conducted by the American Iron and Steel Institute, may change the recent trend, particularly because it is estimated that dormant scrap now comes to some 5,000,000 to 8,000,000 tons (p. 52).

War production continues to gain. War shipments by the automobile industry in April were 46 per cent greater than in February (p. 54). On the other hand, more instances are reported where manufacturers of war goods are handicapped by inadequate stocks of certain parts here and there needed for completion of assemblies (p. 129). Such cases usually are due to shortages of material.

The Bureau of Mines is being reorganized to expedite production of strategic and critical minerals for the war program (p. 58); new processes it has developed will be put to work.

Imports of Bolivian tin ores and concentrates will be enlarged (p. 58).

SUBSTITUTION A large warehouse distributor is stocking the NE steels so as to be in a position to supply small lots of them for experimental purposes (p. 70).

Since the United States obtains cobalt from the Belgian Congo, the possibilities that these supplies might be cut off focuses attention on substitutes for this element in cobalt high-speed steels and other applications where red-hardness is necessary. Analysis of a report on this situation is timely (p. 80).

TECHNICAL W. C. Troy and W. E. Mahin continue their discussion on heat treating of chromium-carbon stainless steels (p. 82). . . C. E. Sims and F. B. Dahle of Battelle Memorial Institute point out (p. 86) how converters can expand capacity for producing steel castings. . . Highly developed crane cab air conditioners (p. 89) occupy only one square foot of cab floor space.

The fact that most any arc welding operator can follow a seam with his electrode at rates approaching 3600 feet per hour indicates that there are potential welding speeds much in excess of usual manual arc welding speeds, says E. W. P. Smith (p. 90) as he points out that it is possible to increase arc speeds *now* to weld more effectively. He shows how 8500 trained welding operators could be made available immediately if only half of present welding were speeded by changes now possible.

Better materials handling schemes described by F. L. Spangler (p. 100) are found to double the number of engine tests per cell in the Buick Motor plant now producing large double-row radial aircraft engines for the armed forces.

MARKETS Certain exceptions are allowed under the iron ore price ceiling (p. 54).

Switch to NE Alloy Steels

to Save Critical Metals

TO HELP conserve nickel, chromium, vanadium and other scarce metals, the War Production Board's ablest metallurgists have developed NE (National Emergency) Alloy Steels. These new steels contain relatively small quantities of alloying elements in such combination as to produce physical properties usually attributed to steels of much higher alloy content. The War Production Board stipulates the use of the new NE Alloys to *replace* the standard SAE and AISI Alloy Steels for a wide range of applications.

Ryerson NE Alloy Steel stocks in six specifications, all fine grain, will be available shortly; and will consist of sizes ranging from ½-inch to 7-inch rounds, in three groups:

Carburizing Grades	*Medium Hardening Grades*	*High Hardening Grades*
NE 4023 and NE 8620. To Replace AISI and SAE Nos. A 2300, A 2500, A 3100, A 4100, A 4600, A 5100, A 6100.	NE 4042 and NE 8744. To Replace AISI and SAE Nos. A 2330-35, A 3130-35, A4130-35, A5130-35, A6130-35.	NE 4047 and NE 8749. To Replace AISI and SAE Nos. A 2300, A 3100, A 3200, A 4100, A 4600, A 6100.

Only limited data on heat-treatment response or physical properties will be available when NE Alloys are first ready for shipment. The WPB is anxious to know how these new steels will function and requests all NE Alloy users to report results in working with these new steels. Ryerson will cooperate fully with users, supplying laboratory test data, and all other available information.

• • •

If you now use Alloy steel, let Ryerson help you in adapting NE Alloys to your requirements wherever possible. Write, wire or phone the nearest of the ten Ryerson plants.

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STEEL

July 6, 1942

LABOR POLICY WILL GET WORSE BEFORE IT GETS BETTER

This nation's wartime labor policy is going from bad to worse. It is difficult to see how the findings of the Fact-Finding Panel of the National War Labor Board in the dispute between the employers and employes of "Little Steel" can result in anything but confusion and demoralization.

We say this reluctantly and with full realization of the fact that the members of the panel were in a tough spot. Undoubtedly they worked sincerely and hard to make the best of an assignment made difficult by past errors in wartime labor policy.

Nevertheless, they have turned in a report that is loaded with dynamite. It is no exaggeration to say that the implications of their "findings" constitute a greater threat to national security than would have resulted from an outright grossly unfair decision in the "Little Steel" case.

Finding No. 1 in the panel's report is that all four companies "are able" to pay the requested wage increase of $1 per day. Are we to assume from this that "ability to pay" henceforth is to be a determinant in the fixing of wage scales? If so, we are in for serious trouble.

For instance, how many employes would be willing to have their wages determined by "ability to pay" in time of depression? Also, if "ability to pay" is to be a factor, what will happen to employes of companies which operate in red through frequent and sometimes extended periods? The mere reference to "ability to pay" by the panel will prove to be another tactical error in the long list of blunders in wartime labor policy.

In Finding No. 8 the panel expresses its belief that "general economic conditions are the principal cause of changes in wage rates." It is difficult to reconcile this naive statement with the very apparent policy of NWLB to encourage pressure blocs, politics and expediency to supplant economic conditions as the major determinant in fixing wages.

The panel is curiously silent about President Roosevelt's recent admonition to stabilize wages as a curb against inflation. It also ignores the fundamental question of what is reasonable compensation for service rendered.

Regardless of how the steel wage dispute turns out, this nation should begin now to divorce wage policy from politics.

E. L. Shaner

Editor-in-Chief

Inflation Inevitable

If Wages Are Increased, "Little Steel" Declares

✦

Protests to War Labor Board against panel's "able-to-pay" report . . . "Finding of Facts" in conflict with President's policy, threatens serious maladjustments . . . Board faces union labor pressure group

✦

WASHINGTON

"INVITATION to inflation" was issued last week by a fact-finding panel of the National War Labor Board which reported four independent steel companies were "able to pay" $1-a-day wage increase to employes. This was the general view in Washington—outside of organized labor circles—as the board proceeded to hear final arguments by representatives of companies and unions.

If sanctioned by the board, the panel's "facts", it was stated, will touch off an inflationary spiral which will wreck the anti-inflation program enunciated by the President April 28; will have disastrous effects on our war-time economy, and lay the groundwork for serious post-war maladjustments.

The panel's report was considered to be a direct contradiction to Mr. Roosevelt's admonition to labor: "You will have to forego higher wages for your particular job for the duration of the war."

The report affects not only the four companies involved, not only the steel industry as a whole, but all industry. Steel long has been a bellwether—along with the automotive industry—as regards wages. Records show that soon after the steel industry or the automotive industry has granted wage increases, there has been a general and comparable rise in all wages. It happened in 1936, in 1937 and in 1941. It easily can happen again.

The report, based upon the reasoning that the requested increase would cost the companies involved only a minor sum—the bulk to be compensated by lower federal taxes—drew widespread criticism in Washington and elsewhere.

One WPB official declared it was "worse than Tobruk", and that if it were approved by the board it would be "worse than Pearl Harbor". Business men, economists and commentators here said that if the board issues a "directive" to grant the increase the price control system so laboriously built up will crack wide open.

Split on Union Security

A 12½-cent increase in wages—which the panel found the "Little Steel" companies "able to pay"—would cost the steel industry $160,000,000 annually. If extended to the railroads, the carriers would be forced to increase wages by $375,000,000. For all industries covered by old age and survivors insurance, the increased cost would be $8,600,000,000. Total wage increase is estimated to amount to about $9,000,000,000, if comparable increases are granted.

If employes in other industries should not receive comparable increases in their wages, they would suffer a disproportionate burden of the war effort in comparison with the steelworkers.

The panel split on the issue of union security. The Steel Workers Organizing Committee (now the United Steelworkers of America) requested a union shop. In earlier directives the NWLB ordered "maintenance of membership" in similar cases.

Decision by the board on the panel's report was awaited with grave misgivings. Upon its action may rest the board's own future. It may grant the wage increase which would appear to be in conflict with the President's policy, or, it may incur the wrath of organized labor by repudiating the wage increase and upholding the anti-inflation program.

Whatever action it may take will be weighed in the "court of public opinion", as was aptly phrased by Edward L. Ryerson, chairman, Inland Steel Co., in a statement to the board last week. He spoke "not to make an argument, but to present point of view." He questioned the board's power to impose the wage increases demanded by the union or to impose any form of union security.

Findings by the panel were generally considered susceptible to specific criticism. April 1, 1941, was selected as a base for comparing wages with the increased cost of living as of March 15, 1942. Had March 1, 1941, been chosen as the living cost basis, it could have been demonstrated that wage increases and living costs were parallel for the year following. Steel wages were raised 10 cents an hour effective April 1, 1941. Selection of the wage level as of that date was criticized as "obvious evasion and favoritism in bookkeeping."

Another fallacy in the report is the assumption that if the companies are "able to pay" the increase should be granted. While, as the panel points out, the companies would have to pay only 6 or 11¼ per cent of the increase asked, it is doubtful that the union would agree to base wage rates on the "ability to pay" after the war is over and operations are lower. Furthermore, by reducing federal revenue by exempting a large segment of otherwise taxable income, a greater burden is placed upon other taxpayers who may not be so fortunate as to have a recommendation for a wage increase.

Panel was composed of Arthur S. Meyer, New York Board of Mediation, representing the public; Cyrus S. Ching, vice president, United States Rubber Co., representing the employers; and Richard T. Frankensteen, United Automobile Workers of America, representing the employes.

Its report was vigorously protested by representatives of the companies involved, on both the wage increase and the union security issues when public hearings opened before the full board, Wednesday.

E. G. Grace, president, Bethle-

HEARINGS on the "Little Steel"-United Steelworkers of America case opened last Wednesday before the National War Labor Board in Washington. CIO President Philip Murray made the opening statement in support of the union's demand for a $1-a-day wage increase and union security. Shown is a scene of the opening session. NEA

hem Steel Co., said: "There is no place for opportunism by anyone in these critical days. That applies both to industrial wages and to industrial profits. Industrial profits, in my opinion, ought not to exceed a conservatively fair level. Whenever they do, they should not be used to increase returns to investors nor as general wage advances for workers, but should be used to help pay the cost of winning the war."

T. F. Patton, general counsel for Republic Steel Corp., objected to the wage increase on the following grounds:

"1—The increase would be in violation of the national wage stabilization program.

"2—There are no substandard wage levels in Republic, by comparison to other companies or other industries, on which to ground any order for a wage increase.

'3—The fact that men in some other industries working many hours of overtime are receiving larger net wages is not proper ground for raising base rates in steel.

"4—The proposed wage increase is not justified on the ground of rising living costs. From August, 1939, to March, 1942, steel weekly wages have increased 23.7 per cent and living costs only 13.7 per cent."

Rejection of the union's demands is required by the "highest consideration of public policy," John Gall, counsel for Youngstown Sheet & Tube Co., told the board. Mr. Gall said the industry's ability to pay the requested wage increase, as found by the panel, was not established by the record.

All the companies registered opposition to the checkoff and union security demands.

If any wage increase is granted by the board, it will be retroactive to the date of certification of the case, April 24.

"Court of Public Opinion" To Judge WLB's Decision, Warns E. L. Ryerson

"I appear before your board, not to make an argument, but to present a point of view," said Mr. Ryerson. "My purpose is to state clearly the deep convictions that Inland Steel holds with respect to the vital issues which are at stake in this case . . .

"I first refer to what is called union security. You have overruled our protest and have declared that you possess the authority to decide this question. I shall, therefore, not pursue that matter further at this time, but we must reserve the right to question your authority in the forum of public opinion. We do not believe that the people of the United States have acquiesced in taking from Congress the power to limit the personal freedoms of the millions of workers throughout the nation. However, since you believe that you possess that immense power, I address myself directly to the responsibility which rests upon you in the exercise of it.

"In the public discussion of the question of union security three tests have emerged which are claimed to justify its requirement in particular cases. These are: First, inter-union rivalry in the plant; second, anti-labor bias of the employer; and third, the effect on war production.

"Not one of these factors exists in the case of Inland.

"There is no inter-union rivalry at Inland plants. The National Labor Relations Board has determined the bargaining unit and the bargaining agency. No one questions that this union is the exclusive bargaining representative.

"Inland is not pursuing an anti-union policy. For five years honest collective bargaining has gone forward in our plant with this union. Every member of the local knows that to be true, and at this moment we are prepared to sign a contract which we negotiated substantially to completion last fall, except for the matters here in issue.

"War production at the Inland plants could not be improved by union maintenance. Since long before Pearl Harbor our plants have been running in excess of rated capacity.

"I say to you, therefore, thoughtfully, that if you should order Inland to accept union maintenance the public of the United States could draw but one conclusion. They would be forced to believe that you had committed yourselves to a social formula which you have determined shall be imposed upon American industry. By such action you would say

E. L. Ryerson

to American industry that you have embarked upon social legislation.

"On the economic aspect of this case, it must be clear to all intelligent people that the question of whether the steelworkers should be granted a wage increase of $1 a day is a national question. Its impact upon the business of our company would be relatively unimportant, but its impact upon the nation would be serious. The government would pay about 90 per cent of any wage increase granted and the effect of this upon the nation's burden of debt and upon the entire war economy would be far reaching.

"Certainly the public believes that the President of the United States, from whom alone this board draws its power, issued a directive to you gentlemen in his recent radio address to the nation.

"He said: 'We must stabilize wages.'

"Does anyone think for a moment that it would be a step toward the stabilization of wages for this board to grant to the steelworkers any increase, when it must be obvious to all that whatever increase is here granted will forthwith be demanded by every other union in the country?

"Or, can anyone believe that the minimum hourly rate of 72½ cents applying to 3 per cent of our employes and the average hourly earnings of $1.03 covering all of our employes are substandard—even compared with present day living costs? And, I may add that our average is 5 cents above the industry average.

"And on this issue, as on that of union security, the entire public of the United States awaits your decision in this case with greatest anxiety as to what the consequences may be."

Highlights of Panel's "Able-To-Pay" Wage Report

Briefly summarized, the highlights of the panel's findings are as follows:

1. "The panel finds that all four companies are able to pay the requested wage increase of $1 a day."

2. "Profit taxes represent the government's opinion of the extent to which the government should share in the net profits of business after all other expenses, including labor costs, have been deducted. To propose that wages should be affected by profit taxes, is to propose that labor's return should be conditioned by the government's impost on industry."

The companies' earnings before federal profit taxes are ample and represent the proper criterion of ability to pay, the panel pointed out. The panel also pointed out, however, that the companies would pay only a small part of any increased labor costs—11¼ per cent under the Treasury profits tax proposal and 6 per cent under the Ways and Means proposal. The balance would cost the companies nothing.

3. "The panel finds that if a wage increase, otherwise proper, is withheld because of its effect on governmental revenues per se, such withholding would involve an unauthorized tax on workers."

4. The panel found that in March, 1941, the month before the steel wage increase last year, the hourly earnings in the durable goods industries were 12 per cent less than they were in the steel industry. During the past year, this relationship has changed so that for the year 1942 the panel estimates the hourly earnings in durable goods will be only 7.9 per cent less than steel, a shift of 4.1 per cent.

In March, 1941, the hourly earnings in all manufacturing industries were 20 per cent less than steel, whereas, for the year 1942 they are estimated to be only 17.2 per cent less, a shift of 2.8 per cent.

Expect Greater Shift

The panel estimates an even greater shift in the relationships, when calculated on a weekly basis. Its figures show that in March, 1941, the weekly earnings in durable goods were 4.2 per cent less than the weekly earnings in steel, whereas for the year 1942 durable goods will be 7.8 per cent above steel, a shift of 12 per cent. In March, 1941, the weekly earnings in all manufacturing were 16.6 per cent below steel, whereas, for the year 1942 they will be only 7.5 per cent below, a shift of 9.1 per cent.

5. The panel's estimates have been made on the assumption that there will be no increase either in wage rates or in hours of work after the month of May, 1942. The panel, however, has drawn attention to the fact that it is highly probable that hours of work will continue to increase throughout the year, except in steel. Steel is a three-shift industry working at capacity and there is no elasticity for increase of hours. The fairly stable weekly hours worked in steel and the continually increasing hours in durable goods and all manufacturing have accounted in great degree, according to the panel, for the shift in relationships which have occurred during the past year.

6. "The panel further finds that a greater weight is normally given to hourly earnings because hourly earnings fix costs and because it is proper that the worker should be paid according to the extent of his labor . . . Weekly earnings should be given more than their usual weight in the present determination of a just wage for the steelworkers."

The panel also found that the comparisons between steel and durable goods and steel and all manufacturing are pertinent, though the former is more to the point. It also found that "contrasts between present comparative relations of industries and past comparative relations are pertinent, though not controlling."

7. "The panel finds that from March, 1941, to March, 1942, the cost

NATIONAL WAR LABOR BOARD that will decide the big issue in the "Little Steel" controversy was appointed early in January by President Roosevelt, and replaced the National Defense Mediation Board.

Four members of War Labor Board are officials of labor unions.

Four members are business men, to represent employers.

Three members are university professors, to represent the public. A fourth member in this group is a patent lawyer, serving as chairman of the board.

Seated, left to right:

George W. Taylor, University of Pennsylvania economics department, vice chairman of the board.

Chairman William H. Davis, New York patent attorney.

Frank P. Graham, president, University of North Carolina.

Standing, left to right:

E. J. McMillan, president, Standard Knitting Mills Inc.

Mathew Woll, vice president, American Federation of Labor.

Walter C. Teagle, chairman, Standard Oil Co. of N. J.

A. W. Hawkes, president, Congoleum-Nairn Inc., and president, United States Chamber of Commerce.

Roger Lapham, president, American Hawaiian Steamship Co.

George Meany, secretary-treasurer, AFL.

Thomas Kennedy, secretary-treasurer, United Mine Workers of America-CIO.

R. J. Thomas, president, United Automobile Workers-CIO.

A twelfth member, Dean Wayne L. Morse, University of Oregon Law School, was not present when photo was taken.

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of living for steel towns advanced 14 per cent; average weekly earnings in the steel industry advanced approximately 13.1 per cent, and average hourly earnings advanced approximately 14.6 per cent."

The panel then compared the changes in the cost of living which had taken place since the general steel wage increase in April, 1941, with the changes in weekly earnings since April, 1941, and concluded:

"The panel believes that weekly earnings are the proper criterion for measuring the impact of rising living costs and therefore finds that the buying power of the earnings of the steel worker has decreased approximately 13.3 per cent since the last general change of wage rates in the steel industry."

8. "Inland has said that in the past, increase in steel wages spread like wildfire throughout the other industries in the country and that the same thing would happen again . . . The panel believes that general economic conditions are the principal cause of changes in wage rates, rather than any specific change in a particular industry . . .

"It is clear that the national money income shares importance with the consumer's pie, and that, though the latter will shrink, the former will grow. To ask labor to accept less than its proportionate share of the nation's money income in order to prevent labor from acquiring too much pie leaves out of account that money has value even when it must be saved."

9. "Inland and Youngstown are either presently complying with or are willing to comply with" the union's request for a minimum daily wage guarantee. "Granting the request would involve no direct additional cost to the companies."

10. "The functions of this union, in particular, are today of vital significance and its maintenance is socially desirable . . . Union security, in the form of maintenance of membership, united with the check off would—(a) make shop conditions more peaceful by diminishing friction and eliminating the solicitation of dues, (b) reduce the cost of dues' collection and benefit the union accordingly, (c) release the time of union membership and management addressed to the elimination of grievances and to a concerted effort to achieve maximum production."

Cyrus Ching dissents from this finding because "he does not believe union maintenance should be imposed in these cases." Richard T. Frankensteen dissents because "he finds the facts in these cases warrant . . . the union shop." The panel was unanimous on everything except this issue.

Other excerpts from the panel's report follow:

"1. The United Steelworkers of America has contracts with firms producing 60 per cent of the total tonnage of the entire steel industry covering more than 600,000 employes. This does not include the four companies involved in this case, which produce about 32 per cent of the total tonnage.

"2. The union's dues are $1 a month. The initiation fee is $3. The union has never levied special assessments.

"3. The union was designated the sole collective bargaining agent in the plants of the four companies in the summer and fall of 1941 when it won National Labor Relations

Board elections in Bethlehem by a majority of 70 per cent and showed the NLRB by a check of union membership records that between 70 per cent and 75 per cent of the eligible employes in the other three companies were members of the union.

"4. The union bases its demand for a general wage increase of $1 a day on the following arguments:

"(1) The steelworker has not received his share of the savings through increased productive efficiency in the steel industry.

"(2) The wages of the steelworker are inadequate when judged by standards of health and decency.

"(3) The companies are able to pay the increase demanded.

"(4) Comparable wages justify the demand.

"(5) The change in the cost of living justifies the demand."

"5. The panel finds that the union cannot ground a demand for a wage increase on the reallocation of savings through increased productive efficiency in the steel industry."

"6. The average annual income of steel workers was $1926.72 in the year 1941 . . . The panel finds that the union has not sustained its contention that wages in the steel industry are inadequate when judged by standards of health and decency."

"7. The $1 a day increase would cost Bethlehem, $23,000,000; Republic, $16,500,000; Youngstown, $4,700,000; Inland, $3,300,000.

"The 1941 earnings of the four companies before federal profit taxes were: Bethlehem, $119,758,000; Republic, $70,288,000; Youngstown, $37,624,000; Inland, $38,079,000.

"8. If the union receives the $1 a day increase, the 1942 earnings of the companies prior to Federal profit taxes would be in round figures as follows: Bethlehem, $90,000,000; Republic, $50,000,000; Youngstown, $30,000,000; Inland, $30,000,000.

"It will be noted that in each case the figure is substantially greater than any year in the 1931-1940 decade, and is in the case of Bethlehem over six times, Republic over 13 times, Youngstown over 20 times and Inland over three times the average annual earnings for the period."

. "The companies, or some of them, have questioned whether earnings before profit taxes are a proper criterion of ability to pay, and base their claim of inability, or at least of unfairness, on the premise that earnings after profit taxes are a fairer and more practical guide.

"Profit taxes represent the government's opinion of the extent to which the government should share in the net profits of business after all other expenses, including labor costs, have been deducted. To propose that wages should be affected by profit taxes is to propose that labor's return should be conditioned by the government's impost on industry. The panel's finding that this neither can nor should be the case, and the panel's finding that the companies are able to pay is not affected by the results flowing from any change of policy, relating to profit taxes, on the part of the government."

9. Should the tax proposals made by the Secretary of the Treasury be adopted, "88¾ per cent of the effect of the wage advance would be absorbed by diminished taxes and 11¼ per cent would be the net fraction borne by the companies. Should the Ways and Means committee proposal be adopted, 94 per cent of the effect of the wage advance would be absorbed by diminished taxes and 6 per cent would be the net fraction borne by the companies".

Transposing these percentages into dollars, the requested wage increase will cost Bethlehem, for instance, $2,590,000 under the Treasury proposal and $1,380,000 under the Ways and Means proposal; Republic, $1,856,000 under the Treasury proposal and $990,000 under the Ways and Means proposal; Youngstown, $529,000 under the Treasury proposal, and $282,000 under the Ways and Means proposal; Inland, $371,000 under the Treasury proposal, and $198,000 under the Ways and Means proposal.

"The panel believes . . . that if increased prices should be agreed upon, they could scarcely (in the case of Bethlehem, for example) be due to a penalty of $1,380,000 attributable to wage increases under the Ways and Means tax formula, but more probably to profit taxes of $118,000,000 which Bethlehem would have to pay under that formula even though no increase in wages were granted."

10. "The panel finds that for the year 1942 hourly earnings in the steel industry will be greater than hourly earnings in durable goods and greater still than hourly earn-

(*Please turn to Page* 126)

Steel Employment Establishes Record

STEEL industry employment rose to a new record in May when 656,000 persons were employed, compared with the prior record of 654,000 in April.

Total payrolls for the industry amounted to $117,403,000 in May, compared with $118,568,000 in April. Average hourly earnings of wage workers was $101.1 cents per hour, a new peak. Average work week during May was 37.7 hours.

	Number of Employes	Total Payrolls (dollars)	Average Earnings Per Hour (cents)	Average Hours Per Week
1939				
September	502,000	69,735,000	84.7	35.0
October	545,000	83,421,000	84.6	38.0
November	561,000	86,682,000	84.7	39.5
December	563,000	84,537,000	85.0	36.9
1940				
January	556,000	82,826,801	83.5	37.1
February	538.000	70,846,559	83.4	34.1
March	514,000	68,767,962	83.6	32.3
April	503,000	67,724,000	83.6	33.4
May	510,000	75,184,000	85.1	35.7
June	535,000	77,388,000	85.9	35.9
July	549,000	82,215,000	85.6	36.5
August	560,000	83,837,000	85.1	36.7
September	565,000	82,068,000	85.4	36.5
October	568,000	90,768,000	85.6	39.4
November	577,000	87,921,000	86.2	38.2
December	585,000	91,233,000	86.5	37.6
1941				
January	598,000	96,234,000	86.6	39.2
February	603,000	89,586,000	86.9	39.4
March	613,000	98,025,000	87.7	38.5
April	621,000	108,557,000	97.1	39.4
May	632,000	115,267,000	98.1	39.7
June	638,000	110,504,000	99.2	38.2
July	648,000	114,059,000	99.1	37.8
August	654,000	112,757,000	98.5	37.2
September	652,000	110,392,000	98.2	37.8
October	646,000	118,890,000	98.3	40.0
November	645,000	109,856,000	99.0	37.6
December	646,000	117,221,000	99.9	38.2
1942				
January	651,000	118,785,000	99.2	39.2
February	651,000	108,563,000	99.5	39.0
March	653,000	116,998,000	100.1	38.1
April	654,000	118,568,000	100.4	39.7
May	656,000	117,403,000	101.1	37.7

Carnegie-Illinois Reports More Production Records

CHICAGO

Carnegie-Illinois Steel Corp. reports five new weekly production records were established at its Chicago district plants in the week of June 22 when they rolled "a tonnage of steel plates sufficient to provide armor plate for more than 7000 light medium tanks."

Among the records was one for blast furnace output "which topped prior records by approximately 1100 tons." Gary works blast furnaces also set a record "with total production of 83,837 net tons."

The other three records related to plates. Total plate output "increased by almost 7000 tons over the best previous record which was established the week ending June 20. The 80-inch hot strip mill at the Gary sheet and tin mills, which formerly produced lighter gage steel and was recently converted to plate production, reached a new high, as did the 160-inch continuous plate mill at Gary works."

Strike Halts Operations

Carnegie-Illinois Steel Corp. was the victim of another work stoppage June 30, when 40 hookers, loaders and cranemen at its Gary, Ind., billet mill and 40-inch blooming mill refused to work at the beginning of the 4 p. m. turn. Operations were suspended and 225 workers sent home.

At midnight, a partial crew reported and the mills were operated at 50 per cent of their capacity. However, the 40 men on the 8 a. m. and 4 p. m. turns again declined to go to work.

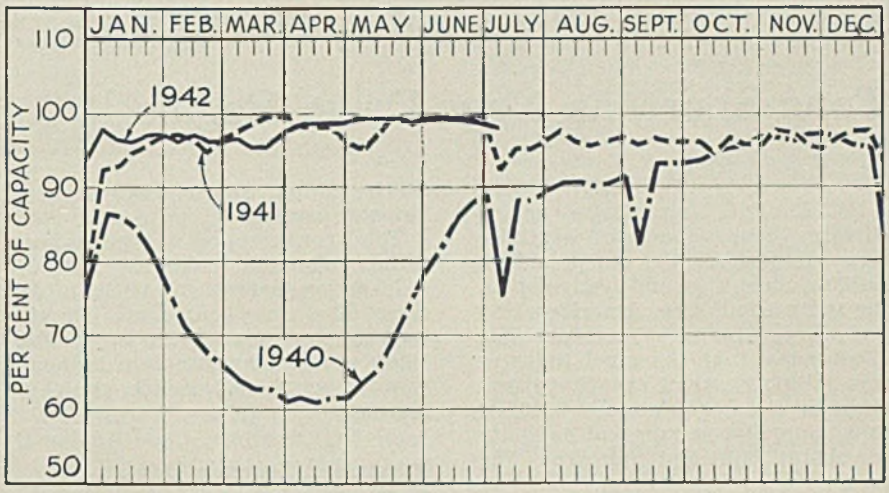
Strike was unauthorized and the union succeeded in persuading the men to return to work July 1 under threat of losing their jobs for violating union's contract with company.

1000 Records Broken by Armco Since Pearl Harbor

Breaking war-time production records has become a habit for the Ashland, Ky., division of American Rolling Mill Co.

Russell R. Smith, manager, announced July 2 the division has made 1000 production and maintenance records since Pearl Harbor, consisting of 624 operating production records and 376 maintenance records.

He also reported the division soon will more than double the total number of production records made during the entire year 1941. During June a new monthly high was set for shipments of steel, largely plates and sheets, topping the previous monthly shipping record set in May, 1941, by 1886 tons.



PRODUCTION . . . . Down

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week was down 1 point to 97½ per cent of capacity. Two districts gained, five declined and five were unchanged. A year ago the rate was 92 per cent; two years ago it was 75 per cent, both based on capacity as of those dates.

Pittsburgh — Receded 1½ points to 94 per cent, due to Independence Day interruption.

Wheeling — Gained 4 points to 83½ per cent.

Chicago — Held at 103 per cent, the highest that scrap supply will support. Two open hearths of one producer are idle for lack of scrap. Some finishing capacity shut down for the holiday.

Detroit—Three open hearths were off for repairs and the rate was down 1 point to 91 per cent.

Central eastern seaboard — Unchanged at 96 per cent, the holiday making no appreciable difference.

Birmingham, Ala.—With 23 open hearths active production continued at 95 per cent.

St. Louis — With 26 out of 28 open hearths active the rate remained at 95½ per cent. Two producers indicate lower operation early in July unless scrap supply improves.

Buffalo — Declined 2½ points to 90½ per cent as an open hearth was taken off for repairs.

Cincinnati — Advanced 2 points to 91 per cent as a shift in active furnaces was made. The holiday did not affect output.

Cleveland — Dropped 2 points to 92 per cent, a gain at one plant being more than offset by loss of one furnace at each of two plants. Steel production was not affected by the holiday.

Youngstown, O. — Three bessemers and 74 open hearths operated last week, holding production at 95 per cent for the fourth week. There was no holiday interruption to steelmaking. A serious breakout at a Carnegie-Illinois Steel Corp. blast furnace has put it out of production for a month. The same rate is scheduled for this week.

New England — Declined 5 points to 95 per cent because of furnace repairs.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended July 4	Change	Same week 1941	Same week 1940
Pittsburgh	94	— 1.5	97.5	64
Chicago	103	None	101.5	77
Eastern Pa.	96	None	92	72
Youngstown	95	None	90	70
Wheeling	83.5	+ 4	87	75
Cleveland	92	— 2	92.5	69
Buffalo	90.5	— 2.5	75.5	74
Birmingham	95	None	90	71
New England	95	— 5	90	80
Cincinnati	91	+ 2	81.5	54
St. Louis	95.5	None	98	52
Detroit	91	— 1	83	79
Average	97.5	— 1	*92	*75

*Computed on basis of steelmaking capacity as of those dates.

J. & L. Takes Over Otis Steel Plants

Jones & Laughlin Steel Corp. last week added approximately 1,000,000 tons steelmaking capacity when it formally took over control of the plants of Otis Steel Co., Cleveland. Sale of Otis, a $93,000,000 transaction, was ratified by stockholders April 24.

E. J. Kulas, Otis president, becomes a member of the board of directors of Jones & Laughlin and vice chairman of the executive committee.

Scrap Supply Reported 4,000,000 Tons Short, as New Drive Begins

NEW YORK

STRESSING importance of recovering every pound of available scrap, Robert W. Wolcott, president, Lukens Steel Co., and chairman of the scrap committee, American Iron and Steel Institute, declared last Wednesday that the steel industry was falling short of capacity operations by a rate of almost 4,000,000 tons annually, because of inability to obtain sufficient pig iron and scrap.

He said it was impossible to get more pig iron at present as blast furnaces are being operated at capacity, and he did not see any material improvement in this direction for some time to come. Consequently the industry has to look to scrap not only to contribute to maintenance of present operations but to provide for still greater use of present steelmaking capacity.

He estimated there are 5,000,000 to 8,000,000 tons of "dormant" scrap in this country which would help materially at this time and appealed to everyone to assist in the national salvage program which is to get under way later this month.

He spoke at a meeting of publicists called by McCann-Erickson Inc., Rockefeller Plaza, advertising firm, which has been selected to handle the $1,500,000 to $2,000,000 scrap-collection advertising campaign sponsored by the steel industry. (STEEL, June 8, p. 37). Purpose of meeting was to outline details.

Other speakers were Paul C. Cabot, deputy chief, Bureau of Industrial Conservation, Washington, who spoke of the nation-wide organization set up through his bureau; Edward D. Madden, vice president, McCann-Erickson; and E. C. Barringer, president, Institute of Scrap Iron and Steel Inc., who discussed the importance of scrap in the war effort. H. K. McCann presided.

Scrap Stocks 5 Per Cent Greater at End of April

Domestic stocks of iron and steel scrap at consumers', suppliers' and producers' plants at the end of April approximated 4,324,000 gross tons, an increase of 5 per cent over the 4,101,000 tons reported March 31, according to the Bureau of Mines.

The increase resulted from the fact that consumers' stocks were more than 6 per cent greater and suppliers' and producers' tonnage 2 per cent larger. The main increase came from 10 per cent larger stocks of purchased scrap at consumers' plants.

Total consumption of ferrous materials, pig iron and scrap was 9,017,000 gross tons in April, a decline of 2 per cent from March, entirely due to the shorter month. Daily average consumption in April was 1 per cent greater than in March.

Intensified Salvage Drive To Be Started July 13

WASHINGTON

Intensified nation-wide salvage program, designed to reach every home and industrial plant and increase the flow of all scrap materials, has just been announced by Donald M. Nelson, WPB chairman and Lessing J. Rosenwald, chief, Bureau of Industrial Conservation.

The campaign starts Monday, July 13.

Beginning this month, the 12,000 state and local salvage committees will have new forces at work to help them, provided by private industry working in co-operation with the Bureau of Industrial Conservation.

While the Bureau of Industrial Conservation considers the new campaign as an integrated whole, it has the following clearly defined parts:

1. An intensified campaign to collect metals, especially iron and steel, and rubber and other waste materials which will flow through regular channels of trade.

2. A waste fats campaign, in which housewives will be urged to sell their waste kitchen fats, such as bacon drippings, to meat dealers who will send them back through the normal channel of trade.

3. A tin can collection campaign which is to be carried out only in selected localities, and then only when local announcements are made.

These industry advertising campaigns will be closely integrated with the program of the Bureau of Industrial Conservation and will take advantage of the fact that the summer is the best time of year to build up stockpiles of waste material.

The national scrap harvest to be conducted in rural areas with the co-operation of other federal and local agencies and the assistance of the farm implement industry will be part of the program as the sumber advances. The program will get under way in the South and work north with the agricultural harvest season. The over-all advertising campaign will tie in with this special effort to get scrap metal out of the farm areas before its movement is handicapped by winter weather.

Officials of the bureau made it clear that all organizations which have taken a part in the program to date would continue to be used —the volunteer workers of local defense councils, the various charities who have collected waste materials, and the youth organizations which have already done an outstanding service to the nation in the collection of scrap and waste materials. For example, the Boy Scouts have already announced a national "Treasure Hunt" for scrap which aims to "build a bridge between the homes of this country and the yards where materials are sorted, graded, processed, packed and shipped."

John Hulst, Veteran U. S. Steel Engineer, Retires

John Hulst, vice president, United States Steel Corp., New York, retired last week after 40 years' association with the corporation and its subsidiaries.

Veteran of the period of the industry's greatest development, Mr. Hulst was active in U. S. Steel's extensive program of plant modernization. He frequently has been cited as one of the best steel engineering minds in America.

A native Netherlander, he came to America in 1874, attended grade and high schools of Grand Rapids, Mich., graduated in mechanical engineering from the University of Michigan in 1895.

Mr. Hulst entered the steel business as a draftsman with the Ohio Steel Co. in Youngstown, O. In 1900 he went with the South Sharon Steel Co. and in 1901 became chief engineer of Mingo works, National Steel Co. Later in 1901, he returned to Ohio works as chief engineer and occupied this position for 11 years until 1912, when he became chief engineer of Carnegie Steel Co. in Pittsburgh. In 1916 he was appointed assistant to vice president of U. S. Steel Corp. at New York and in 1926 was made vice president.

Mr. Hulst is a member of the Engineers Society of Western Pennsylvania, American Society of Mechanical Engineers and American Iron and Steel Institute.

Total volume of industrial development in the Chicago area in June amounted to $108,708,000 compared with $11,568,000 for June, 1941, according to the industrial department, Chicago Association of Commerce.

Group Classification Certification Still Required on Iron, Steel Orders

INTRODUCTION of Allocation Classification Symbols has not eliminated the necessity of certifying on iron and steel orders that the material is required for a certain group classification, as required by Amendment No. 3 to Order M-21.

WPB has advised that while the group classification notation will be supplanted by the Allocation Classification Symbols, buyers should use both until such time as the latter classifications have filtered down through all industry. Iron and steel producers still are required to submit data to WPB classifying their shipments in accordance with the groups listed in M-21.

Some steel sellers are advising their customers to furnish information under both M-21 and Allocation Classification requirements, pointing out that this arrangement likely will continue until such time as WPB prescribes a report form and establishes a filing date covering Priorities Regulation No. 10 (Allocation Classification System). Possibility is seen of such continuation until July 31, since that date has been fixed for final reporting to suppliers of symbols applying to orders placed prior to June 30 and uncompleted July 31.

The fact that in announcing the Allocation Classification System WPB explained that "it will supersede a variety of use classifications now required under Materials ("m") orders" has created considerable confusion among buyers of nonferrous metals as well as of iron and steel. Aluminum purchasers for some time have been required by Order M-1-f to give detailed information concerning use of material being ordered, and many buyers have assumed such data no longer are required. Actually there has been no revocation of this requirement, however, nor has there been any advice from WPB that it will be.

In the case of copper, Form PD-175 which heretofore accompanied all purchase orders and indicated the part into which the material would be incorporated and its end-use, has been suspended. Hereafter brass mills, wire mills and brass foundries will be required to obtain only Allocation Classification information from their customers.

PRIORITIES—ALLOCATIONS—PRICES

Weekly summary of orders and regulations issued by WPB and OPA, supplementary to Priorities-Allocations-Prices Guide as published in Section II of STEEL, July 6, 1942.

M ORDERS

M-24-a (Amendment): Iron and Steel Scrap, effective July 1. Extends regulations covering disposition of tinned and detinned scrap to certain counties of Missouri, Kansas and Texas.

M-63 (Amendment): Imports of Strategic Materials, effective July 2. Requires filing of PD-222-C with WPB for authorization to import material whether in bond or otherwise, including importation for transshipment to foreign countries.

M-154: Thermoplastics, effective June 27. Defines sequence in which orders for various purposes are to be filled.

M-158 (Amendment): Drum Exterior Coatings, effective June 27. Permits use of coatings manufactured before June 6, 1942. Limits order application to drums of 29 gage or heavier steel.

M-161 (Amendment): Inventory Restrictions, effective June 26. Lifts restrictions on paper and paper products, waste paper and ilmenite.

M-166: Flag Fabrics, effective June 27. Assigns A-2 rating to fabric deliveries to flag manufacturers.

M-178: Butadiene, effective July 1. Provides for allocation. PD-33 used by buyers to request delivery.

M-181: Small Diamond Dies, effective July 1. Places dies with diameter of 0.0015-inch or less under complete allocation. Suppliers file PD-559 with WPB by 15th each month, consumers file PD-560 by same date.

P ORDERS

P-41-c: Defense Projects, effective June 26. Assigns A-1-a rating to China National Aviation Corp. for material for war project construction in Far East.

P-89 (Amendment): Chemical Plants, effective June 24. Removes restrictions on size of coal and coke inventories of such plants.

P-118 (Amendment): Dairy Machinery, effective June 26. Raises assigned ratings to A-1-j for materials for maintenance or repair and A-3 for materials for operation or replacement of dairy equipment.

L ORDERS

L-139: Dental Equipment, effective June 25. Schedule I reduces by about 50% types and sizes of dental excavating burs permitted to be manufactured.

PRIORITIES REGULATIONS

No. 10 (Amendment). Exempts use of Allocation Classification Symbol and Purchaser's Symbol from single purchase orders or contracts totaling $15 or less. Distributors not required to indicate Allocation Classification Symbol on material purchased for resale to retailers, but must use Purchaser's Symbol (DP) on purchase orders.

PRICE SCHEDULES

No. 6 (Amendment) Iron and Steel Products, effective June 30. Provides uniform rules for application of extras on cold finished bars and shafting; requires iron and steel producers to file data with OPA covering conversion and processing charges; defines conditions under which discounts on concrete reinforcing bars are to be given.

No. 113 (Amendment)—Iron Ore, effective July 2. Excludes exchanges of ore between producers from price regulations, also Minnesota ore mined south of Minneapolis.

No. 136 (Revised)—Machines and Parts, effective July 22. Defines specific items for which maximum prices are those in effect Oct. 1, 1941, and those in effect March 31, 1942. Sets March 31 as basing date for machinery services.

MEETINGS

Nelson To Address Automotive Council for War Production

Donald M. Nelson, WPB chairman, will address the first annual meeting of the Automotive Council for War Production, July 10, at the Book-Cadillac hotel, Detroit. His address will climax a one-day meeting which will include visits to war plants in the Detroit and Pontiac areas, a luncheon and business session in the afternoon. Other government and industry executives will speak. Estimates indicate more than 1000 officials of the auto and allied industries will attend.

Tool Engineers

National officers of the American Society of Tool Engineers and chairmen of the New England chapters of the society have started plans for a War Production Conference to be held in Springfield, Mass., Oct. 16-17. Five technical sessions have been scheduled. The conference committee, headed by the past national president, F. W. Curtis, is composed of the chairmen of the seven New England chapters and heads of Northern New Jersey and New York chapters.

Chemical Conference

Chemistry in the solution of wartime problems will be discussed at the second biennial National Industrial Chemical Conference and Exposition in Stevens hotel, Chicago, Nov. 17-22. At a forum, leading authorities will talk on recent discoveries and processes in advancement of applied chemistry. The show this year will be twice as large in floor space as the first exposition. About 75 per cent of the available space is under contract.

Hardware Associations

Forty-eighth annual convention of the National Wholesale Hardware Association and the American Hardware Manufacturers Association will be held in Palmer House, Chicago, Oct. 19-21. A number of addresses by officials of the War Production Board and OPA are scheduled.

WINDOWS of WASHINGTON

By L. M. LAMM *Washington Editor, STEEL*

Automotive industry increases war materials shipments 46 per cent in two months. Conversion has been rapid . . . Uses of tin and terne plate further restricted . . . Advisory committee on lake shipping named

WASHINGTON

WAR shipments by the automotive industry were 46 per cent greater in April than in February.

This report on the progress of conversion of the vast industry to war work is based on reports from 432 plants of 157 companies, which, on the basis of labor employed make up 72 per cent of the industry.

Compiled by WPB's Automotive branch, the report covers eight large automotive manufacturers, nine truck companies and 140 parts companies.

These companies reported April shipments of $420,000,000, of which 83 per cent were war goods. War shipments increased from $239,000,000 in February to $349,000,000 in April, while non-war shipments declined from $145,000,000 to $72,000,000.

Value added of war products increased 53 per cent. Value added represents the difference between the money value of shipments and the cost of materials and parts supplied. These 432 plants had a total value added on war work in April of $188,000,000, compared with $123,000,000 in February.

Thus the April shipments of war goods from these companies, 72 per cent of the industry, was at an annual rate of more than four billion dollars, while the value added was at the rate of 2¼ billion dollars a year.

Some shipments from parts companies may have gone to automobile manufacturers or truck companies and the figures on total shipments, therefore, would include some duplications. Value added includes no duplications.

In the eight automobile manufacturing companies, value added on war goods increased 87 per cent, from $54,000,000 to $102,000,000. War shipments increased 64 per cent, from $113,000,000 to $186,000,000. Companies included General Motors, Ford, Chrysler, Studebaker, Hudson, Packard, Nash and Graham Paige, which operate 182 plants.

Man hours on war work in the group increased from 17,000,000 in February to 47,000,000 in April, or 160 per cent.

"Although 30,000,000 man hours were added in April over February, preparation for war work is not included in the April man-hour figures and a substantial additional quantity would be noted, if these figures were available," Ernest Kanzler, Chief of the WPB Automotive Branch, reported.

In the 432 plants, which employed 561,480 persons in April, man hours increased from 65,000,000 in February to 104,000,000 in April. Of the 39,000,000 increase, 36,000,000 of it was on war work, which went from 39,000,000 man hours in February to 75,000,000 in April. Thus man hours on war work were 92 per cent greater in April than in February and war work comprised 72 per cent of the total man hours in these 432 plants.

It has been estimated that when these plants reach their maximum war production, the total man hours will be 1,350,000,000 a year. The 75,000,000 man hours on war work in April was at an annual rate of 900,000,000, or two-thirds of the way toward the war man power peak.

Advisory Committee for Great Lakes Transportation Appointed

Formation of an advisory committee on Great Lakes transportation was announced last week by Joseph B. Eastman, director of defense transportation. The committee will act as an advisory body to A. T. Wood, director of ODT's division of Great Lakes carriers.

Members are:

A. H. Ferbert, president, Pittsburgh Steamship Co., Cleveland; Sparkman D. Foster, Foster, Yost & Lott, Detroit; E. B. Greene, president, Cleveland-Cliffs Iron Co., Cleveland; Elton Hoyt II, president, Interlake Steamship Co., Cleveland; George M. Humphrey, president, M. A. Hanna Co., Cleveland; Wm. A. Reiss, president, Reiss Steamship Co., Sheboygan, Wis.

Exempt Trading of Iron Ore by Producers from Price Regulation

Trading or exchanging of iron ore between producers has been excepted from the price provisions of Maximum Price Regulation No. 113, which covers iron ore produced in Minnesota, Wisconsin and Michigan by OPA.

Excluding of these transactions from price provisions is one of seven changes in Regulation No. 113 made by Amendment No. 1 to the Regulation, which become effective July 2.

Amendment No. 1 affects the following:

1—Excludes exchanges or trades of ore from the regulation, but requires, however, the submission of reports on certain types of exchanges or trades.

2—Provides for the deduction of allowances for shrinkage, insurance and analysis.

3—Clarifies the provision relating to escalator clauses in long-term contracts.

4—Places sellers under long-term contracts for delivery at the mine or at upper lake ports on the same basis as other sellers with respect to freight absorption.

5—Clarifies the provision covering new sellers to include sellers of classifications or grades of ore not sold in 1941.

6—Excludes from the regulation ore mined in Minnesota south of Minneapolis.

7—Establishes Granite City, Ill., as in effect a new alternating basing point.

H. W. Dunbar Resigns as WPB Tools Section Executive

H. W. Dunbar, who has been assistant chief of the Tools Branch, WPB Production Division, has resigned effective July 1 and has left Washington. He will return to the Norton Co., Worcester, Mass. Mr. Dunbar is being succeeded by B. H. Bickle of the Gleason Works, Rochester, N. Y., and A. M. Steadfast, of Steadfast & Roulston, Boston.

Uses of Tin, Terne Plate Are Further Curtailed

Manufacture or use of tin plate or terne plate cans for many chemicals, paints, and other "special products" has been prohibited in a revision of Conservation Order M-81.

Among the special products for which tin plate or terne plate cans are not permitted are the following:

All paint and related products. (An exception is made in the case of shellac, lacquers, varnish removers, lacquer thinners, and lacquer stains, which may use terne plate, but not tin plate cans.)

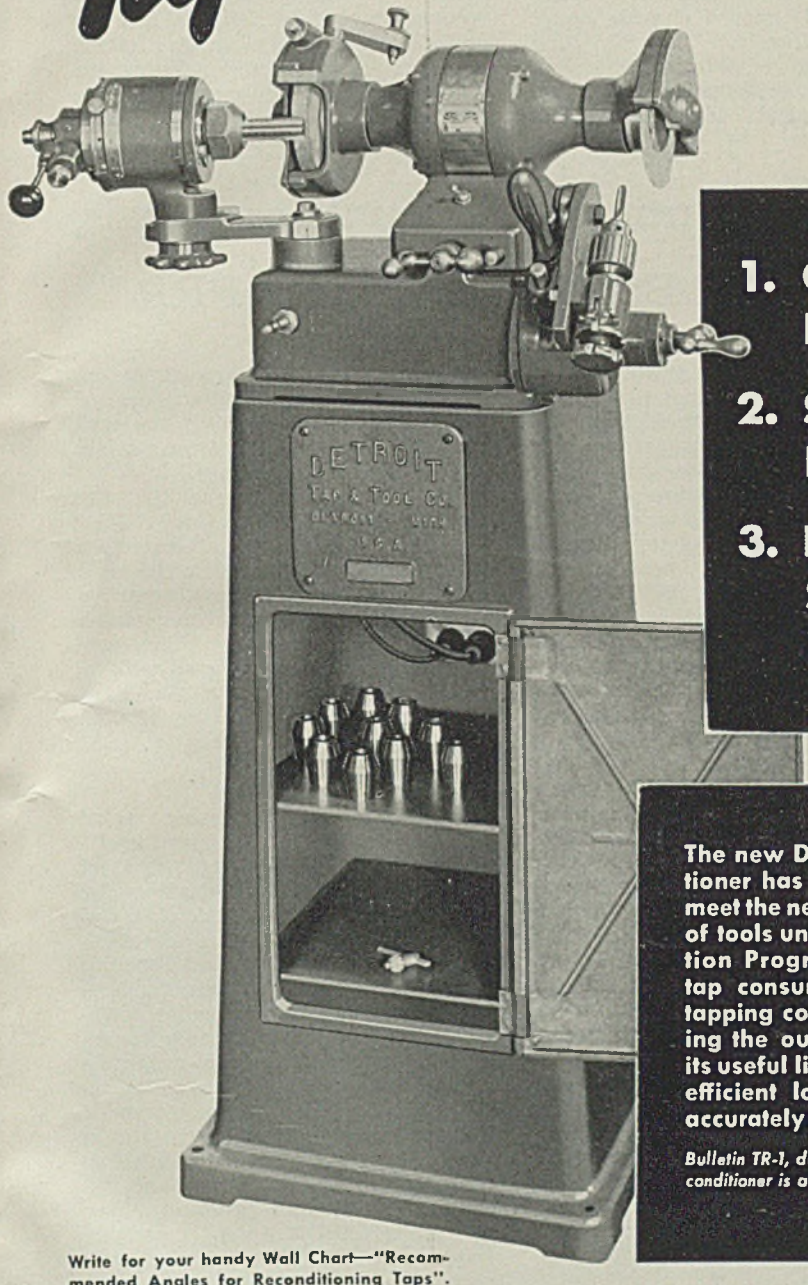
Health supplies (except chloroform, ether, and blood plasma for the armed services or the Red Cross.)

Alcohol; cements, including rubber, linoleum, and radiator; fly spray; lighter fluids; acetone; amyl acetate; oleic acid; sodium silicate; dry cleaners; turpentine; phenols and benzols; and glycerine.

Dyes; graphite; liquid soap; glues

THE NEW DETROIT

Tap Reconditioner



1. CHAMFERS R. & L. H. TAPS
2. SPIRAL POINTS
3. POLISHES SPIRAL POINTS

The new Detroit Tap Reconditioner has been developed to meet the need for conservation of tools under the War Production Program by decreasing tap consumption, decreasing tapping costs through increasing the output per tap during its useful life and providing an efficient low-cost method of accurately reconditioning taps.

Bulletin TR-1, describing the Detroit Tap Reconditioner is available on request.

Write for your handy Wall Chart—"Recommended Angles for Reconditioning Taps".

DETROIT TAP & TOOL Company 8432 BUTL
DETROIT

and paste; waxes; and polish.

The revision also prohibits the packing of the following products in tin plate or terne plate after Oct. 31: Hardened edible oils; hardened or unhardened lard; edible liquid oils; fish fillets; crab meat; and shrimp.

Restriction on Use of Chrome Chemicals Eased

Restrictions on the use of chrome chemicals, particularly in the manufacture of pigments and printing inks, have been eased by WPB.

Revisions were made in Orders M-18-b, covering various uses of chrome chemicals, and M-53, which relates to the use of chrome pigments in printing inks.

The orders cover chrome chemicals only and have no bearing on metallurgical or refractory grades of chromium. Approximately 12 per cent of the total chromium supply is used for chemicals, of grades not adaptable for other uses.

M-18-b lifts the restriction on the manufacture of chrome pigments from 90 per cent of the base period, the year ending June 30, 1941, to 100 per cent. Use of chrome chemicals in the manufacture of ceramics, soap and glass, heretofore prohibited, is limited to 100 per cent of the base period. In roofing materials, also prohibited by the original order, 50 per cent of the base period use may be consumed. For leather tanning the restriction is from 90 to 100 per cent.

M-53 permits the use of chrome pigments in printing inks of 100 per cent of the amount used in 1941, instead of 70 per cent and makes other technical changes in the order.

New Shifts in War Board Organization Projected

Details of a major division of activities among WPB and other war agencies are reported to have been laid before Donald M. Nelson.

W. H. Harrison, who as chief of the WPB Production Division has primarily been concerned with development of materials-producing facilities, is slated, according to good authority, to join General Brehon Somerville's Services of Supply organization now being established in the War Department. Mr. Harrison will receive the rank of Brigadier General, for which his nomination is pending. He now holds the rank of colonel.

This change is in line with the Nelson policy that as creation of new production facilities for materials declines, and the problem becomes one of production itself, the functions belong to the other agencies concerned. The recent order virtually terminating new materials-producing facilities, in favor of utilizing available materials themselves for additional war production, made it advisable for Col. Harrison to give more attention to war procurement.

This policy may extend to other WPB activities. Meanwhile, it is reliably expected that the Army and Navy Munitions Board will be transferred bodily to the WPB organization. The British American Joint Resources and Production group will be placed directly under James S. Knowlson, now directing WPB Industry Operations.

There is a projected consolidation of the Materials Division and the Division of Industry Operations, under a WPB head not yet formally designated; likewise a consolidation of several other old WPB divisions is likely. The fate of the Division of Civilian Supply in these changes is not yet clear.

The Iron and Steel Branch, along with other older divisions of WPB, will remain intact. Actual changes still to be made, it is said, are known only to Mr. Nelson and his immediate advisers at this stage, and probably will not become known until definitely decided upon by him.

WPB Determining Amounts of Metals, Ratings To Be Allowed Under PRP

MORE than 11,000 third quarter applications under the Production Requirements Plan have been received by WPB. Most large users of metals are believed to have met the July 1 deadline.

Facilities have been set up in the Production Requirements Branch and in the industry branches of the WPB to handle the PRP applications, and companies will be notified within a reasonable length of time of the quantities of materials they will be authorized to receive during the third quarter, and the ratings which they may apply to their orders.

To take care of cases in which the approved PRP certificates were not returned to the applicant by July 1, an interim procedure was set up under the terms of Priorities Regulation No. 11. Companies which have properly filed a PRP application before the deadline, may continue to use or extend ratings previously assigned to them, until they receive their PRP certificates. However, they may not receive in this way more than 40 per cent of their estimated requirements of any material for the whole of the third quarter, and any materials so received must be deducted from the amount authorized on their third quarter PRP certificate.

Amounts and quantities of materials authorized under the PRP for the third quarter, and the level of ratings for industries and individual companies, are being determined in accordance with broad policies established by the Requirements Committee of WPB, assisted by the Army and Navy Munitions Board, and the various industry branches. The ratings assigned to any particular company, and the quantity of materials which will be authorized, are dependent in part upon the volume and type of war orders which the company is working on, and also upon the importance of the company's product in the war economy, regardless of previously issued preference ratings.

Mr. Knowlson explained that the third quarter program under PRP is necessarily a stage of transition from primary emphasis on the level of preference ratings to a quantitative control of material for which ratings may be used. The procedures currently employed will inevitably be modified in the light of experience when the fourth quarter program is prepared.

Differential in Ratings

However, in processing third quarter applications it is the intention of WPB to keep the total amount of scarce materials for which preference ratings are authorized within the limits of the estimated supply, and it is therefore hoped that, in most cases, the ratings assigned to particular companies will be high enough to enable them to obtain the materials which they are authorized to receive during the quarter. It is, of course, necessary to maintain a differential in preference ratings so that vital war industries and indispensable civilian producers may be assured of filling their materials requirements if the total supply should prove insufficient to cover all rated orders during the quarter.

Use of the recently announced Allocation Classification symbols (STEEL, June 22, p. 52-A) on purchase orders and reports to WPB will provide additional information as to end uses of a manufacturer's products for consideration in making materials authorizations under PRP for the fourth quarter.

Charles M. Schoenlaub, who has been acting chief of the Production Requirements Branch, has been made chief of the branch.

War Orders To Be Rerated To Permit More Flexibility in Priority System

WASHINGTON

PROVISION for rerating war orders and for applying a new series of high preference ratings has been made in Priorities Regulation No. 12, just issued, and in amendments to Priorities Regulations Nos. 1 and 3.

The new ratings are AAA, AA-1, AA-2, etc., all of which will take preference over A-1-a ratings. Heretofore the highest rating has been AA, use of which was permitted only by special authorization of the Director of Industry Operations. This rating is now abolished, and all outstanding AA ratings are automatically changed to AA-2.

Chief purpose of the rerating is to permit greater flexibility in the assignment of preference ratings to definite quantities of military and related nonmilitary items, most of which have recently been either AA or in the A-1 series. It will permit use of the top ratings for a balanced program of urgent war materials without seriously disturbing the pattern of ratings for other war and essential civilian orders.

The new high ratings may be assigned either directly by the Director of Industry Operations or by appropriate officers of government war agencies expressly authorized to issue reratings. A special form, PD-4X, called a "Rerating Direction," is prescribed for use where the Army, Navy or other government war agency rerates deliveries of war materials to be made directly to it.

Whenever a rerating direction is issued, it must include the Allocation Classification and Purchasers' Symbols required by Priorities Regulation No. 10.

A separate form called a "Rerating Certificate," PD-4Y, is provided for use by a manufacturer whose deliveries to a war agency have been rerated, so that he may in turn rerate related deliveries to be made to him. The test for determining what deliveries may thus be rerated by a manufacturer or his suppliers is substantially the same as the test for determining to what deliveries an original rating may be applied or extended, as specified in Priorities Regulation No. 3, which was recently amended to provide a uniform standard in this respect.

Reratings May Be Extended

A manufacturer may apply or extend the rerating to material which will be delivered by him on a rerated order, or physically incorporated in material so delivered, or to restore inventories to a practicable working minimum when material has been taken from inventory to fill a rerated order.

The new ratings may also be used by small companies for certain operating supplies which will be consumed in filling the rated order, up to 10 per cent of the cost of materials to be processed, provided that not more than 25 per cent of such operating supplies are metals in the forms listed in Priorities Regulation No. 11. Such reratings may not be used to obtain operating supplies by any company whose use of the metals listed in Regulation 11 amounts to more than $5000 in a quarter.

PRP No Barrier

Companies operating under the PRP are specifically authorized, like other companies, to apply or extend the higher ratings, to rerate deliveries to themselves, but may not use the ratings to obtain greater quantities of material than they are authorized to receive on their PRP Certificates (Form PD-25A) or a supplementary certificate issued upon application on Form PD-25F or PD-25H.

Priorities Regulation No. 1 has been amended by altering the provision with respect to displacement of rated orders by new orders bearing a higher rating. Previously, no producer was required to divert material already processed to fill an order rated A-10 or higher which was within 15 days of completion, even when he received a new order with a higher rating, unless the new rating was AA. Hereafter, this provision applies only in case the rating on the original order was higher than A-2. Such an order within 15 days of completion must be displaced only by a new order with an AAA rating, or by specific direction from the WPB.

In no case, however, is a company required to terminate existing production schedules in less than 15 days after receipt of a new rated order, and a company may continue on its existing production schedule up to a maximum of 40 days if change is impracticable, unless specifically instructed to change the schedule by the Director of Industry Operations.

Priorities Regulation No. 3 is amended to conform to the provisions of Regulation 12, and the amendments to Regulation 1. The amendment to Regulation 3 also modifies the previous provision with respect to simultaneous extension of several different ratings. Whereas previously a company having several different ratings to be extended to orders for the same material could put them all together and write one purchase order for the entire quantity, using the lowest rating for all of it, this will now be permitted only when it is not commercially practicable to rate and obtain the items separately.

WASHINGTON TODAY: Capital of the Four Freedoms greeted 14 heroes of World War II recently, and the photographer caught this interesting picture, as they paraded past the capitol building. The visitors were greeted at the White House by President Roosevelt and the British ambassador, Lord Halifax, and then received by members of Congress. NEA photo

Bureau of Mines Reorganized To Accelerate Domestic Mineral Output

WASHINGTON

REORGANIZATION of the Bureau of Mines to help increase domestic production of strategic and critical minerals for the war program was announced last week by Dr. R. R. Sayers, director. "Streamlining" will be designed to increase output of ores, enlarge production of processed minerals and obtain greater use of substitute metals for those which the United States lacks.

"To win this war we must get more American metals and other minerals out of the ground and into the nation's factories to produce ships, tanks, trucks, planes, guns and other weapons," said Secretary of the Interior Harold L. Ickes who directed the reorganization.

The bureau has worked out and tested a large number of metallurgical methods and processes which should be used to provide much needed war materials at once, Mr. Ickes explained. He expects the changes will accelerate the movement of processes from the laboratory and pilot-house stage to commercial production.

Sponge Iron Again

"I am asking the bureau to help remove the bottleneck in steel for cargo ships and tanks and guns by bringing sponge iron plants to make up for the shortage of scrap iron and steel (Steel, June 29, p. 44). We have got to lick the job of getting more aluminum for planes from America's low-grade bauxites and clay. We have got to supply more tungsten for our high-speed steel tools by producing every pound of that vital metal from small, low-grade deposits scattered throughout the West.

"We must provide sufficient chrome from our low-grade domestic ores to provide tough armor plate for the warships we are building. We must build up our production of ferromanganese to keep the steel mills running, and produce more electrolytic manganese as a substitute for nickel.

"We must step up production of magnesium, and develop newer and better ways of producing magnesium for planes and motors and incendiary bombs."

The bureau reorganization includes the establishment of three regional offices which will operate under the supervision of Dr. R. S. Dean, assistant director. These offices will be located at Salt Lake City, Utah, for the western states; Rolla, Mo., for central states; and College Park Md., for eastern and southern states. Each office will be headed by a regional engineer and an assistant regional engineer, whose functions will be to supervise, initiate and execute investigations approved by the office of the director leading to the more rapid use of mineral resources in the region under their supervision.

The regional engineers will supervise the operation of the bureau experiment stations in their respective regions and will direct laboratory investigations, as well as prepare such analysis and reports as will speed the production of minerals needed for the war. Under the jurisdiction of the regional engineers will be district engineers to states or districts within the regions.

The regional engineers also will have project engineers and other technologists and scientists.

Regional engineers will take over all the functions and duties in the field previously assigned to the Mining, Metallurgical and Nonmetals divisions of the Technologic Branch which are now abolished. To advise the office of the director and to perform fact-finding functions and handle reports from the regional engineers, a Resources and Laboratories Service, containing a Mineral Processes Division, a Mining Division and a Laboratories Planning Division, has been established with a small staff in Washington.

The reorganization order also provides for the establishment of a Fuel and Explosives Service within the bureau, which will take over the Coal Division, the Petroleum and Natural Gas Division and the Explosives Division, all of which were part of the abolished Technologic Branch. Operation of the helium plant at Amarillo, Tex., will be under the jurisdiction of the Petroleum and Natural Gas Division, as formerly. All laboratories working exclusively on petroleum or exclusively on coal will also operate under the Chief of the Fuels and Explosives Service, as will sections of other laboratories devoted to petroleum, gas or coal. All other laboratories are transferred to the appropriate regional offices.

Another change in organization is the abolition of the Administrative Branch and position of assistant to the director and the establishment of the position of administrative assistant. Editorial, information, industrial motion picture and graphic functions of the Bureau also are consolidated by the order.

Stephen M. Shelton, a bureau metallurgist and an authority on the recovery and processing of manganese and other ores, has been appointed regional engineer for the southern and eastern states under the new program, Dr. Sayers announced. Mr. Shelton played an important part in the origin and development of the electrolytic manganese process while doing research work at Reno, Nev.

Tungsten Placed Under Tighter Control by WPB

Tungsten, essential ingredient of hardened steels critically needed in war production and armament, has been placed under further allocation and end-use control by an amendment to General Preference Order M-29.

While tungsten is urgently needed for alloy steel, the small amount needed for electric light bulbs will not be affected by this amendment, though allocation control in the original order still applies.

The principal effect of the new amendment is to place under complete allocation and end-use control all tungsten ores and concentrates.

The amount of contained tungsten which may be delivered to any one person in any one month without restriction is reduced from the 100 pounds allowed in the original order to a new maximum of 25 pounds.

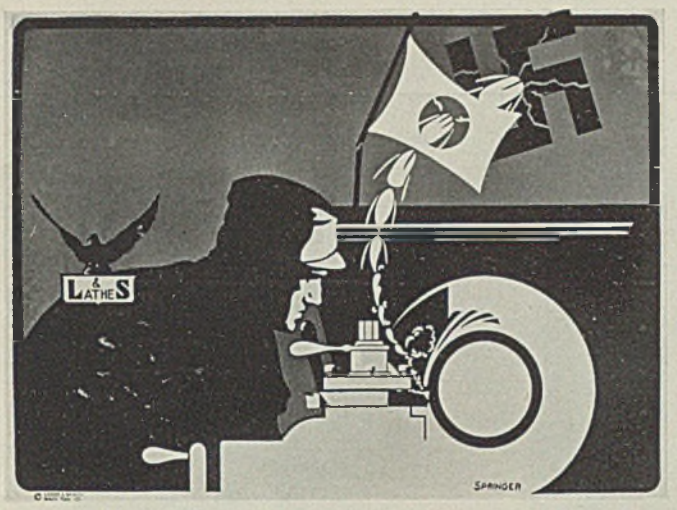
Definition of "tungsten"—the material covered by the order—is broadened to include any substance whatever containing recognizable tungsten, in any stage of process, except alloy steel, high speed steel, tool steel, and finished tools.

To encourage production of concentrates, the amendment allows delivery without restriction of ores or concentrates containing less than 20 per cent tungsten to processors for concentration, or dealers, though no dealer may hold such stocks longer than 60 days.

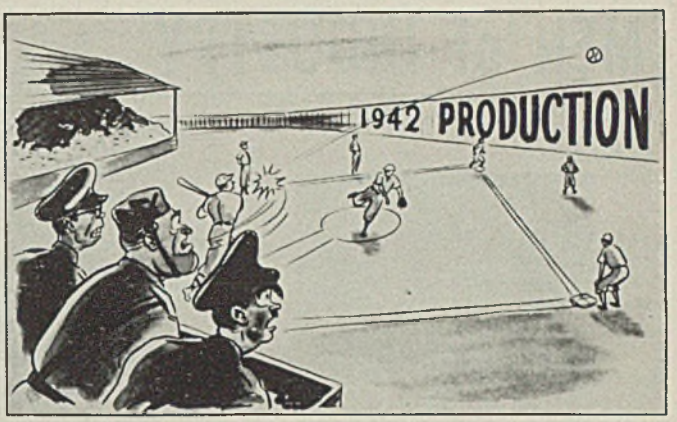
Persons desiring allocations of tungsten must apply for it on Form PD-9-c before the 20th of the month preceding delivery, sending copies to WPB and to the supplier. Form PD-9-d covering inventory, and proposed production must accompany PD-9-c.

MRC Increases Quantity, Price of Bolivian Tin

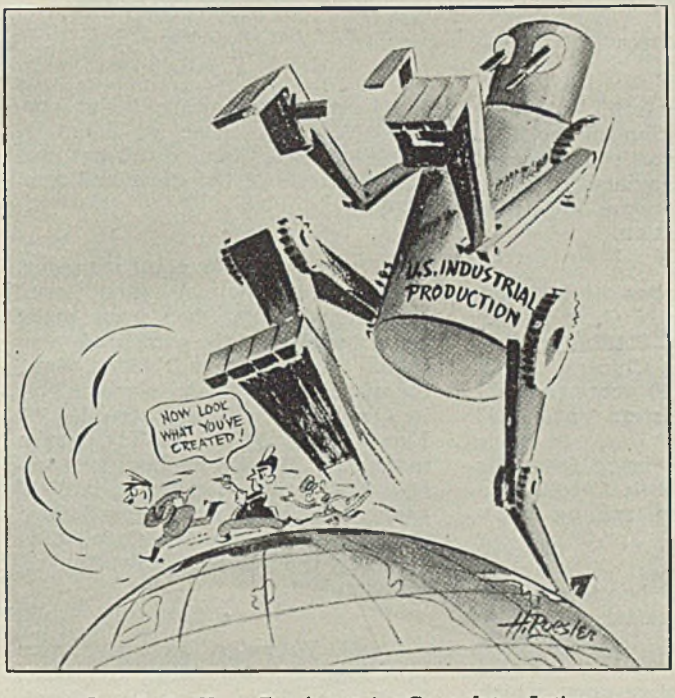
Agreement between Metals Reserve Co. and Bolivian tin producers, increasing the quantity of tin ores and concentrates which may be delivered to MRC during the period ending June 30, 1943, and increasing the price of the tin content of the material delivered during that period to 60c per pound f.o.b. Chilean and Peruvian ports, has been announced by Jesse Jones, Secretary of Commerce.



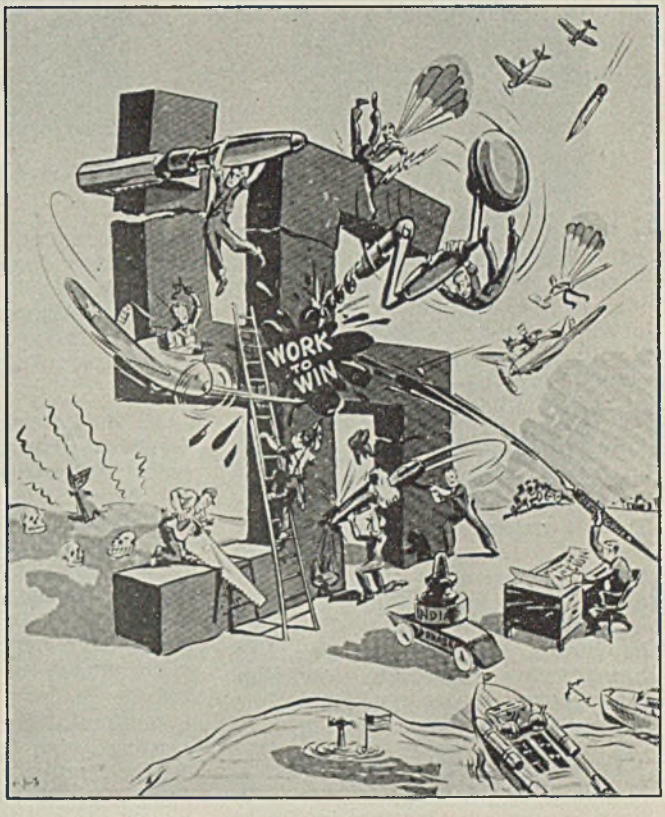
Flying Chips from the Lathe Will Defeat the Axis



We Have the Ol' Batting Eye Now



America's New Frankenstein Goes Into Action



Demolition Squad

Plant Cartoons Emphasize Importance of Production

CARTOONS relating the industrial production effort to defeat of the enemy, often drawn by employes and inspired by labor-management or other drives, now appear in many war plants.

"Flying Chips from the Lathe Will Defeat the Axis" is the work of Fred Springer, an employe of Lodge & Shipley Machine Tool Co., lathe builders in Cincinnati, now engaged in all-out war production. Springer is an artist turned toolmaker for the duration. His poster is displayed throughout the Lodge & Shipley shops.

"We Have the Ol' Batting Eye Now" was drawn for Hobart Bros., Troy, O., to depict the increased production of welding equipment and other materials essential to the war program.

"America's New Frankenstein Goes Into Action" appears in the current edition of Allis-Chalmers Mfg. Co.'s house organ, *Victory Production News*.

"Demolition Squad" is the creation of William Solms, junior draftsman at the Packard Motor Car Co., Detroit, and was submitted in a company-sponsored "Work-To-Win" production drive. The artist won a merit award for his work, the excellence of which can be judged by close scrutiny of details. Note particularly on the desert at the left the drying skulls of Mussolini, Hitler and Hirohito. Other Packard employes won awards for slogans and poems on the same theme, all part of the program to stimulate production which was mapped out by George T. Christopher, president.

Another All-Out Idea

ST. LOUIS

In a letter to a dealer, prominent in the recent drive for scrap iron and steel, Convict No. 9532, State Penitentiary, Jefferson City, Mo., serving a lengthy term for forcible entry with a jimmy, makes a patriotic suggestion.

No. 9532 believes that many tanks, bombs and submarines could be built with steel from bars, gates and cells of the Jefferson City and other state and federal prisons.

MEN of INDUSTRY

R. J. Schuler

K. J. Pedersen

W. B. Griese

R. J. SCHULER has been appointed general manager, Hampshire Products Inc., Milan, Mich. He resigned July 1 as assistant manager of sales, Bolt & Nut Division, Republic Steel Corp., Cleveland. Prior to joining Republic he was manager of sales, LaSalle Steel Co., Chicago.

♦

M. A. Thompson, identified with the Heavy Chemical Sales Division of Pennsylvania Salt Mfg. Co. in the Detroit area since March, 1938, has been transferred to the Industrial Cleaner Division.

♦

S. E. Lauer, president, York Ice Machinery Corp., York, Pa., has been elected a director, American Management Association, New York, to serve a three-year term.

♦

Irving Herriott, general counsel, Zenith Radio Corp., Chicago, has been elected a director to fill a vacancy created by death of Paul Klugh.

♦

J. J. Clark, manager of the Cleveland branch, International Harvester Co., has been named manager of the Toledo, O., branch, succeeding **Le Monte Daniels,** who retired recently.

♦

R. A. Becker has been appointed manager, Baltimore branch, Gar Wood Industries Inc., Detroit. He succeeds **R. J. Grow,** who has joined the Army as a first lieutenant.

♦

Joseph Sander has been promoted to general freight agent, and **John E. Capps** and **Eldon A. Tharp** to assistant freight traffic managers, Rock Island Lines, Chicago.

♦

Harry M. Ellsworth, advertising manager, Pennsylvania Salt Mfg. Co., Philadelphia, has been elected vice president, Eastern Industrial Advertisers Association for the 1942-43 term. Mr. Ellsworth also serves as chairman, employment section, eastern district, National Industrial Advertisers Association.

♦

K. J. Pedersen has been transferred to Charlotte, N. C., to handle sales in North and South Carolina for Acme Steel Co., Chicago. Associated with Acme 20 years, he will maintain headquarters at 2243 Selwyn avenue.

G. R. Easley, on leave from his Acme duties in South Carolina, is now in the Army in training to become an officer.

♦

Benjamin Sack, heretofore executive vice president, Aircraft Screw Products Co. Inc., Long Island City, N. Y., has been elected president, to fill a vacancy which was created in August, 1941.

♦

Philip F. Smith, secretary, Osborn Mfg. Co., Cleveland, has accepted an appointment as a senior priority specialist, Special Industrial Machinery Branch, War Production Board, Washington, for the duration of the war.

♦

Lynn A. Williams Jr., secretary and head of the legal department, Stewart-Warner Corp., Chicago, has been elected a vice president. Associated with the company nine years, he will continue his former duties.

♦

R. E. Lawlor, manager of sales in the Detroit district for Otis Steel Co. for seven years and widely known throughout the automotive and motor parts industries, has resigned. He will announce a new affiliation at an early date. Otis Steel sales offices are being consolidated with those of Jones & Laughlin Steel Corp., which has purchased assets of the Cleveland company.

♦

William B. Griese, plant manager, Lycoming Division, Aviation Corp., Williamsport, Pa., has been made plant manager of the company's new Liquid Cooled Engine Division, plant for which is now under construction in Ohio. He will be succeeded at Lycoming by **M. I. Bradley,** works manager. Mr. Griese became associated with Aviation Corp. in February, 1941, and for 17 years before that was with Crosley Corp., Cindent, has been elected a director, reperintendent.

♦

Claud Wampler, executive vice president, Carrier Corp., Syracuse, N. Y., has been elected president, succeeding the late J. Irvine Lyle. **Edward T. Murphy,** senior vice president, has been electetd a director, replacing Mr. Lyle.

♦

John Nuveen Jr., since 1919 a member of the municipal bond firm of John Nuveen & Co., Chicago, has been appointed Chicago regional salvage manager, Bureau of Industrial Conservation. He will direct activities of the four sections of the bureau, general salvage, industrial salvage, automobile graveyards and special projects.

♦

J. P. Margeson Jr. and **Franklin Farley** have been elected vice presidents, International Minerals & Chemical Corp., Chicago. Mr. Margeson, who has been general manager of the magnesium division, also will become general manager

of the potash division. Mr. Farley has been general manager of the phosphate division. **John T. Burrows** has resigned as vice president and will devote full time to executive direction, Phosphate Recovery Corp., a subsidiary owned jointly with Minerals Separation North American Corp.

Additional Advisory Committees Appointed

Additional industry advisory committees appointed last week by T. Spencer Shore, chief of the Bureau of Industry Advisory Committees, include the following in the metalworking field:

Fin Coils, Coolers

A. H. Baer, Air Conditioning and Commercial Refrigeration Branch, government presiding officer.

Committee members: R. C. Colman, McQuay Inc. Minneapolis; Morrill Dunn, McCord Radiator & Mfg. Co. Detroit; J. W. Hatch, Bush Mfg. Co., Hartford, Conn.; B. E. James, York Ice Machinery Corp., York, Pa.; H. T. Jarvis, Refrigeration Engineering Inc., Los Angeles; O. Z. Klopsch, Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Detroit; William L. Lynch, Rome-Turney Radiator Co., Rome, N. Y.; Milnor Noble, Aerofin Corp., Syracuse, N. Y.; Paul H. Schoepflin, Niagara Blower Co., New York; O. E. Sims, Larkin Coils Inc., Atlanta, Ga.; Reuben Trane, The Trane Co., LaCrosse, Wis.; E. R. Walker, Fedders Mfg. Co., Buffalo.

Heat Exchangers

William K. Frank, chief, Resources Protection Board, government presiding officer.

Committee members: W. C. Beekley, Whitlock Mfg. Co., Hartford, Conn.; H. M. Corrough, Alco Products Division, American Locomotive Co., New York; G. H. Cox, Westinghouse Electric & Mfg. Co., South Philadelphia, Pa.; J. A. Coy, J. A. Coy Co., Tulsa, Okla.; Chas. Currier, Ross Heater & Mfg. Division, American Radiator & Standard Sanitary Co., Buffalo; E. L. Durrell, J. B. Beaird Co., Shreveport, La.; C. H. Latrial, Southwestern Engineering Co., Los Angeles; Melvin Sack, Henry Vogt Machine Co., Louisville, Ky.

Livestock Equipment Manufacturers

William R. Tracy, chief, Farm Machinery and Equipment Branch, government presiding officer.

Committee members: Ben H. Anderson, Ben H. Anderson Mfg. Co., Madison, Wis.; L. J. Brower, Brower Mfg. Co., Quincy, Ill.; C. E. Butler, The Galloway Co. Inc., Waterloo, Iowa; J. B. Clay, Clay Equipment Corp., Cedar Falls, Iowa; Zur W. Craine, Craine Inc., Norwich, N. Y.; A. R. Hill, The Buckeye Incubator Co., Springfield, O.; R. C. Hudson, H. D. Hudson Mfg. Co., Chicago; H. B. Megran, Starline Inc., Harvard, Ill.; T. W. Merritt, Babson Bros. Co., Chicago; S. H. Smith, The Smith Incubator Corp., Bucyrus, O.; George C. Stoddard, DeLaval Separator Co., New York; W. A. Zaloudek, Oakes Mfg. Co., Tipton, Ind.

Zinc Producers

George C. Heikes, chief, Zinc Branch, government presiding officer.

Committee members: Kenneth C. Brownell, American Smelting & Refining Co., New York; Frank E. Chesney, American Steel & Wire Co., Cleveland; Irwin H. Cornell, St. Joseph Lead Co., New York; Robert E. Dwyer, Anaconda Copper Mining Co., New York; George W. Potter, Eagle Picher Mining & Smelting Co., Joplin, Mo.; Howard I. Young, American Zinc Lead & Smelting Co., St. Louis; Benno Elkan, International Minerals & Metals Corp., New York; Marshall L. Havey, The New Jersey Zinc Co., New York; C. H. Klaustermeyer, Metals & Ore Division, Grasselli Chemical Division, E. I. du Pont de Nemours & Co., Wilmington, Del.; J. M. Pomeroy, General Smelting Co., Philadelphia; Bernard N. Zimmer, American Metal Co., New York.

Power Cranes, Shovels

Joseph F. Ryan, chief, Construction Machinery Branch, government presiding officer.

Committee members: C. B. Smythe, Thew Shovel Mfg. Co., Lorain, O.; Carlton R. Dodge, Northwest Engineering, Chicago; Morgan Ramsay, Bay City Shovels, Bay City, Mich.; Doc Shelton, Marion Steam Shovel Co., Marion, O.; Ray Dorward, Insley Mfg. Co., Indianapolis; John Jay, Quickway Truck Shovel, Denver; E. W. Botten, Owen Bucket, Cleveland.

Domestic Water Systems & Irrigation Pumps

William R. Tracy, chief, Farm Machinery and Equipment Branch, government presiding officer.

Committee members: E. F. Brown, Snow Irrigation Supply Co., Los Angeles; W. M. Bryant, Bryant Pump Co., Hutchinson, Kan.; G. R. Deming, The Deming Co., Salem, O.; E. E. Eickmeyer, Dayton Pump & Mfg. Co., Dayton, O.; R. L. Harner, Everite Pump & Mfg. Co. Inc., Lancaster, Pa.; Robert Hula, Clayton Mark & Co., Evanston, Ill.; Donald C. McKenna, Pomona Pump Co., Pomona, Calif.; R. Lewis, Fairbanks, Morse & Co., Chicago; Henry F. Miller, Goulds Pumps Inc., Seneca Falls, N. Y.; John C. Myers, The F. E. Myers & Bro. Co., Ashland, O.; David V. Steward, Columbiana Pump Co., Columbiana, O.; B. N. Sweeney, Stamm-Scheele Inc., Rayne, La.

Rust Awarded $1,000,000 Equipment Contracts

Rust Furnace Co., Pittsburgh, has been awarded the following contracts, at a total cost in excess of $1,000,000;

For Carnegie-Illinois Steel Corp., Pittsburgh, two large slab heating furnaces for the new plate mill at Homestead, Pa. This contract was awarded by Mesta Machine Co., Pittsburgh. Also for Carnegie-Illinois, five car bottom furnaces at another Pennsylvania location. For Columbia Steel Co., three large heating furnaces, to be installed in Utah. For Caine Steel Co., Chicago, three forging furnaces, to be installed in Tennessee.

Second Double Launching By Federal in Eight Days

Federal Shipbuilding & Dry Dock Co., Kearny, N. J., United States Steel Corp. subsidiary, made its second double launching within eight days June 26. The cargo ships SANTA CECILIA and SANTA MARGARITA went down the ways at that time. Two destroyers were launched June 21 and a cargo ship the previous week.

The two ships in the latest launching were designed before the war for trade with South America. They were built for the Maritime Commission.

DIED:

Philip D. Block, 71, former president and at the time of his death chairman of the executive committee, Inland Steel Co., Chicago, in that city, June 30.

Mr. Block was the last surviving founder of Inland Steel, organized 49 years ago. He had been a principal factor with his father, Joseph Block, and the late George H. Jones, in its organization.

On Nov. 10, 1893, he was elected director and treasurer of the company. In January, 1894, he became treasurer and purchasing agent, and on July 9, 1901, vice president and

Philip D. Block

treasurer. Eight years later Mr. Block was elected first vice president. In 1919 he became the fifth president of Inland, a position he held until April 30, 1941. At the age of three score and ten he then retired to the less arduous duties of chairman of the executive committee.

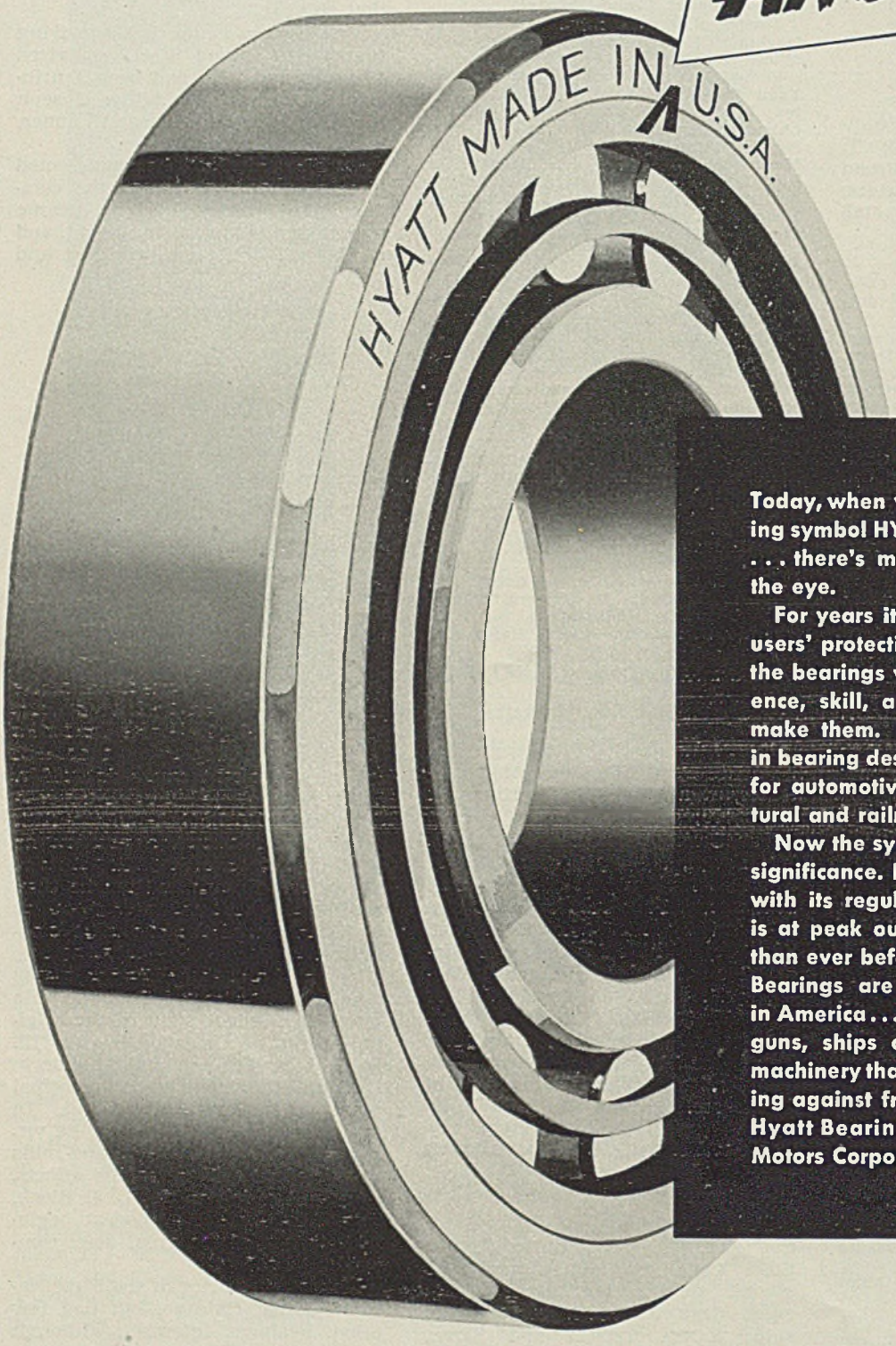
For half a century Mr. Block was "the cornerstone of Inland." He made an efficient plant of the original works at Chicago Heights, Ill. In 1901 he was the main factor in starting the company's principal plant at Indiana Harbor, Ind. In difficult years that followed, he virtually lived with the men and mills at this plant. Through his efforts, assisted by his brother, L. E. Block, Inland rose from a modest beginning to one of the great steel companies of today.

He was a director of the First National Bank, Chicago, but had few other business interests, although serving his industry many years on committees of the American Iron and Steel Institute.

♦

Harry S. Meland, 48, a superintendent of construction, Austin Co., Chicago, drowned June 25 when his motorboat capsized in Silver Lake near Kenosha, Wis.

AND FOR



Today, when you look at the bearing symbol HYATT MADE IN U.S.A. . . . there's more to it than meets the eye.

For years it has represented the users' protection, a guaranty that the bearings were as good as science, skill, and experience could make them. It identified the best in bearing design and performance for automotive, industrial, agricultural and railroad applications.

Now the symbol takes on added significance. It indicates that Hyatt, with its regular and wartime job, is at peak output, harder at work than ever before; that Hyatt Roller Bearings are serving everywhere in America . . . in the vitals of tanks, guns, ships and planes and the machinery that makes them . . . fighting against friction *and for* U. S. A. Hyatt Bearings Division, General Motors Corporation, Harrison, N. J.

THE 50TH YEAR OF

HYATT ROLLER BEARINGS

By A. H. ALLEN *Detroit Editor, STEEL*

MIRRORS of MOTORDOM

DETROIT

Rubber situation clarified. Crude supply largely cut off by Japanese conquests. Synthetic production to reach large proportions within three years. Butadiene process holds best hopes

HOW do we stand on rubber? Out of a welter of conflicting statements and confusing statistics has emerged some clarifying factual information which, boiled down to its essence, leaves the situation approximately as follows:

Natural Rubber: From the Far East has come 97 per cent of this country's crude rubber supply, imports averaging about 800,000 tons annually for the past three years. Bulk of this is now shut off by Japanese conquests, although some still is being shipped in from Ceylon and India. This year imports are expected to reach 368,500 tons, next year 182,350 tons, providing occupation of further territory by the enemy is forestalled.

Natural rubber from such sources as South America, Africa, the guayule shrub, etc., is of insignificant proportions. Even at $3 a pound, the prevailing price in 1910-12, imports from South America would fall far short of actual needs. Scarcity of labor, inaccessibility of trees, leaf disease and other factors rule out consideration of South America.

Plantations of the Far East have maximum capacity for supplying 1,600,000 tons of sheet rubber, a valuable prize for the Japanese which they conquered virtually intact. It is inconceivable the Japs could have any need for the enormous capacity available, leading some observers to the conclusion they will try to dispose of part of it in world markets. However, as long as they feel they are crippling the U. S. war machine by hanging onto rubber, it may be unlikely they will permit any exports.

Open to Destruction

An interesting angle is that expert studies have indicated a single airplane in the space of two weeks could destroy the entire Far East rubber growth by scattering leaf disease germs over the area. But it is not believed likely either the Japanese or the United Nations would resort to such destructive effort.

Requirements: With civilian requirements scaled down to 150,000 tons for this year, the latest figures on total requirements of the United Nations add up to 813,000 tons. Out of this, 82,000 tons are earmarked for lend-lease and 310,000 tons for other countries, leaving 271,000 tons for the army, air corps and Navy. Thanks to heavy stockpiles, an indicated surplus of 428,000 tons is shown for this year.

Next year, synthetic production is scheduled to climb to 300,000 tons, from this year's total of 28,000 tons. This, added to the 1942 surplus and expected 1943 shipments, means a total supply of 861,000 tons, but because of increased military requirements a deficit of 5000 tons is indicated.

Synthetic Rubber Production: Salvation of the rubber problem rests squarely with the synthetic rubber production program which, after being kicked around for a year or more finally has settled at a projected 862,000 tons annually, out of which 32,000 tons is being financed by private capital, 30,000 tons by the Canadian government, the balance by the U. S. government.

May Reach Peak in 1945

By the first quarter of next year, the synthetics will be starting to roll, and in 1944 output is expected to reach 650,000 tons, in 1945 the peak of 862,000 tons. This is a whale of a lot of rubber, especially when it is realized that Axis nations now are using rubber on the basis of only 150,000 tons a year, the bulk of this government subsidized synthetic production. Russia has capacity for only about 50,000 tons of synthetic rubber a year.

Most of the synthetic plants will be making rubber by the butadiene-styrene polymerization process, the butadiene coming from both petroleum refineries and grain alcohol distillation. Units will approximate 40,000-ton size a year, providing no delays are met in construction.

Largest plant in the U. S. now in commercial operation in the manufacture of the butadiene type synthetic rubber is that originally engineered and built by B. F. Goodrich, operating under patents and technique developed by this company. This plant now is known as the Hycar Chemical Co., a corporation jointly owned by Phillips Petroleum and Goodrich. Present production is at a rate of 7000 tons annually and represents the culmination of 16 years of continuous research and development directed by Dr. Waldo L. Semon, director of synthetic rubber research at Goodrich.

This Goodrich rubber is considered superior to the German Buna rubbers, although it is of the same chemical family. Two years ago the rubber was announced publicly under the trade names Liberty Rubber and Ameripol, with two objectives in mind; first to challenge scientists to speed up development of American-made rubber, and second to focus national attention on dangerously low stocks of natural rubber on hand then—around 148,000 tons, or a minimum working level. Several thousand tires of 50 per cent Ameripol were produced and sold at a price approximately 30 per cent higher than first quality natural rubber. Many favorable reports from the "public testing laboratory" have been received.

Synthetic rubbers of the butadiene-base type, it is hoped, can be made to perform with 90 per cent of the efficiency of natural rubber in tires, although several problems still await solution in respect to truck tires. This high performance compares with the 35 per cent efficiency of butyl synthetics and such interim materials as Thiokol.

Sets Automatic Ceiling

It is estimated butadiene rubber can be made and sold at a profit for 25 cents a pound, including amortization of plants. Plantation rubber normally could be sold at 10-12 cents on the New York market, with a profit, although back in the depths of the depression natural rubber sold for as low as 2⅝ cents a pound. Average New York market price in the last two years has been close to 20 cents a pound.

It is on this score that many look on the projected synthetic rubber plants as valuable "automatic ceilings" on natural rubber prices in time of peace, and as priceless "standby" facilities in the event of war. It is reasoned that if the U. S. is to become a leader in a new order of world thought and world trade following the war, it certainly will not be possible to close the door on natural rubber and use only domestic-produced synthetics. The synthetic plants will have to mark time (at government expense) while we drop all tariff barriers and resume buying rubber from the Far East.

It may be necessary to step into the Far East with guarantees of higher wages and better living conditions for the natives who collect the rubber latex from the trees, thereby perhaps doubling the price we pay for natural rubber. Essentially this amounts to raising the standard of living in subnormal

countries at the expense of living standards in our own country. Whether the people in this country will ever swallow such altruistic policies is open to question. Perhaps the easiest way to effect the change would be to persuade the CIO to establish a branch in the Far East and unionize the plantation workers. Then a world labor board could grant higher wages and the checkoff system, and the higher costs would automatically be passed along to the American public.

Scrap and Reclaim: Existing facilities for reclaiming scrap rubber can handle about 400,000 tons of scrap a year, processing it into 320,000 tons of reclaim rubber. In the first two months of this year, scrap rubber was coming in at a rate of only 50 per cent of the maximum usable amount. This has gradually increased until last month when scrap shipments slightly exceeded consumption. The scrap rubber drive sponsored by the oil companies was called disappointing in Washington because it yielded only 250,000 tons. Stacked against the pure guesses as to available tonnage made before the drive, it probably is disappointing, but nonetheless the campaign was productive of well over half a year's supply of material for present reclaiming plants.

If rubber recovery could be made a permanent proposition on the basis of, say, 40,000 tons a month, there would be ample supplies of material for reclaiming.

The largest stockpile of rubber, of course, is in the tires and tubes now on the 150,000,000 wheels of cars, trucks and buses in operation. This amounts to 1,200,000 tons, nearly twice the stockpile of new rubber on hand. In addition there are 6,000,000 new tire casings held in storage for rationing. At the present rate of release they would be sufficient for 12 years but they do not amount to much when compared with tire sales of 35,000,000 units in a good retail year.

Current facilities for recapping or retreading tires can handle only 750,000 tires a month, and all of the camelback used for this retreading is produced from reclaimed rubber. Should new retreading materials become available, as seems likely this fall, it may be necessary to supplement field facilities with those of the large rubber plants to handle the vastly accelerated retreading business.

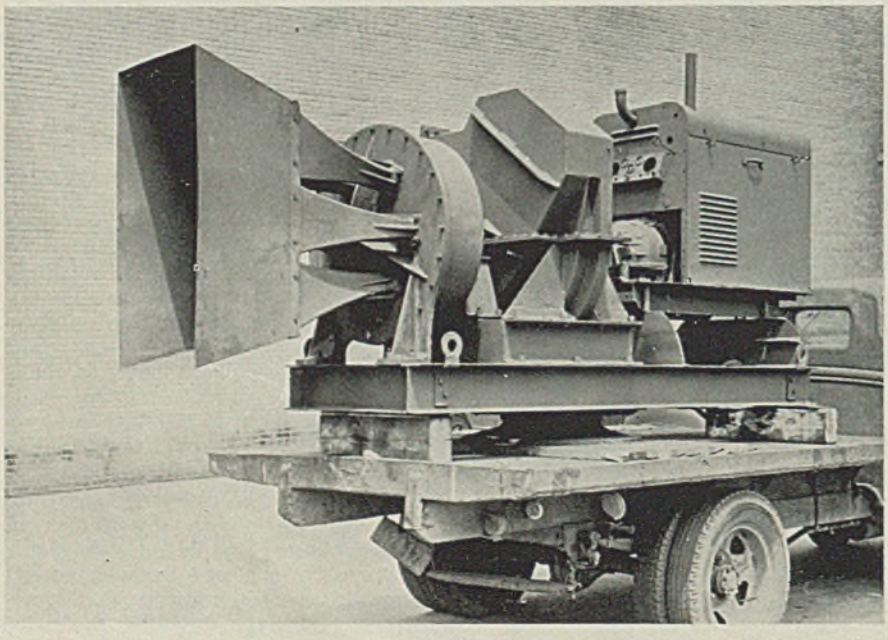
War Shipments Booming

Automotive Branch of the WPB announces April shipments of war products from 432 plants of 157 companies, which make up 72 per cent of the automotive industry (based on labor) were 46 per cent over the February total. Companies included 8 automobile manufacturers, 9 truck companies and 140 parts producers. Shipments amounted to $420,000,000, of which 83 per cent were war goods.

Since some of these shipments are inter-company, a more accurate representation of the production achievement is in terms of value added, or the difference between the money value of shipments and the cost of materials and parts supplied. These 432 plants had a total value added on war work in April of $188,000,000, compared with $123,000,000 in February. Man-hours worked in these companies increased from 65,000,000 in February to 104,000,000 in April. Total employment was 561,480, of which 413,656 were production workers.

Increases in May and June have further expanded these totals, though perhaps at a somewhat decelerating rate. When the 432 plants under consideration reach maximum war production, it is estimated total man-hours will be 112,500,000 monthly. Obviously shipments will expand at a more rapid rate than man-hours, since in preparatory and preliminary stages of production a relatively higher ratio of man-hours to shipments is required than when production is rolling smoothly.

Several floors in the downtown Buhl building here have been taken over by the procurement and distribution divisions of the Quartermaster Motor Transport Service, activities transferred here from Washington and Holabird, Md. Location of these agencies here in the heart of the motor industry is a logical move in the interests of speed and efficiency. Historic Fort Wayne in Detroit has served the Army as its central Quartermaster Motor Supply Depot since September, 1940, and it has expanded steadily since that time, last fall a $630,000 warehouse being added. Many temporary buildings have been built and commercial warehouses and field space leased to store the thousands of tons of motor supplies awaiting shipment to Army units at home and overseas. Procurement orders run into millions of dollars monthly, while thousands of tons of motor supplies are checked by the supply division and shipped to other quartermaster depots or to stations at home and abroad every week.



CHRYSLER-BELL victory siren, pictured above, produces 170 decibels of sound at the horn, claimed by Chrysler engineers to be the "loudest sustained noise ever produced by mechanical means." For description, see accompanying text

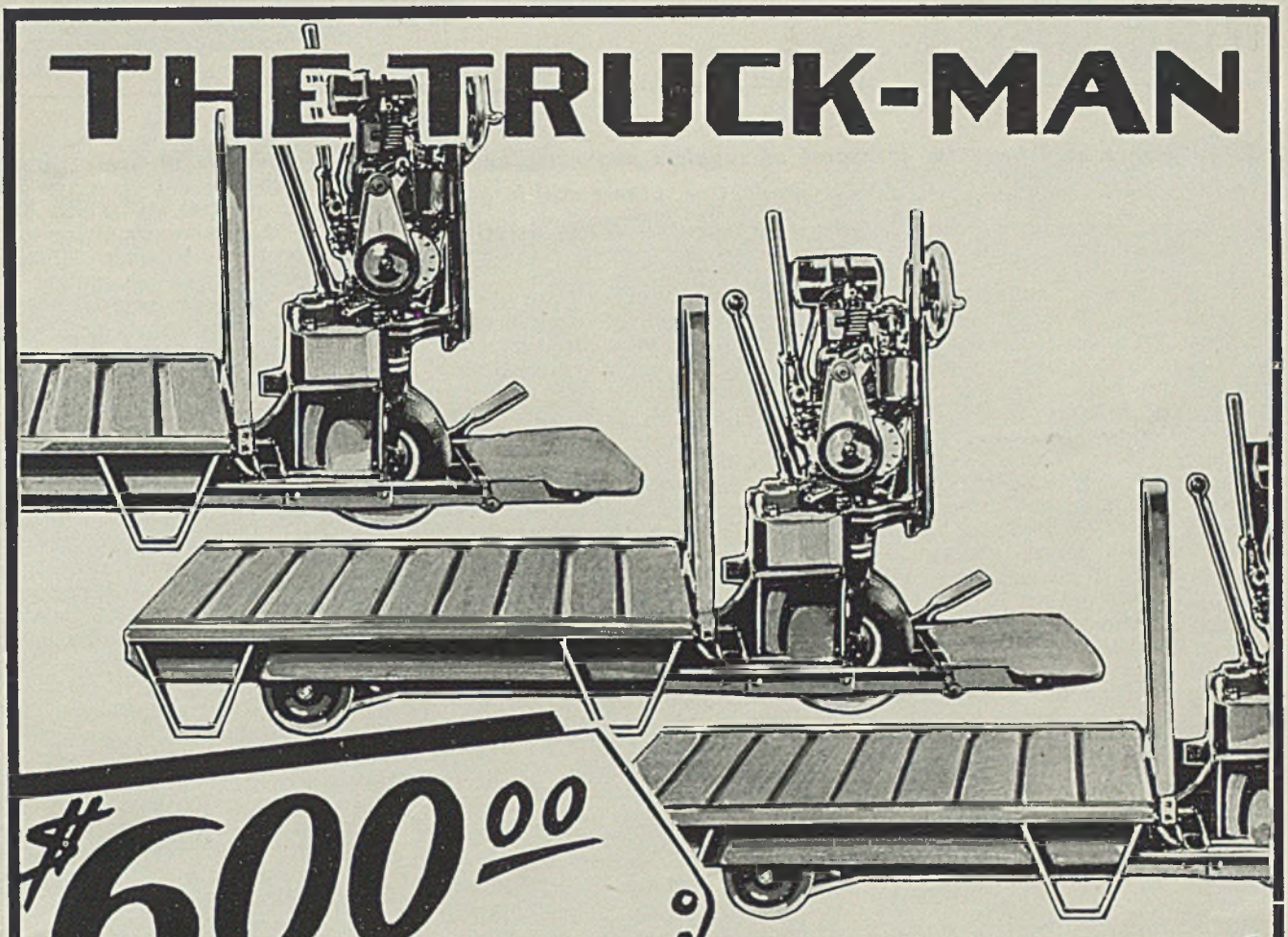
170-Decibel Siren in Mass Production by Chrysler

Large-scale production on a new air-raid alarm siren of the most powerful type ever designed will be started shortly by the industrial engine division of Chrysler Corp., Detroit. Known as the Chrysler-Bell victory siren, the device is the result of joint study by Chrysler engineers and Bell Telephone Research Laboratories. Bell engineers established the sound-producing principle and Chrysler translated their experiments into a practical production unit. The siren is capable of producing the most penetrating sustained sound—170 decibels at the throat—ever achieved by mechanical means.

The apparatus comprises the siren proper or modulator unit, a blower to supply compressed air and a 140-horsepower automobile engine to drive both. It is mounted on a turntable platform that may be placed on top of a building or in any other elevated position where the sound

(*Please turn to Page* 127)

THE TRUCK-MAN



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You can put 3 OF THESE LOAD HUSTLERS ON THE JOB

For less than the annual cost of one man

Write for Complete Information

Here is a fast, versatile, inexpensive motorized hand truck like nothing else on the market. Its performance and rapid efficiency are out of all proportion to its size and price.

YARD-MAN, INC.
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WING TIPS

Cargo planes hold hope for transport of supplies and munitions to far-flung battlefronts. Some now in production, others still in planning stage. Motors are ready . . . New wind tunnel for North American

ATTENTON of military strategists and logisticians for the United Nations, such as General Somervell's board in Washington known as the SOS (Services of Supply), quite naturally is turning to the airplane as a carrier of men and freight to theaters of war. Long, hazardous sea lanes mean months for transporting munitions and other war materiel to far off scenes of action in Egypt, Russia and Australia. Time being of the essence if steady Axis advances are to be stopped, speedy air travel may supply the answer if sufficient numbers of cargo carriers can be mustered.

For over a month, a WPB committee on cargo planes has been studying all the available facts relating to cargo planes, including the past use of airplanes for carrying cargoes and the future possibilities of such transportation techniques as they relate to production problems arising from the war effort. Personnel of the committee includes Harold E. Talbott, deputy director of the WPB production division; T. P. Wright, assistant chief of the aircraft branch of WPB; W. B. Harding, vice president of the Defense Supplies Corp. of the RFC; Lewis Douglas, deputy to Admiral Land in the War Shipping Administration; Dr. Jerome C. Hunsaker, chairman of the National Advisory Committee for Aeronautics; Robert Hinckley, assistant secretary of commerce in charge of aviation; Col. R. B. Lord, assistant director of the Board of Economic Warfare; Grover Loening, consulting engineer for Gruman Aircraft Corp., and G. B. Lambert, member of the executive staff of the WPB.

While a fact-finding committee may represent a good start, it is not going to be productive of very many cargo planes ready to fly. Conspicuous by their absence on the board are such airplane-cargo experts and advocates as Glenn Martin, Charles H. Babb, Harlan D. Fowler, W. B. Stout and others. These gentlemen know the facts; they could skip the preliminary studies and draw up a manufacturing program for immediate adoption. There is the very real danger that Nelson's committee will spend months digging up facts, preparing a report and submitting it for consideration, after which the findings will be kicked around in Congress and nothing will happen.

Of course, cargo carriers and troop transports are already coming from airplane assembly lines, but they are conventional types of craft and not the types of sky freighters visioned by Martin, Stout & Co. One type now abuilding is the C-46, originally the Curtiss CW-20, a transport designed for passenger use in 1941; the other is the C-54, military version of the Douglas DC-4 transport. Both these two-motor ships are fast, large and possessed of characteristics giving long range and heavy payload. Military versions reduce excess weight to allow for increased payload.

An example of what can be done with a Douglas DC-3 is seen in the recent evacuation of refugees from Burma, where a number of these ships were in service, manned by both British and American pilots. Those serviced by American forces had all the seats ripped out and the normal 21-passenger cabin was crowded with as many as 75 refugees, some even being stowed in baggage and freight compartments. For some reason the British-operated transports were not so stripped.

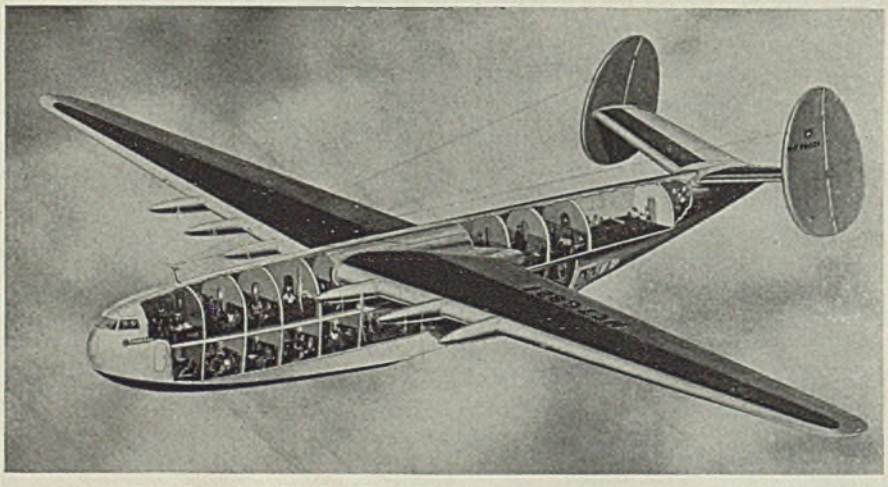
Lockheed Has Cargo Carrier

Soon to join the C-46 and C-54 is the Lockheed Constellation, a four-motor ship with capacity of 64 passengers, including a crew of seven, or over 16 tons of cargo when used as a freighter. Motors are Wright Cyclones of better than 2000 horsepower. Cruising speed is 283 miles an hour, range over 4000 miles, and supercharged engines and cabin permit operation up to 30,000 feet. Even a plane of this size, however, could not accommodate a medium tank, despite the fact that 40 of them could move 1,000,000 pounds of cargo overnight from West Coast to Honolulu.

There are a number of other specialized cargo ships designed and a few are now in the construction stage. Military censorship prevents disclosure of details. One group of air freight experts has gone on record as stating the most effective cargo plane for continental and hemispheric operations is a high-wing twin-engine monoplane, with retractable landing gear, built around a cargo space 25 x 8 x 8 feet in size. This compares with box car dimensions of 40 x 9 x 9 feet. Materials would be steel, plywood and fabric, conserving aluminum and magnesium for combat planes.

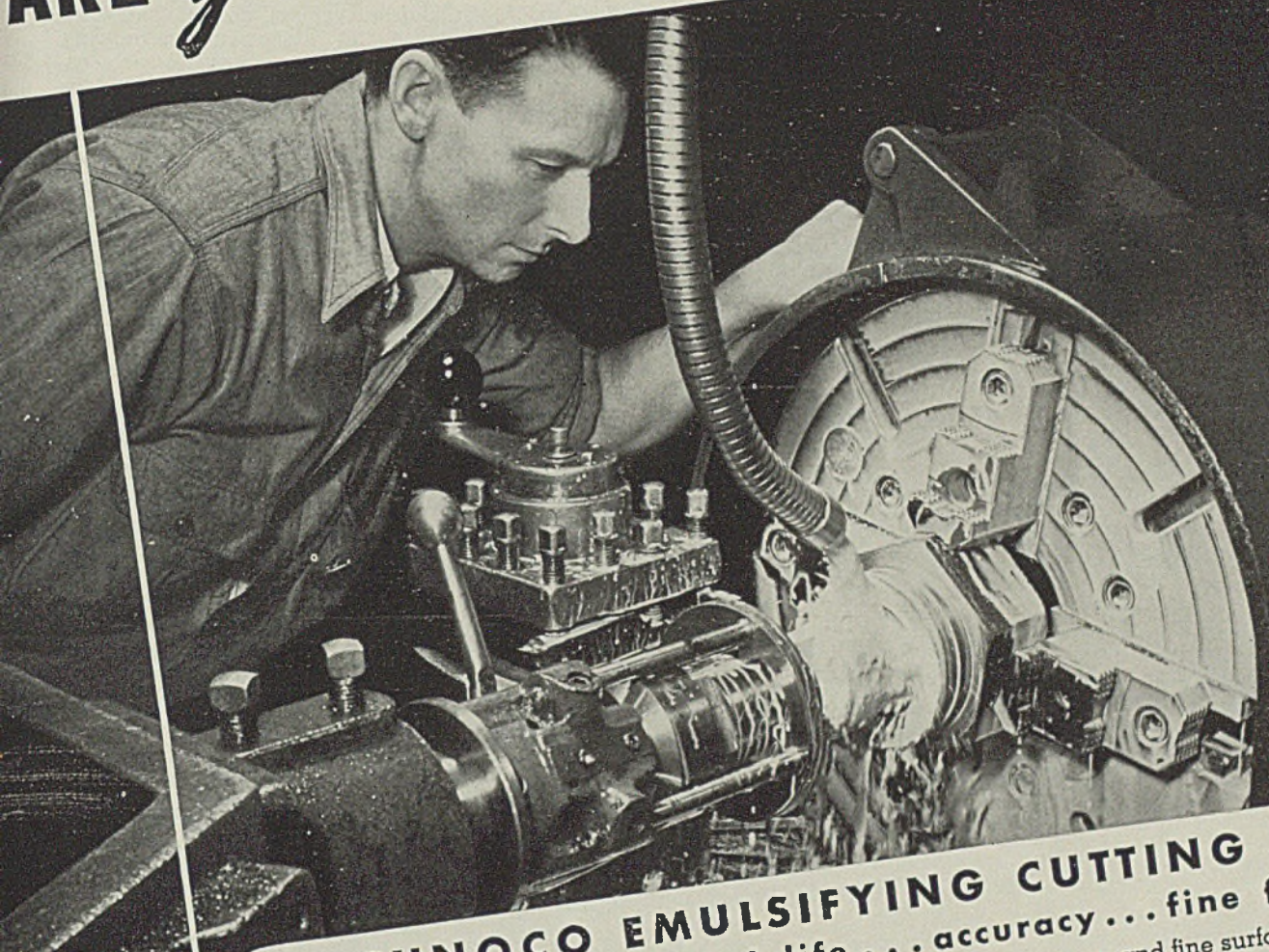
Composite types of cargo planes have been designed by Charles H. Babb and Harlan D. Fowler. The Babb plane has a front fuselage section which is completely removable for the landing, by means of a ramp, of bulk pieces like trucks, machinery, etc. The Fowler plane features a fuselage made up of five separate and detachable cargo containers, each holding about 1000 pounds.

Rapid progress is now possible in the cargo plane field, for one reason because engines with proved horse-



DESIGN picture of projected Glenn Martin 250,000-pound flying boat, discussed in detail in WING TIPS, May 11, p. 66. Mr. Martin recently received the American Design award for development of this colossus and the smaller 140,000-pound flying boat, MARS, now undergoing flight tests. The new ship should be able to carry 102 passengers, each with 25 pounds of luggage, plus 25,000 pounds of mail and cargo, from New York to London in 13 hours

AKE *Guesswork* OUT OF PRODUCTION



Put SUNOCO EMULSIFYING CUTTING OIL to work . . . for long tool life . . . accuracy . . . fine finish

Victory production — the steady stream of machined parts for finished war products — isn't achieved by guessing. The selection of the proper tool set-up, correct speeds and feeds, and the right application of the right cutting lubricant are all important for machine tool operation at rated capacity-plus.

That's why so many leading plants throughout the nation rely on Sunoco Emulsifying Cutting Oil and the recommendations of Sun Oil Engineers to meet their cutting oil needs.

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Sun Oil Engineers — those capable Doctors of Industry — offer you technical service based on scientific training and practical experience that will help you solve your machining problems. Their recommendations are not guesswork. They stand ready . . . willing . . . and able to help you in your plant. For helpful case histories on how they aided other leaders in the metal working industry, write for your free copy of "Helping Industry Help America."

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LET'S GO! U.S.A. KEEP 'EM FLYING!

PERFORMANCE DATA

OPERATION—Tapping ring nuts.

MACHINE—3-L Gisholt Turret Lathe.

MATERIAL—Forged steel.

CUTTING LUBRICANT—1 part Sunoco to 15 parts water.

SUNOCO

SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

power, economy and service life can be produced in the large quantities necessary. High horsepower is essential, since the number of engines for large transport ships is limited by problems of the growing intricacy of controls, added weight and service problems.

In any type of plane, the engine must have a high takeoff horsepower in order to get the ship into the air with its maximum load; as well as low fuel consumption at cruising speeds and low weight per horsepower. In addition, long service life between overhauls is of vital importance.

Grover Loening, consulting engineer for Grumman, declared recently that 40,000 planes of the size of the present B-19 superbomber could carry cargo equivalent to the capacity of 20,000,000 tons in surface shipping, the aggregate of all the surface ships in the United Nations' pool. He added that 45,000 aircraft of the type now being flown day in and day out could carry the freight now being hauled by nearly 2,000,000 freight cars.

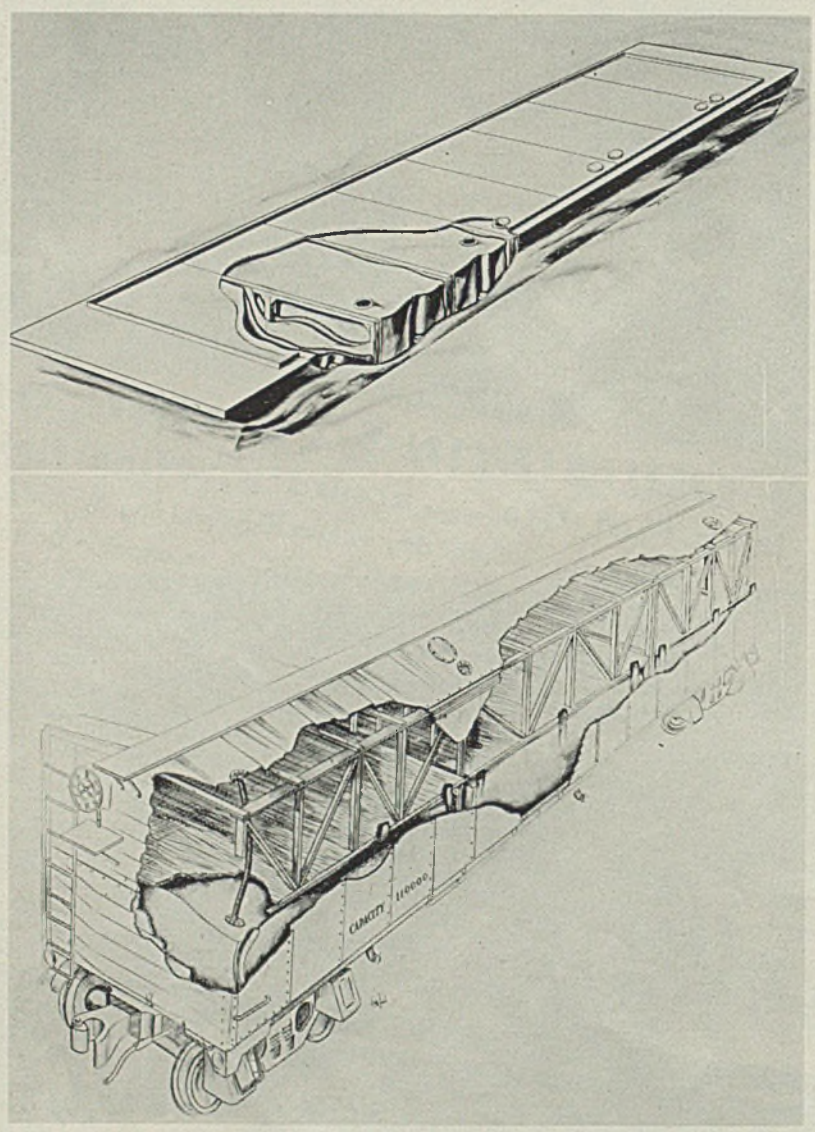
These declarations must be tempered by the observation that individual heavy loads such as tanks and field guns and trucks cannot now be moved by air, as any summary of aggregate freight movement must likewise give consideration to the heft of individual loads if it is to mean anything.

The day is not too far off when mass production of a four-motor plane somewhat larger in size than the Boeing Flying Fortress but smaller than the huge B-19 will be under way. Such a plane might logically be considered a long-range bomber, but could be adapted for cargo handling or troop transport with a minimum of alteration.

Time is still the adverse factor. Consider what might be done now for China with a fleet of long-range cargo planes capable of carrying 40 tons each and escorted by long-range bombers, defensively and offensively armed to the teeth. Arms and supplies might be flown in to Chiang Kai-Shek, once reconnaissance planes had charted a route to miss the many unmapped mountain peaks of interior China, thereby conceling the advantage now resting with the Japanese as a result of their closing the Burma road and holding the China coast.

But as yet we do not have the planes, let alone the bases and ground crews to service such an air freight expedition, so China in the light of some expert opinion is "out of the war."

Gliders, too, will eventually play a significant part in the air transport of men and munitions. The Germans used the nucleus of thousands of pilots trained in sports gliders for the organization of their currently powerful air force. In recent months the call has gone out for glider experts from our own Air Force command, and glider schools are now in full operation. Time alone will prove their value.



AIRPLANE type of fuel tank, known as the Mareng cell, developed by Glenn L. Martin Co., Baltimore, may have possibilities in petroleum transport. Here are suggested applications in a conventional boxcar and wooden barge

Rectangular Wind Tunnel

New wind tunnel with throat air speed equivalent to 327 miles per hour is nearing completion at North American Aviation in Inglewood, Calif. It is of the continuous type, in the form of a rectangle and rectangular in cross section, narrowing to a throat of 7¾ feet high and 11 feet wide where model testing is done. Air blast is provided by a seven-blade 19-foot diameter propeller driven by a 3000-horsepower electric motor mounted in a nacelle in the tunnel on the "back stretch." Speed of the prop can be varied in the range of 70-700 r.p.m.

Air leaving the propeller passes halfway around the tunnel, which is gradually increasing in size, until it reaches the throat where the sudden contraction steps up the speed of the airflow to the maximum of 327 m.p.h. In the throat the model is suspended in the air stream by struts which in turn are connected to an eltromagnetic balance which records the various stresses developing in the model. Test models are of wood, built to exact scale and have built-in electric motors turning model propellers. They are built in a model shop which is on the second floor of the tunnel building, permitting planes to be lowered directly into the test chamber from the shop in which they are made. The complete tunnel installation will not go into operation until early fall.

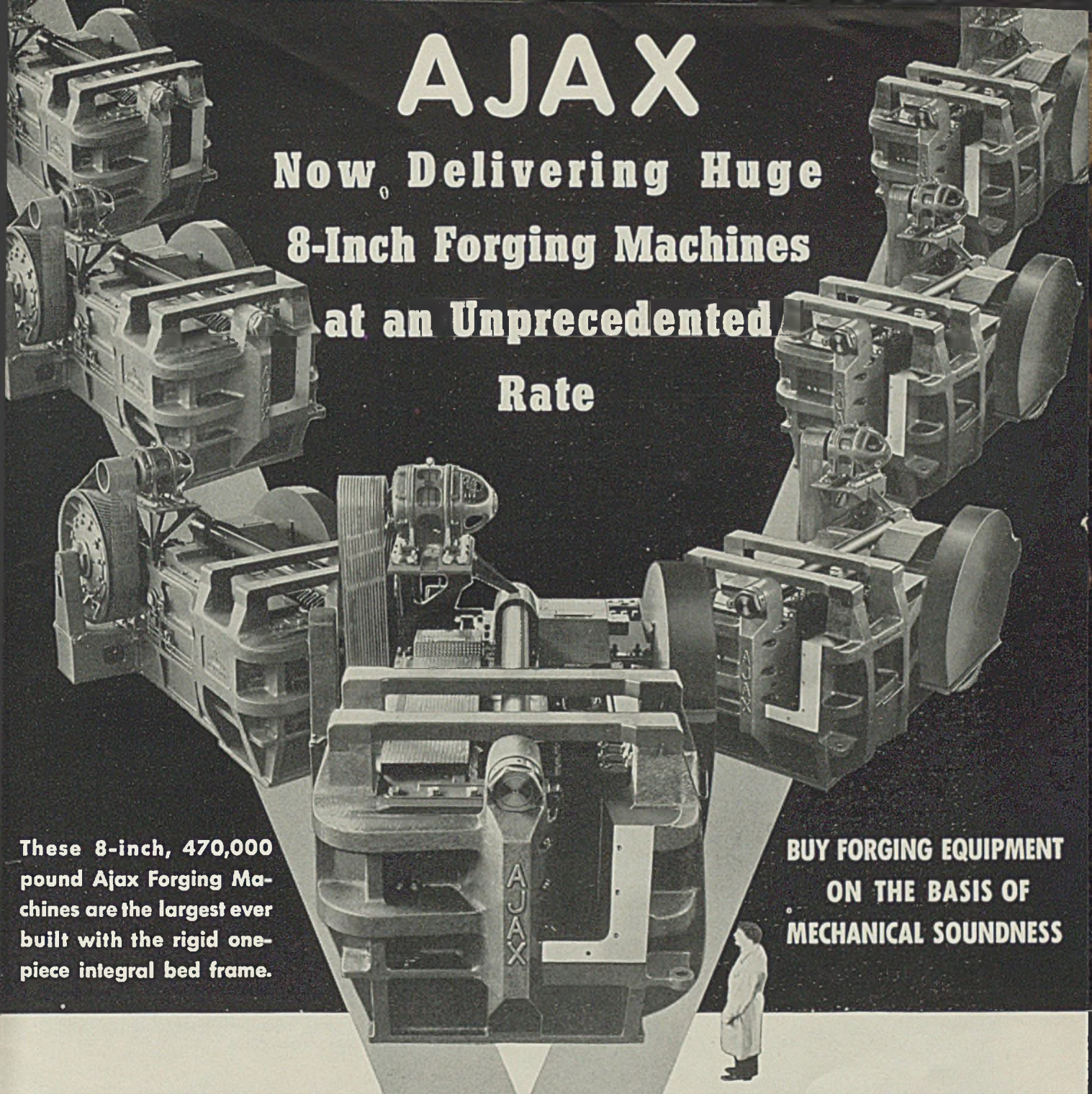
Possibilities of Mareng Cell

Suggested solution to the problem of transporting motor fuel to distressed localities has been offered by airplane builder Glenn L. Martin. It involves the use of the Mareng (MARtin ENGineering)

(*Please turn to Page* 127)

AJAX

Now Delivering Huge 8-Inch Forging Machines at an Unprecedented Rate



These 8-inch, 470,000 pound Ajax Forging Machines are the largest ever built with the rigid one-piece integral bed frame.

BUY FORGING EQUIPMENT ON THE BASIS OF MECHANICAL SOUNDNESS

● No comfort in that performance for the Axis, but plenty for American industry and its craftsmen, driving hard day and night to turn out more and better weapons of war—*in time!* The output of these 470,000 pound 8-inch Ajax Forging Machines has been stepped up tremendously. We are now equipped to again step up even this output . . . and do it without sacrificing established Ajax Standards of mechanical soundness.

Improvement of Ajax manufacturing facilities and training of new craftsmen—initiated ahead of need—is enabling us to accomplish this without tying up vitally needed heavy machine tool capacity outside of our own plant. Output of other sizes of Ajax Forging Machines and Forging Presses is up too, assuring that the productive ability of American war workers may be utilized to the very utmost in producing the vital fighting equipment that can be formed better, faster and cheaper on Ajax Forging Machinery.

The high standards of production, accuracy, and dependability being established by Ajax Forging Machines under the gruelling pace of war production emphasizes again the wisdom of buying forging equipment on the basis of mechanical soundness. For more information on Ajax Air Clutch Forging Machines, write for Bulletin 65-B.

THE AJAX MANUFACTURING COMPANY
EUCLID BRANCH P. O. CLEVELAND, OHIO
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Activities of Steel Users and Makers

JOSEPH T. Ryerson & Son Inc., Chicago, with steel warehouses in various cities, has arranged to stock the various NE (National Emergency) steels to supply small lots for test and experimental purposes. The company also is urging customers to report quickly on results obtained in fabricating and heat treating these new low-alloy steels. Purpose is to obtain and consolidate information which will hasten a changeover to the new steels without disrupting present manufacturing operations.

♦

Pennsylvania railroad is stencilling "Buy War Bonds" on 500 box cars, covering an area 9 feet 4 inches in length.

♦

Square D Co., Milwaukee, has opened a branch office at 146 Chestnut street, Springfield, Mass., with C. T. Nash in charge, to serve the Hartford, Conn., Springfield, Vt., Worcester, Mass., and Providence, R. I., area.

♦

Savage Tool Co. has moved its plant and offices from Minneapolis to Savage, Minn., where a new plant, 85 x 225 feet, has been erected.

♦

Pacific Tool & Supply Co., 344 North Vermont avenue, Los Angeles, has changed its name to Brand Tool & Supply Co.

♦

Carboloy Co. Inc., Detroit, has announced a further increase in manufacturing facilities for standard tools. The tool department of a General Electric Co. subsidiary in the Illinois region, formerly manufacturing appliances, has been equipped to produce such tools from carbide materials furnished by and under subcontract from Carboloy, also a subsidiary of GE.

♦

Through revision of construction plans, more than 900 tons of steel will be saved in a building to house National Aluminum Cylinder Head Co., new subsidiary of National Bronze & Aluminum Foundry Co., Cleveland, for which ground was broken recently. It will have 200,000 square feet of floor space. Site is adjacent to parent company's Laisy avenue structure which now includes a training school for foundry workers under TWI sponsorship.

♦

Belle City Malleable Iron Co., Racine, Wis., has issued an illustrated booklet, marking its fiftieth anniversary. It is informative on the higher grades of ferrous castings, malleable in regular, high-strength and pearlitic, steel, and electric furnace gray iron.

♦

McCarthy Bros. Construction Co., St. Louis, has been awarded a contract by the War Department for building an alien camp "somewhere in Missouri," of about 216 buildings, to cost $1,000,000, under jurisdiction of United States Engineers Office, Kansas City, Mo.

♦

Contract for engineering services for a $3,000,000 addition to a small arms ammunition plant near St. Louis has been awarded to Mauran, Russell, Crowell & Mullgart, architects of St. Louis, and Giffels & Vallet Inc., Detroit. The job is solely for addition to existing facilities.

♦

Victor Equipment Co. is now handling the complete line of stainless and alloy electrodes manufactured by Arcos Corp., Philadelphia. The Victor company has sales offices in Los Angeles, San Francisco, and Fresno, Bakersfield and San Diego, Calif., and in Phoenix, Ariz.

♦

J. F. Pritchard & Co., Kansas City, Mo., recently enlarged its division of chemical design, engineering and construction to meet growing requirements of the new Petrol-Chemical industry. Dr. W. W. Deschner, formerly in charge of the department of chemical engineering, University of Kansas, is head of the division.

♦

Foundry Division of North Wales Machine Co. Inc., North Wales, Pa., will henceforth be operated as a separate company under the name of King Foundries Inc., with no change in officers or address.

♦

Contracts for an addition to the Euclid, O., plant of Thompson Aircraft Products Co., subsidiary of Thompson Products Inc., Cleveland, amounting to more than $8,000,000 were recently awarded by officials of the firm which operates a new $15,000,000 plant manufacturing aircraft engine valves and parts. Funds are being provided by Defense Plant Corp.

♦

American Locomotive Co. dedicated its Chicago Heights, Ill., plant to war production in a ceremony June 29. The plant, one of seven operated by the company, was idle during the depression but has been reconditioned and improved at a cost of $1,645,000 for production of steel ingots, forgings, tank parts and navy materials.

♦

Lessons from Lightning

STUDY of the holes made by lightning in this copper sphere during the seven years that it topped the 878-foot antenna tower of station WSM, Nashville, Tenn., enabled Dr. Karl B. McEachron, left, and J. H. Hagenguth, right, of the General Electric High Voltage Laboratory, Pittsfield, Mass., to work out a formula for calculating the quantity of electricity in the lightning strokes that made them. Surprisingly small amounts of electricity are involved even in large lightning strokes. For example, their calculations show the stroke that produced the largest hole, nearly 1-inch in diameter, contained only enough electricity to light a 40-watt lamp about 80 seconds

New Agents Named by Machinery Companies

New agents have been appointed by Cincinnati Bickford Tool Co. in place of Henry Prentiss & Co., who recently discontinued business.

Wigglesworth Machinery Co., 199 Bent street, Cambridge, Mass., will cover Connecticut, Massachusetts, Rhode Island, New Hampshire, Vermont and Maine.

Eastern New York state and northern New Jersey will be handled by Rudel Machinery Co., 200 Fifth avenue, New York, with whom are associated L. H. Pratt, W. O. Graham and Frank Hamilton, formerly with the Prentiss organization.

C. H. Briggs Machine Tool Co. Inc., Onondaga Building, Syracuse, N. Y. will take care of central New York and northeastern Pennsylvania. Mr. Briggs, president, has been covering this area for the Henry Prentiss Company for the last several years.

Western New York, including Buffalo and Rochester, will be served by George Keller Machinery Co., 1807 Elmwood avenue, Buffalo. E. F. Morgan and J. A. Carter, formerly with the Buffalo office of the Henry Prentiss Co. are now associated with this concern.

Lodge & Shipley

Lodge & Shipley Machine Tool Co., Cincinnati, has completed arrangements with four companies to handle the sale of their lathes and Duomatics in the area formerly covered by Henry Prentiss & Co., who have retired from business.

General Machinery Corp., 140 Federal street, Boston, covers Massachusetts, Rhode Island, Maine, New Hampshire and Vermont.

Wilson Brown Co., 5200 Chrysler building, New York: Eastern section of New York state, northern part of New Jersey, and all of Connecticut.

C. H. Briggs Machine Tool Co., Onondaga building, Syracuse, N. Y.: Control New York state and northeastern counties of Pennsylvania.

George Keller Machinery Co., 1807 Elmwood avenue, Buffalo: Buffalo and Rochester areas.

Brassert & Co. License Sale of Equipment

H. A. Brassert & Co., consulting engineers, have made an exclusive license arrangement, effective June 1, with S. P. Kinney, formerly vice president of the company, covering the manufacture, sale and installation of all equipment previously made and distributed by the Brassert organization.

Consisting mainly of accessory equipment used in blast furnace operation, the list of items includes: Hot blast stove checker systems; burners; valves of various types; gas washers; primary and secondary gas cleaners; self-cleaning strainers; revolving distributors and other similar products. Main offices of the Brassert company are at 60 East 42nd street, New York, where they conduct their iron and steel plant designing, construction and consulting engineering business.

Restrictions on the sale of safety razors by manufacturers and jobbers have been lifted by the WPB, indicating the Armed Services have satisfied requirements during the May-June freeze. WPB has indicated additional supplies using substitute materials will be made available for both military and civilian demand.

✦

Reclaiming Tin

NEWARK, N. J.: Salvaging tin in tooth paste and shaving cream tubes which customers have piled up in the retail stores in this area is under way in a one-story brick building on the Jersey Meadows, located there because of rank odor from burning paste. It is known as the Tin Salvage Institute, employs 40 workers, and reclaims 2 tons of tin per day.

Top: After caps are removed, tubes are dumped into hopper, conveyor belt brings them to group of girls who sort the tin tubes from the lead and aluminum. Lower: Tin is drawn off into molds, making 100-pound pigs. NEA

War Metallurgy Committee Will Co-ordinate Research Activities

EXPERIENCE of 10,000 scientists, representing more than 125,000 man-years' research and accumulated laboratory data, is being brought to bear on the problems of making the most efficient use of available metals in the war effort, through an organization set up by private and public research agencies.

Much already has been done, and future research is expected to be better co-ordinated under a recently established War Metallurgy Committee, composed of leading research men.

Dr. Frank B. Jewett, president of the National Academy of Sciences, Washington, last week outlined the work of the committee and also reported on the achievements of the academy's Metals and Minerals Advisory Committee. The latter committee during the past 18 months has supplied OPM and WPB with 113 reports; 53 were on metals substitution and conservation; 47 on ferrous metals and ferroalloys; 4 on tin smelting and reclamation; and 9 on nonmetallic minerals. Since Pearl Harbor the committee's work has been greatly expanded. Its work will be increased further as it functions for and with the new War Metallurgy Committee which has been set up primarily to appraise and conduct needed research work for the Army, Navy, WPB and other governmental agencies as well as for industry.

The new committee has three major functions; 1 — Formulating and placing research projects; 2— supervising the operation of these researches; 3—correlating the committee's work with war metallurgical research of other government agencies, industrial and university research and with foreign research.

The Metals and Minerals Advisory Committee serves both the WPB and the War Metallurgy Committee on problems involving production, substitution and conservation of strategic materials.

Nerve Center for Research

The War Metallurgy Committee and the advisory committee, according to Dr. Jewett, will function as the nerve center for all metallurgical research organizations and departments in this country. Heads of any business, university or research organization will be expected to make available to the committee the experience of their metallurgical scientists and engineers and their laboratory data.

Thus will be made available to the Army and Navy, either through the WPB or the Office of Scientific Research and Development, the services of any or all research personnel and facilities in the country. The academy estimates there are more than 10,000 persons engaged in such research and that their combined experience represents more than 125,000 man-years.

One basic consideration in the formation of the War Metallurgy Committee was the saving of time, mistakes and money. Whenever a problem is proposed, either through WPB or the OSRD, immediate action can be obtained by telephone communication with leading scientists on that particular subject; initial committee meetings may be held within 24 hours and a plan of procedure laid down.

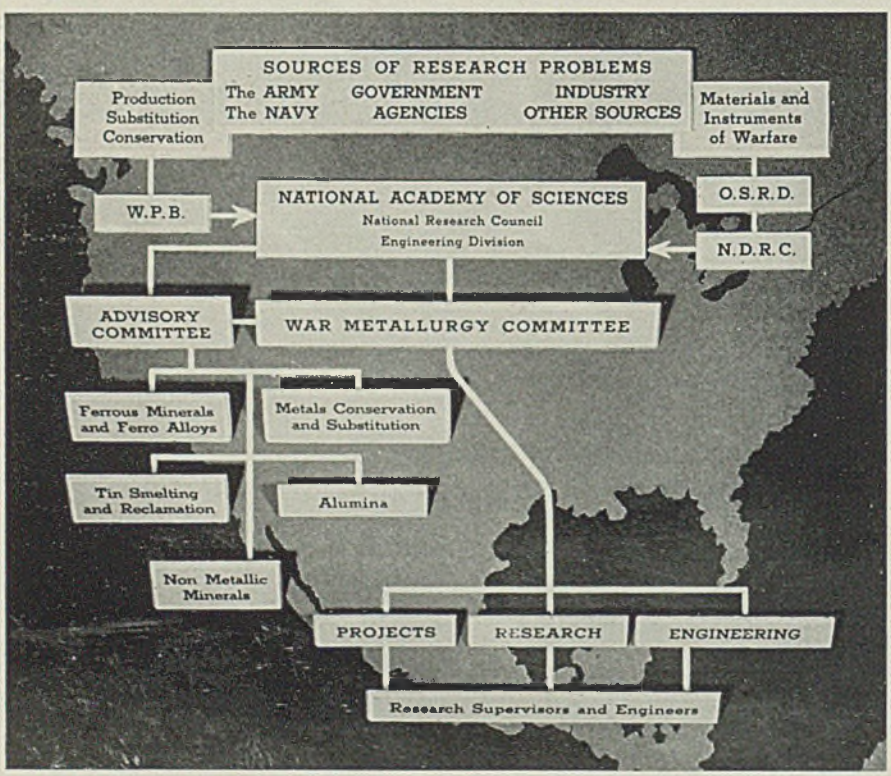
Another function of the War Metallurgical Committee is to digest and make available to the proper persons the results of Canadian and English research. Many of the problems are common and the interchange of information is expected to make available to all the best thinking and practice of scientists and industrialists on both sides of the Atlantic.

Typical of the problems referred to the committee is one asking for improvement in welding processes. A subcommittee was immediately appointed which collected data from engineering foundations, research departments of business organizations and universities. The project section of the committee worked up the research indicated, research procedure, and with the approval of the National Defense Research Committee and OSRD, placed the research with university laboratories qualified for the work.

Another typical request for data was that from the WPB of the effect of substitution of lead-silver for tin-lead soldering of tin cans used for food products. Since a large proportion of tin consumed is used for soldering, the substitution of lead-silver for tin-lead soldering was obviously required, but the problems involved, in certain canning processes, are such that definite research is needed before such substitution can be ordered.

The project has been prepared and will be administered through the committee's research section, the work being done in a large university research laboratory, in cooperation with the National Canners Association.

Membership of War Metallurgy Committee and the advisory committee is representative of leading scientists and industrialists. Members follow:



War Metallurgy Committee

Includes 26 members, as follows: Chairman, Clyde Williams, director, Battelle Memorial Institute, Columbus, O.; vice chairman, Zay Jeffries, director of research, General Electric Co., Cleveland; secretary, Louis Jordan, National Academy of Sciences, Washington; Carl Breer, vice president, Chrysler Corp., Detroit; Dr. Lyman J. Briggs, director, U. S. Bureau of Standards, Washington; Col. H. H. Zornig, Ordnance Department, Watertown Arsenal, Watertown, Mass.; James H. Critchett, vice president, Union

Carbide & Carbon Research Laboratories, New York.

Col. R. S. A. Dougherty, manager, research and development, Bethlehem Steel Co., Bethlehem, Pa.; Rudolph Furrer, vice president, A. O. Smith Corp., Milwaukee; Dr. H. W. Gillett, chief technical advisor, Battelle Memorial Institute, Columbus, O.; S. D. Heron, Ethyl Gasoline Corp., Detroit; Dr. R. P. Heuer, vice president, General Refractories Co., Philadelphia; Col. G. F. Jenks, Ordnance Department, Washington.

Dr. John Johnston, director, research laboratory, U. S. Steel Corp., Kearny, N. J.; Dr. Vsevolod N. Krivobok, director of research, Lockheed Aircraft Corp., Burbank, Calif.; Frederick Laist, general metallurgical manager, Anaconda Copper Mining Co., New York; Dr. W. K. Lewis, head of department chemical engineering, Massachusetts Institute of Technology, Cambridge, Mass.; Dean C. E. MacQuigg, College of Engineering, Ohio State University, Columbus, O.

C. E. McCuen, vice president, General Motors Corp., Detroit; Dr. Robert F. Mehl, director, metals research laboratory, Carnegie Institute of Technology Pittsburgh; Dr. Paul D. Merica, vice president, The International Nickel Co. Inc., New York; Dr. Gilbert E. Sell, technical director, E. J. Lavino & Co., Norristown, Pa.; Captain Lybrand Smith, Office of Coordinator of Research & Development, Navy Department, Washington; Dr. F. W. Willard, president, Nassau Smelting & Refining Co., New York; Dr. Robert S. Williams, head, department of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.; Col. A. E. White, University of Michigan, Ann Arbor, Mich.

The Advisory Committee is composed of 63 regular committees, plus 20 other specialists who are called in frequently for advice on specific problems. Regular members are, according to subcommittees:

Ferrous Minerals, Ferroalloys

Gilbert E. Sell, chairman, E. J. Lavino Co., Norristown, Pa.; A. C. Fieldner, secretary, U. S. Bureau of Mines, Washington; Ralph Bowman, Republic Steel Co., Cleveland; Frederick G. Cottrell, Washington; James Critchett, Union Carbide & Carbon Research Laboratories, New York; John V. N. Dorr, The Dorr Co., New York; Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.; Donnell F. Hewett, U. S. Geological Survey, Washington; John Johnston, United States Steel Corp., Kearny, N. J.; Frederick Laist, Anaconda Copper Co., New York; Enoch Perkins, Mutual Chemical Co. of America, New York.

Metals Conservation, Substitution

Zay Jeffries, chairman, General Electric Co., Cleveland; Paul D. Merica, vice chairman, International Nickel Co., New York; W. H. Eisenman, secretary, American Society for Metals, Cleveland; Robert S. Archer, Republic Steel Corp., Chicago; E. W. Bennett, Dow Chemical Co., Midland, Mich.; A. L. Boegehold, General Motors Corp., Detroit; S. K. Colby, Aluminum Co. of America, Pittsburgh.

Major G. L. Cox, Ordnance Department, Watertown Arsenal, Watertown, Mass.; D. K. Crampton, Chase Brass & Copper Co., Waterbury, Conn.; Lieut-Col. L. S. Fletcher, Frankford Arsenal, Philadelphia; John R. Freeman Jr., American Brass Co., Waterbury, Conn.; James P. Gill, Vanadium-Alloys Steel Co., Latrobe, Pa.; H. W. Gillett, Battelle Memorial Institute, Columbus, O.; W. C. Hamilton, American Steel Foundries, East Chicago, Ind.

Charles H. Herty Jr., Bethlehem Steel Co., Bethlehem, Pa.; John Johnston, United States Steel Corp., Kearny, N. J.; A. B. Kinzel, Union Carbide & Carbon Research Laboratories, New York; Robert H. Leach, Handy & Harman, Bridgeport, Conn.; Robert F. Mehl, Carnegie Institute of Technology, Pittsburgh; W. M. Peirce, New Jersey Zinc Co., Palmerton, Pa.; Albert J. Phillips, American Smelting & Refining Co., Barber, N. J.

William B. Price, Scovill Mfg. Co., Waterbury, Conn.; H. S. Rawdon, Bureau of Standards, Washington; Walter C. Smith, Cerro de Pasco Copper Co., New York; Jerome Strauss, Vanadium Corp. of America, New York; W. P. Woodside, Climax Molybdenum Corp., Detroit; F. W. Willard, Nassau Smelting & Refining Co., New York.

Nonmetallic Minerals

R. P. Heuer, chairman, General Refractories Co., Philadelphia; Paul Tyler, secretary, United States Bureau of Mines, Washington; L. E. Barringer, General Electric Co., Schenectady, N. Y.; G. A. Bole, Orton Ceramic Foundation, Columbus, O.; B. C. Burgess, United Feldspar & Minerals Corp., Spruce Pine, N. C.; W. S. Landis, American Cyanamid Co., New York; M. M. Leighton, State Geological Survey Division, University of Illinois campus, Urbana, Ill.

G. R. Mansfield, United States Geological Survey, Washington; Oliver C. Ralston, United States Bureau of Mines, College Park, Md.; Robert B. Sosman, United States Steel Corp., Kearny, N. J.; John D. Sullivan, Battelle Memorial Institute, Columbus, O.; Frank J. Tone, Carborundum Co., Niagara Falls, N. Y.; William M. Weigel, Missouri Pacific Railroad, St. Louis; R. B. Wittenberg, International Agriculture Corp., New York.

Tin Smelting, Reclamation

F. W. Willard, chairman, Nassau Smelting & Refining Co., New York; P. M. Ambrose, secretary, Bureau of Mines, Washington; W. K. Lewis, Massachusetts Institute of Technology, Cambridge, Mass.; M. F. McConnell, Carnegie-Illinois Steel Corp., Pittsburgh; Walter C. Smith, Cerro de Pasco Copper Co., New York; John F. Thompson, International Nickel Co., New York.

Alumina Subcommittee

John D. Sullivan, chairman, Battelle Memorial Institute, Columbus, O.; Francis C. Frary, Aluminum Co. of America, New Kensington, Pa.; Oliver C. Ralston, United States Bureau of Mines, College Park, Md.; R. S. Sherwin, Reynolds Metals Co., Sheffield, Ala.; Arthur Fleischer, Kalunite Co., Salt Lake City, Utah.

Associations and technical societies in the metallurgical field are taking an active part in the problems of metallurgical reports and research. Among those now cooperating in the program are: American Institute of Mining and Metallurgical Engineers; American Society for Testing Materials; American Society of Mechanical Engineers; American Society for Metals; Society of Automotive Engineers; Engineers Defense Board; American Institute of Chemical Engineers; Army Ordnance Association; American Iron and Steel Institute; and American Ceramic Society.

East-Central Areas Have Major Share Of War Contracts

Total of government contracts for new war plant, facilities and materials from June, 1940 through first quarter 1942 was $55,800,000,000. Of this amount, $50,500,000,000 was scheduled for allocation to specific production areas, but due to unequal distribution of existing facilities in some regions and inadequate facilities requiring development or new construction in others, disproportionate expansion resulted.

Analysis of total awards in the 22 months by National Industrial Conference Board, New York, shows that regional expansion was most heavily concentrated in central areas. Five east-north-central states held 25 per cent of the total. Middle Atlantic states received 22.2 per cent, while the Pacific region took 16.1 per cent, the only other area to be allotted over 10 per cent. Among the states, California led with 10.8 per cent; New York received 9.2 per cent; Michigan held 8.2 per cent; Ohio had 7.8 per cent, and Pennsylvania and New Jersey each received 6.5 per cent of the total commitments for war plant and war supplies. Almost half of all awards were placed in these six states.

Plants Widely Distributed

In contrast, the awards for war plant and equipment alone, totaling $10,700,000,000, have been spread more broadly over the states. For example, the mountain region, with only 1.7 per cent of the supply contracts, received 3.5 per cent of plant awards; the Pacific area, with 16.2 per cent of material contracts, took only 6.6 per cent of the total war plant allotment; New England, with 8.8 per cent of the material contracts, received only 4.6 per cent of plant awards. West-north-central and east-south-central regions both showed marked gains in war plant expansion.

Plant Expansion in Peace and War

Region	% Distribution of Capital Outlays in Manufacturing, 1939	% Distribution of Government Plant Awards, June, 1940-March, 1942
New England	8.4	4.6
Middle Atlantic	24.5	18.1
East North Central	33.0	32.6
West North Central	4.6	10.3
South Atlantic	11.6	7.1
East South Central	4.0	6.1
West South Central	6.0	11.0
Mountain	1.3	3.5
Pacific	6.7	6.6

U. S. Steel Capacity 65 Per Cent Greater Than That of Axis Europe

STEEL productive capacity in the United States is nearly 65 per cent higher than combined capacity of Germany and all of Europe now controlled by the Axis.

If Germany could operate every iron and steel plant in Europe outside of Russia, at their highest rate, total steel output would be 53,000,000 net tons, it is estimated by the American Iron and Steel Institute. This would be about 35,000,000 tons less than annual capacity in the United States as of Jan. 1, 1942.

Total steel ingot capacity of Axis Europe is divided as follows, in net tons:

Germany	24,700,000
France	10,700,000
Belgium	4,500,000
Italy	3,000,000
Luxembourg	3,000,000
Czechoslovakia	2,500,000
Poland	1,700,000
Sweden	1,200,000
Hungary	800,000
Austria	700,000
Spain	700,000
Rumania	300,000
Total	53,800,000

Comparison of capacities of the United Nations and the Axis, in net tons, follows:

United Nations	
United States	88,570,000
British Empire	20,600,000
Russia	21,800,000
Total	130,970,000

Axis	
Europe	53,800,000
Japan	7,200,000
Total	61,000,000

While some of the steel capacity in Axis controlled countries may have been damaged, such losses may have been offset by new plants in Germany. Reports from France and Italy indicate output has been greatly curtailed by shortage of raw materials, and transportation difficulties. Production in other conquered countries is also believed to have declined.

Axis Europe has mines sufficient to produce iron ore, coal and limestone to operate all iron and steel plants at capacity. However, some mines are distant from plants and the quality of ore is low or mediocre. This has imposed a heavy burden on railroad facilities already strained by military requirements.

The Axis apparently faces great insufficiency in certain strategic alloying elements, especially manganese, nickel and chromium. Large reserve stockpiles are known to have been accumulated by Germany before the war.

Countries in Axis Europe are able to mine only 30 per cent of manganese, 40 per cent of chromium and 10 per cent of nickel needed for capacity output of steel. These percentages assume the Axis need for alloy steels is proportionate to that in this country's war program.

Germany always has beeen almost entirely dependent upon imports for chromium, nickel, tungsten, cobalt, tin and vanadium and imported more than half its manganese requirements. Part of these supplies came from countries now at war with Germany or from overseas countries not now accessible.

Additional chromium supplies were made available by invasions of Norway, Albania, Greece and Yugoslavia and domination of Rumania and Bulgaria. The quantity now obtainable, however, must be still far below Germany's estimated war needs.

New manganese sources were obtained in France, Bulgaria, Greece, Yugoslavia, Hungary, Czechoslovakia and Poland. Additionally, the German forces captured the Nikopol mining area in the Russian Ukraine in 1941 but this district is close to the fighting front and probably of little use to Axis steel plants.

Small nickel reserves of Germany and Italy have been supplemented by those of Finland, Norway and Spain but these additions probably fall far short of supplying sufficient for alloy demand.

In addition to use of steel plants of conquered countries Germany has obtained valuable coal and ore resources. The most important iron ore districts are in Lorraine and at Krivoi Rog in Russia. The Lorraine ore has helped meet Germany's need for richer ore, though it may have curtailed supply to steel plants in France.

Safety Glass

ST. LOUIS

A pocketful of glass eyes proved an effective argument in a campaign among metal workers by the St. Louis Council. Reyburn P. Hoffman, secretary of the Council, recently lecturing to lathe workers, exhibited the eyes and said: "If any of you would prefer one of these to his natural eye, you can afford to be less careful."

Several foremen obtained supplies of the eyes which they offer to workers who neglect to wear goggles.

Salesmen, Now Factory Workers, in "Duration Club"

In Rome, N. Y., recently, 13 men sat down for dinner, preceded by a general get-together. All of them, former salesmen, are now working in the factory of Rome Mfg. Co., a division of Revere Copper & Brass, Inc. The men have formed an "exclusive private club" which they have called the "Duration Club"—because they hope it won't last forever. Until they are back as salesmen, they serve as timekeepers, payroll clerks and bookkeepers.

In the group, seated: J. M. Kennedy, vice president, Rome Mfg. Co. division; J. J. Zingerline, J. H. Finnegan, E. E. Wood, C. P. Drake, sales managers. Standing: S. R. Knight, G. W. VanDewalker, H. W. Fisk, L. T. Stannard, J. F. Butts, J. A. Preisendorfer, R. E. Conley and H. J. Humphrey. C. Donald Dallas, president, Revere Copper & Brass, is an honorary member.

Industrial Activity Continues Upward Trend

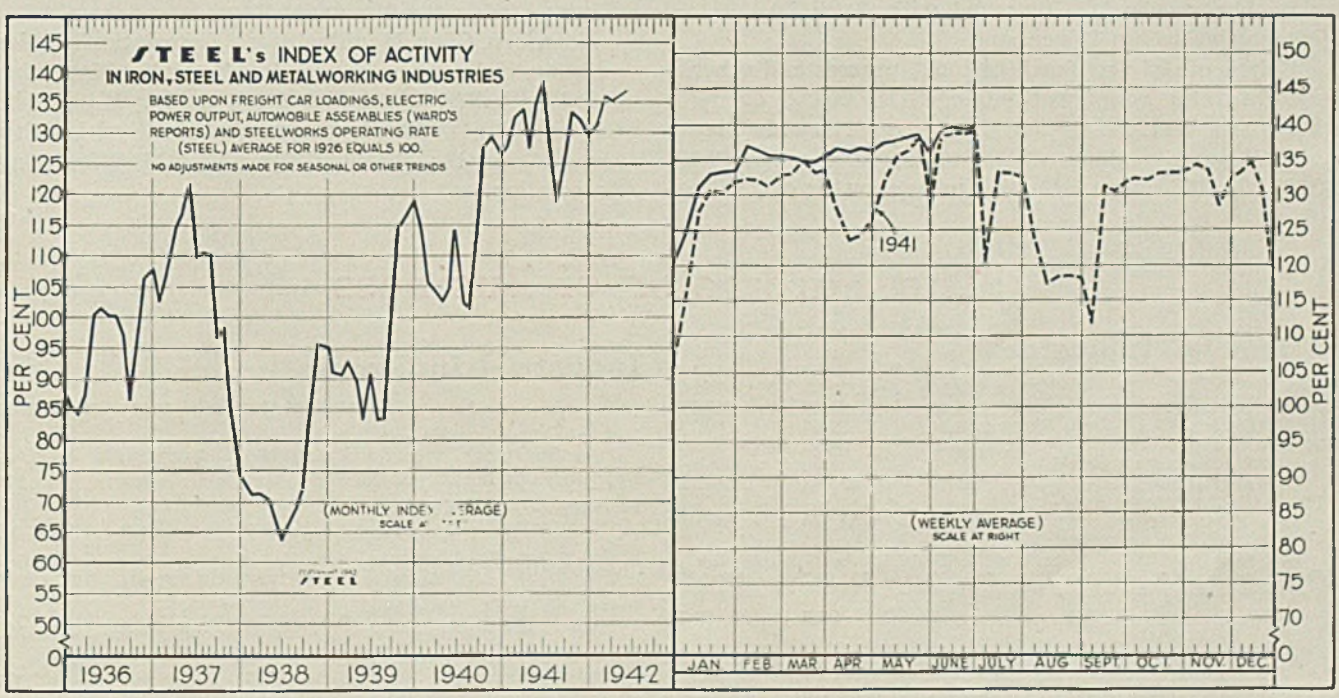
INDUSTRIAL activity continued to move steadily upward throughout June, extending the gains recorded during April and May. STEEL's weekly index averaged 139.2 last month, comparing with 137.4 in May and 138.7 during June, 1941. Reflecting the all-out effort to increase output of military materials, most plants maintained full operations over the Fourth of July holiday.

During the week ended June 27, STEEL's index advanced slightly to 139.6. This represents a gain of 0.3 point from the preceding week's index figure and compares with 138.8 recorded in the like period a year ago.

The national steel rate was off one half point to 98.5 during the week ended June 27. Percentagewise, steel production is below the 99.5 per cent level recorded this time last year, but output tops a year ago on a tonnage basis. Steel scrap is moving to mills in greater volume. However, the scrap drive is disappointing in so far as collections are not sufficient to permit accumulation of stocks at mill yards for use throughout the winter months.

Electric power consumption totaled 3,457,024,000 kilowatts during the latest period. This compares favorably with 3,433,711,000 kilowatts consumed in the preceding week and represents a gain of 9.5 per cent over that recorded in the like 1941 week.

Revenue freight carloadings edged slightly upward during the week of June 27 to about 850,000 cars. A year ago freight traffic totaled 908,664 cars. There are grounds for optimistic belief that the railroads will be able to meet fully this year's freight traffic demands, Joseph B. Eastman, director, Office of De-



STEEL's index of activity advanced 0.3 point to 139.6 in the week ending June 27:

Week Ended	1942	1941
April 25	136.3	126.5
May 2	137.2	132.6
May 9	137.5	135.9
May 16	137.9	136.1
May 23	138.1	138.6
May 30	136.0	128.4
June 6	138.4	138.4
June 13	139.5	138.7
June 20	139.3	138.7
June 27	139.6†	138.8

†Preliminary.

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	136.3	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	135.2	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	136.6	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	137.4	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	139.2	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3

fense Transportation, told rail executives recently. American Trucking Association reports freight transported by motor carriers in May decreased 3 per cent from April, but was 2.6 per cent above tonnage moved in May, 1941.

Inventories, in terms of dollars based on cost values, were down 3 per cent at the close of April, according to the Department of Commerce. This is the first month since December, 1940, that an inventory decline has occurred. Compared with April 30, 1941, inventories are up 16 per cent.

Shipments of new machine tools, presses and other metalworking equipment totaled $118,500,000 during May, the War Production Board reports. Machine tool shipments alone, 25,700 units, were valued at $107,300,000, compared with April's showing of 25,400 units valued at $103,364,000. Metalworking machinery output is running at the rate of $1,400,000,000 annually, an increase of 65 per cent over the 1941 volume, and is steadily expanding.

American Gear Manufacturers Association's index on industrial gear sales rose to 421 during May, compared with 378 in April and 273 during May, 1941. Orders for new foundry equipment declined in May, according to the Foundry Equipment Manufacturers Association.

Where Business Stands

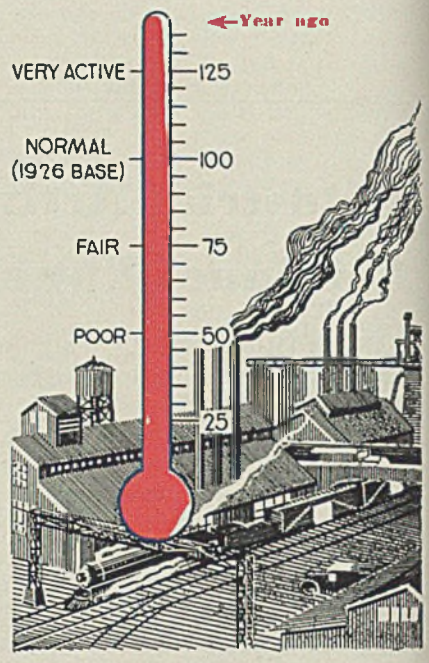
Monthly Averages 1941=100

	May, 1942	April, 1942	May, 1941
Steel Ingot Output	104.8	104.0	91.0
Finished Steel Shipments	107.5	103.1	102.3
Freight Carloadings	101.0	103.0	103.4
Freight Car Awards	81.2	209.8	184.0
Structural Steel Shipments	92.4	96.5	102.3
Building Construction	134.5	99.6	109.6

Industrial Weather

TREND:

Upward



The Barometer of Business

Financial Indicators

	May, 1942	Apr., 1942	May, 1941
30 Industrial Stocks*	11.68	11.06	17.30
20 Rail Stocks*	68.30	67.52	84.71
15 Utilities*	24.29	24.56	28.25
Average Price of all listed bonds (N.Y.S.E.)	$95.64	$95.63	$94.22
Bank Clear'gs daily average (000 omitted)†	$1,108	$1,164	$1,049
Commercial Paper, interest rate (4-6 months)	½–⅝	½–⅝	½–⅝
Com'l loans (000 omitted)‡	$10,905	$11,337	$10,030
Federal Reserve ratio (per cent)	89.8	90.6	91.1
Capital flotations: (000 omitted)			
New Capital	$127,570	$157,820	$105,973
Refunding	$52,461	$104,328	$299,269
Federal gross debt. (mil. of dol.)	$68,571	$64,961,000	$47,737,000
Railroad earnings†	$101,994,561	$92,388,079	$52,074,739
Stock sales, New York Stock Exchange	7,229,097	7,589,297	9,660,000

*Dow Jones series.
‡Leading member banks Federal Reserve System.
†April, March and April respectively.

Commodity Prices

	May, 1942	Apr., 1942	May, 1941
STEEL'S composite finished steel price average	$56.73	$56.73	$56.73
U. S. Bureau of Labor's index	98.7†	98.8	84.9
Wheat, cash (bushel)	$1.21	$1.215	$1.038
Corn, cash (bushel)	$0.965	$0.998	$0.83

†Preliminary.

Industrial Indicators

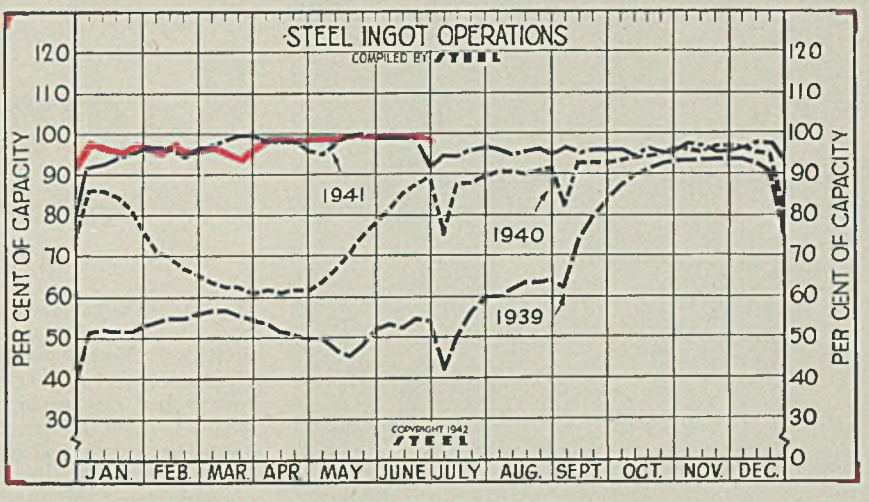
	May, 1942	Apr., 1942	May, 1941
Iron and Steel Scrap consumption (tons)	4,857,000	4,672,000	4,609,000
Gear Sales Index	421	378	273
Foundry equipment new order index	653.6	1089.3	423.3
Finished steel shipments (Net tons)	1,834,127	1,758,894	1,745,295
Ingot output (average weekly; net tons)	1,667,470	1,660,213	1,590,195
Commercial steel castings production†	149,625	146,507	101,977
Dodge bldg. awards in 37 states ($ Valuation)	$673,517,000	$498,742,000	$548,700,000
Fabricated structural steel shipments (Tons)	173,321	180,987	191,905
Steel castings output (Net Tons)†	191,195	211,081	152,007
Coal output, tons	48,250,000	49,000,000	43,400,000
Business failures; number†	938	1048	1149
Business failures; liabilities†	$10,175,000	$13,241,000	$15,068,000
Cement production, bbls.†	14,068,000	12,733,000	12,196,000
Cotton consumption, bales	957,015	998,754	923,518
Freight Car Awards	822	2,125	18,630
Car loadings (weekly av.)	825,452	837,759	841,557

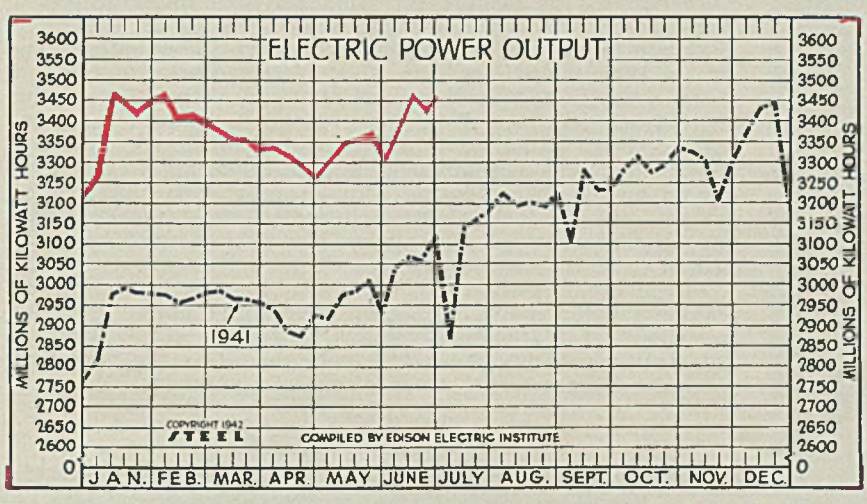
†April, March and April respectively.

Steel Ingot Operations

(Per Cent)

Week ended	1942	1941	1940	1939
June 27....	98.5	99.5	89.0	54.0
June 20....	99.0	99.0	88.0	54.5
June 13....	99.0	99.0	86.0	52.5
June 6....	99.0	99.0	81.5	53.5
May 30....	99.0	99.0	78.5	52.0
May 23....	99.0	100.0	75.0	48.0
May 16....	99.5	99.5	70.0	45.5
May 9....	99.0	97.5	66.5	47.0
May 2....	99.0	95.0	63.5	49.0
April 25...	98.5	96.0	61.5	49.0
April 18...	98.5	98.0	61.5	50.5
April 11...	98.5	98.0	61.0	51.5
April 4....	98.0	98.0	61.5	53.5
Mar. 28....	97.5	99.5	61.0	54.5
Mar. 21....	95.5	99.5	62.5	55.5
Mar. 14....	95.5	98.5	62.5	56.5





Electric Power Output

(Million KWH)

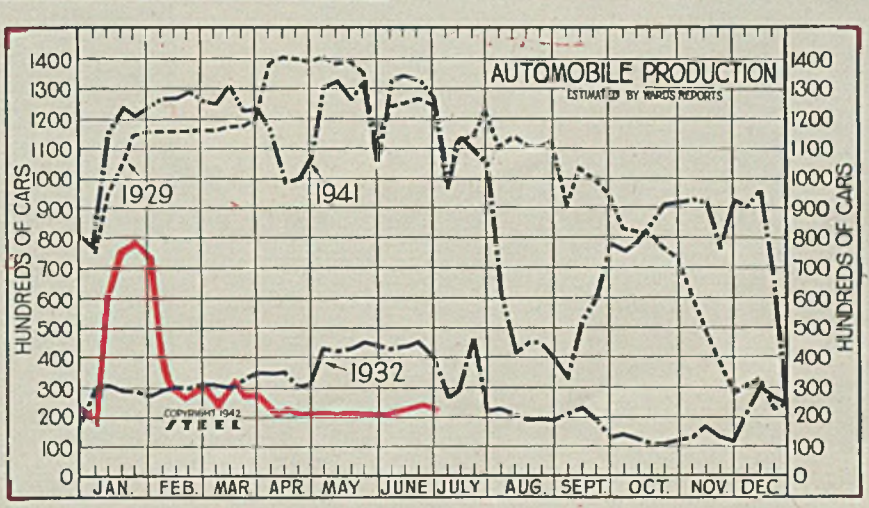
Week ended	1942	1941	1940	1939
June 27.....	3,457	3,121	2,660	2,396
June 20.....	3,434	3,056	2,654	2,362
June 13.....	3,464	3,066	2,665	2,341
June 6.....	3,372	3,042	2,599	2,329
May 30.....	3,323	2,924	2,478	2,186
May 23.....	3,380	3,012	2,589	2,778
May 16.....	3,357	2,983	2,550	2,235
May 9.....	3,351	2,975	2,516	2,239
May 2.....	3,305	2,915	2,504	2,225
April 25.....	3,299	2,926	2,499	2,244
April 18.....	3,308	2,874	2,529	2,265
April 11.....	3,321	2,882	2,530	2,235
April 4	3,349	2,938	2,494	2,244
Mar. 28.....	3,346	2,956	2,524	2,272
Mar. 21.....	3,357	2,964	2,508	2,258
Mar. 14.....	3,357	2,965	2,550	2,276
Mar. 7.....	3,392	2,987	2,553	2,285

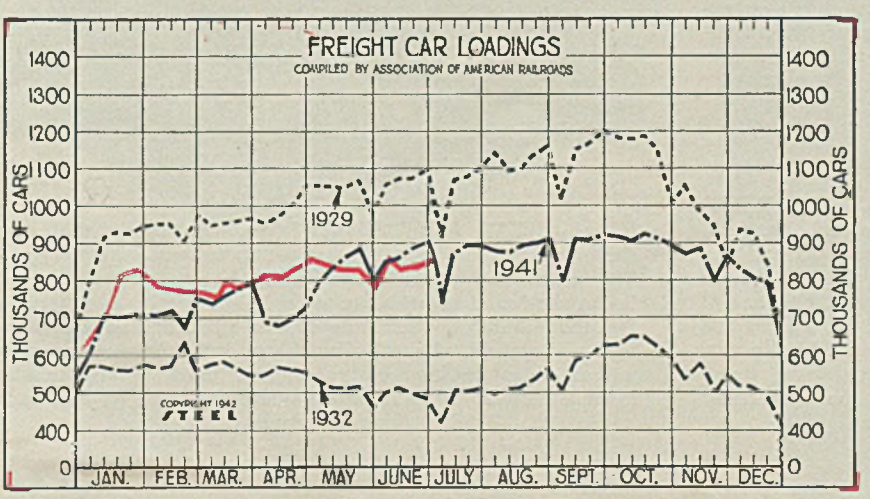
Auto Production

(1000 Units)

Week ended	1942	1941	1940	1939
June 27....	22.9	127.9	87.6	70.7
June 20....	23.2	133.6	90.1	81.1
June 13....	22.3	134.7	93.6	78.3
June 6....	22.0	133.6	95.6	65.3
May 30....	21.5	106.4	61.3	32.4
May 23....	21.6	133.6	96.8	67.7
May 16....	21.8	127.3	99.0	80.1
May 9....	21.5	132.6	98.5	72.4
May 2....	22.0	130.6	99.3	71.4
April 25...	21.9	108.2	101.4	86.6
April 18...	21.7	99.9	103.7	90.3
April 11...	23.0	99.3	101.9	88.1
April 4....	22.3	116.3	101.7	87.0
Mar. 28....	28.9	124.2	103.4	86.0
Mar. 21....	28.9	123.8	103.4	89.4

†Canadian trucks and automobiles and United States trucks, since week of Feb. 21 last.



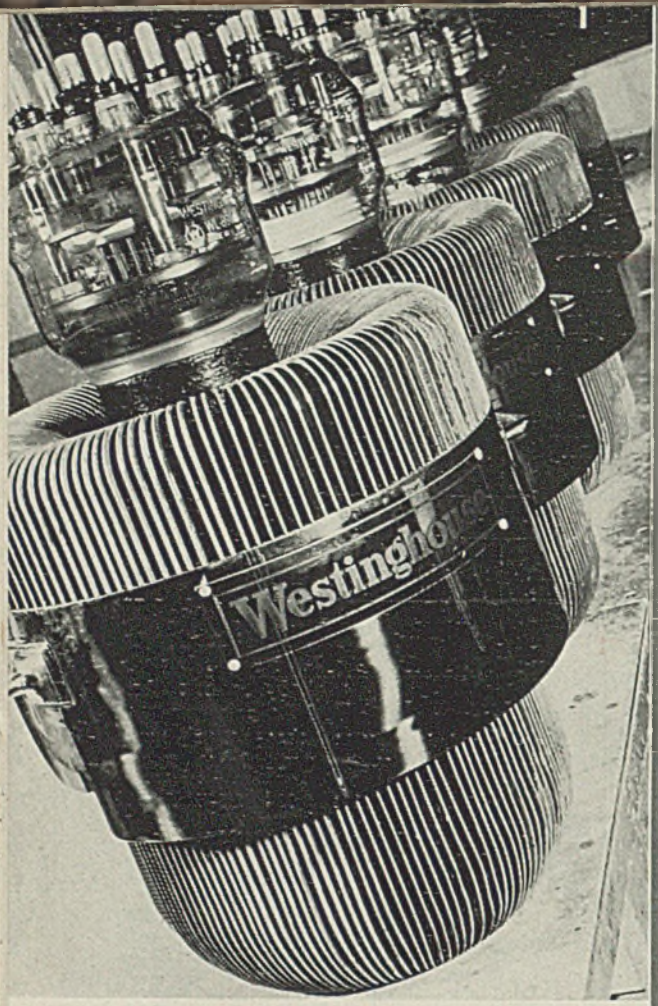


Freight Car Loadings

(1000 Cars)

Week ended	1942	1941	1940	1939
June 27	850†	909	752	666
June 20.....	840	886	728	643
June 13.....	833	863	712	638
June 6.....	855	853	703	635
May 30.....	796	802	639	568
May 23.....	838	866	687	628
May 16.....	839	861	679	616
May 9	839	837	681	555
May 2.....	859	794	666	573
April 25.....	855	722	645	586
April 18.....	847	709	628	559
April 11.....	814	680	619	548
April 4.....	829	683	603	535
Mar. 28.....	805	792	628	604

†Preliminary.



Radio Research a

. . . . given great impetus by war

IN THE greatest expansion of radio facilities in the history of the industry, research men are working on developments which will prove as startling when peace returns as the telephone and electric light were in an earlier generation. Radio, first developed on a large scale as a result of military needs in World War I, is now undergoing a second great period of research and expansion. Once again, war will probably give us new and amazing tools.

Compared to our present facilities, the armies of World War I were relatively without radio "voice" or "hearing" until late in the conflict. When the United States entered the war in 1917, there were only 50 aircraft radios available and these were limited in range of communication. Today, the men who pilot America's military planes have modern transmitters which often go into action simultaneously with the pilots' guns. Voice communications, co-ordinating aircraft with ground or sea forces during actual combat, are now a vital part of military tactics, although radios are generally silent until the presence of the planes has been detected by the enemy.

Even tanks now have voice transmitters and receivers to provide greatest co-ordination of mechanized units. FM, the frequency modulation system, has improved tank broadcasting, further reducing the interference caused by the operation of engines, motors and other electrical equipment. Westing-

Fig. 1—POWER ON PARADE: A total of 100,000 watts of radio transmitting power is represented in this bank of Westinghouse broadcasting tubes. Largest air-cooled tubes of their kind in the world, these transmitting giants are now at work beaming United States broadcasts to South American nations. Airplane-type fins carry away enough heat from each tube to keep a small house warm in winter

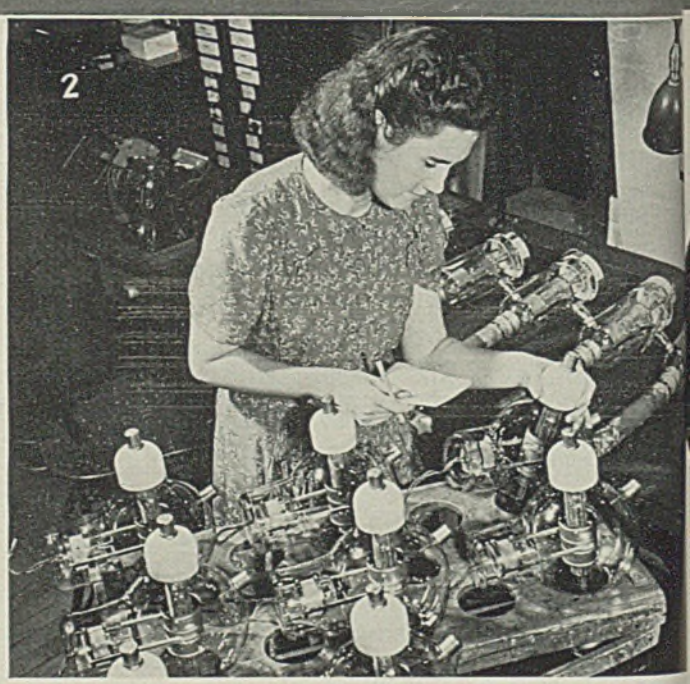


Fig. 2—INSPECTED FOR SHIPMENT: A battery of high-powered radio transmitting tubes for naval signal communications is checked out for shipment to Navy by Westinghouse girl inspector. Tubes operate in compact transmitters carried aboard ships and installed in land stations

Fig. 3—COMPLETING "MOUNT" ASSEMBLY FOR RADIO TUBES: Operator is completing the assembly of the "mount" or inner structure of a 25-watt Westinghouse transmitting tube used largely for plane-to-plane or plane-to-ground radio communication. She is spot-welding a part to one of the wires which support the structure. At the instant the weld is made between the two metal pencil-like points over the operator's gloved hand, a tiny gas flame spurts from the slender copper pipe and envelops the spot being welded, preventing oxidation

Fig. 4—CLEAR, MUSICAL NOTE and she knows that the radio transmitting tube she is testing is ready for service. The photo shows the "noise test" where required current is supplied and the tube is tapped lightly with a soft rubber rod. A high, clear note in the operator's headphones indicate a good tube. A scratching, gutteral noise usually means loose or improperly fastened parts in the tube's inner structure. In the latter event, the tube is rejected and destroyed

Production

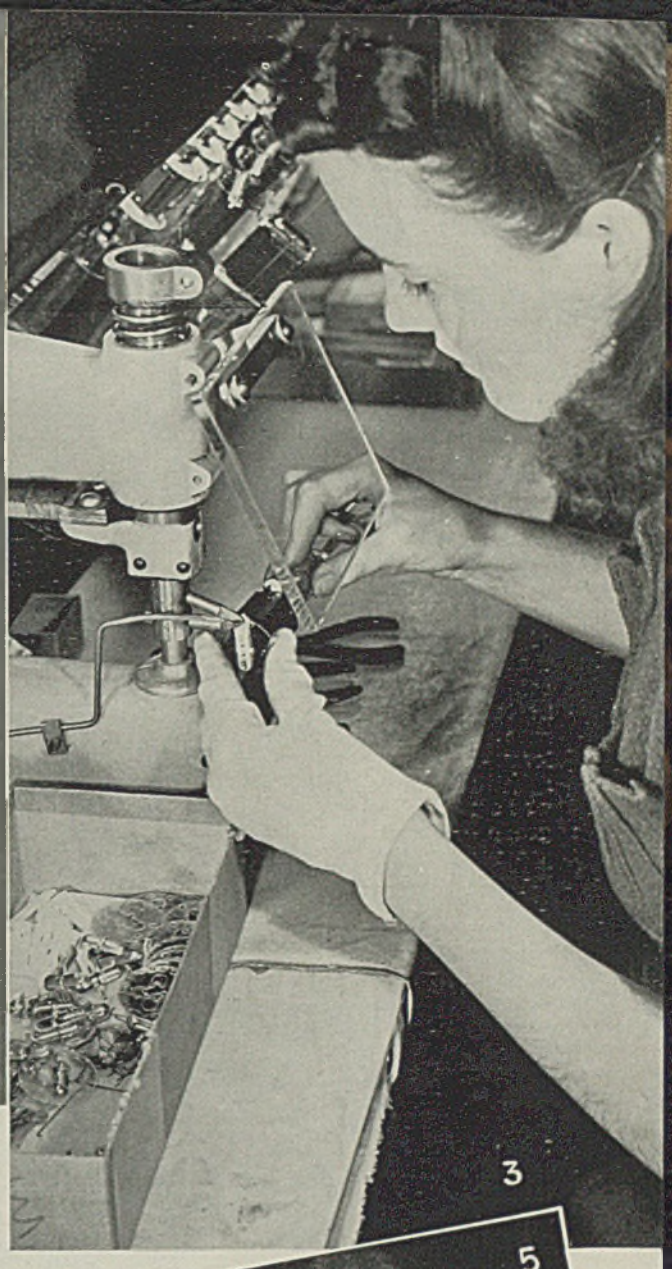
house is now producing many of the transmitting tubes for Army FM tank sets.

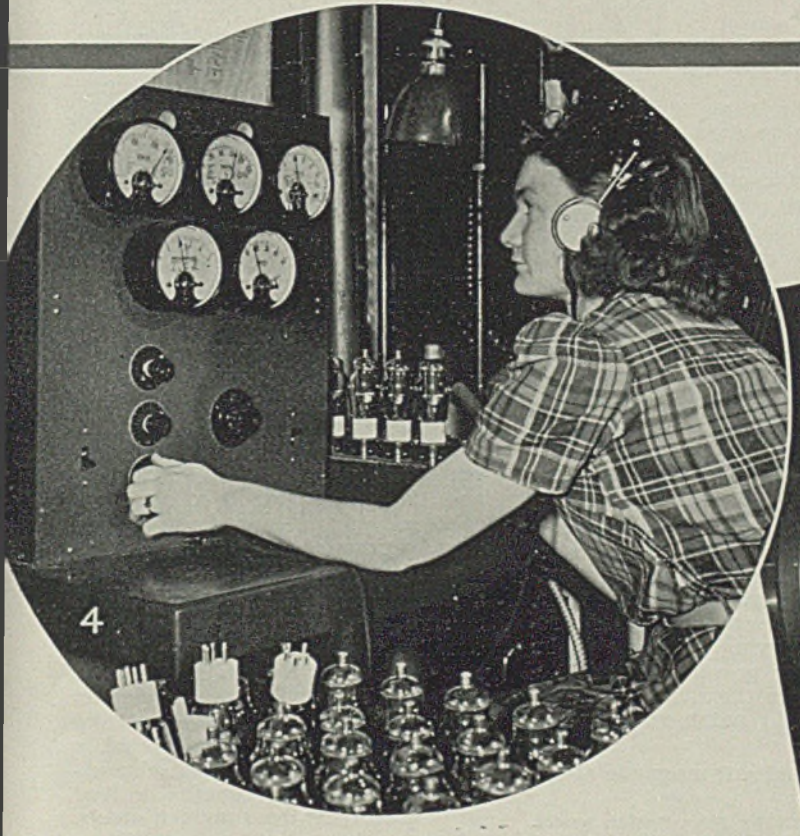
Taking a tip from the London policemen who several years ago wore tiny radio transmitters in their hats, the Signal Corps is now equipping its men with 1-watt "broadcasting stations". Like walking patrol cars, parachute troops and riflemen equipped with these 5-pound sets are now able to carry on conversation with their comrades 2 miles away.

Police patrol cars also have their counterpart in armored trucks and other motorized units which have been equipped with radio transmitters to receive and broadcast "on-the-spot" military intelligence, time signals and weather reports.

For short-wave broadcasting stations fighting the Axis nations in a "war of the air waves", Westinghouse is said to be producing the largest air-cooled transmitting tubes in existence. These giant tubes, cooled by airplane-type fins, consume 25,000 watts each and generate enough excess heat to keep a 6-room house warm in winter.

Development by Westinghouse of large air-cooled broadcasting tubes has helped to enlarge the scope of military radio communications. With air-cooled tubes, powerful stations can be set up in the field or on shipboard without the need for a steady supply of fresh water for cooling. This is particularly important for naval vessels where fresh water is at a premium. Salt water cannot be used to cool the tubes.





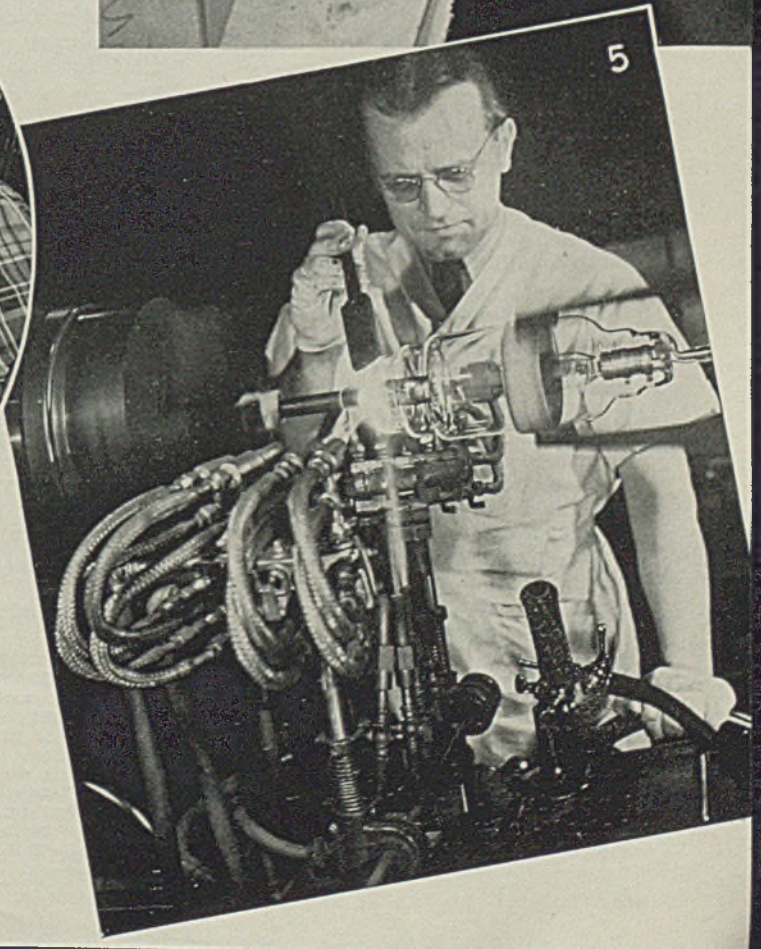


Fig. 5—HOT TONGUES OF FLAME from a dozen gas jets are played on the rim of this 400-watt radio broadcasting tube as a craftsman in glass seals the filament mount (cathode) to the tube proper. For this purpose the tube is placed in the jaws of a lathe and rotated rapidly while the operator, using a small metal paddle, shapes the hot glass as desired

Uses and Possible Substitutes for COBALT

CONSUMPTION of cobalt in the United States has increased remarkably during the past two decades, and a substantial gain is anticipated in 1942. Although the United States is the chief consumer of cobalt, this country has been an unimportant factor in its production. The Belgian Congo, Northern Rhodesia and French Morocco have supplied the bulk of the world output in recent years. Production in Canada, formerly the chief source of cobalt, has gradually declined and in recent years has had minor importance only.

Except for a small domestic output, the United States depends on the Belgian Congo for its supplies of cobalt. In the unfortunate event that those supplies should be shut off, the United States would face the problem of finding substitutes or developing low-grade deposits, some of which probably could be placed in production as an emergency supply. Purifications of solutions for electrolysis to produce manganese metal would make available another source of cobalt as a sulphide sludge containing large quantities of cobalt could be recovered from many domestic manganese ores.

War conditions emphasize the important use of cobalt in high-speed cutting tools. Other uses are: Permanent magnet materials, welding materials, metal-to-glass seal materials, ceramics, driers, and miscellaneous applications of small amounts, as for catalysts and soft magnetic alloys.

Cobalt high-speed steels are used for specific purposes more especially where high red-hardness is necessary. *Apparently, high vanadium is the best substitute* for cobalt in steels for this class of work. Cemented carbide tools can often be substituted for the cobalt high-speed steels. Low-cobalt high-speed steels, or those containing no cobalt, can be used with a small loss in cutting speeds and production rates. Nickel can be substituted for cobalt as a binder in cemented carbide tools, but usually with resulting impairment too great to be tolerated except in an emergency.

Cobalt also occupies a critical position among the alloying elements for permanent magnets. However, iron-molybdenum, iron-tungsten, chromium-molybdenum, iron-nickel-aluminum and low-cobalt-iron-nickel-aluminum precipitation-hardening alloys can be made to replace many of the cobalt magnet steels and alloys. Again, however, certain combinations of desirable properties are obtainable only by definite cobalt alloys. Redesigning of magnet shapes in accordance with the magnetic properties of non-cobalt or low-cobalt materials can effect considerable conservation of cobalt in the manufacture of permanent magnets.

The use of welding rod containing substantial amounts of cobalt is important in a war economy. Hardwear or corrosion-resistant surfaces are applied, and worn surfaces can be built up to the original dimensions, thus salvaging dies and many other wear-resistant surfaces.

Small amounts of cobalt are needed for metal-to-glass seals in the manufacture of radio power tubes, X-ray tubes and other electronic devices. Larger quantities may be needed for superchargers.

The use of cobalt in ceramics is evidently not critical, with the possible exception of its application to ground coats for porcelain enamel ware. It is believed that a large proportion of the cobalt oxides and salts now going into the ceramics industry could be diverted to other more important uses.

Cobalt driers show the most rapid drying times of all metal driers used in the paint and varnish industry. Manganese driers can be used, with the consequence of approximately doubling the drying time. Cellulose and other lacquers requiring no "drying" oils should be used wherever possible if it is desired to reduce the quantity of cobalt going into paint and varnish driers.

Catalysts and soft magnetic alloys do not represent much of the cobalt consumption and, in both instances, acceptable substitutes are believed to be available for a substantial portion of the uses.

Reports to the Bureau of Mines from virtually all domestic manufacturers who use cobalt in steels and as catalysts indicate a probable consumption of 2,128,000 pounds in 1941, distributed as follows: Cutting tools and drills, 43 per cent; welding rod and stock, 18; dies, valve steel and electroplating, 2; magnets, 28; special steels, 6; catalysts and dental and surgical alloys, 3.

Tool Steels and Cutting Alloys: An important use of cobalt is in the manufacture of high-speed cutting tools for operation at high speeds or at high temperatures. It also is employed in alloy steels for high-temperature dies, heavy-duty shears, and other implements requiring extreme toughness combined with great hardness at high temperatures. Certain high-temperature noncorrosive alloys are made with small amounts of cobalt in their composition.

Typical analyses of some commercially available high-speed steels are shown in Table I. The usual alloying elements are carbon, tungsten, chromium, vanadium and cobalt. Small amounts of other elements are found occasionally in special steels. The steels listed in Table I may be roughly divided into two classes upon the basis of the predominating alloying element. These are: Tungsten steels such as Nos. 1, 2, 8, 9, 10, 11 and 12; and molybdenum steels such as Nos. 3, 4, 5, 6, and 13. The so-called cobalt high-speed steels are, in general, simply modifications of these two types.

The addition of cobalt to standard high-speed steels improves their cutting performance under some conditions. It is not substituted for any other alloying metals. The fact that cobalt also dissolves tungsten in amounts up to 30 per cent and that a tungsten-cobalt compound is precipitated upon reheating also explains some of the benefits derived from cobalt by the tungsten steels, which are improved by the addition of cobalt in amounts up to 12 to 13 per cent. In general, the cutting ability is proportional to the cobalt content up to about 13 per cent.

It is reported that 5 per cent cobalt added to an 18 per cent tungsten alloy increases its "perform-

---

From a report by John Koster, senior metallurgist, Metallurgical Division, and H. W. Davis, associate mineral economist, Metal Economics Division, both of the Bureau of Mines. The report was prepared for the War Production Board as part of the work of the Metals Conservation E Substitution Group of the Advisory Committee on Metals & Minerals of the National Research Council of the National Academy of Sciences.

ance" by 100 per cent. Ten per cent cobalt increases the performance 200 per cent and 15 to 16 per cent cobalt, 400 per cent. Tests indicate that a 12 per cent manganese steel can be worked satisfactorily with a high-cobalt high-speed steel—a feat claimed difficult with any noncobalt material. Such performance can be relied upon only for the particular conditions of these tests for machining performance tests depend on many interrelated factors.

The improvement in properties by the addition of cobalt is equally apparent in the case of the molybdenum high-speed steels. Thus, steel 13 in Table I is regarded by the manufacturer as a "super-high-speed steel" in comparison with noncobalt molybdenum steels, such as 4 and 5 in Table I. Cobalt is added to such steels in amounts up to 13 per cent.

Cobalt steels are utilized in cutting cast iron, hardened steels, and, in general, in making heavy or hogging cuts. Their cutting efficiency is not so high on softer materials. High-cobalt steels are inclined to be brittle, which is counteracted to some extent by the vanadium content. Such steels harden with a finer grain, decarburize more readily and are subject to more cracking during hardening than high-speed steels with no cobalt. The hardening temperature range is wide and the red hardness is better than in the noncobalt steels.

These statements in the literature might easily mislead one in the appraisal of the value of cobalt in high-speed steel. When the test conditions are selected near the upper limit of possible feeds and speeds, superiority of performance of the cobalt steels seems great. When the tests are conducted within the ranges of practical operation, the cobalt steels often make a poorer showing than the steels containing no cobalt. The small percentage of the cobalt high-speed steels in use, as compared with the noncobalt steels, does not provide a strong argument for the indispensability of the former.

Cobalt is also a necessary constituent of other cutting alloys, such as those of the stellite types and cemented carbides. Stellite alloys contain up to 55 per cent cobalt.

TABLE I—Composition of Typical High-Speed Steels, Per Cent

No.	Carbon	Tungsten	Chromium	Vanadium	Molybdenum	Cobalt	References
1	0.55–0.75	18.0	4.0	1.0	....	....	1 and 4
2	0.65–0.75	14.0	4.0	2.0	....	....	1 and 4
3	0.64–0.84	1.3–1.8	3.5–4.0	0.9–1.3	8.0–9.5	....	2 and 3
4	0.78	.....	3.50	1.25	9.5	....	2
5	0.79	.....	4.25	2.13	9.0	....	2
6	0.80	5.5	4.00	1.50	4.50	....	.....
7	0.78	18.47	3.92	1.86	0.53	....	2
8	0.70	14.0	4.0	2.0	0.5	5.0	1 and 4
9	0.70	18.0	4.0	1.0	0.5	5.0	1 and 4
10	0.75	14.0	4.0	2.0	0.5	5.0	1 and 4
11	0.80	20.0	4.0	2.0	0.6	8.0	1 and 4
12	0.80	20.0	4.0	1.25	0.6	12.0	1 and 4
13	0.79	1.55	3.75	1.10	7.85	5.5	2

1—This is a standard high-speed steel and is made by a number of manufacturers. Refer to *Engineering Alloys* by Woldman and Dornblatt, published by American Society for Metals, 1936.
2—*Molybdenum High-Speed Steels, Molybdenum in Steel,* published by Climax Molybdenum Co., sec. 12, p. 1.
3—Emmons, J. V., *Molybdenum-Tungsten High-Speed Steels,* published by Cleveland Twist Drill Co.
4—*Metals Handbook,* published by American Society for Metals, 1939. Refers to alloy in question in index or to list of manufacturers and tool-steel trade names on p. 18.

The tungsten carbide materials are of the sintered and fused types. In the first type, tungsten or other carbides are sintered with metallic cobalt as a binder. The quantity of cobalt used is generally about 3 to 20 per cent. The second or fused type is the product of direct fusion of the carbides, generally with cobalt.

TABLE II—Substitutes for Cobalt High-Speed Steels

	First	Second	Third
Carbon	1.00	1.25	1.25
Tungsten	18.00	....	5.50
Molybdenum	....	8.00	4.50
Chromium	4.00	4.00	4.00
Vanadium	3.00	4.00	4.00

Substitutes for Cobalt in Tools: There is a considerable tendency to regard the use of cobalt in high-speed steel as absolutely indispensable. On the other hand, some metallurgists seem to be of the opinion that cobalt use in high-speed steel could be substantially reduced if necessary. One way would be to use steels higher in vanadium. In such cases, the strategic values of cobalt and vanadium must be weighed one against the other. The compositions listed in Table II have been suggested as substitutes. In some cases these steels give better performance than the cobalt steels. Many applications of cobalt steels are for single-point cutting tools where cemented carbide tools can often be substituted to advantage, or the cobalt steel can itself be used as an inserted cutting tip instead of a solid tool.

Tantalum has been patented as an "ersatz" material for cobalt in high-speed steels of all kinds.

High-speed cobalt steels may perhaps be replaced by carbide cutting tools or alloys based on chromium-tungsten-carbon and some metal other than cobalt. Although cobalt is recognized as the best binder for cemented carbide materials, nickel has been used, which is the substitution of one strategic metal for another.

Practical tests lead to the conclusion that none of these suggested improvements can be counted on to conserve cobalt. Tantalum, uranium and boron steels have been tried and found wanting.

Other alloys of the Kovar and Fernico type, containing around 17 to 19 per cent cobalt, are used to make vacuum-tight metal-to-glass seals. The amount used is small, but important in the construction of radio, power and X-ray tubes and other electronic devices.

A new use of alloys containing substantial percentages of cobalt is for blades of the airplane tubro-superchargers. While experiments with noncobalt alloys are in progress it now seems probable that the cobalt alloys will be preferable. If

(*Please turn to Page* 119)

TABLE III—Composition and Properties of Possible Substitutes for 8.5 Per Cent Cobalt Steel

Alloy No.	Composition, Per Cent; Iron Plus the Usual Impurities Equals the Remainder							Hardening Temperature Centigrade	Remanence, Gauss	Coercive Force, Oersteds
	Cobalt	Nickel	Aluminum	Tungsten	Chromium	Molybdenum	Carbon			
1	8.5	....	....	1.25	4.75	....	0.9	895	7500	120
2	...	....	....	....	....	23.4	...	645	7000	219
2	...	....	....	....	....	23.4	...	610	7500	120
3	...	....	....	27.9	....	....	...	700	8000	110
4	...	....	....	26.0	7.0	9.0	...	700	8000	215
4	...	....	....	26.0	7.0	9.0	...	640	7500	120
5	...	....	....	30.0	10.0	....	...	675	7000	120
5	...	....	....	30.0	10.0	....	...	700	7000	125
6	...	....	....	25.0	15.0	....	...	700	7000	180
6	...	....	....	25.0	15.0	....	...	645	7000	130
7	...	21.0	12.5	....	....	....	...	700	8000	150
7	...	21.0	12.5	....	....	....	...	675	7500	120

HEAT TREATING

CHROMIUM-CARBON STAINLESS STEELS

(*Section* II)

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THE EQUILIBRIUM diagram for the iron-chromium-carbon system at 12 per cent chromium is shown in Fig. 1. The increasing solubility of carbon in the gamma phase with rising temperature (line SE) is the basis for the hardness control of quenched alloys. This chart provides the quantitative explanation of the principles which permit this method of controlling the as-quenched hardness.

This analysis regards the carbide phase as a reservoir containing carbon for hardening, the extent of the withdrawal of carbon being controlled by the hardening temperature, the line SE giving the increase in carbide solubility with rising temperature.

Such a progressive solution of the carbide phase should be borne out by metallographic evidence. For this reason, the micrographs, Figs. 2 to 8 are included. Fig. 2 of an annealed sample of a steel containing 0.37 per cent carbon, 12.6 per cent chromium, reveals carbide spheroids in a matrix of chromium ferrite. Figs. 3 to 8 show this same material after hardening from successively higher temperatures covering the range from 1742 to 2100 degrees Fahr.

The gradual diminution in the amount of free carbide is clearly evident. Other phenomena which can be seen are: First, gradual agglomeration of the carbide phase at the higher temperatures; second, progressive grain coarsening with increasing temperature; third, complete disappearance of the carbide phase in the specimen hardened from 2100 degrees Fahr. Fig. 7, and consequent serious coarsening of the grain size.

The reservoir hypothesis illustrated by this series of micrographs presupposes that as long as an excess of the carbide phase is at equilibrium with the austenite phase for a given temperature and chromium content, the hardness of the martensite in the as-quenched material will be independent of carbon content. However, with increase in carbon content there is, of course, an increase in the number of carbide spheroids present at a given temperature. The hardening effect of these spheroids may account for the comparatively slight variation in hardness at a given quenching temperature. In general, the higher and lower points at each temperature tend to be the higher and lower carbon contents respectively.

In a similar series of micrographs prepared to show structural changes occurring with rise in quenching temperature for a steel containing 0.10 per cent carbon and 13.7 per cent chromium, the hardness was found to increase by an increased solution of the free ferrite phase up to a temperature of about 1740 degrees Fahr. Above this temperature, a new phase appeared, probably the delta phase, and the hard-

This is the second section of a series on heat treatment of the chromium-carbon martensitic stainless steels from a paper presented at the National Metal Congress in Philadelphia, Oct. 23, 1941. Section I appeared on p. 66 of the June 22 issue.

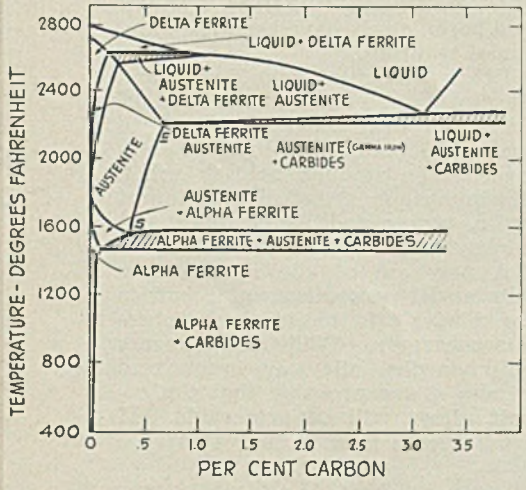
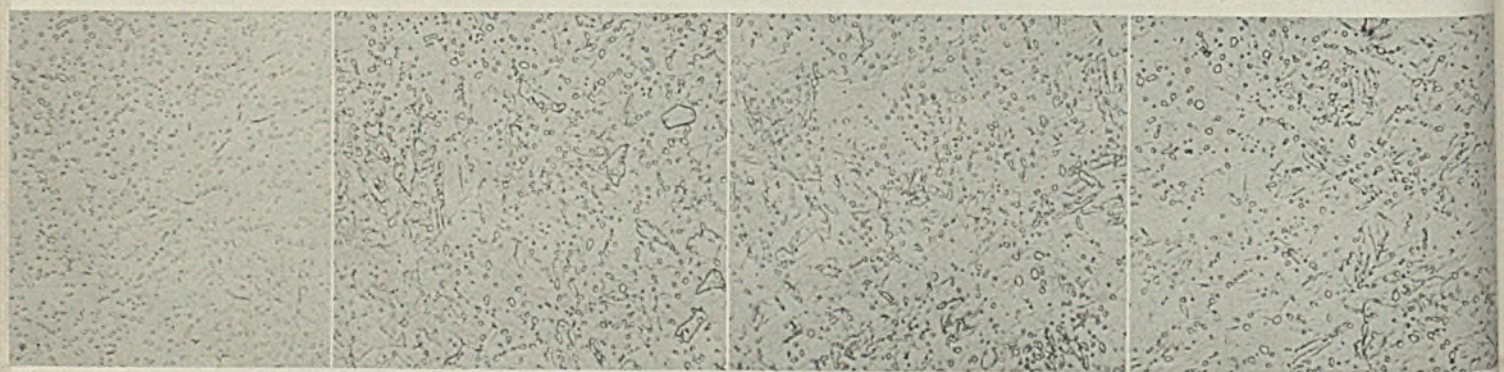
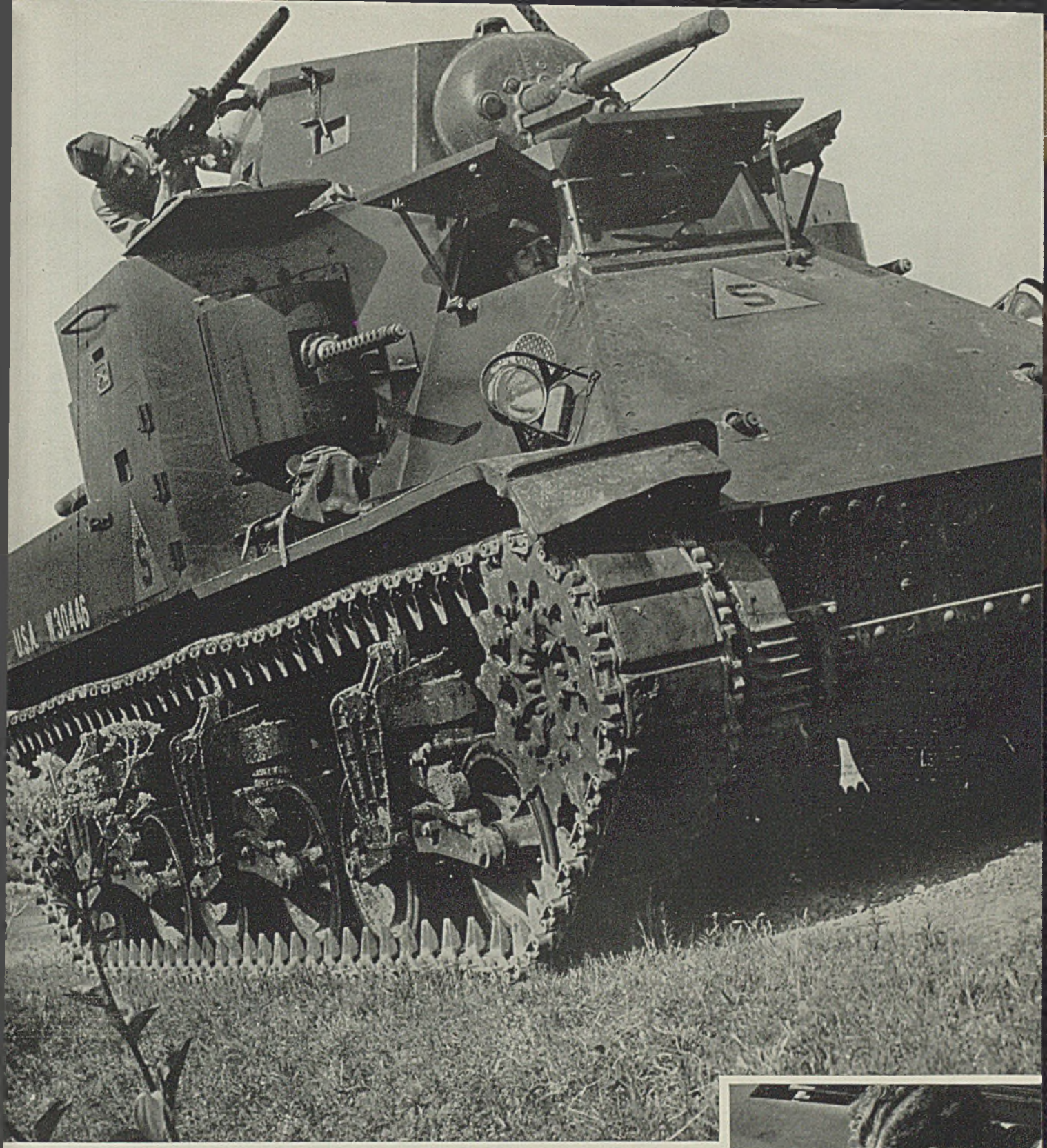


Fig. 1. (Left)—Equilibrium diagram for the iron-chromium-carbon system at 12 per cent chromium (Book of Stainless Steels) shows the increasing solubility of carbon in the gamma phase with rising temperature as shown by the line SE. This is the basis for as-quenched hardness control method described here. Below, left to right, Fig. 2—Micrograph of steel containing 0.37 per cent carbon, 12.6 per cent chromium, as received in the annealed condition, shown at 1000 diameters. Note the preponderance of spheroids of the iron-chromium carbide phase. Fig. 3—Same steel as in Fig. 2 but this sample has been hardened by quenching after heating one hour at 1560 degrees Fahr. The beginning of the progressive solution of the carbide spheroids is shown here. Fig. 4—Same steel as in Fig. 2 but quenched from 1650 degrees Fahr. All micrograph specimens prepared with an etchant of 1 per cent picral plus 5 per cent hydrochloric acid and shown at 1000 diameters. Fig. 5—Same steel as in Fig. 2 but quenched from 1740 degrees Fahr.





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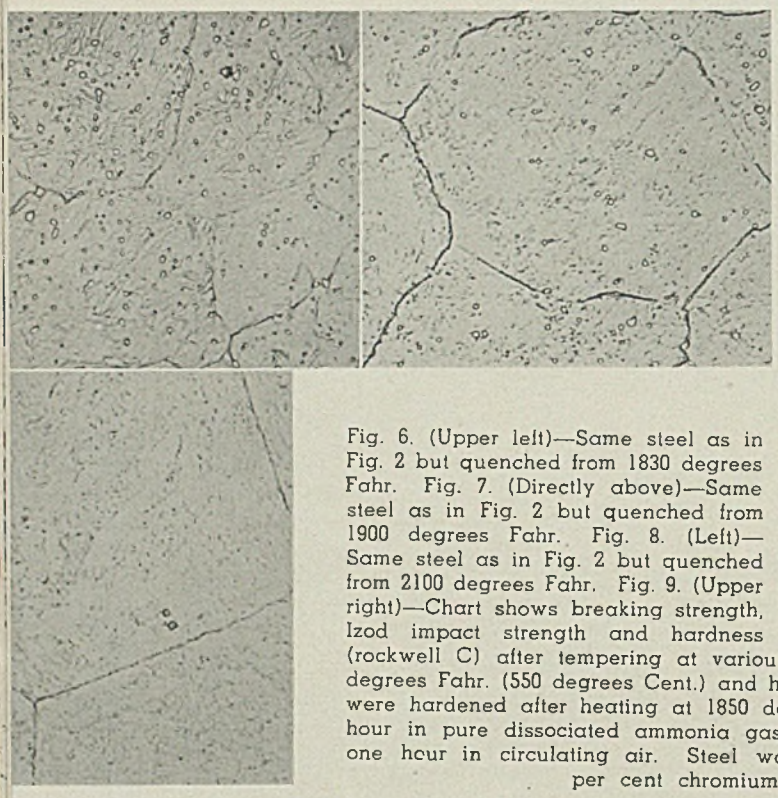
MAIN OFFICE AND MILLS: CONSHOHOCKEN, PA. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, [illegible] Seattle, Montreal.



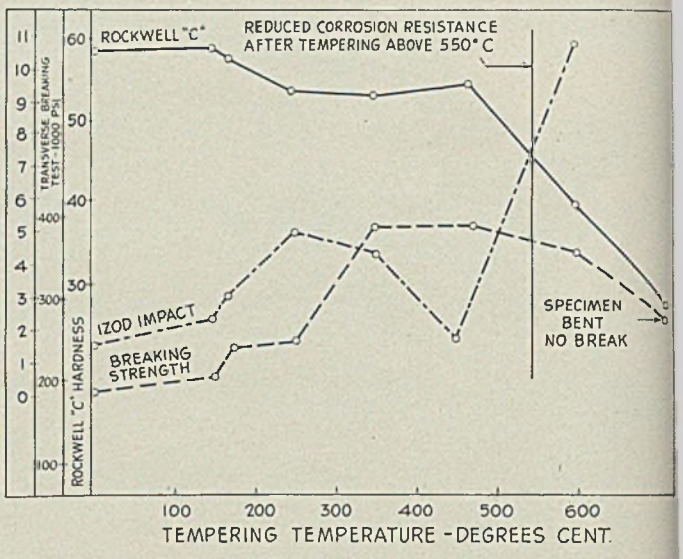


Fig. 6. (Upper left)—Same steel as in Fig. 2 but quenched from 1830 degrees Fahr. Fig. 7. (Directly above)—Same steel as in Fig. 2 but quenched from 1900 degrees Fahr. Fig. 8. (Left)—Same steel as in Fig. 2 but quenched from 2100 degrees Fahr. Fig. 9. (Upper right)—Chart shows breaking strength, Izod impact strength and hardness (rockwell C) after tempering at various values up to 1020 degrees Fahr. (550 degrees Cent.) and higher. All specimens were hardened after heating at 1850 degrees Fahr. for one hour in pure dissociated ammonia gas, then tempered for one hour in circulating air. Steel was 0.37 carbon, 12.6 per cent chromium

ness did not increase further but dropped slightly.

Effect of Time at Temperature: It is important to observe the rate of solution of the chromium carbides for a given temperature. This influence was evaluated by holding specimens of two steels at 1850 degrees Fahr. for periods varying from 10 to 120 minutes. As shown in Table I, the solution of carbides was essentially complete after heating for 10 minutes at this temperature. Consequently, beyond a certain minimum time of the order of 10 minutes for small pieces, time at temperature has little effect upon the as-quenched hardness.

Control of Hardness: The above results seem to provide a workable means of controlling hardness, particularly in the hardness range from 45 to 60 rockwell C. The method is exceptional in that it requires only careful control of quenching temperature. So long as the carbon content is above a minimum value of about 0.25 per cent, the hardness obtained will be a controllable function of the quenching temperature for most practical purposes.

With carbon contents falling below 0.25 per cent, hardness can still be controlled by adjusting the quenching temperature, but the hardness range becomes more limited with the lower carbon contents. Maximum hardness that can be obtained in steels of this type is directly dependent upon the carbon content.

Tempering May Still Be Necessary: Although the method described is more satisfactory for controlling hardness of these martensitic stainless steels than conventional tempering treatment following quenching, quite often other factors such as internal stresses and aging phenomena may require that the work be tempered.

To evaluate internal stresses remaining after hardening by quenching, use was made of a transverse breaking test. Square bars, 0.25 x 0.25 x 2½ inches, were prepared from a steel containing 0.37 per cent carbon, 12.6 per cent chromium. After heat treatment, they were supported on hardened ¾-inch diameter rolls spaced 2 inches apart. Using the brinell hardness tester, the bars were loaded in increments at the midpoint until fracture occurred. The maximum tensile fiber stress was calculated by the simple beam formula from the breaking load read on the previously calibrated dial gage. This test is applicable to those specimens whose hardness is such that fracture occurs with negligible plastic deformation.

Fig. 9 shows the variation in transverse breaking strength through the entire tempering range. Note that the breaking strength rises from 189,000 pounds per square inch with no temper, to 396,000 pounds per square inch after tempering at 660 degrees Fahr.—more than double.

Breaking-strength tests were made of two specimens of 0.37 per cent carbon, 12.6 per cent chromium steel—both hardened to the same final hardness value but by different heat treatments. The first was held for one hour at 1760 degrees Fahr. in pure dissociated ammonia, then quenched directly to a hardness of 53 rockwell C without any tempering. Resulting breaking stress was 325,000 pounds per square inch.

The second specimen was held for one hour at 1850 degrees Fahr. in pure dissociated ammonia and fully hardened, subsequently being tempered to 53 rockwell C by tempering one hour at 660 degrees Fahr. The resulting breaking strength was 390,000 pounds per square inch, 65,000 higher than the first. It is felt this difference in breaking strength is ascribable directly to the residual hardening stresses, since most of these were removed from the second specimen by the tempering operation.

The 65,000 pounds per square inch difference thus represents the residual stresses after hardening, a relative low effective value for residual stresses. Note that it represents the combined effect of the orderly Heyn (macroscopic) stresses and the microscopic stresses.

Impact Strength: Fig. 9 shows the results of impact tests carried out to determine the tempering temperature at which the maximum impact strength could be developed after hardening from 1850 degrees Fahr. Standard 0.394-inch square 3-notch Izod test bars were prepared before heat treatment from steel containing the 0.37 per cent carbon, 12.6 per cent chromium.

Note the minimum value in the

(*Please turn to Page* 121)

TABLE I: Effect of Time at Temperature Upon Quenched Hardness

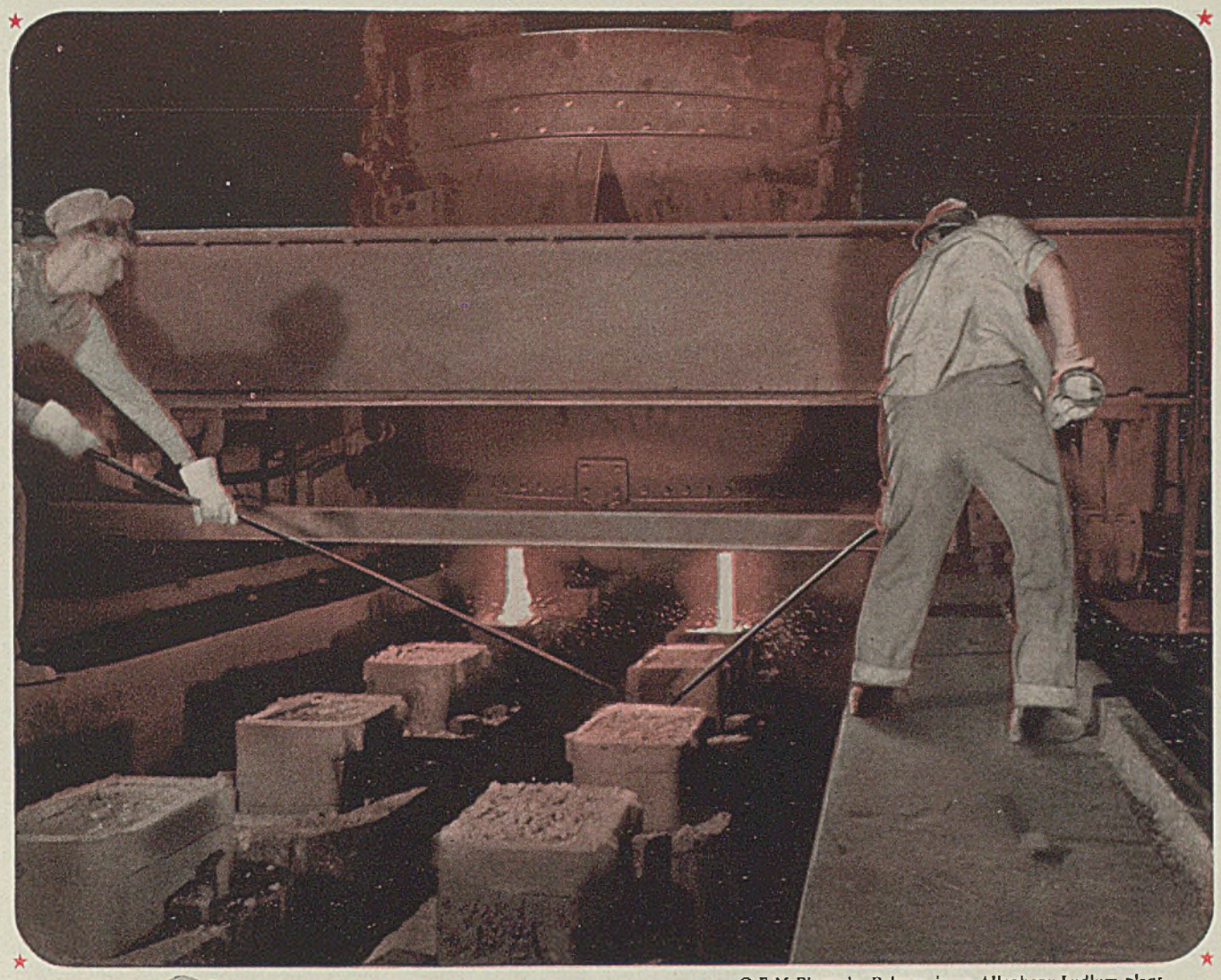
(All tests were at 1850 degrees Fahr.)

Minutes at Temperature	Rockwell "C" Hardness* Steel 1†	Steel 2‡
10	56-57	56-57
30	57-58	56-57
60	57-58	57-58
120	57-57	57-58

*Values reported give the range for four impressions.

†Carbon, 0.3 per cent; chromium, 12.6; manganese, 0.28; nickel, 0.08; phosphorus, 0.012; silicon, 0.32.

‡Carbon, 0.64 per cent; chromium, 16.2; manganese, 0.24; nickel 0.18; phosphorus, 0.024; silicon, 0.06.



O E M Photo by Palmer, in an Allegheny Ludlum plant

STEEL IS FLOWING TODAY THAT WILL BE FLYING NEXT MONTH

Alloy steel, conceived in the mighty heat of electric furnace arcs, is just being born when it teems into ingot molds.

How soon can the raw steel in those ingots be brought to maturity as parts in finished warplanes (or tanks, guns, ships, munitions)? How much of it can be actually put to work, with only a bare minimum of scrap, "reject" and spoilage losses? In this war, a battle easily may hang on the way any one plant handles its problems of production and conservation.

The Allegheny Ludlum line-up of alloy war-steels includes stainless and heat resistant, tool, valve, nitriding and electrical steels. Information on their more effective fabrication and use includes certified "Blue Sheets" for engineers and technical men; "Handbook of Special Steels" for production men; "Elementary Discussions" of tool and stainless steels for training course use, etc.

• Tell us your alloy steel problems —particularly if yours is a converted plant, making unfamiliar products from strange materials. If we don't have the answers in printed form, the services of our Technical and Field Staffs are also at your disposal.

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STEEL FOR THE NATION'S WELFARE

Allegheny Ludlum

STEEL CORPORATION

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

From Suggestion to Test—In Twelve Days

LONDON

Indicative of the part welding is playing in today's world affairs is the recent record of a workshop in the English Midlands which, in twelve days, succeeded in producing an anti-aircraft gun platform of arc welded sheet metal so simplified in design that it was accepted as standard by the government.

In making the suggestion to the government, the concern promised to turn out a test platform in 14 days. But after four draftsmen, working with the chief designer, produced the drawings overnight—and the day and night construction that went on from there—the components were ready for assembly in 10 days.

Two days later the completed platform was towed off for test. Results of the tests succeeded in obtaining official acceptance of the unit as standard within a month.

Original design of the same platform consisted of riveted construction of rolled steel sections, demanding many man-hours to make.

Publishes 228-Page Book On Cold Finished Steels

Cold Finished Bar Steels is the title of a 228-page volume just issued by Bliss & Laughlin Inc., Harvey, Ill., and Buffalo, N. Y., in connection with this company's fiftieth anniversary. It is crammed with information of interest and value to users of cold finished bars.

Chapters 1 and 2 are devoted to a detailed, illustrated description of operations involved in the production of cold drawn, turned and polished, drawn, ground and polished and turned, ground and polished steels. The functions of the laboratory are set forth, and the operations of inspection, marking and packaging and shipping are explained.

Chapter 3 contains a glossary of technical terminology used both in steelmaking and in processing of steel. It includes charts for classifying steel according to grain size, together with a discussion of the significance of grain size. Other subjects covered are machinability of cold finished steels, heat treatment of such steels and their applications for industrial purposes.

Chapter 4, comprising 80 pages, is devoted to hardness test data, analyses of microstructures, temperature and measurement conversion tables, areas and circumferences of circles, revolutions of spindles per minute, a tap drill chart, coarse and fine-thread tables, data on etching solutions and much other material of this type.

CONVERTERS

Can Expand Steel Production For Castings

WIDENING of the bottleneck in steel castings production and utilization of an untapped source of experienced labor by allowing wider use of steel produced by the cupola-converter method was suggested recently by C. E. Sims and F. B. Dahle, research metallurgists of Battelle Memorial Institute, Columbus, O., at the annual meeting of American Society for Testing Materials at Atlantic City.

Rapid expansion of side-blow converter steel production to meet the unprecedented demand for steel castings can be achieved by the cupola-converter combination. This method, a modification of the bessemer process, Mr. Sims pointed out, has the further advantage that many of the cupolas are already available.

The average annual production of gray iron foundries is 10,000,000 tons of finished castings. Numerous foundries have been forced to discontinue manufacture of plumbing goods, cylinder blocks, stoves, and their other normal products. This makes available not only cupolas, but plants for conversion, fully equipped with sand-handling and molding facilities and crews of molders. Although not experienced in steel casting, they can learn the proper technique faster than green men.

Cast steel is being used for airplane landing gears, gun mounts, tanks and other ordnance material. Much welding and riveting is eliminated, and less metal is required. Cast steel armor plate has stood up well under ballistic tests.

Early bessemer steel was relatively impure and unrefined and therefore inferior in some engineering qualities. By use of the modern cupola with the converter, cast steel can be made to the same chemical composition as acid open hearth or acid electric cast steel. Data presented before the ASTM meeting by Mr. Sims and Mr. Dahle prove that properly made converter steel has engineering qualities on a par with other steels.

The electric furnace was introduced to the foundries of the United States in 1909 at a time when crucible steel was relatively expensive and the converter was almost the only producing medium open to the small jobbing foundry. The converter reached peak production in 1918 with 180,000 tons, but by 1919 the electric furnace had passed it. By 1930 the converter had fallen to a production of 16,500 tons.

Some converter shops have remained in continuous operation, and these have experienced no trouble in meeting ordinary commercial specifications. In England, a land of relatively small foundries, the converter was reported in 1936 to be still the most widely used unit for steel making in the foundry.

Early converter steel was conceded to be impure, with high contents of phosphorus, and nitrogen. Today soda ash treatment of molton cast iron for sulphur removal is developed to such a state that sulphur specifications can be readily met with converter steel. High phosphorus content can be brought within bounds by a ladle treatment with a basic, oxidizing slag. Such treatments have been only recently developed but are proving successful in operation.

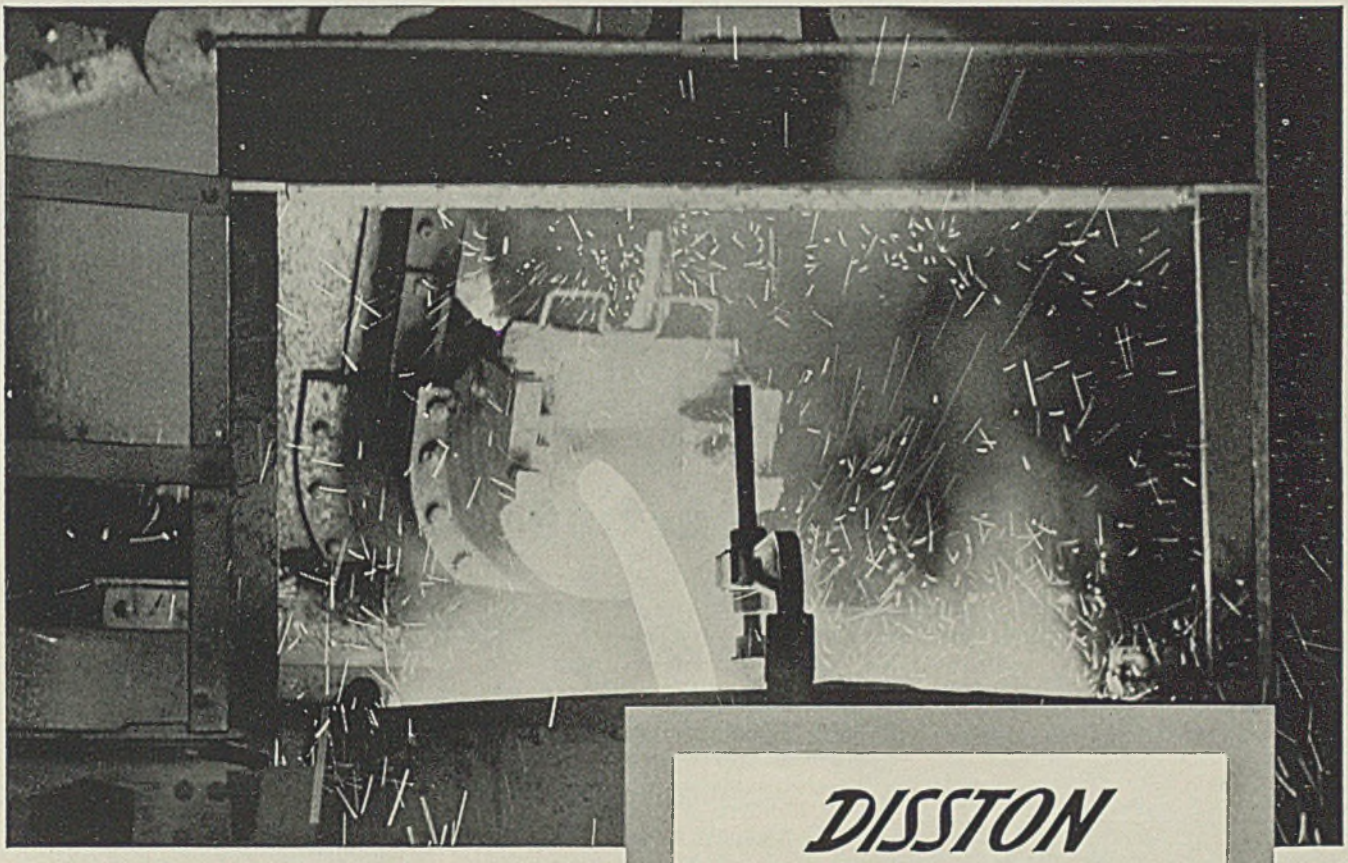
Control of the metal composition charged to the converter and control of operation, such as provided by the photoelectric cell, keep the nitrogen content to a minimum.

Of the various steels studied by the Batelle metallurgists, the basic open-hearth steels had lowest phosphorus contents. Without proper indentification, it would be difficult to decide from their properties by what process the others were made.

Mr. Sims' and Mr. Dahle's data showed that the room temperature mechanical properties of all the types of steel tested were entirely orthodox for grade B cast steel and varied with the composition and type of inclusions, without regard to the method of manufacture.

Low temperature impact properties were found to be dependent upon deoxidation practice without relation to process of manufacture. Where low-temperature toughness is required, as for example in mobile equipment used in cold climates, Mr. Sims suggested that the steel be subjected to performance tests and judged on its merits, not on method of manufacture.

The Sims-Dahle report was based on a research investigation conducted in the laboratories of Battelle Memorial Institute and was sponsored by the Whiting Corp.



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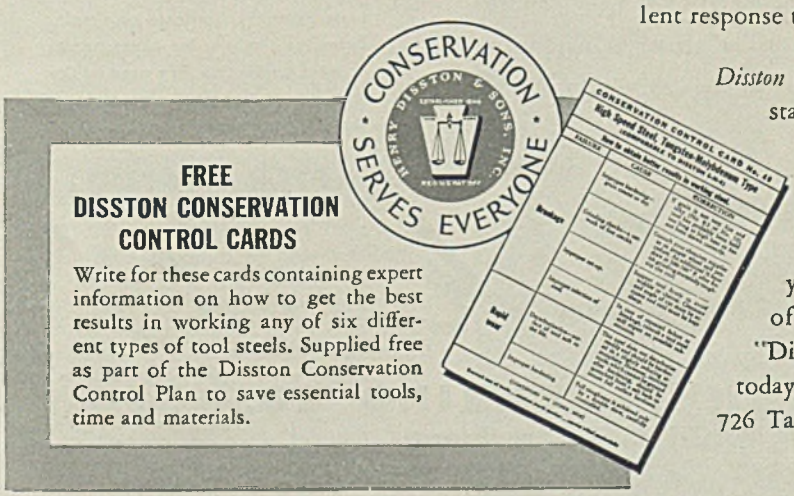
Better tool steels have been the goal of Disston manufacturing effort for 87 years. Beginning in 1855 with the first crucible saw steel ever made in the United States, pioneering again in 1906 with America's first commercial heat of electric steel—Disston has consistently sought new and better ways of improving practice and product.

Modern electric furnaces make Disston tool steel today. Only the purest obtainable materials are used. Scrap is carefully segregated—the most accurate metallurgical and chemical controls are employed—casting, forging and rolling are expertly, skillfully supervised.

By being able to hold operations within extremely close limits, Disston can produce extraordinarily sound and clean alloy and carbon steels with predetermined grain size—to precise specifications. For example, Disston 6-N-6 High Speed Steel—an exceptional high speed steel combining unusual toughness and remarkable wear resistance and having an excellent response to heat treatment.

Disston engineers at your service: Our technical staff will help you select the most suitable tool steels for the job you have to do—to see that you get the best possible service and longest life from each tool . . . And if you do not have your *free* copy of the illustrated, 73-page book, "Disston Tool Steels" write for it today to Henry Disston & Sons, Inc., 726 Tacony, Philadelphia, Pa., U. S. A.



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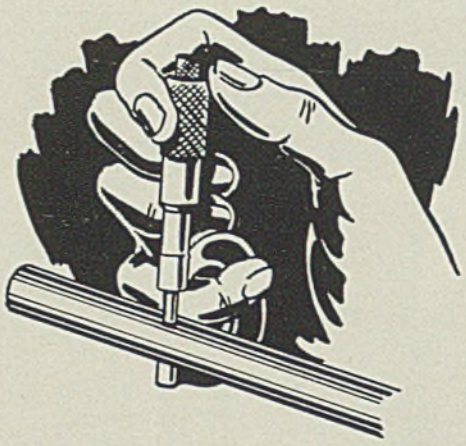

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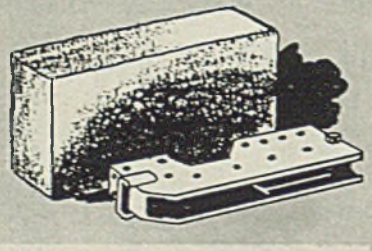
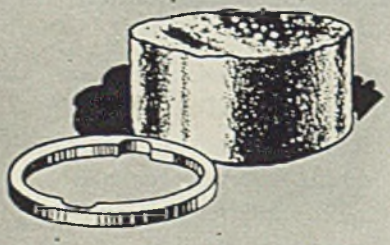


Feed-trough for airplane cannon. Cut from bar of solid steel weighing about 50 lbs. Finished part, illustrated, weighs but 1 lb.



Aluminum Adapter Ring for Gun Mount cut from a solid 7" diameter bar of aluminum. Ingenuity, precision and speed enters into both our experimental and standardized production.

True American business confidence means planning ahead, even in the stress of war time. ★ ★ We practice this belief in enterprise. For example, today we are in war production, rushing out Bomb Racks, Bomb Shackles, Machine Gun Mounts, Parachute Flare Racks and hardware for all types of military planes. Twenty-four hours a day, 7 days a week this materiel goes out of our shops. ★ ★ Not only that, but we have been able to deliver these valuable parts on time or ahead of schedule. A lot of this performance may be attributed to our long and valuable experience with the U. S. Army, since 1928. Supplying the Army and Navy exact requirements has developed Spriesch modern war production with the lowest percent of rejections! ★ ★ Yet with all this emergency production, we have not relaxed about the future. ★ ★ Should you need help in planning your future, we are at your service. Our business in the future will be tools and dies, metal fabrication, experimental or production ability applied to your problems.

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JOSEPH J. CHENEY, *President*

10 HOWARD STREET ★ BUFFALO, NEW YORK

CRANE CAB AIR-CONDITIONERS

Now Highly Developed

CONTRARY to the impression that might be obtained from the article on p. 102, June 15 issue, of STEEL, the air-conditioning of crane cabs has long passed the experimental stage, and standard equipment has been developed especially to meet the unusually high ambient temperatures and lack of continuous water supply that are encountered on these jobs.

Already one company Lintern Corp., Berea, O., has eight standard models available, suited to all types of metal handling cranes. The units not only provide complete cooling facilities but air filtering and ventilation as well. This equipment has been developed for a number of years to answer the needs of those wide awake managements that realize the immense benefits obtained from speedy, sure handling of ladles, molds, ingots and slabs, rather than the fumbling, half blinded, ineffective efforts of the exposed operator in the old style cab.

Best of all, such modern air-conditioning systems can be installed in old cabs as well as new for the equipment only occupies 1 square foot of floor space in the cab, as is shown in the accompanying illustration of a typical installation. Existing crane cabs can be enclosed inexpensively with windows of the usual type and size. Consequently signaling is carried on in the usual manner without special facilities. When mandatory, a window may be left open for signaling, although this would require a conditioner of larger capacity, of course.

Such units are in daily use in steel mills, foundries and forge shops, operating with complete satisfaction in ambient temperatures up to 165 degrees Fahr. and down to 10 degrees below zero, tempering the air to 90 degrees in summer and to 70 degrees in winter.

Since lowering the temperature alone is not sufficient to safeguard the health and comfort of the operator, filters are included in the equipment to remove dust, and ventilation is supplied to remove noxious gases.

The problem of operating the condenser unit at normal head and line pressures at high atmospheric temperatures encountered over soaking pits, ladles, etc., is met through the use of an evaporative condenser using water carried in a storage tank. Water is pumped from the tank and sprayed over the condenser coil, dissipating the high temperature through water evaporation. Excess water passes back into storage tank. It is only necessary to fill the storage tank through a detachable connection at the landing platform at intervals of 8 hours or more.

Since crane cabs are usually somewhat crowded with operating controls, only a duct is located in the cab, the remainder of the air-conditioning equipment being mounted either on the bridgewalk or on a platform attached to the trolley in the case of stripper or pit cranes. There the equipment is easily available for servicing and allows close coupled refrigeration lines. There, too, relatively cool air is obtainable, lowering the load on the cooling equipment.

A typical installation shown in the accompanying illustration has the filter-blower assembly located at A, the filters removing all dust, dirt and fumes from the air. The clean air is then drawn through the cooling or evaporator coil, where its temperature is reduced. Next a blower forces the air through the duct B into the cab at D, where it is diffused without draft. The evaporator coil operates in a closed Freon mechanical refrigeration circuit, with condenser unit E ordinarily located in close proximity to the filter-blower unit A.

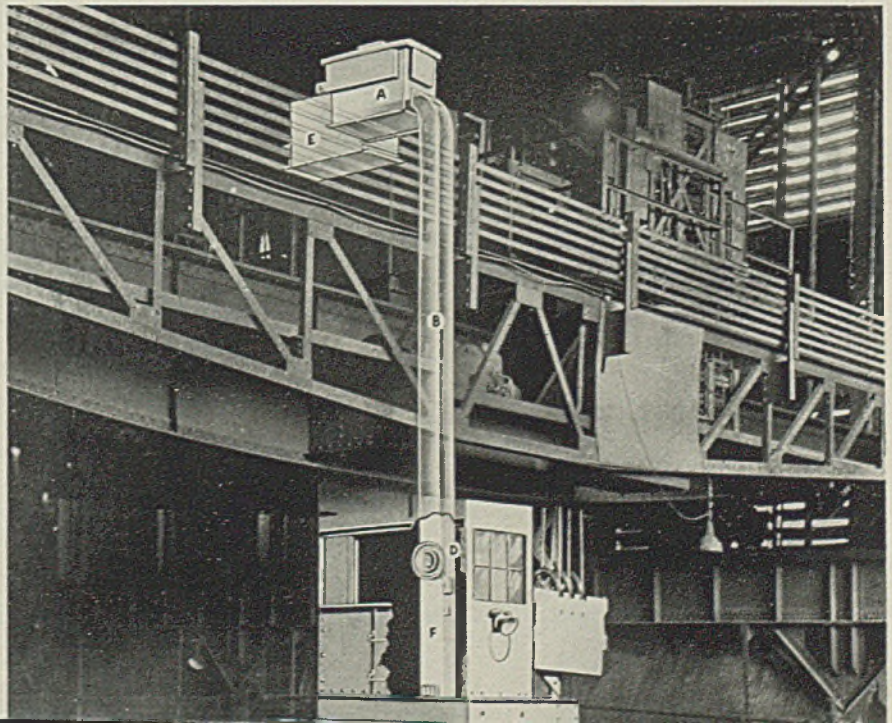
In winter, heating often is required, so an electric heater is built in the equipment at E. It makes the conditioner effective 365 days of the year. Heat is delivered at floor level. Whether heating or cooling, sufficient pressure is maintained in the cab to prevent entrance of fumes or gases.

It should be emphasized that while the design of the conditioner as a whole is special, the motor, compressor and automatic control are of standard and proved design, including the thermostat which functions without any special care or attention. Deliveries are currently possible, and spare parts always available.

Such conditioners made by the Lintern Corp. are being installed on existing cranes (without delaying position) in New England, Pittsburgh, Chicago, Texas and the far west.

Many crane manufacturers are putting them on a major portion of the hot-metal cranes being built, for they are regarded as a protection to the health and comfort of the crane operator that returns the investment quickly through elimination of relief men in full utilization of the time of those trained and capable men available.

Typical installation of a Lintern-Aire conditioner in the cab of an overhead crane such as is used to handle hot metal in steel mills. Filter-blower assembly is at "A", condenser unit at E, cooling coil at A. Duct B carries clean cool air to cab at D where it is diffused without draft. Note only 1 square foot of floor space is required by duct in cab, the air-conditioning equipment being mounted on crane walkway above



WHY NOT INCREASE ARC SPEEDS NOW???

(How To Get the Most from Arc Welding—Section 13)

By E. W. P. SMITH
Consulting Engineer
Lincoln Electric Co.
Cleveland

POSSIBILITIES of more effective utilization of man power in our war effort are exemplified in the greatly increased welding production that can be obtained by increasing arc speeds, the rate of travelling the arc along the seam being welded.

This brings up the matter of unused or dormant abilities that lie within every welding operator. Many operators, supervisors and engineers working in different parts of the country have discussed this in group meetings of different types, so the writer has been able to obtain the benefits of a wide range of experiences. On the basis of arc speed only (that is, following a seam with no dragging of the electrode but keeping the arc in operation), opinions expressed indicated that it should be possible to obtain ultimate speeds of the order of 3600 feet per hour.

On first thought, this may seem excessive. But take a pencil. Trace the length of the long edge of an ordinary letterhead laid on a table. If you can follow this line while saying rather deliberately "one chimpanzee", the speed is about 3600 feet per hour. And you will realize that as far as mechanical ability to follow the seam is concerned, 3600 feet per hour should be all within the realm of possibility.

The fact that almost any arc welding operator thus is capable of following a seam with his electrode at a rate around 3600 *feet per hour indicates that there are potential welding speeds much in excess of usual manual arc welding speeds, which seldom exceed* 100 *feet per hour.* And much welding at present is done at rates far below that value.

For example, welding handbooks show an arc speed (rate of electrode travel) of only 4 feet per hour when making an overhead butt weld in ½-inch plate with 3/16-inch rod. Of course this largely is a type of weld tedious to make, because the speed is limited by position. On the other hand, one of the fastest arc speeds listed is 200 feet per hour, a rate employed in making a lap weld in 3/16-inch plate in a flat position using a ¼-inch rod. This is recognized and labeled as a high-speed weld. Of course various applications and types of joints are listed with expected arc speeds throughout this entire range of 4 to 200 feet per hour.

However, if the operator can move an electrode over a joint at a rate approaching 3600 feet per hour, there are vast possibilities to be developed. Granted that there are problems in procedure, much higher welding speeds should be possible.

That some thought has already been given to this problem of increasing manual arc welding speeds is evident from the fact that some few jobs are already in operation at double or triple usual speeds, one job being done at the rate of 500 feet per hour. As far as is known, this is the fastest rate attained in any shop at the present time. This particular job consists in welding hollow rectangular table legs made from 18-gage steel sheet. A fixture is provided which holds the joint edges precisely in position against a copper backing strip in such a manner that the weld metal can simply be poured in to the bead which forms the corner weld here.

In addition to being positioned in the manner shown below, the work is tilted. The direction of electrode travel is down to help control the flow of deposited metal. This joint is made at an arc speed of 500 feet per minute by manual arc welding, a 3/32-inch electrode being employed at 100 to 125 amperes welding current with 40 volts across the arc. The electrode is a heavily shielded type.

Some will claim that it is impossible to follow a seam at such high speeds and produce a good-looking joint. However, the work being turned out at the installation just described is excellent. Obviously it is a matter of skill—just as most of us who drive a car 60 miles an hour when conditions are suitable dare not drive over 100 miles per hour even though car, road and traffic conditions permit. On the other hand, experts drive more than 300 miles per hour.

The question of whether or not the operator can follow a seam at high speeds thus narrows down to a matter of skill and whether or not the conditions for moving the electrode at these speeds have been set up properly. However, as will be explained below, any welding engineer can calculate the arc speeds which should be obtained on any job by a simple formula. In practically all cases, the arc speed that should be had according to the formula will be found anywhere from 1½ to 3 times present actual speeds, indicating great possibilities of faster welding.

Thus within the limits of present welding equipment it is entirely possible to increase welding speeds anywhere from 1½ to 3 times on the average application.

The reason for this is that the amount of bead, welding current, arc voltage and arc speed are all relative factors. Thus it is possible to step up the arc speed if the other factors are stepped up in the correct proportion.

The formula mentioned for calculating the arc speed which should be attained involves a simple arithmetical relation as follows: Arc speed in feet per hour equals 0.2 of the arc kilowatt that are now being consumed (arc voltage times arc current divided by 1000) divided by the cross sectional area of the *deposited* metal in square inches. This latter figure must be obtained

This is the setup in which an arc speed of 500 feet per minute is obtained by manual arc welding

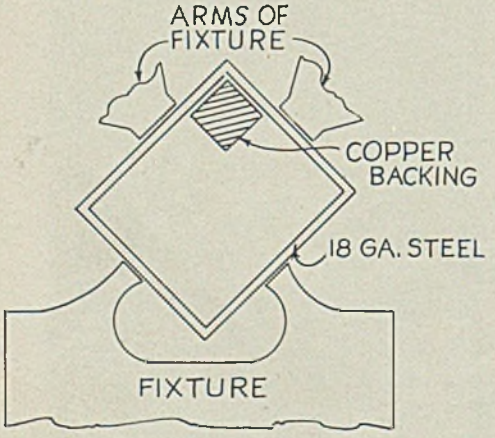


TABLE I—Relation Between Kilowatt-Hours at the Arc and Consumption of Electrode in Pounds per Hour

Electrode Size	Arc Amperes	Arc Volts	KWH Per Hour	Consumption Lbs. Per Hour
1/8	110	24	2.64	2.60
5/32	130	25	3.25	3.30
3/16	150	26	3.90	3.95
1/4	250	30	7.50	7.50
5/16	325	34	11.10	10.70
3/8	425	38	16.10	16.20

DOW

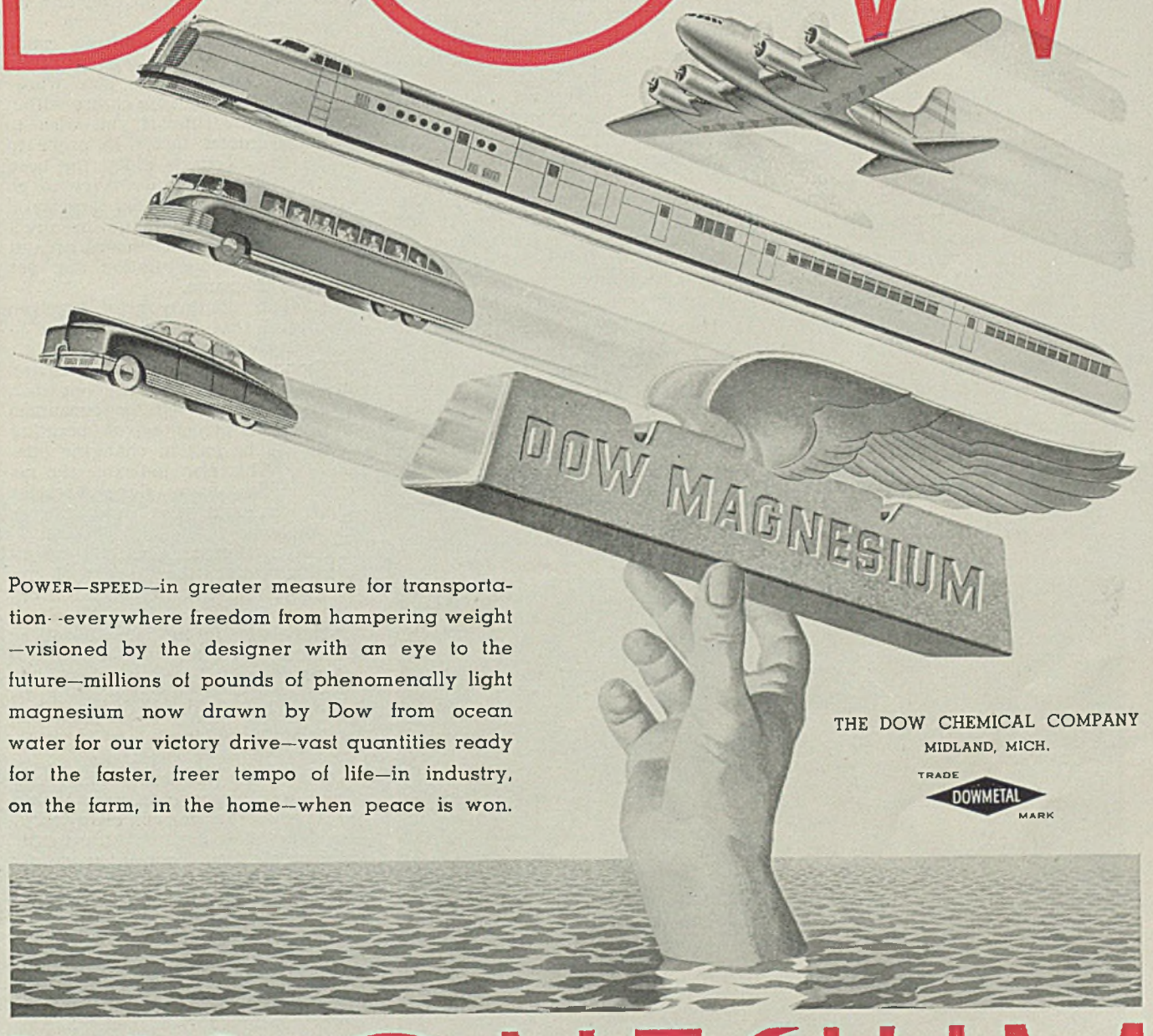


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TABLE II—Effect in Man-Hours of Changing to Larger Electrode

Electrode Diameter, Inch	Percentage of jobs done with next larger size electrode				
	0%	25%	50%	75%	100%
1/8	21,400,000	20,330,000	19,170,000	18,060,000	16,900,000
5/32	41,650,000	39,785,000	37,770,000	36,155,000	34,340,000
3/16	39,700,000	35,030,000	30,450,000	25,875,000	21,200,000
1/4	10,300,000	9,500,000	8,720,000	7,970,000	7,200,000
Total	113,050,000	104,645,000	96,110,000	88,060,000	79,640,000
Decrease	.....	8,405,000	16,940,000	24,990,000	33,410,000
Operators available	.....	4,200	8,470	12,495	16,700

by actual measure for an accurate average value must be used to obtain the correct results. This formula is true for any type of electrode, any type of joint in any type of base metal within 15 per cent. It is based on burning off from the electrode 1 pound of metal for each kilowatt-hour of power consumed at the arc. It also allows for spatter loss and vaporization by figuring that only 2/3 of this pound is actually deposited as weld metal. Thus a ¼-inch electrode, operated at 250 amperes with 30 volts across the arc will consume electric power at a rate of 7.5 kilowatts per hour and consume electrode at a rate of 7.5 pounds per hour.

Now let's see what is involved in increasing the arc speed—that is, the speed at which the welder traverses the joint with his electrode. Assuming that the size of the bead is not changed, if we move the arc along the bead faster, metal must be melted off the end of the electrode at a faster rate. To do this requires more power at the arc—in other words, more kilowatts will be consumed at the arc in a given length of time. This means that the product of the volts times the amperes must be greater. Since for a given type of electrode the drop across the arc or the arc voltage is approximately constant over a considerable current range, this means that to get more power into the arc, the welding current must be stepped up. This in turn means that the current setting on the welding machine must be raised.

However, there is another factor involved, for it is not practicable to use the same diameter electrode and simply increase the welding current to get faster deposition because there is a certain range of consumption rate in which any particular size of electrode must be operated to deposit metal efficiently without excessive loss from splatter and vaporization.

Results of these limiting conditions is that for each current range there is an electrode size whose optimum burn-off rate comes within that range. Thus if you wish to melt off metal faster in order to move the electrode along the bead faster, it becomes necessary to go to a larger rod, for the larger rod will deposit more metal in direct ratio to its cross sectional area if the rate of consumption (in. per min.) is the same.

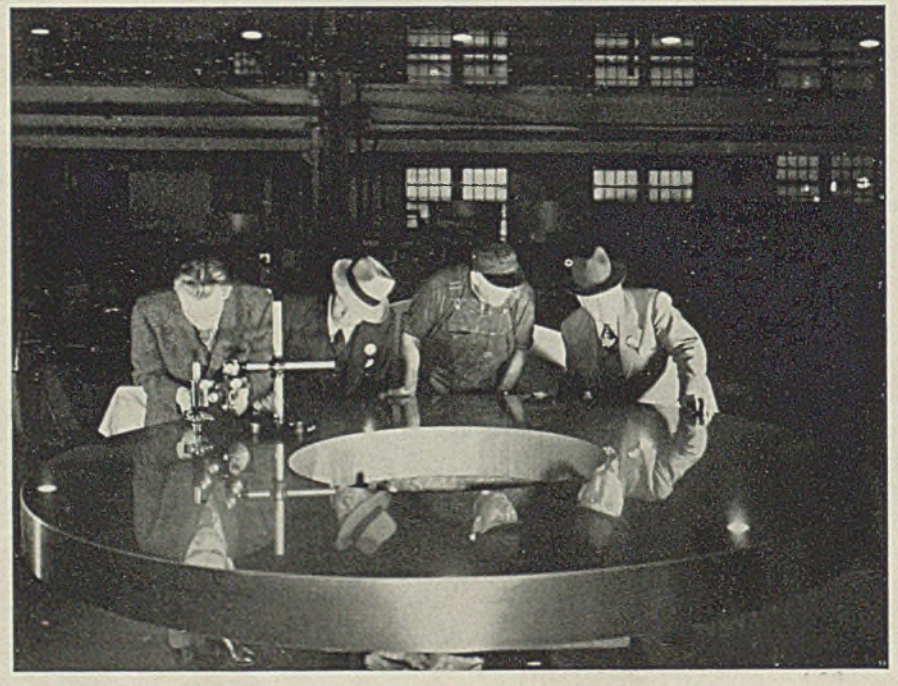
There is another factor involved also, and that is the time lost in changing electrodes. If we are going to move the electrode faster and deposit more metal in a given time, more electrodes will be consumed and a larger percentage of operating time will be lost in changing electrodes. This also indicates the necessity for using large-diameter electrodes and maximum lengths available.

The matter of electrode length also determines the number of craters involved in laying down a given volume of weld metal, for the shorter the electrode, the more it will be necessary to interrupt the weld to change electrodes, thus producing more craters. Electrodes should be 14 inches or longer in all instances, and the 18-inch length is to be recommended in some cases.

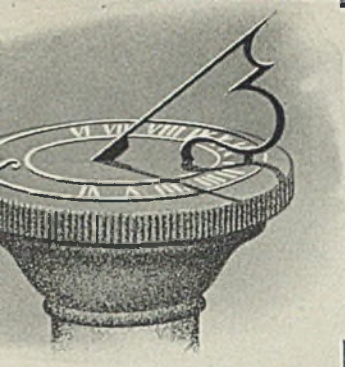
Can using higher welding currents and larger electrodes be significant in the present emergency? Consider these figures: An estimate places electrode consumption for 1941 at 315,643,000 pounds, about 80 per cent of which was in electrodes of ¼-inch diameter or smaller. Of this volume, 13 per cent was in ⅛-inch rod, 32 per cent in 5/32-inch rod, 37 per cent in 3/16-inch rod and 18 per cent in ¼-inch rod. Of the total consumed then, some 32,825,000 pounds was in ⅛-inch electrode; 80,800,000 pounds in 5/32-inch; 93,425,000 pounds in 3/16-inch; and 45,450,000 pounds in the ¼-inch size.

On the usual 14-inch length of electrode, there is a 2-inch stub end loss, which amounts to about 15 per cent. Deducting this leaves for actual consumption 27,901,250 pounds of ⅛-inch electrode; 68,680,000 pounds of 5/32-inch; 79,411,250

Iron Mirror Supports Huge Rotor



TWO MILLION pounds of rotating machinery in a 108,000-kilovolt-ampere Westinghouse vertical waterwheel generator for Grand Coulee will be supported by this giant cast iron mirror. Weighing 9700 pounds, this shiny thrust runner plate is 8 feet in diameter, 6 inches thick and has a 38-inch bore. It will support the generator rotor, waterwheel propeller and shaft. The finish resulted from completely machining, lapping with abrasive compound and polishing



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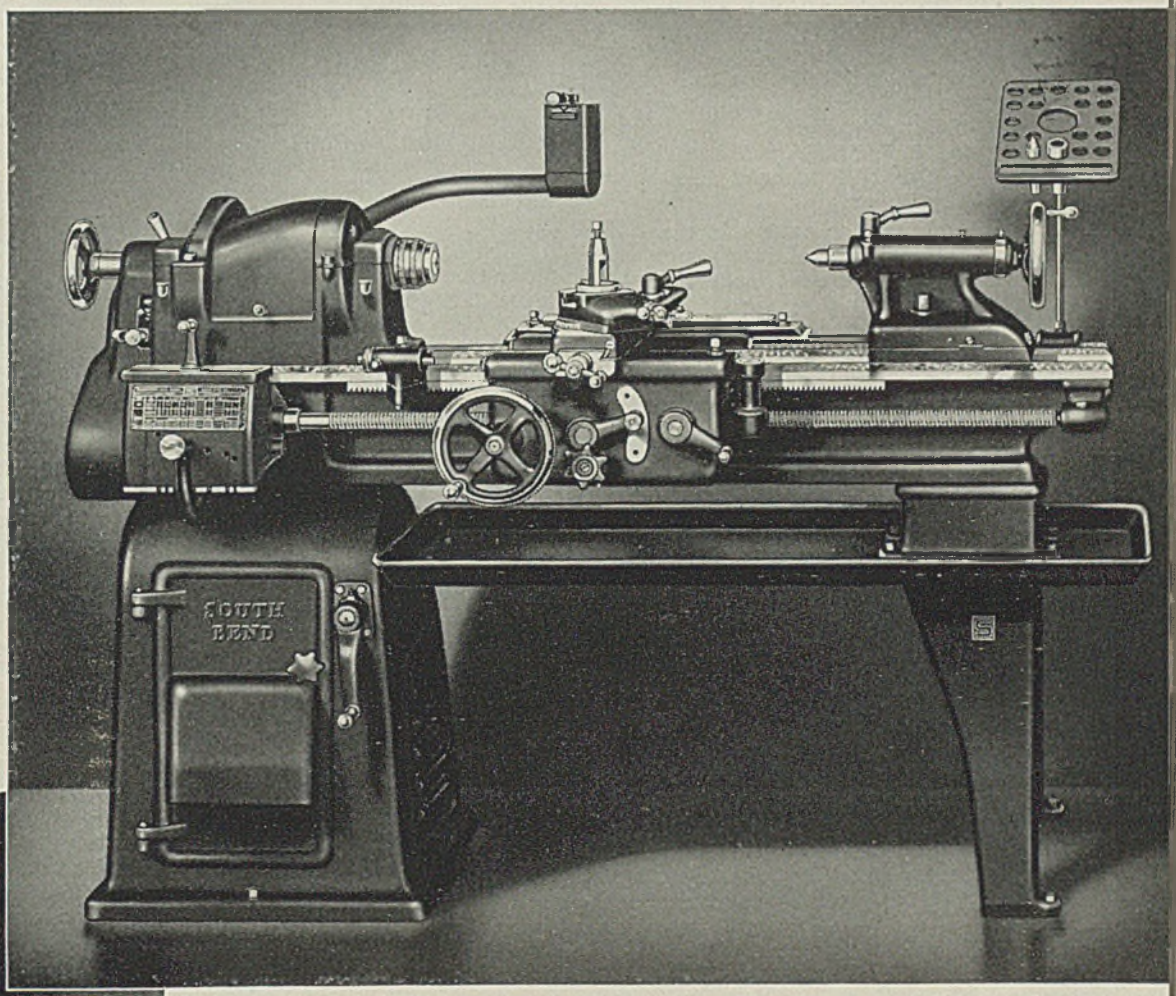
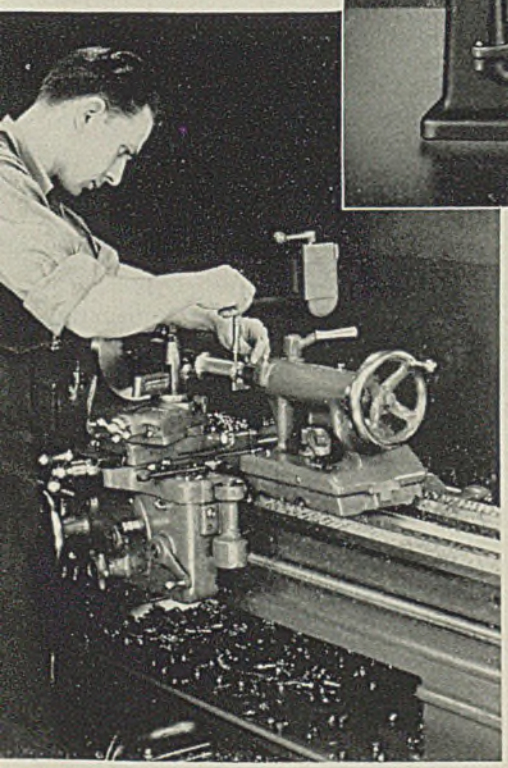


13" x 5' South Bend Underneath Motor Driven Tool Room Lathe.



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pounds of 3/16-inch; and 38,632,500 pounds of the ¼-inch.

On the basis of usual good practice, with a 50 per cent operating factor, the actual consumption rate would be 1.3 pounds per hour for ⅛-inch electrodes, 1.65 for 5/32-inch 1.95 for the 3/16-inch, and 3.75 for the ¼-inch.

Now dividing the pounds available for consumption by the rate of deposition gives 21,400,000 man-hours employed in depositing ⅛-inch electrode; 41,650,000 for 5/32-inch; 39,700,000 for 3/16-inch and 10,300,000 for the ¼-inch.

Now consider the saving in man-hours that could be obtained merely by shifting to the next larger size electrode and its correspondingly higher current. Referring to Table II, note the effect of changing 25 per cent, 50 per cent, 75 per cent and 100 per cent of the jobs now using a given type electrode over to the next larger size. In many cases it will be possible to change to two sizes larger, which of course would produce a correspondingly greater saving.

A study of the figures in Table II reveals the great time savings increased production of guns, ships merely by going to the next size larger electrode. It is not unreasonable to say that 75 per cent of all welding jobs could be done with one size larger electrodes, but a figure of 50 per cent will be employed to be conservative. *On this basis, the time saved would make available almost* 8500 *trained welding operators for other and additional work.* At the present emergency with war production demanding more and more trained operators, the availability of such skilled men is highly important.

Use of the larger electrodes also permits a joint to be completed with a smaller number of passes and so with less distortion. Thus time saving is obtained along with better fabrication.

To utilize fully the benefits from employing large electrodes and high welding currents with fast arc speeds, a joint should be positioned so the "fluid" type of electrode can be utilized and the weld metal simply poured into the joint. Positioning or placing the joint in the most favorable position for welding is of two general types—static and moving.

Simply changing the work to a position for downhand welding may permit an increase of as much as 100 per cent in the speed of deposition. The economic advantages are obvious.

TABLE III—A Highly Weldable Steel, Suited to High-Speed Welding

	Recommended Value, Per Cent	Limits, Per Cent
Carbon	0.17	0.15-0.25
Manganese	0.45	0.35-0.60
Silicon	0.05	0.07 max.
Sulphur	Low	0.05 max.
Phosphorous	Low	0.045 max.
Aluminum	Not over 2 ounces per ton added unless semi-killed with silicon, in which case aluminum should be as low as practical—from 0.04 to 0.07% silicon.	

On work that cannot be moved about to position it for welding, it thus becomes important for the designer to give careful thought to layout and assembly of the work so the welding operator may be able to take full advantage of the highest possible welding speed by having the joints of a type easy to weld in the position in which they are found in the structure. As an example, the selection of a joint as a fillet may be made so as to obtain a flat fillet in one case and overhead type in another. Once the designer has made the decision and laid out the work for that type of joint, the shop has no alternative but to follow his design. Thus welding speed begins on the drafting board.

Also important in making it possible to utilize high speeds is the matter of moving or turning over the work for best welding position —called "positioning" as against "position", in which the joint must be welded where the work cannot be moved about. For example, a joint normally horizontal may be made flat merely by turning the parts 90 degrees. In the case of a girth seam in a tank, the tank can be rotated, thus allowing the entire girth seam to be made in the flat or downhand welding position as the joint passes underneath the electrode. All these increase welding speed.

The welding equipment itself must be selected for high-speed operation for older types of welding generators will not produce as high deposition speeds as will the newer types with their better operating characteristics.

Selection of Material: While a great many metals and steel alloys can be arc welded satisfactorily, the selection of a material particularly well suited to the welding operation can greatly speed the work.

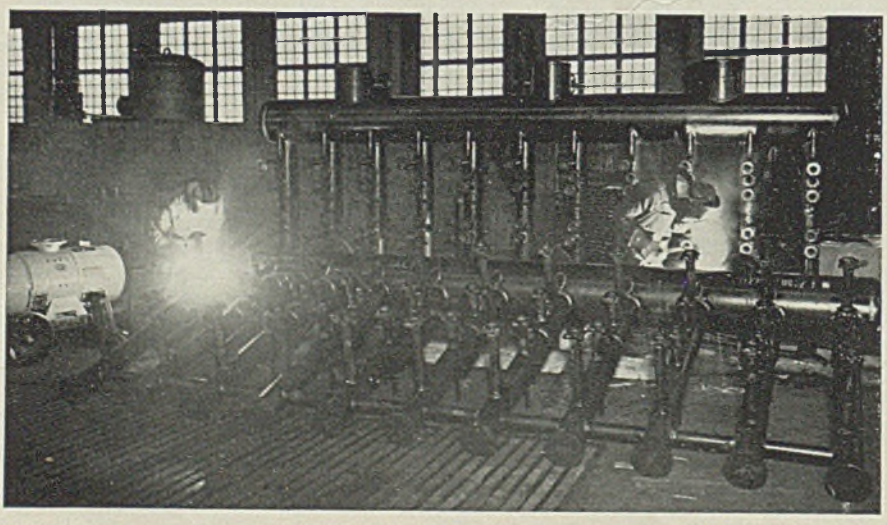
As an example, in an automatic job where good jigs, fixtures and fitup permit full advantage to be taken of the highest possible speeds, an arc travel of 350 feet per hour was being obtained. Simply by changing the analysis of the steel it was possible to increase this speed to about 600 feet per hour—almost double.

The cost of the new material was not higher, but obviously the cost of the finished article was greatly reduced by the increased welding speed. For a highly weldable steel, see Table III.

Weldability of steel, positioning, electrode size speed of travel influence rate of production. Of these, electrode size and speed of travel are most important.

The operator can do it. He says so himself. The war effort requires greater production. And it can be done on existing production lines NOW.

Hold 80 Points in Alignment While Welding



AN EXAMPLE of effective control of expansion and contraction effects in welded pipe assemblies is demonstrated above in the fabrication of ammonia accumulators at Vilter Mfg. Co., Milwaukee. Here 238 welds are made on each of these assemblies, keeping 80 inlet and outlet points in alignment for connecting the accumulator to the cooling system for which it is intended. Photo by Air Reduction Sales Co., New York

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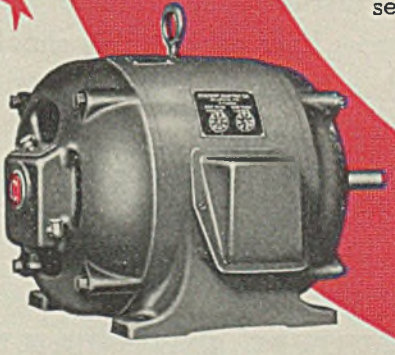

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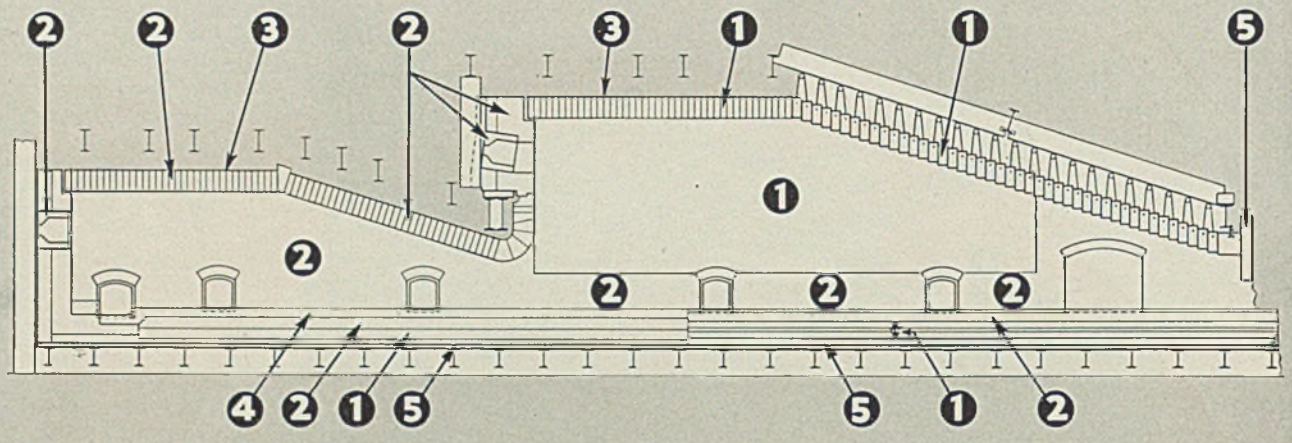

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Recovery and Preparation of STEEL SCRAP

By Fred E. Ullman
Chief Engineer
The Heckett Corp.
Butler, Pa.

(Concluded from last week)

EQUIPMENT used in the recovery of scrap, as described in the first installment, can be operated in confined areas. The transportation facilities are adequate to handle any disposal of the waste and move the recovered steel over any kind of terrain. Due to the fact that the transportation costs do not ordinarily exceed 15 per cent of the total cost of recovery and preparation in the average operations, the stationary preparation unit may be located some distance away from the site of the recovery operation. In all cases this distance varies due to the fact that the recovery equipment is portable and moves, during the course of the recovery job, all over the area occupied by the dump. In cases where adequate power and rail transportation facilities are not available, portable power generation equipment may be employed with slight increase in production cost and trucks may be employed to transport the recovered and prepared steel scrap from the site of the recovery and preparation job to rail transportation facilities or directly to the steel plant.

Present Operations Limited

At present dump recovery operations are limited largely to clean steelmaking furnace slag dumps containing from 12 to 18 per cent of recoverable steel scrap and delivering from 2000 to 3000 tons per month of prepared scrap with each set of equipment described. However, there is no reason why, if the scrap shortage continues, the recovery operations might not be started on dumps containing lower percentages of steel provided steelmakers are willing to pay the price of recovery. In present operations the cost of recovery and preparation ranges between $6 and $9 per gross ton and in dumps containing as low as 6 per cent of recoverable steel the cost might rise above $20 per gross ton. These cost figures depend largely upon labor cost and the physical conditions under which the recovery operation is performed. The preparation cost generally remains constant for all operations.

In analyzing recovery and preparation cost of dump operation it is interesting to note that amortization and maintenance costs are exceptionally high. This condition is due to the fact that standard equipment, such as shovels, tractors, trucks, etc., must be used for this type of work. Steelmaking furnace slags are among the most heavy and abrasive materials known. Accordingly the life of the equipment is considerably shorter than units handling dirt, rock, etc., and maintenance costs are several times those encountered in most other operations.

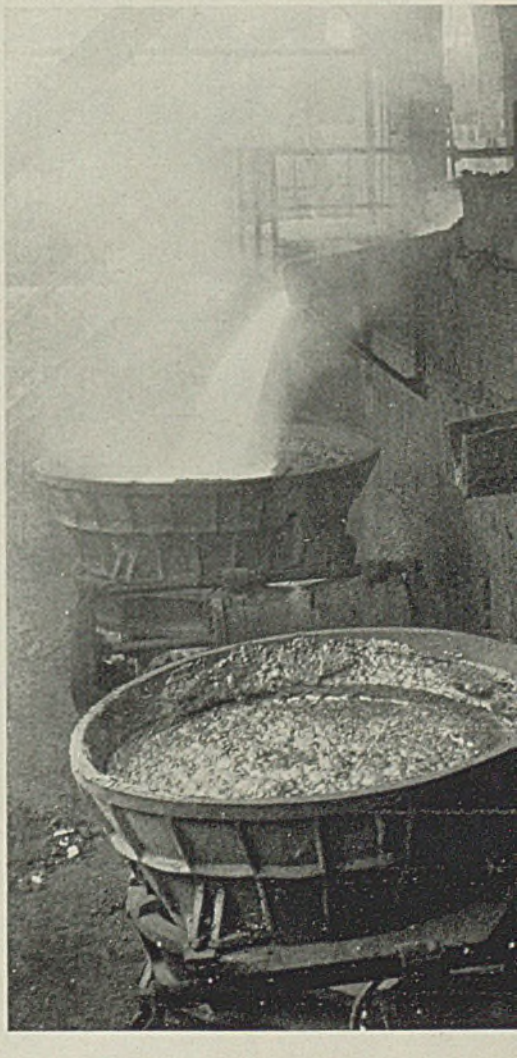
Stationary Equipment Used

The second general type of recovery and preparation job is the current production operation. This type of operation differs from the dump operation described in that all of the equipment is stationary. In the current production operation the recovery and preparation work is performed upon the slag and refuse being currently produced by the respective steelmaking furnaces. The currently produced slag and refuse are taken from the furnaces to the current production recovery and preparation plant and disposed of in the usual manner by the respective steel plant equipment.

Equipment used in the current production is, with the exception of the separator machine and the cleaning installation, the same type of equipment used today by many of the steel plants for the recovery operations on the steelmaking furnace slag and refuse as they are being performed. Slag and refuse, usually in thimbles and side dump cars respectively, are brought under an overhead crane runway and dumped into a hot slag pit. With a drop ball these materials are broken up in this pit and fed through a separator. Slag and refuse coming out of the slag chute are directed into railroad cars or trucks and removed to the dump. This type of operation necessitates only one bucket handling of the slag and refuse, from the hot slag pit to the separator grizzly, since the cars are reloaded by gravity from the separator slag chute. Slag and refuse which will not pass through the separator are deposited in front of the separator grid in a concentrated pile where they are broken most efficiently with the drop ball. The larger pieces of steel which will not pass through the separator also are concentrated in front of the separator grizzly. In many cases it is necessary to cool the slag with water before feeding it through the separator and this operation aids greatly in breaking up the hot slag. Developments indicate that all of the slag can be broken up in this manner to small sizes which will allow maximum efficiency in bucket operation as well as in separation.

Steel scrap and blast furnace fines recovered by the machine are fed by gravity into storage pits under the runway where the fines may be stored for rerunning through the separator and ultimate shipment to blast furnaces, and where the recovered steel scrap may be picked up directly by a magnet on the crane hook and fed into the cleaning installation.

Where a stock is located near the steel plant the slag coming from the slag chute may be led through a crusher and crushed down to size suitable for use in the blast furnace as a fluxing material. Slag



Flush of molten slag being received by cinder ladle. Any carry-over of iron is recovered at the slag dump

from the thimbles is dumped into a separate part of the hot slag pit in order that it may be fed separately from the pit refuse through the separating unit, crushed, and dropped directly into cars for shipment to the blast furnace.

Crushed slag of this type also could be used for various aggregates. In Europe it has been applied particularly to road building materials because it is structurally stronger than blast furnace slag and will not absorb as much tar, road oil, or asphalt. In the southern steelmaking areas where high-phosphorous open-hearth slags are produced, the slags at present are being used for fertilizer. Steel-free slag can be crushed readily in standard crushing equipment without breakage to the crushers.

At steel plants equipped with overhead cranes on runways under which currently produced slag and refuse is dumped, it is often a relatively simple matter to add the installation of separating and cleaning equipment. The small amount of space occupied under the runways by these units is more than compensated for by the increase of efficiency in the operation of the present equipment. It is also possible to bring other steel containing wastes such as soaking pit scale, rolling mill scale, foundry slag, and foundry sand into a complete current production recovery and preparation plant for the recovery of scrap contained in them. Where production recovery and preparation plants are located in the vicinity of the steelmaking furnaces, the recovered and prepared steel scrap is loaded directly into charging boxes with a resulting saving in time and handling expense.

The cost of the recovery and preparation of steel scrap from the currently produced slag and refuse depends entirely upon the character of the materials being handled. The average loss into slag and refuse at the furnace is between 3 and 6 per cent of the ingot production of the furnace depending largely on the type of furnace and method of operation; 95 per cent of this loss can be recovered by use of the previously described process. The cost to recover and prepare steel scrap contained in these materials may range from $2 to $15 per gross ton.

Reasons for Cost Spread

Many reasons for this wide range are apparent. Where individual steel plants have various types of recovery operations going on, the materials which might be worked through by a current production recovery operation would contain a low percentage of steel with a resulting high cost per ton for recovery and preparation. A number of the steel plants are of relatively small size and are accordingly not producing large quantities of slag and refuse. Since any complete recovery and preparation plant requires equipment of adequate size to effect the complete recovery and preparation job, it may not be necessary to operate the equipment more than five or six hours per day to process the volume produced, and therefore the amortization costs make up a high percentage of the total cost per ton. In adapting special recovery and preparation equipment to present recovery equipment operated by individual steel plants, it is often necessary to make special outlays involving extensive installations of conveying equipment. In general the cost per ton of labor and maintenance in the current production operation makes up a smaller percentage of the total cost per ton due to the fact that less labor is necessary and because the separator machine and the cleaning equipment are especially built to handle the heavy and abrasive materials encountered in this operation.

One of the major objections to the use of steel scrap contained in steelmaking furnace slag and refuse has been its low quality. With the exception of the best quality pit scrap and ladle skulls, the steel scrap lost with the slag in tapping the furnaces contains only approximately 50 per cent steel by weight due to adhering slag. The steel scrap recovered and prepared as described is composed of approximately 85 per cent steel by weight, and the analysis can be raised beyond this point where necessary in special steelmaking operations. Although many steelmakers do not consider steel scrap of 85 per cent metallic content by weight to be a high-quality scrap, present users of the scrap recovered and prepared to this quality indicate that no serious

(*Please turn to Page* 122)

Spun Steel Barrel

EXAMPLE of modern metal fabrication and its application to scientific research is this open-end spun steel barrel recently completed at Milwaukee Metal Spinning Co., Milwaukee, for Ohio State university, department of physics. Ordinarily, these "caps" or barrels, for use as an electrostatic shield for a Van der Graaff electrostatic generator producing X-rays, are spun of copper, but due to war restrictions steel was substituted. The spinning operation demanded extreme care and skill for the harder metal required utmost precision

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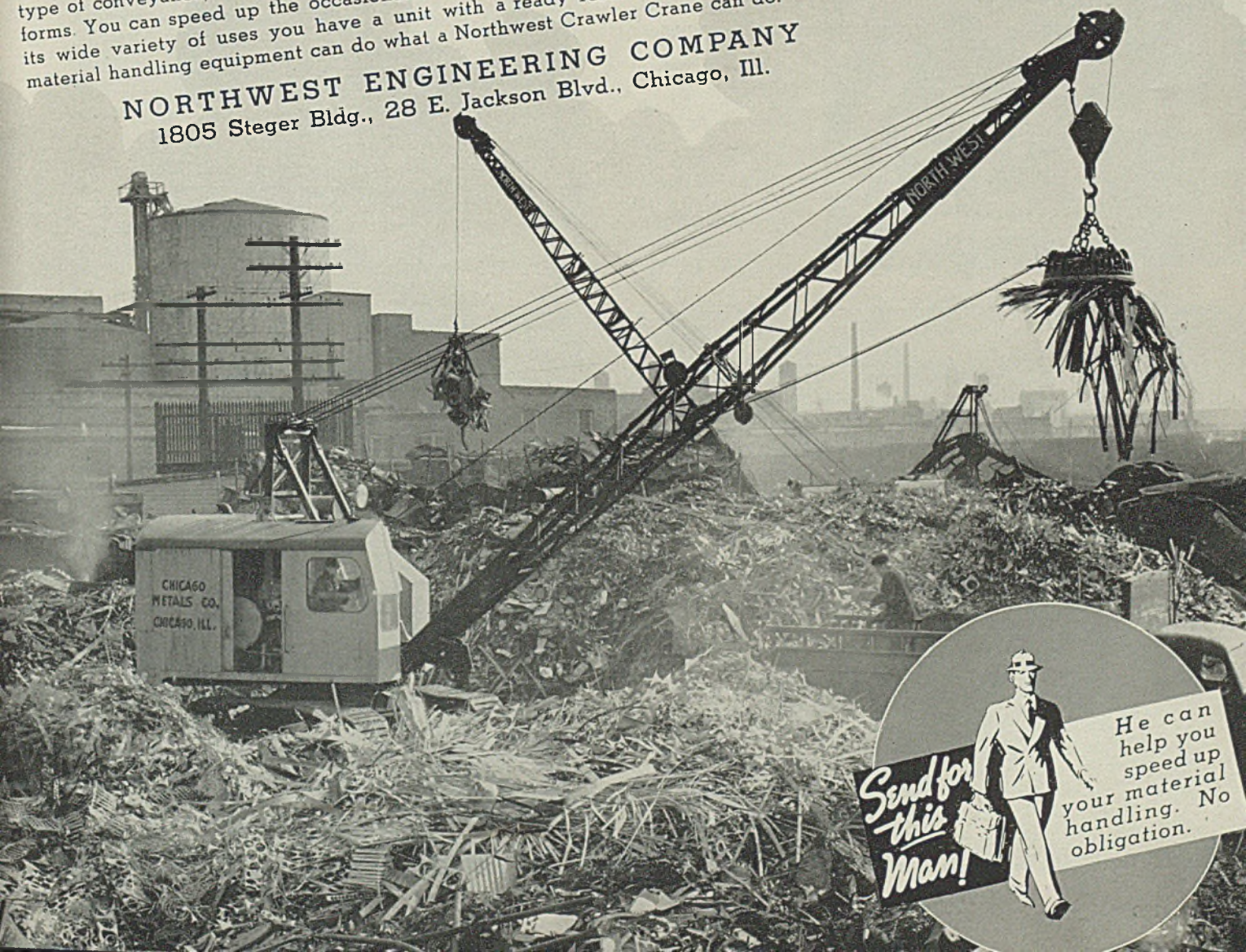


BETTER HANDLING SCHEME

. . . . doubles number of engine tests per "cell"

By F. L. SPANGLER

UNCLE SAM must be satisfied with the performance of every aviation engine before it leaves the factory. This means exhaustive tests under prescribed conditions of operation. Each engine is tested in a closed room, known as a test cell, observation and control being in an adjoining room.

Ordinarily, before an engine can be put on test, at least four hours of preliminary preparation is required. And after the test, several more hours are necessary to disconnect wires, hose, exhaust, etc., before the engine can be removed from the test cell. As a result, the test cells, with their expensive and intricate equipment are tied up more than half the time in preparation and dismantling operations.

Each test cell requires an electric generator for loading the engine, an air blast system for cooling, provision for supplying gasoline and lubricant, piping for carburetor air, means for throttle control, and delicate instruments for indicating or recording the test results.

To increase the use of their engine test cells, the Buick aircraft engine plant has devised a means for doing almost all the preliminary work, in preparation for the test, outside the test cell instead of in the cell. After a test is completed, less than half an hour elapses before the next engine is in the cell and completely hooked up ready for the test. With this method, this plant is getting more than 90 per cent use from its test cells. Hence, the flow of engines through each test cell is almost twice as fast as with the conventional method of preparing the

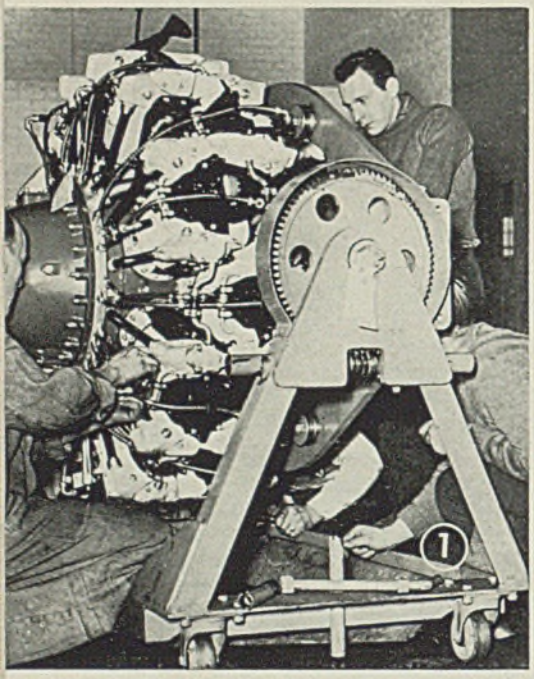
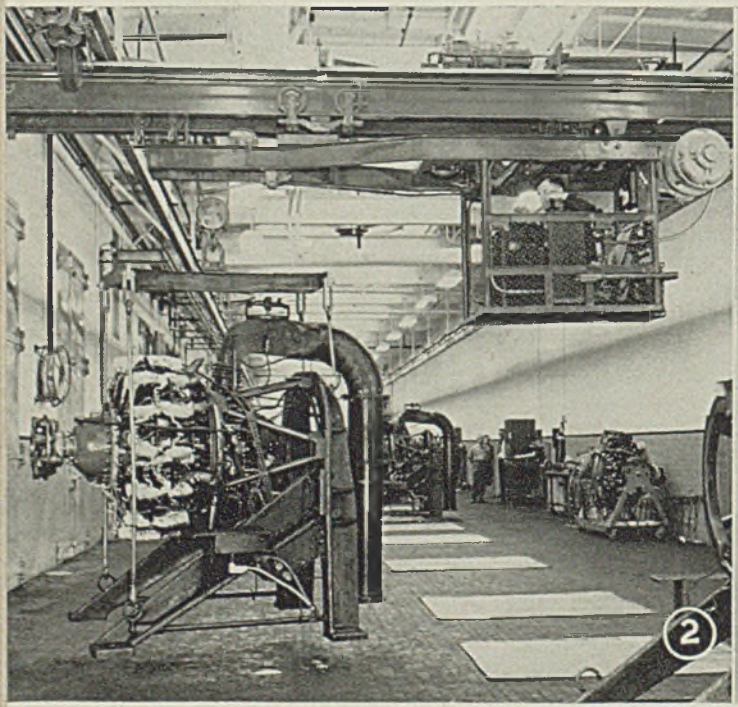


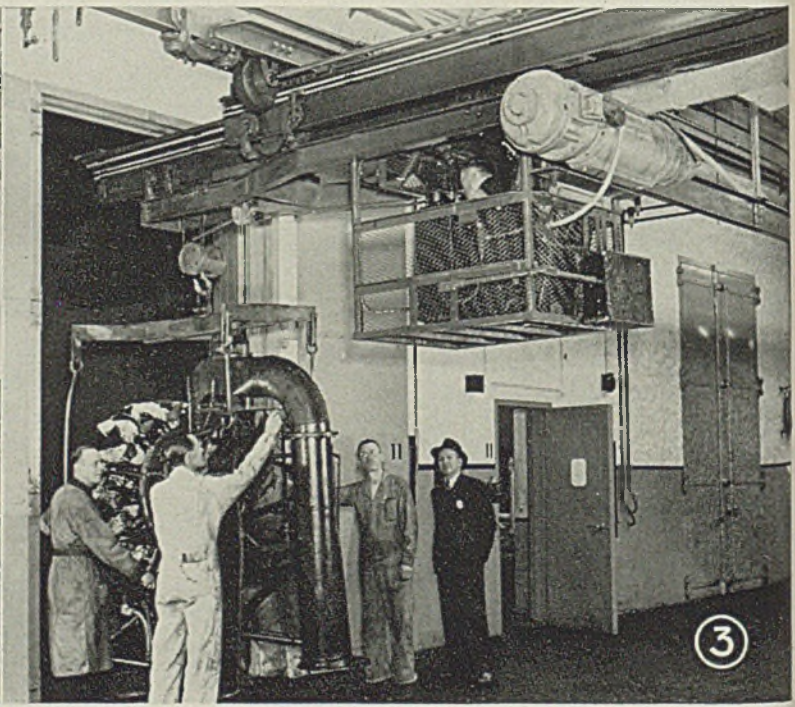
Fig. 1—Big Buick-built aircraft engines come from the assembly lines mounted on these special stands, the wheels of which run in sunken tracks or on special rails to keep the stand traveling in line. A pan is provided to catch any parts that may be dropped during assembly operations. Note worm gear drive on end to rotate engine on the cradle to any angle desired. This facilitates assembly

Fig. 2—Engine is mounted on this special stand, flexible connections attached, ready to be coupled to connections in test cell in short order. Note at lower right, a portion of one of these stands with the engine mount ring clearly visible.

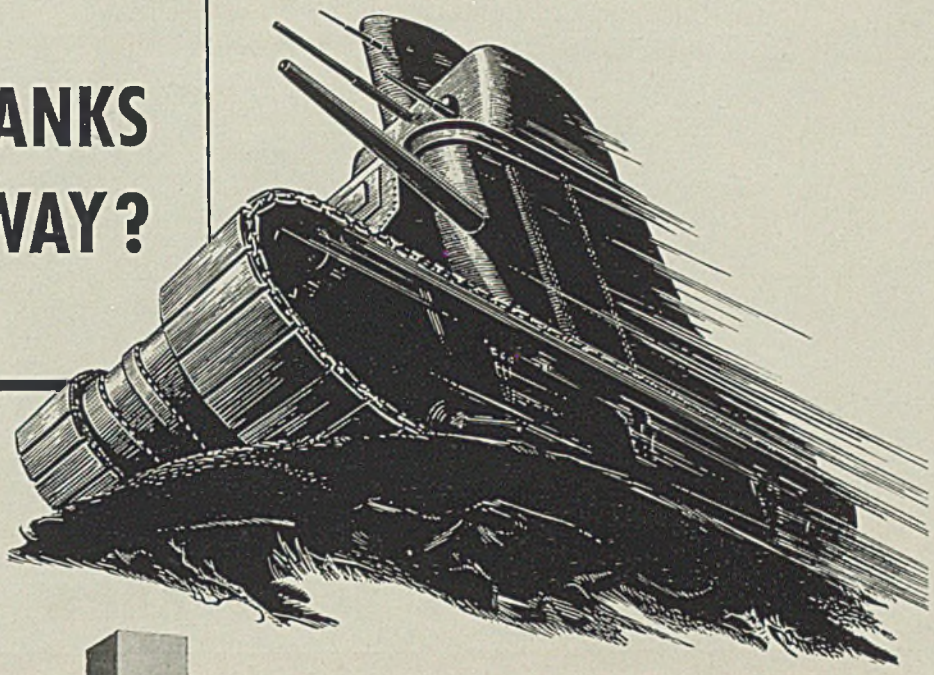
All photos from Buick Motor Division, approved by Army censors

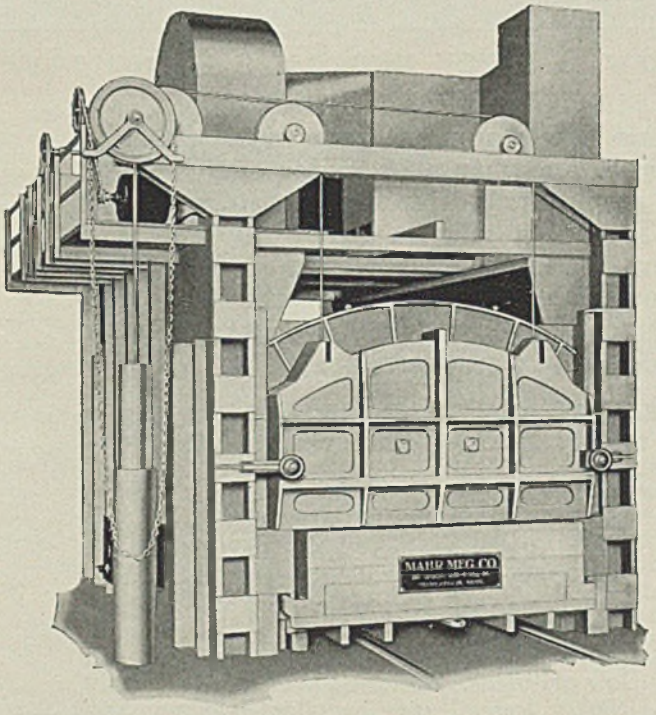
Fig. 3—With all electrical and hose connections attached, shaft coupling and carburetor air piping in place, engine and mount are moved into test cell by special overhead monorail crane. Note monorail employs two beams on traveling bridge, the lower one of which extends into test cell to line up with short section therein. Interlocks prevent trolley running off end of monorail bridge by assuring perfect lineup. Special lifting frame supports engine and mount during moving



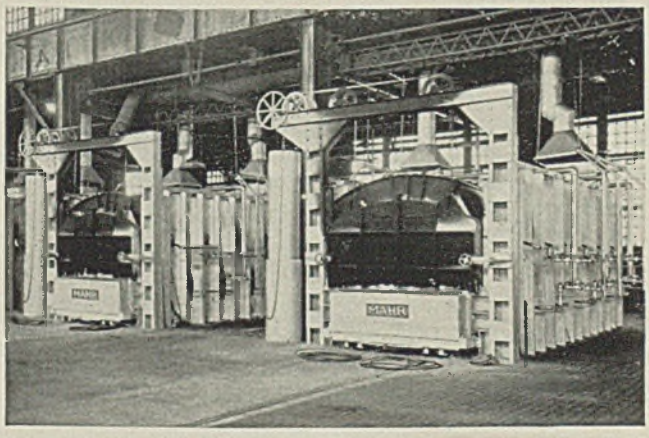


HOW DO TANKS GET THAT WAY?





MAHR recirculating air draw-stress relief furnace.



MAHR car bottom Carburizing furnaces for Carburizing armor plate.

COLOSSUS OF TODAY'S BATTLEFRONT—Behemoth of ruggedness and well-nigh irresistable power—precision motored, ultra offensive—yet, like the ponderous tortoise, dependent upon its *shell* for protection from enemy assault!

American tank manufacturers today are using many MAHR Carburizing and air draw-stress relief furnaces for perfecting the super armor of modern tanks. MAHR continuous, car and batch type furnaces are also used extensively for the critical heat treatment of tank transmissions to give them dependable, rugged driving power. That's because, through the years, MAHR furnaces have always been on the front line of heat treating progress in *every* phase!

FOR EVERY HEAT TREATING NEED

ANNEALING, CARBURIZING, BAKING, HARDENING, FORGING, DRAWING, STRESS RELIEF—CAR BOTTOM, PIT, PUSHER, ROLLER HEARTH, CONTINUOUS, POT . . . RIVET FORGES, TORCHES, BURNERS, BLOWERS, VALVES.

WRITE, WIRE OR PHONE TODAY

Our engineers will gladly help you select the type unit you need, and we'll give you complete information on any specific request. There's an engineer-representative near you for quick consultation.

MAHR MANUFACTURING CO.

DIV. DIAMOND IRON WORKS, INC.

GENERAL OFFICES—MINNEAPOLIS, MINN.

SALES OFFICES IN PRINCIPAL CITIES

"Well, I never knew that!"

Out of the experience of today, better products tomorrow

NEVER since the birth of the machine age has equipment been asked for such overloads, materials for such performance, and man's brain for such results! Men whose technical knowledge was ample for yesterday, marvel today at what war's drive demands and gets. Though it takes a harsh toll, war *is* a school to those who will learn. Forced out of beaten paths, we are now learning to use many a new method, many a new material. For those who study and record as they do war's work, the future should be rich in opportunities for more beautiful, more efficient, more economical products.

As a study-guide to those now working with Seymour Products, let us emphasize some of their basic qualities—"spring boards" from which future possibilities may be legion!

1. SEYMOUR NICKEL SILVER is an alloy of copper, nickel and zinc. Fine grain, good corrosion resistance and a silvery white color make it an ideal base for silver, nickel and chromium plating. Takes any hardness from dead soft to spring temper. Excellent for deep draws and difficult spinning. Leaded, it machines freely.

2. SEYMOUR PHOSPHOR BRONZE is an alloy of copper, tin and phosphorus. Highly resistant to corrosion, abrasion, friction and fatigue. Springs made of it stand almost indefinite flexure. Practically indifferent to thermal change in most applications. In all ranges of hardness and leaded for machining.

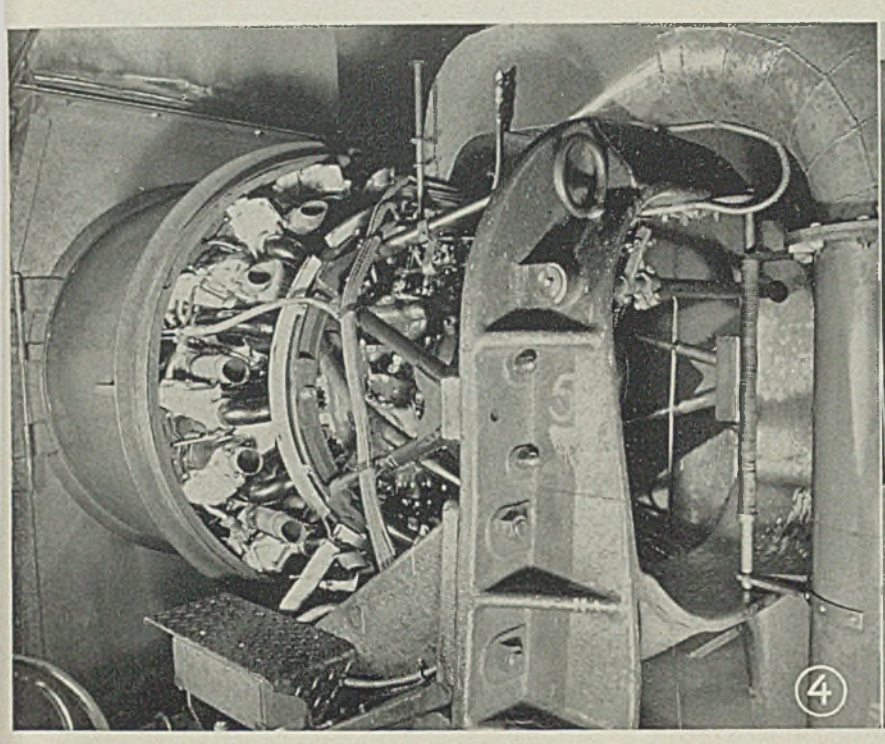
3. SEYMOUR NICKEL ANODES are made of virgin nickel, melted in the electric furnace under pyrometric control and laboratory check. Outstanding is the "Seycast" 99%+ cast nickel anode with radial "anchored" grains that tend to eliminate loose nickel in low pH baths. Designed primarily for Bright Nickel, but will give excellent results in any hot Watts bath having a pH of 4.5 (electrometric) or lower.

4. SEYMOUR BRIGHT NICKEL is an organic plating process free from promoter metal, stable, easily controlled. Utilizes the hot Watts bath and produces brilliant, silvery white deposits over copper and brass, also direct on steel. No coloring required after plating. The work leaves the final rinse with a bright deposit.

SEYMOUR

NON-FERROUS ALLOYS SINCE 1878

THE SEYMOUR MANUFACTURING CO., SEYMOUR, CONN.



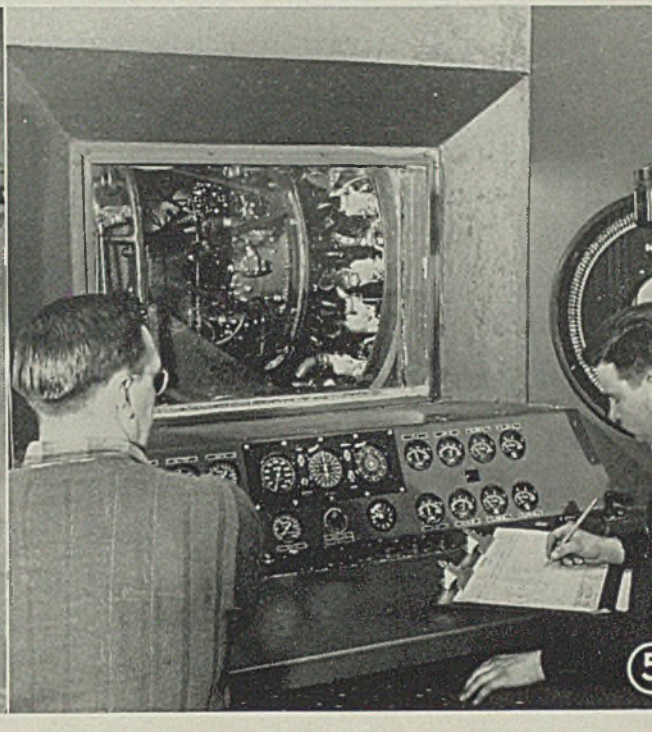


Fig. 4—Mounted in test cell, engine is ready for initial test run. At a touch of the starter in the adjoining control room, it will roar into action

Fig. 5—This is a view of the control room and a few of the many instruments and meters employed to afford an accurate measure of the engine performance. A complete log is kept of each test

engine for the test in the cell itself.

The Buick plant is engaged in manufacturing radial aircraft engines. These come from the assembly floor with each engine mounted on a special truck, Fig. 1, that runs on rails laid in the floor. These rails end in a bay running alongside the test cells. After the engines have been delivered to this bay, they are handled by means of a cab-controlled overhead electric traveling crane of special design, Figs. 2 and 3. This crane lifts each engine from the truck and sets it onto a structural frame, Fig. 2, to which it is fastened by means of nine clamps. For lifting the engine a special sling is used, employing two hooks that engage eyes in the top of the engine block.

After the engine is mounted in place on the test frame, the ignition wiring and pyrometer wiring are fastened in position, a special hood for the carburetor air is mounted onto the engine, and a shaft coupling is installed. Gasoline and lubricating-oil hoses are attached, these being provided with quick-fastening couplings. With the preliminary work completed, the crane serving the bay lifts the frame and engine by means of a special rigging provided with four hooks which engage the base of the frame as shown in Fig. 2. The frame, with engine attached, is moved into the test cell, Fig. 3, after the crane has taken out the preceding engine under test. Then the frame is clamped to a steel-and-concrete base on the test cell floor.

With the engine in the test cell, each hose is coupled to its proper connection in the floor, and the electric wiring is plugged into a special multiple-connection receptacle. The hood for the carburetor air is attached to an intake in the floor by means of a quick-fastening coupling. The engine shaft is bolted onto an extension of the generator shaft, and the cooling air duct in front of the engine is opened. Also the throttle is connected to a hydraulic control in the floor, this control being operated from the adjoining control and observation room.

When the engine is ready for testing, the door to the cell is closed. The engine is operated at varying loads while manifold pressure, brake horsepower, fuel consumption, oil temperature, and other readings are taken. Each engine first goes through the "green" test, which requires nine hours, after which it is removed from the test cell and sent back into the plant, where it is torn down and all parts examined. The engine is then reassembled and given another similar test, this one lasting four hours, after which it is ready for shipment.

The crane used for moving the engine and mounting frame into and out of the test cell has a monorail trolley which runs back and forth on a steel beam. When the trolley is directly opposite the test cell, this beam lines up with an overhead beam in the cell so the trolley can be moved into the cell and out again by control from the crane cage. An electrical interlock prevents the trolley from being moved unless these beams are exactly in line, thereby insuring safe operation.

The crane equipped with a hoist drum, and long rope life is assured by using preformed rope, which resists fatigue induced by bending action of the rope around the drum and the fall block sheaves.

The power generated during testing is pumped back into the public utility power system supplying the plant, and this power is credited to the plant.

Develops Paint that Covers with One Coat

A new paint product, called Valdura Singlekote, that primes, seals and finishes interior surfaces in one application is announced by American-Marietta Co., 43 East Ohio street, Chicago. Formulated for maintenance painting of industrial, institutional and commercial properties, it combines the hiding power and economy of water-type paints with washability, durability and performance of oil-type coatings.

The paint may be applied to surfaces previously coated with calcimine or casein paints, providing the old covering is bonded. While it easily covers dirt, it is not recommended for use on oily or greasy surfaces. High hiding power permits coverage of dark surfaces with a single coat, and the product is self-leveling. It sets within two hours, dries within 12 hours and provides a dead-flat finish when viewed at a 90-degree angle.

Determining Tapping Temperatures by the SPOON TEST

Training open-hearth crews to judge temperature of steel by observing characteristics of sample is facilitated by moving picture camera. Numerous replicas of samples spooned through the wicket are compared on screen, thus saving considerable time

By A. G. AREND

Open-hearth helpers learn to judge tapping temperatures after lengthy practical experience

TRAINING OPERATIVES in the making of steel was to some extent retarded in earlier years because various practical features were understood to require so much experience that the immediate employment of fresh attendants could not be considered. That this need not necessarily be so has been fully demonstrated by the rapid methods applied in American training centers, where the total time necessary is reduced to its absolute minimum. This has, not unnaturally, raised some speculation by older steelmelters, with such references as "canned" methods from the U.S.A., etc., but under the present circumstances, it might be desirable to have a large surplus of freshly trained furnace attendants available, on the shortest possible notice. It is generally accepted that although the book-learning obtained from a study of numerous furnace log-books, showing charges, and periods occupied, etc., may acquaint one with the chief items, the matter of actual tapping heats could not be learned with precision except by lengthy practical experience.

Although the rod test and pyrometric control are still used, the spoon test is regarded as being the most reliable means of taking temperature measurements. It is this fact that has opened the field for the movie camera to be applied with suitably filtered light, under the most desirable conditions, since all the variations possible can be revealed in the most concentrated manner. Instead of the student being given instances of the spoon being withdrawn with its sample from the hearth, many hundreds of replicas can be projected on to a screen for comparison.

The time-saving is enormous, since should any doubts exist, these can be dispelled by making reference at any time to different parts of the movie film. This is because the correct and inaccurate application of the spoon test are both supplied under all conditions. The following is a short detail.

By having the temperature above that required for tapping at any time during the process, the metal may be gassy, tend to produce cracked ingots, and when actually tapped too hot, impair the inner surfaces of the mold and scour the ladle bricks, while if held above its tapping temperature, it would damage the furnace, and waste time. When tapped too cold, steel tends to splash, since on coming in contact with made-up metal round the pot bottom it is sprayed to the walls, and skulls form in the ladle, from which latter, the ladle bricks may be eventually torn out of place.

Use of a faulty spoon has not infrequently been responsible for furnaces having been kept waiting to tap unnecessarily long, and for this reason it has sometimes been suggested that standard makes of spoons should be utilized.

In some instances, instead of a definite thickness being adhered to, the bottom and sides differ in this respect, while the actual lips may be of almost pointed formation, which puts an added strain on the method of testing.

The movie film can reveal the correct position to take when making a comparison of the color of the bath, *i.e.*, away from the flame, by making use of the obstruction offered by the lower edge of the door. The blue glasses used to reduce the light cannot be expected to give an absolutely true rendering to the film as they do to the eye, but other associated points are revealed with great precision. These relate to practical wrinkles such as holding the spoon in the gas for a few minutes to warm up, filling, and pouring out the slag. This is shown repeated several times until a maximum thickness of slag coating has covered the spoon, and which may require a different number of immersions, before the actual sample is removed.

This repetition is necessary, and

From the *British Steelmaker*, February, 1942.