Operator watches template guiding a multiple torch setup as it flame cuts tank sprockets. Page 58

STEEL

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STEEL
January 24, 1944

Will Patience Be Rewarded?

Last Thursday evening Benjamin F. Fairless, president of United States Steel, spoke at the annual dinner of the Pittsburgh Chamber of Commerce. As part of his address, he summarized the corporation's labor policy.

He recalled that in June, 1933, following the passage of NIRA, a plan of employe representation was submitted to employes. The plan was adopted in June, 1934. At the time, the corporation announced a labor policy recognizing the right of employes to bargain collectively and pledged its willingness to negotiate with the representatives of any group so chosen, subject to the recognition of the principle that the right to work is not dependent on membership or non-membership in any organization.

Later the Wagner act was passed, granting exclusive representation to a bargaining agent chosen by a majority of employes. CIO was formed in 1935 and in due time United States Steel subsidiaries signed contracts with SWOC of CIO. These contracts did not provide for a closed shop or for a check-off.

Later, under directives from WLB, corporation subsidiaries signed new contracts imposing "maintenance of membership" and the check-off. U. S. Steel's subsidiaries signed these under protest, stating that "acceptance is predicated on one premise, namely that the country is at war and that your board has ordered the company to do certain things embodied in your directives. For the period of the contract now under negotiation, this company bows to your decision and accepts that which it considers unnecessary, undesirable and subversive of the workers' individual freedom."

U. S. Steel still stands on this protest. We mention it because it is typical of the attitude of practically every unit of private enterprise in the country. With few exceptions, every industrialist is enduring situations which he knows to be unjust, artificial, discriminatory and in most cases unnecessary. He awaits the time, after the war, when correctives can be applied intelligently.

These inequities are not confined to labor relations. They embrace the basis of wage payments, the determination of prices and the rights of companies and individuals in all phases of competition under the system of private enterprise. Never before in history have rewards for one's effort been based so little upon merit and so much upon arbitrary rules, personal whims and downright discrimination.

Industry deserves credit for its willingness to waive its right to correct these injustices until after the war. Let us hope that patience in this respect will bring its proper reward.

TWO IMPORTANT BILLS: Two bills designed to insure an orderly method of disposing of surplus government property now are before Congress. One is H.R. 3873, introduced by Representative Wright Patman. The other is S. 1609, proposed by Senator James E. Murray.

Of the two, the Patman bill is broadest in scope. It would create a Surplus Property Board, headed by the chairman of the Defense Supplies Corp. Other members would be the secretaries of Navy, War and Treasury and three experienced business men appointed by the President. The board would determine and prescribe the methods to be used by government agencies in disposing of all surplus property through established trade channels.

The Murray bill is confined to the disposal of machine tools only. Entitled the "Surplus Machine Tool Utilization Act," it would create a Federal Machine Tool Commission of nine members to classify and dispose of surplus machine tools to companies

(OVER)

according to size, to public schools, to friendly foreign nations and as scrap.

Both bills aim at tremendously important objectives. Industry should do its utmost to help shape these or other bills to handle the surplus equipment problem effectively. —p. 30

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INDUCTION HARDENING: Pressed to increase its output of internal combustion engines in the face of a diminishing supply of skilled labor, the Cooper-Bessemer Corp. has turned to the electrical induction process for hardening specific areas of engine parts with accurate control as to depth, width and location.

The process consists of passing a high frequency current through an inductor which surrounds but does not touch the area selected to be hardened. The degree of heating and hardening is controlled principally by the rate of power input to the inductor and the time during which power is applied before quenching. For quenching, jets of water are directed against the heated surfaces through orifices in the induction coils.

Cooper-Bessemer now has 158 different parts scheduled for induction hardening. The hardening unit takes up only a few square feet of floor space, requires only one operator, cuts down the speed of the hardening operation drastically and turns out a product free of distortion and requiring a minimum of grinding or machining.

This adaptation of the process of hardening by electrical induction is worthy of attention in other fields. —p. 76

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CONFUSION, UNLIMITED: The government's curious administration of wage disputes continues wearily along the road of confusion. Having "bought" a settlement with the rail workers by granting them more than the amount approved by the economic stabilizer before the President interfered, the government now finds itself confronted with a tough steelworkers' wage problem.

United States Steel, failing to reach an agreement with the union, has asked that the case be certified to the War Labor Board, stating that if the demands were granted they would increase the cost of finished steel by more than $9 per ton. Weirton Steel and its independent union are asking WLB for a quick ruling on the union's demands. The company will "gladly" grant any increase WLB will authorize providing that steel prices are raised accordingly.

Obviously wages will go up, and later prices. —p. 28

NON-WAR ESSENTIALS: Civilians who have had to garage their automobiles for repairs have discovered that it is difficult and sometimes impossible to get certain replacement parts. Truck line operations have been grappling with this problem for months.

An interesting sidelight on this situation comes from Thompson Products, Inc. An officer of the company states that sales of auto replacement parts in 1943 broke all previous records and now are equal to the company's entire business in 1937.

This reflects the threatening situation in motor transportation, wherein inventories of spare parts are seriously depleted, few new cars and trucks are available and the old ones are wearing out fast. WPB Chairman Nelson says that volume production of civilian goods must wait until the war picture becomes clearer, but that some easing in munitions schedules may permit a diversion of materials for "the most essential non-military items."

Repairs for transportation—motor vehicles and railroad rolling stock—undoubtedly rank high in the list of non-war essentials. —pp. 25, 42

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HOME FRONT CASUALTIES: Almost every reader of this page will recall that when the war broke out the people primarily interested in industrial safety were quick to say that the advent of new and inexperienced workers in war plants would increase the rate of accidents. All of the existing accident-prevention organizations, including the long-time effective National Safety Council, went to work to meet the challenge of the emergency.

These agencies have done a marvelous job, but in spite of their extraordinary efforts the accident rate, as predicted by them, has mounted alarmingly. OWI, gathering statistics from numerous sources, states that from Pearl Harbor to Jan. 1, 1944, the toll in industrial accidents is 37,600 killed (7500 more than have been killed in battle since Pearl Harbor); 210,000 permanently disabled and 4,500,000 temporarily disabled—60 times more than the military wounded and disabled.

This is a sorry picture and yet it is understandable. No nation can introduce millions of novices into industrial jobs without increasing the accident rate. Our logical course is to pursue our tried and proved safety precautions with renewed vigor. —p. 52

E. L. Shaner

EDITOR-IN-CHIEF

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When you buy alloy steel from Ryerson you receive helpful information on the heat-treating characteristics of the steel with each shipment. This time and money-saving information is included in the individualized Ryerson Alloy Steel Report which gives you more complete data than has ever before been furnished with steels shipped from stock.

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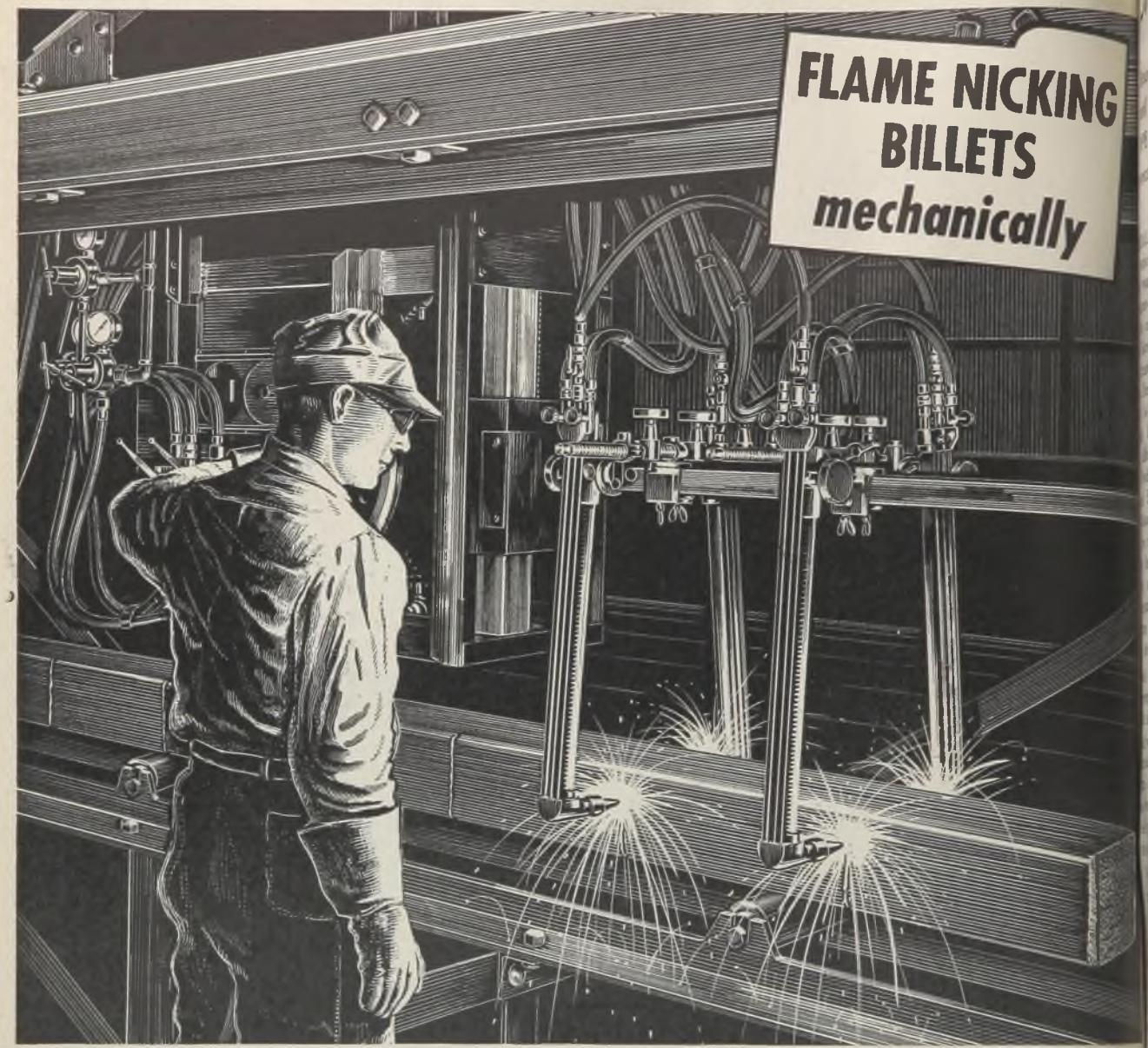
A TYPICAL CASE *from Airco's Research and Service file*



Because of Air Reduction's extensive experience in applying flame cutting methods to many varied industrial jobs, its Research Engineers were able to meet this customer's needs in fast time. By pooling their specialized "know how" with that of the customer's production staff, they soon designed and built the multiple torch billet nicking machine shown above, vitally needed for the production of shells.

This "tailor-made" machine employs four cutting torches to make simultaneous cuts a fraction of an inch into both sides of a billet, at speeds of from 20" to 30" a minute. After nicking, the blanks are cleanly separated by a hammer blow.

Later on, as shell production schedules rose, this same machine was redesigned to employ eight cutting torches, which nick the billets only on one side, thus providing an even faster mechanical procedure.

This actual case serves to illustrate Air Reduction's established policy of providing helpful engineering service to meet customers' special needs. This service is an integral part of Airco's *complete* oxygen service to industry. Airco products for every flame and arc application—and engineering service to promote their efficient use—are available through Air Reduction's nationwide plants and offices.

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Volume Production Must Wait

Resumption of manufacture of non-military items deferred until war picture becomes clearer, Nelson tells industrialists. WPB tightens restrictions on placing contracts in critical labor areas. Overall 1944 munitions program slightly reduced

GENERAL resumption of civilian goods production will not be permitted until the war picture becomes a great deal clearer—probably until the success of the coming invasion of the continent of Europe is assured.

This decision—announced by WPB Chairman Donald M. Nelson at a meeting with 14 leading industrialists in Washington last week—apparently resolves a difference in opinion within the War Production Board. While Mr. Nelson and Executive Vice Chairman C. E. Wilson have maintained there could be no return to volume production of the less essential goods in the near future, officials in the Office of Civilian Requirements have been holding out hope for a quick and sizable increase in civilian items.

Mr. Nelson further has declared that WPB will keep whatever limited civilian production is allowed out of labor shortage areas and will "use its powers of allocating materials and production in order to minimize new demands for labor in areas where every available worker is needed by plants already engaged in production for the armed forces".

While deferring any large-scale resumption of civilian goods manufacture, Mr. Nelson was reported considering a "test tube reconversion" experiment in three selected WPB areas—those with headquarters at Cleveland, Philadelphia and Kansas City, Mo. WPB tentatively has approved a plan whereby small plants would be permitted to use idle and surplus materials without restriction to manufacture civilian goods.

The scope of the test tube plan would be so limited that it would not conflict with the ban on general resumption of the manufacture of peacetime items. In areas of acute labor shortages only those plants employing ten or fewer workers would be eligible; in group II areas, only plants employing less than 25 persons; in other areas, plants employing up to 50 workers could participate.

"With our biggest battle coming up," said Mr. Nelson, "this emphatically is not the time to divert any substantial quantities of materials, labor or facilities to less essential civilian production."

Some observers believe the decision to retain most of the restrictions on production involves a psychological as well as a supply factor. Should resumption of civilian goods manufacture be permitted, they point out, a tendency toward complacency might develop to slow war production. Then if the United Nations should meet reverses in the European invasion, and more materials than anticipated are required, it would be difficult to re-accelerate the production pace.

Mr. Nelson explained that the situation respecting raw materials has changed substantially since many of the controls affecting non-military production were placed in effect. Some materials which were extremely scarce a year ago now are in fairly comfortable supply, while others which were plentiful now are scarce.

Consequently, WPB is making a number of resubstitutions in the use of these materials and is re-examining the controls under which their use is determined. Hence while surpluses of some materials exist, these surpluses cannot immediately be devoted to the manufacture of civilian items.

An example, Mr. Nelson said, is the program to permit the manufacture of 900,000 steel baby carriages. Far from being a relaxation of the restrictions on civilian production, this program is a means of substituting steel, which is comparatively easy, for wood, which is now one of the scarcest of materials.

Even more critical than materials is the manpower shortage in many manufacturing centers. While War Manpower Commission officials figure that only 100,000 more workers are needed for the 1944 production program of the armed services, they point out that approximately 800,000 of the present labor force will be drained off for military service. Thus, a total of 900,000 new workers must be added to the labor force.

Shifts in the types of munitions required and the resulting cutbacks and cancellations of war contracts also will intensify the manpower problem in many communities.

To minimize the problem as much as possible, WPB will allocate materials for non-military production only after it has determined that such allocation will not interfere with the manpower needs of war production. WPB will not grant authority to produce, purchase or use materials which will cause an increase of employment in areas where a labor shortage already exists or is anticipated. This policy represents a widened application of the principles laid down by WPB last September, when procurement agencies were instructed to avoid placing contracts in areas where labor shortages existed.

An overall cutback in the 1944 munitions program from an early figure of $76 billion to about $71.2 billion and the closing of some arms plants is expected to alleviate the manpower shortage and make possible the production of the more essential non-military items in the areas affected. Approximately 600,000 more workers would have been required for larger munitions program.

Industrialists attending last week's conference with Mr. Nelson included: J. L. McCaffrey, International Harvester Co.; Alvan Macauley and James H. Marks, Packard Motor Car Co.; E. G. Grace, Bethlehem Steel Co.; Henry M. Reed, American Radiator & Standard Sanitary Corp.; A. W. Robertson, Westinghouse Electric & Mfg. Co.; Henry J. Kaiser, Kaiser Co. Inc.; E. Tappan Stannard, Kennecott Copper Co.; H. W. Prentis, Armstrong Cork Co.; Fred W. Nichol, International Business Machines Co.; Fred Lazarus Jr., F. & R. Lazarus Co.; Otto Seyforth, United States Chamber of Commerce; and Robert Gaylord, National Association of Manufacturers.

DONALD M. NELSON

CONTROLS MISHANDLED

Only properly administered price regulation of essential civilian goods can prevent runaway inflation, widespread unemployment and serious delays in the production of needed goods in the transitional period ahead, according to Howard E. Blood, president of the Norge division of Borg-Warner Corp., Chicago. Mr. Blood declared present mishandling of price controls portend a "dreaded condition" for the nation.

Manpower Bottleneck To Deter Resumption Of Peacetime Output

War Production Board official warns manufacturers of civilian durable goods not to anticipate any substantial easing in situation until war is over

HENRY A. DINEGAR

WHILE metal supply is improving, manufacturers of durable civilian products should not anticipate any substantial easing in materials for such requirements until after the war is over in Europe, and even after that there will be no widespread lifting of limitations until after the war is over in the Pacific. Until that time needs for munitions must continue at fairly substantial levels.

These observations were made recently in New York by Henry A. Dinegar, director of durable goods and products, Office of Civilian Requirements, War Production Board, who said that most excess metal at the end of the European war would go into the construction and repair of railroad rolling stock, new farm machinery and food processing equipment and repairs to industrial equipment and into pressing rehabilitation needs of the now occupied countries of Europe.

Such consumer items as automobiles, refrigerators, vacuum cleaners, washing machines and the like would not, he indicated, become complètely available until after Japan had been finally defeated.

Shortage of labor is an important deterrent to any such shift and will probably continue to be for some time. Admittedly, many raw materials are in better supply—aluminum and copper, for instance, among the major products. While there is a shortage at present in steel plates and sheets, due primarily to ship requirements and particularly to needs for landing craft, steel in general is more easily available. However, he pointed out, manpower is still critical over a large area.

Mr. Dinegar spoke at a panel meeting of the War Production Conference, sponsored by the Engineering Societies Committee on War Production at the request of WPB at the Hotel Commodore. Other panel meetings pertained to problems in metallurgy, foundry technique, welding, production and tool engineering, transportation, safety and manpower utilization.

A feature of the conference was a dinner, attended by more than 1300, at which Capt. Eddie Rickenbacker, president and general manager, Eastern Air Lines Inc., New York, was the principal speaker.

Declaring that the war would probably last much longer than most believe, Captain Rickenbacker appealed for a more intensive all-out war effort. He voiced sharp criticism of absenteeism, slowdowns and strikes which are impeding the war effort in this country, and remarked that after last visiting Russia he came away with the feeling that "they are the only all-out people in this war."

He urged closer unity with the Russian people. "It's our duty and obligation to get together with the Russians," he said, adding that when the proper time comes Russia will supply Siberian bases for American bombing of Japan.

He urged that this country compose her home-front differences so as to support her fighting men as Russia is doing. He also advocated universal military service and the re-vitalization of the country's diplomatic corps around the world with new and younger men of military training.

Predicts Higher Requirements

Mr. Dinegar stated that war requirements in 1944 would be 10 to 15 per cent higher than in the past year, with special emphasis on aircraft, heavy artillery, ships and radio among other requirements, and added that industry must continue in a flexible position so as to give the military services what they want when they want it.

Many believe, he continued, that as the peak of war requirements has been so nearly reached, facilities in general are sufficient. This is true in a broad sense, he declared. He said he expected the greater production still required to come as a result of greater efficiency.

The Office of Civilian Requirements is fully conscious of the desirability of permitting the production of a greater amount of civilian goods and would do so just so long as it doesn't drain away from war requirements—materials or manpower. He condemned as absurd the opinion in some quarters that limitations were being placed unduly on civilian needs with the idea of making the country more war conscious.

OCR is not in favor of the so-called Victory models of civilian needs, he said. The cost of planning for such models, the making of dies and tools and so forth, more than offset any savings in raw materials that might result.

Arthur D. Whiteside, head of OCR, attended the meeting informally and supported Mr. Dinegar's contention that shortage in manpower was an important consideration in the question of easing of limitations on the manufacture of civilian products.

In commenting on the manpower supply, he asserted he would not be much concerned about unemployment in this country until war with Japan was over.

He also believed that the situation with respect to small plants was not as bad as indicated in some quarters.

Lewis S. Bergen, associate director of metallurgy and research, Crucible Steel Co. of America, New York, chairman, in introducing the topic, said that alloying elements are now in balance with supply but that it wouldn't have been possible had it not been for NE steels.

Declaring that NE steels got off to somewhat of a "bad start," Dr. Woldman, chief metallurgical engineer, Eclipse Pioneer division, Eclipse Aviation Co., Teterboro, N. J., said that various revisions and changes have been made in the original specifications and that in his opinion the latest list, as of last August, is satisfactory.

He discussed various series of NE steels, pointing out their uses and importance, and particularly with regard to their application as substitutes for other alloys.

In his experience as chairman of an industry advisory committee, he found there was special interest in knowing what type of NE steel would be best for combating high torsional fatigue. He thought that for this purpose the 8650 type was the best suited.

The aircraft industry was the last to take up the use of NE steels and Dr.

Noldman thought this had been due 1) to the fact that all NE steels are nade in open hearth furnaces whereas he industry had always favored electric urnace steels; and (2) to the fact that n the beginning all the NE steels were of "commercial quality," which was considered not high enough for aircraft needs.

He believed that one reason why NE steels had tough sledding in the beginning was the fact that there were already so many different specifications and steels and he emphasized that he still thought there were far too many. This opinion was supported by others at the meeting.

It was revealed in the discussion that NE steels now represent about 50 per cent of all the alloy steels produced.

Sees Production Expansion as Chief Problem of Postwar Era

Hoffman, chairman of Committee for Economic Development, points out industry must achieve 30 to 45 per cent increase over 1940 output level to provide employment for additional millions

RECONVERSION will not be the principal problem faced by American business and industry in the postwar period, but rather the need to expand production to from 30 to 45 per cent over 1940 levels, Paul Hoffman, president of the Studebaker Corp., and chairman of the board of the Committee for Economic Development, declared recently in New York city.

"I find generally prevalent," Mr. Hoffman said, "a misconception that the great postwar problem is reconversion—that if we can just reconvert quickly our troubles will be over. That is far from the truth."

He explained that some industries will face certain difficulties, and encounter temporary unemployment. He included in this category the automobile industry, which he said would take six months to shift over from war to civilian production. However, various industries would have no such problem whatsoever, he remarked.

Commenting upon the necessity of achieving the specified expansion of 30 to 45 per cent of the 1940 output of $97 billion, he said "in the year 1940 some 46,000,000 persons were gainfully employed in our working-fighting force. However, there were from 6,000,000 to 9,000,000 competent individuals unemployed. In order to have had a satisfactory employment situation that year there should have been from 52,000,000 to 55,000,000 jobs available.

"Since 1940 we have added approximately 8,000,000 to our working-fighting force, of whom perhaps 5,000,000 are transient workers and will not want or need peacetime jobs. However, there is a net addition of 3,000,000 to our labor force which means that if we are to have abundant employment in the immediate postwar period there must be jobs for from 55,000,000 to 58,000,000 persons in our working-fighting force. That's 9,000,000 to 12,000,000 new peacetime jobs that will be needed.

"Our enlarged postwar army and navy will require, as a minimum, additional personnel to the extent of 2,000,000. From the standpoint of our civilian economy, the figure to focus on is the net of from 7,000,000 to 10,000,000 new jobs needed in the field of private endeavor."

Repeating the principle that he has emphasized since he first headed up the Committee for Economic Development, a business group concerned with postwar planning, many months ago, he declared that production must keep pace with expansion in employment. He therefore assailed vigorously a bill pending in Congress to reduce gradually the work week to 30 hours. Such a move would lower the living standard of the whole nation, he pointed out.

Present, Past and Pending

■ INDUSTRIAL SILVER USE REACHES NEW PEAK

NEW YORK—Use of silver in the arts and industries in the United States reached a new high last year at 125,000,000 ounces, a 9 per cent increase over 1942, Handy & Harman, dealers in precious metals, estimate. Total consumption, of which 65 per cent went into war production, was more than four times the average for the five years prior to 1941.

■ FOUNDRY STRIKES IN WEST THREATEN WAR PRODUCTION

SEATTLE—An estimated 10,000 American Federation of Labor members were idle last week in 80 foundries in Washington and Oregon in a strike resulting from refusal of the regional War Labor Board to grant an 8-cent hourly wage increase.

■ SWEDISH INDUSTRIALISTS SEEK U. S. MARKETS

PHILADELPHIA—Six industrialists, representing the Central Export Association of Sweden, have arrived in this country to study the possibilities of reviving and increasing markets for specialty steels, iron ore and some other products after the war.

■ BEEHIVE COKE OVEN PRACTICES OUTLINED

PITTSBURGH—To assist beehive coke oven operators improve quality and uniformity of their product, the Bureau of Mines has published a report outlining operating practices of a western Pennsylvania plant recognized for producing high quality coke.

■ STEEL DIVISION CUTS REPORTING REQUIREMENTS

WASHINGTON—Thirty-five daily, monthly and quarterly reports will be required by the WPB Steel Division in the future. This is about half the number required earlier.

■ CARBON STEEL RELEASED FOR MACHINERY, EQUIPMENT

WASHINGTON—Small amounts of carbon steel may be used now in the fabrication of conveying machinery and mechanical power transmission equipment. About 800 tons of carbon steel will be released each quarter by the War Production Board for this purpose.

■ STEEL INDUSTRY ADVISORY COMMITTEE MEETS

WASHINGTON—Relaxing of restrictions and limitation orders were among subjects discussed Jan. 20 by the WPB Steel Industry Advisory Committee, the first such meeting since November. Second quarter supply and requirements, CMP developments were also discussed, while the raw materials situation was explored, expansion program studied and revocation of uncompleted projects considered.

■ MACHINE TOOL SHIPMENTS CONTINUE TO DECLINE

WASHINGTON—December machine tool shipments continued a downward trend, being 15 per cent under the November total, or $60,680,000 against $71,811,000, the Tools Division, War Production Board, announced last week. New bookings were valued at $33,746,000, a decline of 10.5 per cent, while cancellations rose 16 per cent to $6,942,000. Unfilled orders at the end of December totaled $211,751,000, a decline of about 14 per cent.

Steelworkers' Wage Demands Head Toward War Labor Board

U. S. Steel reports negotiations with union futile. Concessions asked estimated to increase industry's costs by more than half billion dollars annually, equivalent to $9 per ton of finished steel. Would break stabilization program

DEMANDS of the United Steelworkers of America for a 17-cent hourly wage increase, a guaranteed minimum weekly wage and numerous other concessions last week headed toward the War Labor Board.

The United States Steel Corp., speaking for its steel producing subsidiaries, announced that collective bargaining conferences held with union representatives since Dec. 14 had resulted in no agreement and that further negotiations on the wage issues were deemed futile. It asked the Secretary of Labor to certify the wage issues to the WLB.

The corporation estimates that if all the union's 43 demands were granted, U. S. Steel's manufacturing costs would be increased about $186,000,000 annually, equivalent to an average increase in cost of $9 a ton of finished steel shipped during 1943. This figure makes no allowance for a guaranteed minimum weekly wage or for severance pay.

U. S. Steel subsidiaries control approximately a third of the country's steel producing capacity and last year shipped approximately a third of the total finished steel produced. Projecting the corporation's estimate of increased costs to the entire industry indicates the union's demands, if granted, would increase the industry's costs by more than $550,000,000.

The request for certification of the issues to WLB was made by John A. Stephens, vice president in charge of industrial relations of the United States Steel Corp. of Delaware, on behalf of the Carnegie-Illinois Steel Corp., American Steel & Wire Co., National Tube Co., Tennessee Coal, Iron & Railroad Co. and Columbia Steel Co. Mr. Stephens explained the proposals now being referred to the board "are of such a nature as not to permit solution in collective bargaining since they either involve departure from the national economic stabilization program administered by the National War Labor Board or concern fundamental matters of principle on which the respective viewpoints cannot be reconciled. Most of the proposals of the union, if granted or ordered, will involve increases in cost which, in view of the ceiling on prices for steel products, the companies are financially unable to absorb."

In a letter last December to the board, U. S. Steel stated that wages paid by the subsidiaries had increased since Jan. 1, 1941, at a rate in excess of the reported advance in the cost of living index since that date. In this period, the basic common labor rate in the Pittsburgh, Chicago, Ohio and California districts increased from 62½ cents to 78 cents an hour, an advance of nearly 25 per cent; average hourly earnings of all wage earners in these subsidiaries increased from $0.853 to $1.159 an hour, an advance of 35.9 per cent; and average weekly earnings of all such wage earners increased from $33.01 to $50.42 per week, an advance of 52.7 per cent. The Bureau of Labor Statistics of the U. S. Department of Labor reported an advance in the cost of living index of 23.4 per cent between Jan. 15, 1941, and Oct 15, 1943.

Railroads Returned to Owners

Nonoperating employes granted wage increases of from 9 to 11 cents an hour, larger than proposed raise originally disapproved by Economic Stabilizer Vinson

THE nation's railroads, seized by the War Department Dec. 27 to avert a threatened strike, were returned to private ownership at midnight Jan. 18.

Return of the carriers followed the signing of an agreement between the carriers and the 15 nonoperating unions providing for pay increases of from 9 to 11 cents an hour. Nearly a year ago an emergency board recommended an increase of 8 cents an hour for the nonoperating employes but this was disapproved by Economic Stabilizer Fred M. Vinson. Later a sliding scale increase of 4 to 10 cents an hour, recommended by another board, was approved by Vinson but rejected by the unions.

Under the terms of the new agreement, workers receiving less than 47 cents an hour will receive an increase of 11 cents; those formerly paid between 47 and 57 cents will get 10 cents more; and those receiving more than 57 cents will get 9 cents increase.

Operating brotherhoods and the carriers had reached an agreement earlier, providing a base increase of 4 cents an hour, plus 5 cents more in lieu of overtime.

In ordering the carriers' return, Secretary of War Henry L. Stimson said that "from a financial standpoint, the War Department will never have been in the railroad business at all. We will owe the carriers nothing; they will owe us nothing."

Weirton Asks Speedy Ruling on Wage Demand

Officials of the Weirton Steel Co., Weirton, W. Va., and the Weirton Independent Union Inc. are asking the War Labor Board for a quick ruling on the union's demands for a 22-cent hourly wage increase.

A joint announcement by the company and the union said: "We have reached an agreement to carry the matter of a general wage increase to the National War Labor Board with the request that a hearing officer be appointed to hear the case."

The company has taken the position that it will "gladly" grant any increase the WLB and other government agencies authorize provided steel prices are raised accordingly.

The increase asked by the union would raise the basic wage rate from 78 cents to $1, with equitable adjustments for those making more than $1 an hour. A 15 per cent increase is asked for office workers.

Biddle Rules Mines Need Not Be Returned

Government-operated coal mines need not be returned to private owners despite their production records, since to do so probably would cause a recurrence of labor disturbances, Attorney General Biddle has informed Harold Ickes, solid fuels administrator. Mr. Ickes had asked for the ruling to determine his responsibility under the Smith-Connally anti-strike law which provides that government-seized property must be returned to the private owners within 60 days after productive efficiency has been restored.

Mines of 1909 companies still are in government possession; mines of 476 companies have been returned.

Veterans Placed in Fifth WMC Region Up Sharply

Discharged veterans are being placed in war and civilian jobs in ever increasing numbers, Robert C. Goodwin, director, WMC Fifth region covering Michigan, Ohio and Kentucky, states.

Placements of veterans in November totaled 5592 in the Fifth WMC region, almost double the July figure. Comparisons with preceding months show: 5392 in October, 4486 in September, and 3541 for August.

TANK RETRIEVER: M-3 tank is lifted by retriever to demonstrate how it operates in repairing or towing disabled land battlewagons. Boom powered by retriever's engine enables repair crew to remove turret, guns or engine on the battlefield. The boom jacks are telescopic and fit onto the rear end of the retriever. The machine was designed and is built by Baldwin Locomotive Works, Philadelphia

Labor Board Sure of Its Powers

Garrison, alternate public member, tells Smith committee authority stems from War Labor Disputes act. Denies body is unfair and arbitrary in its methods

L. K. GARRISON, formerly general counsel, and now alternate public member, National War Labor Board, appeared before the Smith Committee to Investigate Executive Agencies last Tuesday to reply to allegations by various witnesses that the board is unfair and arbitrary in its methods and that it lacks legal authority to make its orders stick.

There is no question in the minds of the board as to its powers, declared Mr. Garrison. These powers, he explained, stem from the War Labor Disputes act and from a presidential executive order based on the War Powers acts enacted by Congress. Questioned, he said the board may go so far as to issue orders that are not in conformity with stringent state labor laws, such as those of Colorado and Wisconsin.

Because upward adjustments in wages frequently generate a need for higher prices, a matter that comes under the authority of the Office of Price Administration, and over which the War Labor Board has nothing to say, the overall authority resides in the Office of Economic Stabilization which has the power to approve or disapprove of proposed WLB and OPA rulings.

Mr. Garrison was asked how it was that the WLB had power to adjust wages of clerks in retail groceries stores in California, stores that distinctly are not in interstate commerce. He said the matter of interstate or intrastate commerce had no bearing on the action taken. The Secretary of Labor certified that there were labor disputes in these stores and under the law it was up to the WLB to get them settled.

He was asked to explain the WLB policy in ordering retroactive wage increases. He said such action is not a matter for WLB policy. It is the custom of labor unions, he said, to work under contracts that stipulate wages and working conditions. When a contract expires, he said, labor unions normally seek some revision in its terms and when higher wages are demanded it is quite customary to agree that when a decision is reached as to the amount of wage increases, the increases are applied retroactively to the date when the old contract expired.

Questioned About Complaint

WLB in no case, said Mr. Garrison, has ordered any employer to pay retroactively any amounts in excess of the amount agreed upon by the employer and the union. He was questioned as to the complaint of the Western Foundry Co. that under its agreement with the union it was bound to pay a large amount of back pay on a retroactive arrangement and that it did not have the money to pay it. The WLB ordered the amount be paid in accordance with the agreement. Subsequently the union made a compromise arrangement with Western Foundry Co. and the WLB amended the order to incorporate the reduced amount of back pay.

Contrary to a general impression, the maintenance-of-membership provision in union contracts, with the 15-day escape clause, originated from the industry members of the board, not from the labor and public representatives. WLB has withheld this security provision in the case of unions shown to be irresponsible. WLB does not wink its eye at coercive measures resorted to by unions to maintain their dues-paying membership. When it does not withhold the security provision from their contracts, it appoints arbitrators who settle these troubles. WLB, he said, is not a party to strong-arm workers into unions against their will.

Committee members showed considerable interest in the manner in which the WLB regional offices function and as to the manner in which members of panels are selected. He said that it is impossible to handle all these cases at Washington. WLB now is getting about 6000 new disputes each month while voluntary applications for wage increases are coming in at the rate of about 3000 weekly. Therefore, to keep pace with the demand, it is essential to call on the services of a large number of qualified people to do the mediating. The WLB has long lists of eligible men all over the country from which these panels are drawn.

Contrary to many allegations, transcripts of testimony submitted before the panels may be made. Either party can hire a stenographer for this purpose if he desires. There are no star-chamber proceedings. He admitted that over a period of several months a California regional board did not permit newspaper men to be present during deliberations of its panels; this was a misunderstanding, he said, and all of the procedure now is public.

Complaints also have been made that witnesses appearing before the panels are not sworn. Mr. Garrison stated this is true, and that the WLB does not want to put witnesses under oath as that would introduce a courtroom atmosphere that would not help any. WLB, he said, does not seek to act as a judge. It is trying to resolve the demands of two parties in a quarrel and it strives to encourage them to agree rather than force an order on them. Arbitrary methods are used when persuasion fails.

Too, it is not necessary to swear witnesses to prevent them from committing perjury, he said. He pointed out that by an act of Congress it is a criminal offense to make false statements to any federal agency whether or not the witness is under oath.

WLB has complete power to get tough in imposing terms on labor and industry when that becomes necessary, he said. It has a mandate to keep labor disputes from interfering with the war effort and it is carrying out this mandate. The board, said Mr. Garrison, takes the attitude that it can order either party in a labor dispute to do anything that party has the legal power to do.

Now that the United States District Court, District of Columbia, has denied the request of the Attorney General that the suit of the U. S. Gypsum Co. be dismissed, said Mr. Garrison, a court decision as to the authority of the War Labor Board is in sight. In its action the U. S. Gypsum Co. challenges the legal power of the board to order maintenance-of-membership.

Patman Urges Passage of Disposal Bill

Says haphazard methods now being followed by government agencies. Machinery dealers seek speedy enactment of H.R. 3873

WASHINGTON

DECLARING the government today "is using the same haphazard methods" in disposal of surplus war goods "which brought near chaos to our economic structure" after the last war, Rep. Wright Patman, (Dem., Tex.) last week proposed to the House Banking Committee that his bill to control the disposition of surpluses be enacted.

He said the Treasury Procurement division "apparently is doing a very poor job," pointing out the sale of thousands of items of chinaware at almost the same time the Navy department was purchasing pieces of pottery.

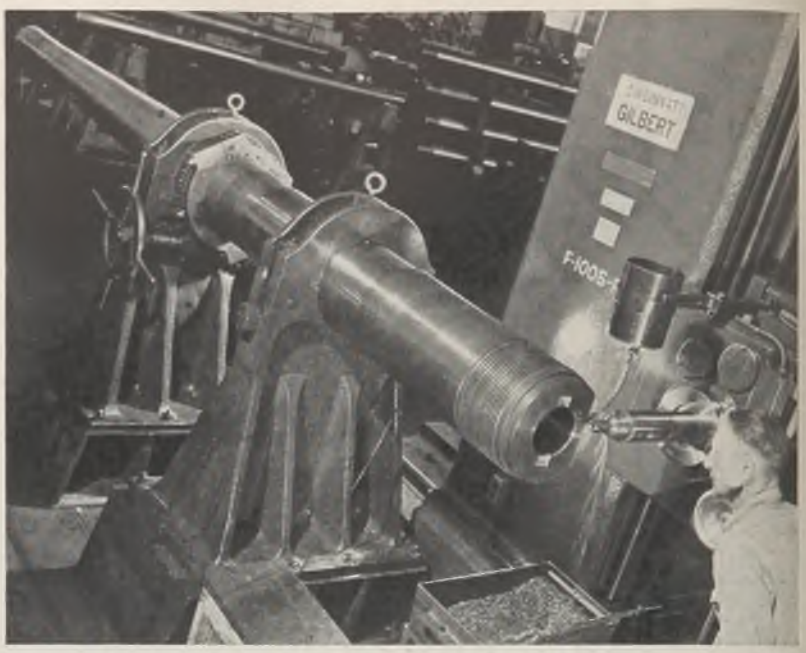
Officers and members of the Machinery Dealers National Association appeared before the House Small Business Committee recently to recommend speedy enactment of H. R. 3873. Introduced by Representative Patman, the committee's chairman, this bill proposes organization of a surplus property board to handle the disposition of government-owned property. Its chairman would be the chairman of the Defense Supplies Corp., and its other members would be the Secretary of the Navy, the Secretary of War, and the Secretary of the Treasury, along with three other individuals to be appointed by the President with the advice and consent of the Senate. These three men will be businessmen "who have had at least five years' experience in the business of the retail sale and distribution of merchandise."

The board would determine and prescribe the methods to be used by governmental agencies in making and maintaining inventories of property and would determine the surplus property under the jurisdiction of the various governmental agencies that should be sold or leased. All government agencies would make and maintain accurate, uniform inventories in accordance with the methods determined by the board.

The bill is aimed at obtaining distribution of government-owned property through established trade channels and not through speculative agencies; at establishing uniform prices on government-owned goods offered for sale or lease and at prices low enough to facilitate disposition of the property but high enough to ensure a fair return to the government; at controlling the rate of sale so as not to unduly interrupt the markets; at promoting establishment of small business enterprises.

R. A. Vine, Vine Machinery Co., Detroit, and president, Machinery Dealers National Association, declared that his entire industry is in enthusiastic support of the bill but he recommended that the phraseology requiring the governmental agencies to make and maintain inventories of surplus property be amplified so as to be more specific. For example, each machine tool listed in an inventory should be thoroughly described, also its jigs, fixtures and other accessories.

"Nowhere in the government, in the Army, Navy or War Production Board, as far as I have observed, is there adequate knowledge of the machine tool and machinery industry to protect Uncle Sam by setting up accurate descriptions of the machines offered and their market value," he said. "To protect the government you will have to have the services of experienced machinery men who can tell you what these machines are worth, but who also know by experience where to find a customer for them, and who know how to repair or redesign a machine to suit the customer."



TWO SONS IN SERVICE: A personal as well as patriotic interest motivates John J. Paul in turning out fine jobs on his milling machine at the Naval Ordnance plant in Louisville, Ky. One of his sons is in the Navy and another is in the Army. Mr. Paul is shown milling a bevel on the breech face of a 5-inch antiaircraft gun at the plant, which is operated by the Westinghouse Electric & Mfg. Co.

Senate Hearings Expected Soon On Surplus Tools Disposal Act

HEARINGS are expected to be opened shortly by the Senate Committee on Military Affairs on S.1609, introduced last December by Sen. James E. Murray (Dem., Mont.) providing for equitable disposal and effective utilization of government-owned machine tools, and for other purposes.

The bill is known as the "Surplus Machine Tool Utilization Act." It is designed to provide for disposal and utilization of those machine tools now or hereafter owned or controlled by or in behalf of the United States as a result of the prosecution of the war, which have or will become surplus to government needs and functions upon termination of war procurement contracts.

Important features of the bill are aimed at the creation of a commission so that there can be uniform action through the various departments, classification of equipment, and the creation of means of disposition.

New DPC Plant Nears Completion

Project launched in July, 1941, first produced steel in June, 1943. Wholly owned by government and built and operated by Carnegie-Illinois, last finishing units are scheduled for operation in February

A BROADWAY gossip columnist got considerably off the beam in one of his syndicated columns last week when he undertook to call attention to what he described as "one of the biggest grabs of the war," referring to the new steel plant at Homestead, Pa., built and operated for the Defense Plant Corp., government agency, by the Carnegie-Illinois Steel Corp.

The inference from the item is that the Steel corporation subsidiary after having undertaken to build and operate the plant and had the government condemn "one half the town as the site for a huge new mill," dawdled on the job with the result that the plant from which steel was expected to be coming in 1941 still is far from completed.

As a matter of fact, steel has been coming from the new plant since June of last year, and only last week operations were started on the 45-inch, 2-high slab mill which has an annual rated capacity of 1,350,000 tons of steel slab and can roll and shear slabs up to 60 inches in width. With completion of this slabbing mill there remains only one unit of the plant to be brought into production. This is the 160-inch plate mill, which is virtually completed and which will start partial operations within the next few weeks.

That there has been some delay in completion of the plant is well known. But to attribute this delay to dawdling on the part of the Carnegie-Illinois company is wide of the mark.

One of the largest single units in the steel expansion program, the giant Homestead DPC plant actually was launched in July, 1941, when a contract was signed by the corporation and DPC. The job entailed clearance of a 123-acre site, which included a portion of Homestead, Pa., with 1225 buildings as well as the Howard Axle works of Carnegie-Illinois. With active co-operation of community authorities, this giant relocation job was accomplished in a few months. Only a fraction of 1 per cent of the total land was acquired by condemnation, the remainder being purchased for the government on terms satisfactory to all parties.

Originally scheduled for production by the first steelmaking units in 18 months, the project was delayed by jurisdictional strikes among construction unions in its initial stages. This delay snowballed into further delay because the A-1-k priority which was assigned to the project in the beginning to insure rapid delivery of needed materials became outmoded before those materials could be delivered. Before some components could be shipped, for example, WPB (which had succeeded OPM, initial agency which authorized the project) had introduced AA, AA-1, AA-2, etc., ratings which superseded the Homestead A-I-k. This situation was not corrected until the speedup in the steel expansion program became an urgent necessity. Subsequent pressure made it possible for the first steel to be poured from a new Homestead open hearth in June, 1943. It required a little less than 23 months for the first unit to go into production.

Following months saw completion of ten additional open hearths, all of which are now operating, with an annual rated capacity of 1,494,000 tons of ingots. A 7500-ton forging press, together with a machining and heat treating shop for the production of heavy armor plate, has likewise been completed, and the slabbing mill and auxiliary equipment are now operating. This leaves only the plate mill with its auxiliary shear lines and heating equipment to be completed and this is scheduled for around Feb. 15.

When completed, the plant will provide employment for 3000 men and women. It will produce ingots up to 250 tons, slabs rolled and sheared up to 60 inches wide, 6-inch plate up to 150 inches wide in 60-foot lengths, as well as forgings for battleship armor, ship shafting, turbine rotors and other large dimensional products.

There has been neither revision nor cancellation in the project since its beginning. The original setup remains; Defense Plant Corp. owns all the land and equipment, while the Carnegie company has supplied the engineering and is operating the plant for the government.

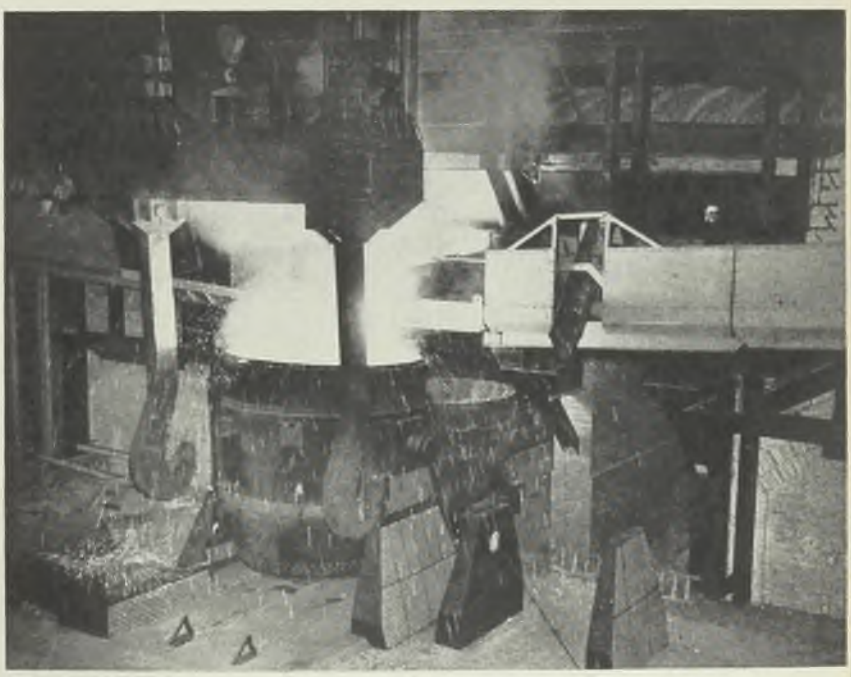
Postwar Preparedness Urged To Prevent Future Wars

Postwar preparedness program as insurance against another war was advocated by Charles E. Wilson, executive vice chairman, WPB, in an address last week at the annual dinner of the Army Ordnance Association, Waldorf Astoria hotel, New York.

He suggested the program be made the responsibility of the federal government, that it be a continuing program supported by Congress. Industry's role should be divided in two parts—research and production.

Industry should be permitted to play its part unhampered "by political witch hunts, or thrown to the fanatical isolationish fringe tagged with 'merchants-of-death' label," he said.

To develop the research program, Mr. Wilson said he believed competent, civilian advisers should be named to institutional committees that could maintain a liaison with industry and government laboratories.



One of the early heats of steel being tapped in the open-hearth shop of the new government-owned Homestead steel works, engineered and operated by Carnegie-Illinois Steel Corp. First steel was produced in this plant in June, 1943

Consumer Needs Less Pressing; Supply Better

Open weather aids collections. Easier pig iron situation cuts use of scrap. Some easing in market noted

CLEVELAND

SCRAP iron and steel industry anticipates comparatively smooth sailing in meeting 1944 needs with consumers' inventories slightly above a year ago, blast furnace capacity substantially increased and expectations in some quarters of a downward trend in steel production.

Easier pig iron supply has altered the proportion of steel scrap to pig iron used in the production of open-hearth steel. The former practice of using between 45 and 50 per cent scrap in some instances has been lowered in recent months, currently ranging from 35-45 per cent in certain cases.

Mild weather to date this winter has been an important factor in permitting scrap collection efforts to continue in high gear. There appears little doubt now that stocks will be sufficient to sustain steel production throughout the remaining winter months.

Based on the expectation that consumption of purchased scrap will be off an estimated 4 million tons in 1944 emphasis on the collection of dormant industrial scrap has been eased. WPB Fifth region industrial scrap collection efforts, for example, are currently directed on an all-out drive for paper which is particularly scarce at present.

Reflecting improved scrap supplies a few large steel mills were out of the market throughout December. Some of these plants are currently purchasing scrap on a limited basis, while the others are expected to re-enter the market some time next month. There is still a heavy demand for No. 1 heavy melting steel and for cast scrap. Movement of other grades to consuming channels is at a substantially slower pace than recorded through most of last year.

Slower movement of scrap to consumers has made it possible for dealers to recently purchase material from the plants from 50 cents to as much as $3 a ton below former price levels. With the leading consumers out of the market in the Cleveland district, for example, dealers have been forced to absorb freight charges on shipments to other points such as Youngstown, Warren and Canton.

The amendment to supplementary order M-24-c, permitting the melting of certain low alloy steel scrap in the production of carbon steel, is not expected to materially alter the growing excess supplies of this grade. Not all mills will be able to use this material, while others can to a limited extent only. The alloy scrap which may now be used in making carbon steel are:

(1) Chromium or chrome-vanadium steel scrap with chromium 1.65 per cent maximum, that is the 5000, 5100, 52100 and 6100 series.

(2) Chromium - molybdenum scrap with molybdenum 0.27 per cent maximum, or the 4100 series.

(3) Nickel - chromium - molybdenum scrap with nickel 0.70 per cent maximum, chromium 0.60 and molybdenum 0.30 per cent. These are the 8600, 8700 and 9400 series.

WPB may soon force the mills to use a certain percentage (about 55 per cent) of alloy scrap in open hearths in the production of alloy steels

Steel Castings Production Continues To Increase

Steel castings industry turned out about 26,760,000 individual castings during the last quarter of 1943, according to an estimate by the Steel Division, War Production Board. This compared with a quarterly average of 27,426,040 in 1943 and 22,396,930 in 1942.

Total production of castings by weight was reported in tons as follows: 1,577,736 in 1941, 2,239,693 in 1942, and 2,742,604 in 1943.

Tin, Black Plate Output Expected To Increase

Production of tin plate and black plate during the second quarter probably will exceed first quarter production by more than 125,000 tons, according to the War Production Board. Total production for the first quarter is scheduled at 627,000 tons while the second quarter figure is expected to be increased to more than 750,000 tons, or a gain of about 20 per cent.

South African Plate Mill Starts Production

Steel plate now is being rolled on a new mill at Vereeniging, South Africa, up to 1¼ inches thick and 96 inches wide. Completion of this mill, which has a capacity of 100,000 tons of plates annually, made it possible to schedule a larger tonnage of light-gage plate at the plant at Pretoria which at present is making 500,000 tons of steel annually. South African plants now produce 1,500,000 tons of finished steel annually.

Fairless Points Out Pittsburgh Freight Handicap to the East

PROBLEMS and policies of the United States Steel Corp. in the matter of labor relations, steel production capacity, and government-plant disposal were discussed Thursday evening, Jan. 20, by Benjamin F. Fairless, president of the corporation, speaking at the annual dinner of the Pittsburgh Chamber of Commerce.

In his address, Mr. Fairless also called upon Pittsburgh industry and the railroads serving the district to work for elimination of discriminatory freight rates between Pittsburgh and the East Coast, which he said had increased 280 per cent in 40 years and which had worked to the disadvantage of the city.

He pointed out that 40 years ago Pittsburgh was at an average freight disadvantage of only $1 a ton on shipments of steel from Pittsburgh to New York as compared with similar shipments by Eastern competitive mills located nearer New York. Today, freight disadvantage averages $3.80 per ton.

"If unfair freight rates prevent the Pittsburgh steel mills from reaching the consuming markets of the country in the postwar period," he said, "then the new steel facilities now being built in this area may prove to have been a mistake and the decline of Pittsburgh as an important steel center must then be expected.

With respect to the labor policy of the United States Steel Corp., Mr. Fairless said it was established in 1933 on the basis that collective bargaining was desirable but that the right to work did not depend on membership in any organization and this still holds despite wartime obedience to maintenance of membership and the check-off.

Discussing postwar problems of American industry, Mr. Fairless pointed out that when peace comes some industries will have capacity greatly in excess of that required for a peacetime economy.

"In my opinion the government should dispose of its plants and facilities as promptly as possible after the end of the war," he said.

In disposing of these plants, he declared, it should be recognized that their cost is not government investment; rather it is a war cost, and so instead of attempting to recover the full cost of these plants, the government should be generally willing to take a reduced amount and charge the balance to the general cost of the war.

Valve Output Approximates 1943 Stated Requirements

Steel valve production has been expanded to about seven and one-half times its prewar level, Capt. J. O. Gawne, di-

rector, Shipbuilding Division, War Production Board, said recently. Output of steel and other metal valves in 1943 is estimated at 277,525 tons, or more than 99 per cent of stated 1943 requirements.

Fittings production at a level of two and one-half times that of 1938.

MEETINGS CALENDAR

American Mining Congress: Joint meeting of western division with Colorado Mining Association, Denver, Colo., Jan. 27-29.

American Road Builders' Association: Forty-first annual convention at the Edgewater Beach hotel, Chicago, Feb. 1-3.

Eastern States Blast Furnace and Coke Oven Association: Winter meeting at the William Penn hotel, Pittsburgh, Feb. 11.

American Institute of Mining and Metallurgical Engineers: Annual meeting at the Waldorf-Astoria hotel, New York, Feb. 20-24.

American Society for Testing Materials: Spring meeting and committee week, Netherland Plaza hotel, Cincinnati, Feb. 28 to March 3.

American Society of Tool Engineers: Annual meeting at the Bellevue Stratford hotel, Philadelphia, March 26-28.

American Gas Association: War conference on industrial and commercial gas, Hotel Seneca, Rochester, N. Y., March 30-31.

American Institute of Mining & Metallurgical Engineers: Twenty-seventh annual conference of the Open-Hearth Steel committee and Blast Furnace and Raw Materials committee, Iron and Steel Division, A.I.M.E., William Penn hotel, Pittsburgh, April 20-21.

American Foundrymen's Association: Third war production foundry congress at Buffalo, April 25-28.

POSTWAR PREVIEWS

EMPLOYMENT—Principal postwar problem will not be reconversion, but the need to expand production to from 30 to 45 per cent above the 1940 level to provide jobs, according to Paul G. Hoffman, chairman of the board of the Committee for Economic Development. See page 27.

SURPLUS PROPERTY—Bills pend in both House and Senate to govern disposition of machinery and other government-owned property. See page 30.

FOREIGN TRADE—Government-to-government dealing will constitute bulk of foreign trade for considerable period after the war, Leo T. Crowley, foreign economic administrator, predicts. See page 33.

ADVISORY COMMITTEES—WPB's industry advisory committees are aiding postwar planning with recommendations for stockpiling strategic materials, disposition of government plants and similar problems. See page 34.

CONSTRUCTION—Volume in the ten years following the war expected to be double that of the 1930-39 decade. See page 37.

PLANNING AIDS—Bureau of Foreign and Domestic Commerce will issue ten additional pamphlets to aid industry in postwar economic planning. See page 37.

NE STEELS—Revision in price structure held essential if lean-alloy types are to be widely used after emergency ends. See page 41.

PLASTICS—Developments by Curtiss-Wright Corp. necessitated by emergency will have lasting effect on postwar industry. See page 46.

CANADA—Dominion, with iron and steel producing capacity increased, looks to share in reconstruction of Europe and greater participation in normal postwar export trade. See page 51.

CENTERLESS THREAD GRINDING—Landis Machine Co., Waynesboro, Pa., has acquired patents relating to a new and revolutionary centerless thread grinder from Alfred Herbert Ltd., Coventry, Eng., and will place it in production as soon as the war is won.

TANK TURRET RINGS—Experience gained in manufacturing large turret rings for military tanks will be useful after "V-Day" when improvements in heating, forming, machining and flame hardening can be applied to production of motor and generator frames, bearing races, gear blanks, etc., for peacetime products. See page 56.

FAULTY FORGING "FINDER"—An authoritative check list helps foundrymen to determine possible sources of defects in forgings by classifying weaknesses in material, design and processing. Invaluable under war conditions, it will prove equally indispensable as a guide in maintaining high standards for postwar competition. See page 60.

Early Return of Peacetime Trade Is Not Expected

Postwar reconstruction will require joint efforts of business and government, Crowley tells exporters

ASSERTING that government-to-government dealings will probably constitute the bulk of American foreign trade for the duration, Leo T. Crowley, foreign economic administrator, emphasized in New York last week that a "too early or too complete resumption of peacetime private trade" should not be expected.

"In the postwar period," he continued, "it will probably be necessary for the government to be of assistance to private industry and private banking."

In what is said to be his first public address since he became head of the Foreign Economic Administration last September, Mr. Crowley told some 2000 foreign traders at a meeting in the Hotel Commodore under the sponsorship of the Commerce and Industry Association that the task of postwar reconstruction is of such dimensions that it will require the joint efforts of business and government for its adequate fulfillment in foreign as well as domestic fields.

If the problems of foreign construction and reconstruction are met, he said, "I would venture to predict that we can, in the ten years after the war, easily double what our private foreign trade was before the war."

Pointing out that private trade could not be asked to supply munitions to the nation's allies, underwrite the purchase of critical materials in neutral countries or so co-ordinate its activities as to conserve and to make the best use of materials in short supply, Mr. Crowley said that "only your government is in a position strong enough to take these risks and to exercise the necessary control."

Proposes Option for Government-Owned Tools

Corporations would be granted options to buy government-owned machine tools and other machinery under the provisions of an amendment to the $2,200,000,000 tax bill, introduced by Sen. Harry S. Truman (Dem., Mo.).

The proposed "rider" reflects the recommendations made by spokesmen for the automotive industry recently to the Senate War Investigating Committee, of which Senator Truman is chairman.

The amendment gives manufacturers the option to buy machines one year or less old at 80 per cent of cost; one to two years at 60 per cent; and two years or more at 50 per cent.

Well Heeled

THE ARMY estimates that Japan has an accumulation of such materials as manganese, tungsten, molybdenum, vanadium, mercury, tin, chrome and rubber sufficient to last two to three years; also that she has a three-year supply of high-octane gasoline and an 18-month supply of lubricating oils. Japan's weakest spot is in ship tonnage. We have sunk some 1500 of her ships, about two-thirds of them merchant vessels and the rest naval vessels. That is, we have sunk about one-third of Japan's prewar merchant fleet. While Japan has increased her shipbuilding capacity all indications are that she is not producing ships rapidly enough to replace losses.

Valuable Postwar Aid

The industry advisory committees of the War Production Board are becoming important agencies in formulating postwar plans. Last September their meetings were opened to postwar discussions and recommendations. Due to the fact that war production is under control and tending to level out, it is believed that postwar planning is in order. Since then quite a few of these committees have made recommendations of various types on what to do with surpluses, what to do about stockpiling, how to utilize government-owned plants, how to avoid one competitor from getting the jump on others. All these reports and recommendations are being filed with the WPB Office of Industry Advisory Committees. Whether the WPB or some other agency manages the reconversion program, these plans will be ready for use. In the meantime, the WPB is going along in the belief that it will be the reconversion agency; in fact, a number of its recent orders have dealt directly with reconversion.

Urge Early Ordering

At a recent meeting of the WPB Mining Machinery Manufacturers Industry Advisory it was reported that many coal mine operators are not placing their orders for mining machinery sufficiently in advance. Inasmuch as lend-lease demand for such equipment has increased, so that 1944 business will be larger than that of 1943, coal mine operators are urged to place orders prior to Feb. 1 for such equipment as they will need during 1944.

Beneficial Agreement

The little-known British-American patent interchange agreement, which has been in effect since Jan. 1, 1942, is reported by the War and Navy Departments to have proved of great value to the two allies in their war production programs. Under the agreement there has been a free flow of patent rights and scientific and technical information between the two countries without the necessity of paying royalties or any other charges. Army officials point out that under the agreement, which runs for the war's duration, there are wide opportunities for additional American manufacturers to avail themselves of free licenses to utilize British-owned inventions, including those patented in the United States, to aid them in their war production. The agreement is confined to manufacturing products required in fighting the war. When the war is over, the patent rights will revert to their respective owners. The way to procure such free licenses during the war is for a contractor to file requests through the contracting officer or the technical representative of the service or agency with which he has made his war contracts.

FALSE RUMOR

Recent reports to the effect that the output of steel from electric furnaces would be sharply reduced in the first quarter apparently have no foundation. First quarter production schedules call for an output of electric furnace alloy and carbon steels of around 330,000 tons a month. This is about the average monthly production in 1943. If there is any curtailment it is not expected to be more than 10 per cent at most. Present electric steel capacity is about 430,000 tons a month. Allowing for additional facilities which will be available in February and March, total maximum capacity after completion of the expansion programs will be around 533,000 tons monthly or at an annual rate of 6,400,000 tons. That means that, on the basis of the present production rate of some 330,000 tons monthly, the excess capacity will come to about 200,000 tons monthly when the expansion program has been completed.

Helpful Pamphlet

"Business Reserves in the Present Tax Law" is the title of a pamphlet published by the National Planning Association, 800 Twenty-first St., N. W., Washington 6, D. C., and available from that organization at 25 cents a copy. The work of E. Cary Brown and J. Keith Butters, both identified with the United States Treasury Department, it discusses in readily understandable language the following subjects: 1—The postwar refund of 10 per cent of excess-profits taxes; 2—the carryback of net operating losses and unused excess-profits credits; 3—special treatment of taxpayers using the last-in, first-out method of inventory valuation in event of involuntary inventory liquidation.

Ambitious Plans

Chile, land of sparse coal deposits containing many swift rivers, has ganized a $100,000,000 hydroelectric tion plan to be carried out over the ing 18 years. Work prepared for the six-year period is now under way; it volves 14 stations. The aim is to improve Chilean living conditions through industrialization and through improved agriculture. In the south, Chile has much rain; in the central portion the falls in the wrong season of the year the northern desert section there is rain at all. But in addition to the that are fed from the glaciers and snow of the Andes mountains there also is subsurface water. The government hopes by installing electric pumping facilities on an adequate scale, to convert the northern desert area into a second Imperial valley. The plans also call for the installation of new smelters for production of copper and iron and steel, utilizing more of Chile's raw materials at home.

Methodical Destruction

Destruction in Italy as the Germans slowly retreat to the north is on an incredible scale, according to advices to the War Department from Allied headquarters in that country. Early demolitions showed signs of hasty preparation and execution, but since the Germans have had time to adjust themselves to the Italian campaign they have developed a wrecking program on a "mass production" scale. They are blasting every span and bridge. By cratering and bringing down buildings and trees, they are obstructing every defile, no matter how small. Docks, power plants and transformer stations, aqueducts and pumping stations are being demolished. By means of huge steel claws mounted on four-wheel carriages, they destroy railroads by uprooting rail ties as they move back. With all this destruction going on the needs for materials and machinery of many different types are increasing over original expectations, which means an increased demand upon American industry. For example, sappers of the Fifth and Eighth armies already have constructed more than 200 bridges of major importance since invading Italy.

Black Market

Latest wartime black market is in railroad transportation. Director of Defense Transportation Joseph B. Eastman recently wrote to the mayors of more than 100 cities reporting that space accommodations on heavily traveled trains had been resold in some cases at a markup as high as $50. He asked them to ascertain whether such black markets exist in their cities and, if so, to recommend to their city councils the adoption of an ordnance limiting such resales to a markup of $1.

Forgings Offer Yo

ORGINGS CONSERVE METAL

ORGINGS LESSEN SCRAP

gs offer many benefits beyond what the ications call for. Three of the 7 advantages gings stand out above all others under 's conditions, but every one of the 7 advan- offers you some worth-while benefit. Are btaining the utmost benefits from your use gings? Many manufacturers, who have had experience in the use of forgings, have found checking parts against these advantages, that gs offer further opportunities to conserve al materials or reduce weight. In some cases have found a faster method for machining inishing forgings.

ORGINGS REQUIRE LESS TIME O MACHINE AND FINISH

hecking every forged part against these 7 ntages need not be a difficult or wasteful task. ight repay you many times over for the slight rt it entails. It may reveal unusual benefits ch have been neglected or overlooked. Consult rging engineer connected with your source of supply for assistance along this line. His broad experience may be helpful to you in obtaining the fullest measure of benefits from the 7 Advantages that forgings offer.

MBLEM OF THE G ASSOCIATION

1 FORGINGS CONSERVE METAL

Strength is a primary quality advanta forgings. The metal bulk of many may be reduced because maximum t and torsional strength is obtainab forgings through controlled grain flov distribution of metal.

2 FORGINGS LESSEN SCRAP

In forgings it is possible to obtain unif ity of physical properties in the exact d desired. Practically no rejections re Heat treating forgings is a straight-for production procedure, controllab all times.

3 FORGINGS CONSERVE METAL BY WEI REDUCTION OF PARTS

Reduction of dead weight is a con result of using forged parts because fo produces maximum strength in lighte tional thicknesses, thereby permittin use of lighter weight parts.

4 FORGINGS FACILITATE RAPID ASSEM THROUGH WELDING ADAPTABI

Forgings provide a welding adaptabili widest range for fabricating compli parts from two or more forgings.

5 FORGINGS REQUIRE LESS TIME MACHINE AND FINISH

Forgings are shaped in closed dies require a minimum of machining or fi ing because there is no bulk of excess to remove, and freedom from conc defects avoids loss from rejections.

6 FORGINGS REDUCE ACCIDENTS TO M AND MACHINES

Freedom from concealed defects is an standing characteristic of forgings underlies the greater margin of safety forgings afford for men, machines material.

7 FORGINGS CAN TAKE IT

By the forging process, stamina is ach through concentration of grain stru and fibre formation at points of gr shock and strain. Forgings provide fatigue resistance which underlies dep ble performance, and continuous oper over longer periods of use.

Evidence substantiating benefits accruing from the 7 advantages which forgings offer is published in Drop Forging Topics, now in its 8th year.

P FORGING ASSOCIATION

Drop Forging Topics contains technical information for design engineers, production executives, metallurgists and other technicians who are devoting all their effort to speeding up the production of fighting equipment. If

Board Ruling Wipes Out Postwar Conversion Fund, Says W. S. Jack

President of Cleveland war contracting firm, opposing "excess profits" assessment of $7 million, says signs point to dictatorship. Holds heavily taxed industry will have to turn to government for loans and aid

WILLIAM S. JACK

"EVERY sign today as far as the average American can see, in my opinion, points to a dictatorship and a socialized form of government because industry is being taxed so much that it must turn to the government for a loan or aid," William S. Jack, president, Jack & Heintz Inc., last week told STEEL, contending that the government had renegotiated his company into a net loss of $2826.23 in 1942 on sales of war products which amounted to $23,357,599.

The comment was occasioned by the fact the government is taking steps to enforce an assessment of $7,0000,000 for excess profits in 1942 against Jack & Heintz. About $5,250,000 of this sum has already been captured through taxes paid. The $7,000,000 assessment left the company with a small profit but refusal of income tax examiners to approve expense items totaling about $375,000 resulted in a deficit of $2826. Such expenses as salaries and bonuses of $312,500 were disapproved. Jack & Heintz proposed a settlement in which its profits for 1942 would total $550,077 or about 2.35 per cent return on its sales.

Mr. Jack said that the postwar reconversion fund which he had set up has been wiped away entirely by the renegotiation. "I plan to finance reconversion, if necessary, by issuing preferred, non-voting, profit sharing stock to my associates."

Voluntary cash subscriptions totaling between $10,000,000 and $15,000,000 have been pledged by the "associates" to the company without solicitation. A payroll deduction plan will be placed into operation for the purchase of more War Bonds by "associates" to be held in reserve for conversion. "All legal procedures will be followed," a company official said.

"The renegotiation law is not constitutional," Mr. Jack charged. "Industry to survive must make a profit. What made America is that industry has been able to plough back its profits into its plants. As a result industry must refinance to get working capital.

"I am opposed to war profiteering. I do not believe, though, that a 5 per cent profit on sales after taxes is profiteering. Any percentage allowed before taxes does not mean a thing."

The company is planning to follow every recourse of the law to fight the renegotiation decision. Its legal counsel plans to file a suit in the Court of Claims.

"Industry's obligation is to find a way to keep people working. The government has the obligation to see that industry has enough money to do that," Mr. Jack declared. "American industry wants to run its own business and doesn't want to be told by people who think they know how to run industry but don't know how.

"God help industry if the government tries to run it," he continued. "And God help the American people. We are fighting this war to prevent dictatorships and all the lives appear to be sacrificed uselessly. Everything is being put at the will of the government. We seem to be headed toward socialism. Industry is becoming a pawn of the government."

Mr. Jack said that the renegotiation law "has left us in a hell of a pickle. I wouldn't mind if the government had some set formula by which it acted, but it apparently doesn't." He said that the government is destroying all of his plans for providing jobs for returning servicemen during the postwar period.

He then cited several quotations from President Roosevelt's addresses as an example of empty promises. He quoted the following: "We at home are supremely conscious of our obligations to you now and in the future. We will not let you down. . . When you come home we do not propose to involve you, as the last time, in a domestic economic mess of our own making. . . We have profited by past mistakes."

"But has he?" Mr. Jack asked.

Government Moves To Collect Jack & Heintz "Excess" Profits

REFUSAL of Jack & Heintz Inc., Cleveland, to refund a total of $7,000,000 to the government, ruled excessive profits on 1942 business, is forcing the War Department to recover that amount through withholding of amounts otherwise due the corporation, the War Department announced last week.

"Among the factors considered in making this determination," Robert P. Patterson, Under Secretary of War, said, "were the satisfactory production accomplishments of the company and the success of the management in meeting production schedules. However, the fact that a company operates satisfactorily cannot be allowed to serve as an excuse for war profiteering. One of the basic policies which must be maintained during the war is that no one shall be permitted unreasonable profit at the expense of the public. It must be borne in mind that the company's business was financed principally by the government, which purchased its entire output. It is regretted that Jack & Heintz Inc. has not seen fit voluntarily to conform to the mandate of Congress that war

production shall not provide a source of excessive profits."

During 1942, the company made a profit of $8,361,000 on sales totaling $23,357,599, the price adjustment board declared. Total investment of the owners at the start of this period amounted to $354,000, increased from an original $100,000 capital investment in November, 1940, as a result of previous profits on government business. The 1942 profit of $8,361,000 was deemed excessive by the War Department and by its order reduced by $7,000,000 to $1,361,000. During the same period, the price adjustment board reports, the four owners of the business received $516,500 for their personal services, of which amount $212,000 was allowed by the Bureau of Internal Revenue as a tax deductible item.

The price adjustment board declared that all other financing beyond the $354,000 with which the company started its 1942 fiscal year was supplied by the government. By the end of the 1942 fiscal year, the government's investment totaled more than $15,000,000. Of this, $11,670,000 represented cash advanced against contracts in process while $3,439,000 was spent by the government to purchase plant and equipment for use by the company for producing war goods.

Expect Postwar Construction To Double 1930-39 Volume

The construction industry will be able to swing into the transition from wartime to peacetime economy without difficult conversion problems and will be able to provide a volume of activity in the years of the first postwar decade even greater than that experienced during the boom that followed the first World War, the committee on postwar construction markets of the F. W. Dodge Corp., New York, reports.

The corporation estimates that total construction volume in the 10 years after the war will average approximately double the average annual volume of the 1930-39 decade.

Plans More Helpful Pamphlets

Bureau of Foreign and Domestic Commerce now is preparing 10 additional reports covering various economic factors pertinent to sound planning

LAST year the Bureau of Foreign and Domestic Commerce, Department of Commerce, issued four helpful pamphlets dealing with postwar economic planning, "Markets After the War", "Market Prospects After the War", "Foreign Trade After the War" and "Community Action for Postwar Jobs and Profits". The bureau now has in preparation the following reports, for publication in 1944:

1—"Postwar Sales Territories", an analysis showing the extent of regional income redistribution effected by the war and the resulting influence or relative importance of aggregate markets in various sections of the country.

2—"The Reconversion in the Postwar Capital Market", a study showing the extent to which corporations have accumulated liquid assets during the war and thus are prepared to finance their reconversion programs.

3—"Estimates on Retail Inventories", a study aimed at revealing exactly where and in what products the shortages occur.

4—"Retail Trade in 1944", to be an outline not only of retail trade this year but also to analyze the postwar patterns for 26 major types of retail businesses.

5—"Trends in Business Population and Markets", to embrace not only trends in the business population by industry and size groups, but also to cover employment, income, consumer spending, bank debits, electric power utilization and so on.

6—"Statistical Handbooks", to assist individual industries and trades in analyzing and planning markets after the war; one on plumbing and heating equipment recently was published, while two others, on furniture and radios, now are in preparation.

7—"Distribution", covering specific functions of delivery, selling, financing, budgeting, and buying, as well as an analysis of costs and suggestions on how to reduce them.

8—"Distribution Costs Studies", covering all phases of distribution through the wholesale and retail levels.

9—"Market Data Techniques", aimed at informing business men how to get information on which to plan soundly.

10—"Keys to Making Local or Regional Surveys", a compilation of sources of selected business statistics, both government and non-government statistics.

Sees Reconversion and War Production Concurrent

If as much as a year elapses between the ending of hostilities in Europe and in Asia, war production may taper off as much as 50 per cent, Abraham D. H. Kaplan, member of the research staff of the Committee for Economic Development, said recently at the New York University Institute on Post-War Reconstruction, New York. This would mean, he said, that the problem of reconversion may become as current as the problem of war production before the war is over.

Crosley's $30,000,000 Loan Has Novel Features

Crosley Corp., Cincinnati, recently received a $30,000,000 V-loan possessing two novel war-financing features.

The corporation agrees to increase its working capital each year of the loan by the amount of 50 per cent of its net profits after taxes and all charges, or $1,000,000 a year, whichever is less. As long as this program for working capital is maintained there is no restriction on expenditures for capital improvements.

Also, the Crosley Corp. may borrow 100 per cent of its net accounts receivable on war contracts; 90 per cent of the aggregate dollar volume of its inventories; 90 per cent of the outstanding amount of advances and progress payments made and of termination payments made; and either $3,000,000 or 5 per cent of the funds to become due on unperformed and uncanceled war contracts, whichever sum is less.

Crosley Corp. previously had an $11,000,000 V-loan, and this will probably be paid off under the new agreement. At present the organization holds unfilled orders to the amount of $150,000,000.

Finance Committee Votes To End Renegotiation on Dec. 31, 1944

WASHINGTON

AN AMENDMENT to terminate war contract renegotiation on Dec. 31, 1944, was approved last week by the Senate Finance Committee. The new proposal was viewed as the basis for a compromise modifying renegotiation amendments to which the administration has taken sharp exception.

The impression prevails in congressional circles that the Senate Finance Committee will be willing to back away from their earlier provisions of the bill if the Senate will accept the termination date.

The termination amendment is so written that the President can stop renegotiation after June 30 this year if he thinks it is no longer necessary to assure reasonable prices to the government and prevent unreasonable profits on war contracts. Also the President could extend renegotiation for six months beyond Dec. 31 if he found competitive price conditions have not been restored sufficiently to protect the interest of the government.

PRIORITIES–ALLOCATIONS–PRICES

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

INSTRUCTIONS

AIRCRAFT: WPB has delegated authority to the aircraft scheduling unit of the Aircraft Resources Control Board to grant specific authorizations to deliver magnesium products going into aircraft and aircraft equipment.

PRIORITIES: PD-1A's now are known as "form WPB-541" and all copies of the old form should be destroyed immediately. Applications for general priority assistance should be made on the new form to avoid possible loss of time in processing as, effective Feb. 1, all WPB-541 applications received on the old PD-1A form must be returned to the applicant with instructions to use the revised applications.

CONTROLLED MATERIAL ORDERS: Any change in a customer's order constitutes a cancellation of the earlier order and placement of a new order on the date of the change, if (but only if) the change necessitates alteration of the producer's production schedule to a point which would interfere with production. Where changes constitute placement of new orders, the acceptance or rejection of the new order and its place in the producer's schedule shall be governed by conditions existing at the time the changes are received by the producer.

CMP REGULATIONS

ALLOTMENTS: Special allotment procedure, under which purchase authority for controlled materials forms of copper, steel, and aluminum may be made available in extraordinary cases of extreme urgency to manufacturers who have not received allotments from their customers, has been extended six months to operate through the fourth quarter of 1944. When a person operating under the special allotment procedure has paid back the allotments or materials that he has "borrowed" he may operate for the rest of the particular quarter in a normal manner by using his customers' allotments to get controlled materials. (CMP No. 1)

L ORDERS

SPRINKLER HEADS: Shipments of sprinkler heads have been placed on a quota basis. For the year beginning Nov. 1, 1943, and for subsequent years, each manufacturer is limited to shipping 78 per cent of the number of sprinkler heads he shipped during 1941. In any six months' period, his shipments must not exceed 70 per cent of his quota for the entire year. No more than the number of sprinkler heads required to maintain a practicable working inventory may be manufactured, and may in no case exceed in number one-sixth of the manufacturer's yearly shipment quota. Reports of shipments must be made to WPB on or before the 10th of each month. The first report was due on Jan. 24, 1944, and showed shipments during November and December, 1943, reported separately. (L-39-a)

PLUMBING AND HEATING EQUIPMENT: Consumers are no longer required to obtain authorization from WPB to purchase plumbing, cooking and heating equipment, with certain exceptions. Formerly an A-10 or better rating was required. Purchase or rationed items, those under specific allocation and those on a special restricted list is still controlled.

Any consumer who wishes to purchase for replacement purposes an item on the restricted list (list A of L-79) need only certify to his dealer that it is needed to replace equipment worn out, damaged beyond repair, or destroyed, and that it will not be used to replace usable equipment or to make a substitution which would provide more extensive facilities. If a consumer wishes to purchase for other than replacement purposes some item on the restricted list, he must apply to his local WPB office for a preference rating before purchase can be made.

Sellers have been assigned a rating of AA-3 to enable them to purchase and maintain an inventory of such equipment for replacement purposes as well as for new installations

Rationed items and certain items, under specific allocations (list D of L-79) cannot be obtained by an AA-3 rating. However, repair parts for such equipment can be purchased under the rating and sold to consumers without authorization or rationing certificates.

Orders P-84 and P-84-a, which formerly assigned a rating for such equipment for replacement and repair purposes, have been revoked. (L-79, P-84, -84-a)

CONDENSERS: Specifications have been changed to permit increased use of copper and aluminum strip and tubing in the manufacture of commercial and industrial coil and tube assemblies for refrigeration condensers and coolers. There will be a corresponding decrease of 500,000 pounds of steel strip and 400,000 pounds of steel tubing used per quarter as a result of the substitutions. Alterations of schedules III and IV of order L-126 will permit the following changes in the manufacture of coil or tube assemblies for refrigeration condensers or coolers: (1) Permit the use of nonferrous metals in the fabrication of coil or tube assemblies for coolers of the finned type only, for coil or tube assemblies to be used in farm milk coolers of the immersion type and for pipe and tubing in water and brine coolers of the shell and tube type; (2) remove the restrictions on the thickness of fins used in the fabrication of coil or tube assemblies for air cooling; (3) permit the use of nonferrous metals in the fabrication of replacement coil or tube assemblies when the assembly is to replace an existing assembly of like metals. Servicemen or repairmen will be permitted to use copper or copper-base alloy pipe or tubing for refrigerant connections. Use of copper or copper-base alloy pipe or tubing for service connections, such as water and drain lines, is still prohibited. (L-126)

STEEL SPRINGS: Wood upholstered furniture manufacturers have been granted permission to resume the use of a limited quantity of steel springs. Each manufacturer may use for upholstery springs in each quarter of the year 12½ per cent as many springs (on a dollar value basis) as he used in the year 1941. Order L-135, which had prohibited the production of steel springs for upholstered furniture, has been revoked. (L-135, -260)

CONSTRUCTION MACHINERY: Used shovels, cranes, draglines, motor graders, and track-laying construction machinery must be registered on form WPB-1159 by distributors and contractors in the nearest WPB regional office, but registration of many other items is no longer required. Any change of status of such equipment must be reported to the regional office on form WPB-1333. Sale is permitted only upon WPB approval, with certain exceptions. Export is permitted only by the military services or upon specific WPB authorization. (L-196)

MOTOR CONTROLLERS: Manufacturers of electric motor controllers have been relieved from the technicality of obtaining an AA-5, or higher, priority before starting production on these units or parts therefor. An AA-5, or higher, priority must be obtained before acceptance or delivery of completed motor controllers. (L-250)

BAKERY MACHINERY: New schedule of production quotas has been established for manufacturers of bakery machinery and equipment, changing previous quotas from a flat 50 per cent of the number of units of any type made during the 1939-41 period to a varying percentage of annual average tonnage of controlled materials used in those base years. Manufacturers will be allowed from 30 to 95 per cent of the annual average tonnage of controlled materials they used during the base period (L-292)

INDEX OF ORDER REVISIONS

M ORDERS

MAGNESIUM: Foundries now are permitted to accept the return of rejected or spoiled magnesium castings of their own manufacture without obtaining prior approval of WPB and they no longer are compelled to sell such castings to a producer or approved smelter. Redefinition of "magnesium scrap" excludes sawings, grindings, sweepings, and similar fines; also dross and sludge containing less than 20 per cent magnesium by weight. Persons generating less than 1500 pounds of scrap a month are freed from the requirement that they segregate their scrap. WPB form 309, heretofore filed by magnesium fabricators, is discontinued and applications for magnesium products now are made by consumers on form WPB-3462. (M-2-b)

SCRAP: Restrictions on alloy steel scrap users have been relaxed, permitting certain low alloy steel scrap to be used in carbon steel at the discretion of the mill. Dealers and producers of alloy scrap are still required to segregate it, although producers turning out less than 10 tons a month of scrap with low alloy content are excepted. (M-24-c)

OSMIUM: Suppliers, consumers and other persons holding supplies of osmium or osmium alloys now are required to report quarterly rather than monthly. (M-302)

P ORDERS

CHEMICALS MANUFACTURERS: Individual preference ratings and allotment symbols will be assigned to purchase orders of chemicals manufacturers operating under order P-89 for maintenance, repair and operating supplies. This assignment is in place of the blanket rating of AA-1 and the allotment symbol MRO-P-89 formerly provided by P-89. No changes were made in restrictions which confine use of MRO ratings and symbols assigned under the order to purchases of fabricated parts and equipment having a value of less than $500 and of aluminum in controlled material forms to amounts not to exceed 500 pounds in any one calendar quarter. (P-89)

AIRCRAFT: Order P-122, which provided

preference ratings on materials to be used in the construction of military and naval aircraft has been revoked. Preference ratings applicable to aircraft construction now are included in the Basic Rating Structure adopted by WPB. (P-122)

PRICE REGULATIONS

BRASS VALVES: Method for pricing unused brass and bronze valves being transferred from consumer-holders to other manufacturers requiring them for war work has been established. For sales by consumer-holders to Metals Reserve Co., the price will be the consumer-holder's original cost plus transportation charges or the maximum price, whichever is lower, at the time of sale to the MRC, plus the cost for repackaging (if necessary), providing it does not exceed 5 per cent of the net cost of the item. MRC and the consumer-holder will agree as to which of the two parties shall bear the transportation charges incurred in delivering the valves from the consumer-holder to the delivery point. (GMPR)

STEEL CASTINGS: An upward adjustment of 17 per cent in ceiling prices for miscellaneous freight car castings has been made. Other changes made in pricing provisions for steel castings and railroad specialties follow: Uniform extras are established for machining principal freight car castings required in 1944's railroad rolling stock construction program; increases of 10 per cent in maximum prices for high tensile steel bolsters and 11 per cent for rigid yokes are established to match increases previously authorized in ceilings for grade B steel bolsters and rigid yokes; extras of 80 cents per bolster are established for bolsters made for use on the ASF ride control A-3 trucks, and for Railway Truck Corp. snubup bolsters; ceiling prices for steel castings now are made specifically applicable to two or more steel castings which are welded together, also steel castings which have parts made of other materials cast integrally in them; increases ranging up to 10 per cent are established for a number of other castings for rolling stock items. (No. 41)

CONSUMERS' GOODS: Manufacturers, whose ceiling prices for milk pails have been below their total unit costs, are authorized to apply to OPA for individual relief. Ceiling prices for 50,000 recess type cast iron bath tubs to be produced by five manufacturers under direction of the WPB will be the same ceiling prices that were in effect when bath tubs were last manufactured in mid-summer of 1942. Manufacturers of about 1000 different kinds of manually-operated control valves have been provided the following uniform method of establishing maximum prices for sales to producers of various types of appliances: Add to the unit direct cost of the particular type valve, as of Jan. 13, 1944, the markup realized by the manufacturer in question during 1941. The unit direct cost of materials used in this calculation must not exceed the ceiling prices of these materials. (No. 188)

Revisions of Warehouse Orders Simplify Operation Procedures

Distributors may purchase idle and excess general steel products without restrictions under M-21-b-1, as amended. . . Dealer participation in market widened. . . Certification no longer required for shipments from warehouse

RECENT revisions of the War Production Board's orders M-21-b-1 and CMP regulation No. 4 and Office of Price Administration's price schedule No. 49 are expected to simplify procedures which must be followed by steel warehouses in transacting business.

The moves are a continuation of the agencies' policy of relieving industry of unnecessary paper work and of allowing a freer flow of material whenever the supply situation justifies such action. This trend likely will continue since additional revisions are expected to be announced later this quarter.

Under order M-21-b-1, as amended, any person now is permitted to qualify as a dealer, even though he was not in business on Aug. 9, 1941, which was required in the original order. While dealers are not permitted to buy from producers, they may purchase idle and excess stocks, or they may purchase from other distributors.

Warehouses now may purchase idle and excess inventories of any type of steel without limitation. Under the old order, they were restricted to those types of material in which they had dealt during the first quarter of 1941. In re-ordering material from producers, they are still restricted to those products in which they dealt during the base period.

Reports by warehouses on form WPB-2888 now are required quarterly, rather than monthly. No reports are required of dealers, but their records are subject to WPB inspection at any time.

Sales of general steel products acquired according to the provisions of order M-21-b-1 must be in strict compliance with provisions of CMP regulation No. 4. Under this latter order, as amended, warehouse sellers no longer are required to obtain certification of shipments of any amount of steel products they wish to ship from warehouses. Previously, they were required to obtain certification for amounts of 40,000 pounds or more.

Distributors now may fill orders on which no endorsement is required in amounts of $25 or less instead of $10 or less as previously permitted, as well as orders calling for delivery to one customer during any calendar quarter of not more than 10 tons of carbon steel, 1000 pounds of stainless steel and 2 tons of other alloy steel, providing such deliveries of any one product group and type do not exceed the amounts specified in the regulation. Purchases of steel from persons other than producers or distributors do not affect the amount which can be bought under this provision

Prompt Delivery Required

A delivery order for steel placed with a distributor or warehouse now must be considered as calling for immediate delivery unless the order specifically provides otherwise.

Of particular interest to all warehouses is the elimination in price schedule No. 49, as amended, of the reports covering shipments of 40,000 pounds or more in any semi-monthly period. The last of such reports are the ones for the second half of December, 1943.

Reductions in prices on carload quantities of the products covered in the zone price component schedules also are eliminated in the price schedule's amendment No. 20.

Each seller now must make a record of all of his purchases and sales, and keep these records available for OPA inspection. Sellers must supply buyers with complete invoices of shipments, giving a description of materials included so that the buyer will be in a position to determine whether the prices charged are legal.

Subdividing of orders for the purpose of giving the seller the higher prices permitted on smaller-sized shipments is now specifically outlawed. Seller and buyer are equally liable under the Emergency Price Control Act for evasion of this requirement.

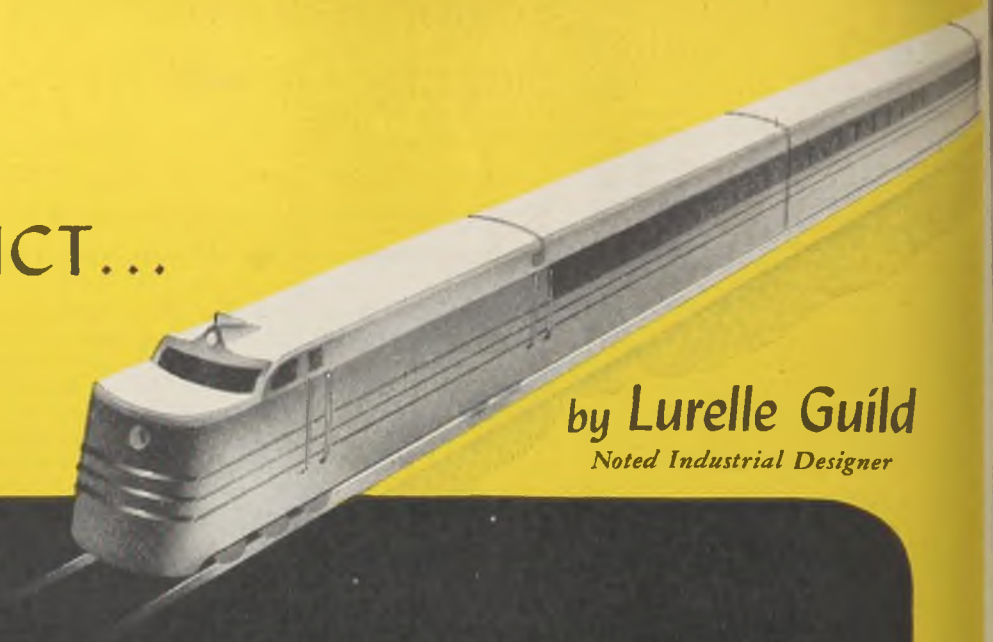
A new pricing procedure permits warehouses to calculate their ceilings on carload shipments according to a method provided by OPA. Previously, sellers were required to obtain certification from WPB on carload shipments, and then to apply to OPA for the ceiling price that could be charged on the shipment.

WPB Decentralization Proves Beneficial

Decentralization of activities of the War Production Board, especially in priorities matters, has effected material savings in time and effort. In the 16 districts of the Ohio, West Virginia, Kentucky and western Pennsylvania region, for instance, manufacturers have been saved up to 33 per cent of the travel formerly required by trips to Washington and nearly 75 per cent of the detailed paper work has been eliminated.

Some of the priorities matters turned over completely to the district offices include authority to process applications for industrial, commercial and residential construction up to $25,000; to process applications for general priorities assistance up to $2500 in value; to make decisions on requests for emergency repairs costing up to $2500; to take action on applications for domestic mechanical refrigerators; to grant additional quantities of copper wire to dealers; and authority to process small-case interim and emergency applications for production materials under the controlled materials plan.

I PREDICT...



by Lurelle Guild

Noted Industrial Designer

The railroad car of tomorrow will make today's de luxe cars resemble the stage coach by comparison. I have designed for one of the country's largest railroads a train embodying numerous new and practical features including super-efficient heating and cooling systems to eliminate dust, germs and draft. Coach passengers will have club car comforts. You'll experience the restful quietness of acoustically-correct, fabric-coated walls; color-corrected, cold cathode lighting with pinpoint lights to spotlight at night the individually reclining seats that will face the windows. Your luggage will be safely secured in individual lockers and all cars will be wired for sound and telephone connections. Yes, your War Bonds will buy you many delightful experiences on the railroad trains of tomorrow.

Note: The Weatherhead Company, exclusive American manufacturer of Ermeto fittings, made vital parts and assemblies for the railroad industry in its four plants prior to Pearl Harbor. We hope to contribute our services and facilities to this important industry again after Victory is ours.

Look Ahead with

Weatherhead

THE WEATHERHEAD COMPANY, CLEVELAND, OHIO

Manufacturers of vital parts for the automotive, aviation, refrigeration and other key industries.

Plants: Cleveland, Columbia City, Ind., Los Angeles
Canada—St. Thomas, Ontario

FREE: *Write on company letterhead for "Seeds Of Industry"—a history of the Weatherhead facilities and products.*

Revision of price structure for lean-alloy steels held necessary if they are to continue in use after the war ends. . . Dodge Chicago aircraft engine plant believed entering mass production stage on 2200-horsepower units for super bombers

DETROIT

METALLURGISTS generally are wary of emerging from their ivory towers of S-curves and hardenability to have a go at the economics of steel usage. Hence considerable interest attaches to the remarks of W. P. Eddy Jr., top-flight automotive metallurgist until recently with General Motors Truck division at Pontiac, and now associated with Pratt & Whitney Aircraft, who for the benefit of the Society of Automotive Engineers meeting here took a squint at wartime developments in steel and weighed their probable effect on future progress.

As STEEL suggested in one of its Yearbook analyses (Jan. 3, p. 218) a general clarification of the entire steel pricing structure is felt by many to be an immediate postwar possibility. Mr. Eddy, in his SAE discussion, expressed similar sentiments and declared bluntly, "Unless this structure (extras for alloy content) is modified during the war or promptly thereafter, return to normalcy will surely see the multiple-alloy NE steels become as dead as King Tut."

Going into more detail on the matter of prices, Mr. Eddy noted that present net prices of steels are computed by adding numerous extras to a base price, items being generally expressed as dollars and cents per hundred pounds of finished steel. Reasons for having such a pricing system are logical, he added, but certain details are not understandable to many users.

For example, any hot-rolled bar steel classed arbitrarily as "alloy steel" costs, in addition to extras for alloy content and other features 55 cents per hundred more than one classed as "carbon steel," even though both may be made in the same furnace or by essentially the same practice. Further, steel treated with special additives (needled, boronized, vitamized, or what have you), even though in the carbon steel composition classification, is priced as "alloy steel," when the only difference in manufacturing practice may be the addition of an almost undetectable percentage of needling agent to the ladle just before pouring into ingot molds.

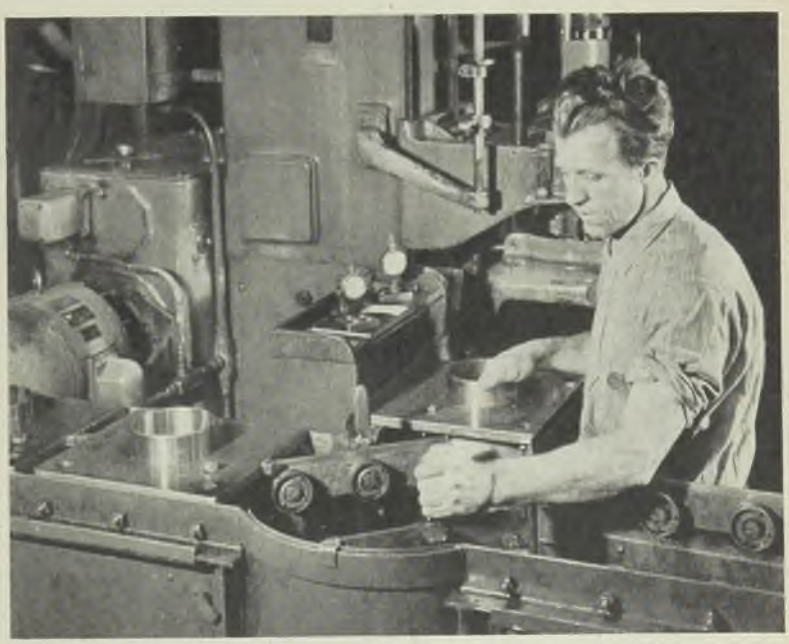
Thus, in comparison with a 1.50 per cent manganese steel, a steel to which 0.25 per cent more manganese has been added, costs 65 cents a hundred extra, while a steel to which 0.003 per cent boron has been added costs 80 cents a hundred or $16 a ton more. It is realized, notes Mr. Eddy, that, particularly in operations subsequent to pouring ingots, high-hardenable steels are more difficult and costly to manufacture than are low-hardenable steels. Nevertheless, the present alloy base price, in the opinion of many persons, represents an artificial and unreasonable increment which tends to encourage use of carbon and high-alloy steels and to discourage development and application of low-alloy and needled carbon steels. If, he concludes, special addition agents continue to show merit in accordance with results to date, they will force their way into the picture and eventually should influence price structure sufficiently to make their use economical in carbon as well as in alloy grades.

Permanency of NE Steels Affected

Other less-important factors affecting the permanency of NE steels after the war, and mentioned by Mr. Eddy, include sales efforts made by steel producers and alloy suppliers to restore the former eminence of the high-alloy steels; length of the war, since the longer the war lasts the greater will be the knowledge of and familiarity with NE steels by users; regimentation of industry after the war, which probably would tend toward continuing the use of the lean-alloy steels; and nationalistic preparedness, involving the recognition of the need for conservation of national resources so that the country can be forearmed for the next war. A related factor to the latter will be the willingness of all the armed services to learn during peacetime how to build materiel for the next war with the minimum use of strategic materials.

Examining the immediate status of the NE steels, Mr. Eddy said the trend has been apparent for several months toward a single NE steel type. The 1300 series manganese steels are increasingly difficult to obtain, because of scarcity of scrap free from other alloying elements, and the relatively high manganese and silicon 9400 series, although perfectly satisfactory for many applications, was never as cordially received as had been hoped. The latest modification of the 9400 series eliminated the influence of dislike for high silicon, but the recent easing of molybdenum has removed the principal motive for establishing 9400 steels in the first place. Therefore, because much alloy steel scrap is too high in nickel to make 9400 steels, and because 8600 and 9700 steels are held generally in good favor, it now seems probable the 9400 steels will die out, and that 8600 or possibly restored 8700 steels will supplant them.

Application of a porous chromium plating to the inner walls of engine cylinders, a recently developed technique, also was described to the SAE, by representatives of the Van der Horst Corp. of America, Cleveland. Porous chromium for the inner bearing surface of a cylinder is said to give the designer considerable latitude in his choice of material for the cylinder, permitting him to design for



TIME SAVER: This turntable conveyor switch routes aircraft engine cylinder barrels, mounted upside down in these plate fixtures, from conveyor line in the foreground to the honing machine in the background at the Chevrolet engine plant which builds Pratt & Whitney aircraft power plants. Considerable time and manual effort is saved by this unique arrangement

specific requirements. The plating may be applied to steel, cast iron or aluminum with nearly equal facility. High-corrosion resistance, low coefficient of friction and high hardness are the essential qualities of chromium which appear to support its use on engine cylinders. Here, briefly, is how the porous chromium plate is applied:

An engine cylinder or block is cleaned and placed in a special fixture. Anode or anodes are placed in position in the center of the cylinder bore, and the anode is of such size as to leave a comparatively small gap between anode and cylinder wall. The assembly then is placed in a tank containing a special etching solution and connected to current so that the cylinder is the anode. This process serves for a final and thorough cleaning of the cylinder walls. Then the assembly is lowered into the plating solution and, after contacts are adjusted, electrode-position starts at a current density of from 2 to 4 amperes per square foot of surface area.

Time of plating may vary from 2½ to 15 hours, depending upon the thickness of plate required. After plating, the assembly is returned to the etching solution to obtain the porosity. Current is reversed as in the preliminary cleaning, and the stripping of the plate begun. Curiously, however, the chromium is not stripped in layers off the surface, but in depth. As much as 30 per cent of the chromium deposited may be removed without any measurable increase in inside diameter.

Thickness of chromium deposited varies with the type of engine. Aproximately 0.006-inch on the diameter of an automobile engine is claimed to make it outlast the life of the automobile, but 0.030-inch on the diameter of a marine diesel engine is not entirely sufficient for maximum service life.

Usual practice in depositing chromium on aluminum has been to preplate the aluminum with copper or nickel or both before the chromium. However, for porous chromium plate to improve wear resistance, a direct plating of chromium is recommended and experiments in this direction are said to be promising.

A mild sprinkling of publicity is beginning to emerge from the Dodge Chicago airplane engine plant operated by Chrysler, suggesting the incidence of mass output of the big 2200-horsepower Wright radial engine for Superfortresses is not far off. This huge undertaking, comprising 19 separate buildings stretching over 500 acres of property, likely will prove to be the "Willow Run" of the airplane engine industry.

An intensive job training program is now under way, with instructors taking groups of three or four to the machines they will operate and demonstrating the technique for about a day's time, then supervising the new employes as they are transferred immediately to the machines the next day. After a short interval the trainees become sufficiently skilled for a specific operation to be permitted to handle production, although it's hard to see how they could be classified as skilled labor in any sense of the word.

Soon to make its bow in metalworking circles is a new type of resistance welding equipment, designed primarily to facilitate the welding of aluminum for aircraft. Hitherto, most aluminum welding equipment has been of the alternating-current stored-energy type, involving bulky and expensive equipment, at best not readily usable in all localities. The new system is based on the use of low-voltage direct-current power supplied by storage batteries of an improved type perfected for use in submarines. Also a part of the new equipment is an ingenious type of carbon-pile contactor for making and breaking the welding current. Held closed under hydraulic pressure of around 25 tons, the contactor opens with virtually no arcing despite the intense current surge it transmits.

Not mentioned in last week's review of Nash aircraft engine operations at Kenosha, Wis., and the postwar outlook of Nash-Kelvinator, were the plans which the company has for expansion of operations at its Detroit plant on Plymouth road. A new engineering laboratory, new administration building and new refrigerator cabinet manufacturing plant are contemplated. Property has been acquired and details of the new structures developed by architects. The cabinet plant will obviate the need for shipping refrigerator units from the Kelvinator Grand Rapids, Mich., plant while the engineering and administration buildings will house staffs for the full range of N-K operations, including automobiles, refrigerators, helicopters and whatever else the company may elect to venture in the postwar period.

Likelihood of the Henry J. Kaiser interests undertaking manufacturing operations in Michigan, on ordnance department vehicles at first and perhaps civilian automotive production later, drew one step closer with announcement of incorporation of the Michigan Kaiser Co. last week. Development work on ordnance vehicles for the Kaiser interests has been under the direction of Probst & Harger, consulting automotive engineers in Detroit, until recently when Mr. Harger dissociated himself from the activity and Mr. Probst joined the Michigan Kaiser Co. A Kaiser representative, formerly located in Pittsburgh, is now in Detroit handling business details. Acquisition of manufacturing facilities is regarded as a possibility.

AUTO PARTS NEEDED

Replacement sales of Thompson Products Inc., Cleveland, reached a new high of about $14,500,000 in 1943 or 35 per cent above the preceding year, according to T. O. Duggan, vice president. Volume totaled $10,737,000 in 1942 and in 1941, the previous peak year, totaled $12,244,000 or 28 per cent of the company's total business that year.

Mr. Duggan, in an article in the company's employe newspaper, points out replacement sales now are equal to the company's entire business for the year 1937.

He says with trucks and motor cars wearing out and no new ones being built demand for parts to keep this private equipment moving grows greater every day. There is a lack of inventory in replacement parts throughout the automobile industry, he states, and it will require months to catch up with orders.

They Say:

"The time is not far distant when our basic concern will be, not with preventing inflation, but with preventing deflation. . . Let me say flatly that the price and rationing controls will be lifted, piece by piece, at the very earliest moment consistent with the national safety."—**Richard V. Gilbert,** chief economist, Office of Price Administration.

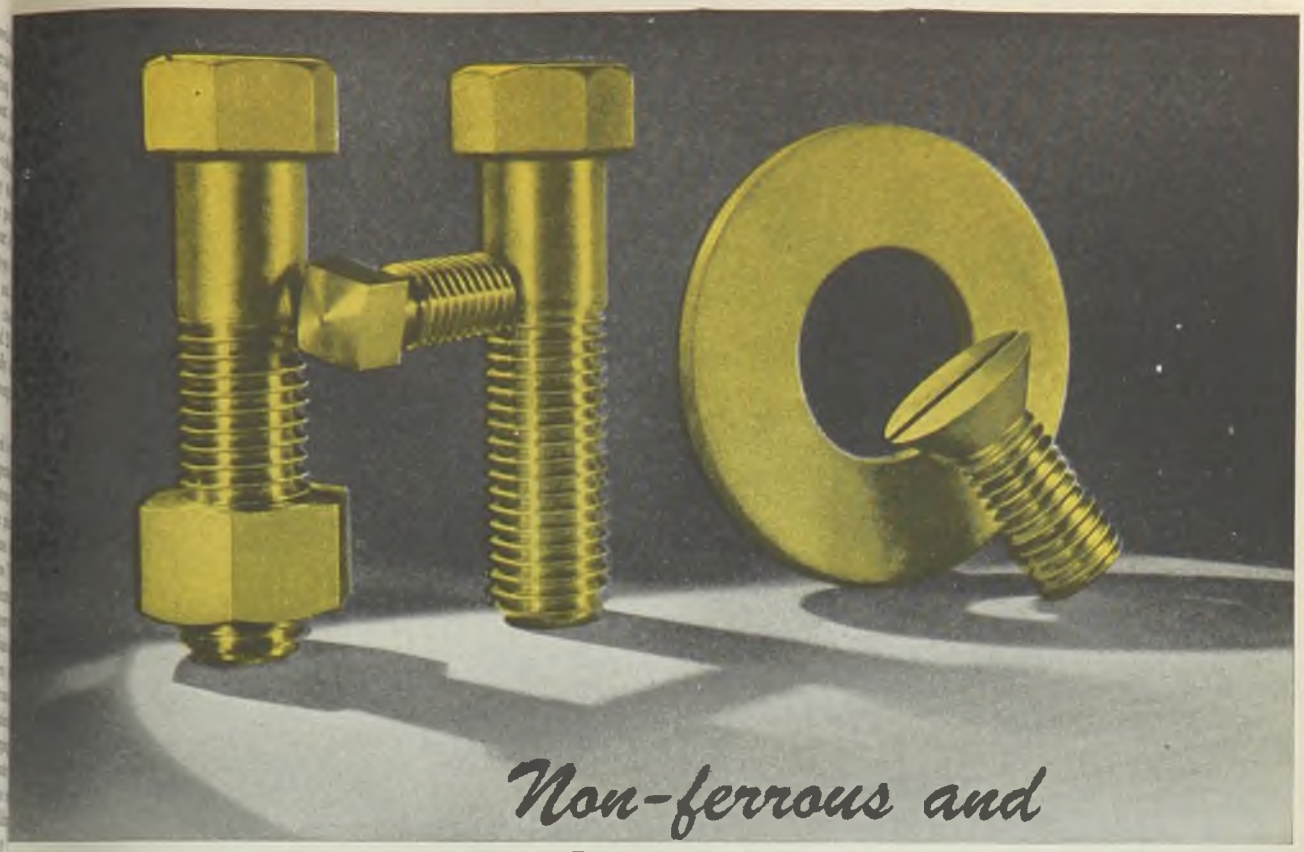
* * *

"By teamwork, men and management must make their own jobs in the postwar era. Neither government, social agencies, manufacturers' associations nor labor organizations can be depended upon to guarantee jobs to anyone."—**Frederick C. Crawford,** president, Thompson Products Inc.

"Men who seek big war profits or foment strikes are playing into the hands of America's 'would-be-Hitlers' by helping to destroy the country's unity and democratic balance."—**Donald Nelson,** chairman, War Production Board.

* * *

"The time in which to prepare for peace is growing short and unless the nation stands ready to meet the problems arising with the fall of Germany, confusion and chaos will develop on the home front and delay the day of ultimate victory."—**Paul G. Hoffman,** president, Studebaker Corp. and chairman of Committee for Economic Development, Washington.



Non-ferrous and Stainless FASTENING

Headquarters

HEADQUARTERS is "a chief place of business." So . . . . . when you need non-ferrous and stainless fastenings, come to Harpers . . . the organization which specializes on the manufacture of bolts, nuts, screws, washers, rivets and specials made of Brass, Bronze, Copper, Everdur, Monel and Stainless . . . an organization not concerned with common steel fastenings.

To serve fastening users, Harper stocks over 4280 different items . . . employs a large staff of engineers and field service men . . . and offers a vast fund of practical non-ferrous and stainless fastening "Know how." Sample this "Know how" by writing (on your letterhead) for a 4-color, 84 page catalog.

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WING TIPS

Curtiss-Wright reaches quantity production on new 2200-horsepower Cyclone engines for super bombers. Output in 1944 to be 750 per cent higher than last year. Hollow steel propeller blade manufacture increased

WRIGHT Aeronautical Corp., which has raised its average horsepower per individual engine upward from 1333 horsepower in December, 1941, to a current average of 1655, contributed a major development to the field of power last year by placing in quantity production its Cyclone 18 engine of 2200 horsepower for use in new types of heavy, long-range super bombers, dive bombers and fighters with extended range, greater firepower and heavier armor and new transport types such as the Lockheed (C-69) Constellation and the Martin Mars Flying Boat. During 1944, output of the Cyclone 18 will be 750 per cent higher than in 1943.

Cyclone 18s of 2200 horsepower each powered the giant Mars when it made one of the outstanding flights of 1943 by flying 8972 miles from Baltimore to Natal and return. Taking off at Baltimore with 148,500 pounds the Mars flew 4375 miles nonstop with high priority cargo from Baltimore to Natal to set a long distance record for cargo runs.

Production by the Wright company of three types of Cyclone engines and two types of Whirlwind engines was further increased last year by the output of four domestic licensees. These are: Studebaker Corp., which is building Cyclone 9s of 1200 horsepower for Boeing (B-17) Flying Fortresses; the Chrysler Corp. which is producing Cyclone 18s of 2200 horsepower in its new Dodge-Chicago plant; the U. S. Naval Aircraft factory which is manufacturing Whirlwind 7 and 9 engines for Navy trainers; and Continental Motors, which is turning out Whirlwind 9s of 400 horsepower for tanks and gun carriers.

The Whirlwind engines which now power all but a small fraction of the tanks and gun carriers used by American armored divisions, it was pointed out, are almost identical with the Whirlwinds used in aircraft. This type has been adapted to use in tanks by the addition of a combination cooling fan and flywheel mounted on the propeller shaft in place of the propeller and by changes in the induction system to supply adequate carburetor air, since the engine is installed behind heavy armor plate in the rear of the tank and since air does not enter the air scoop at the high velocity it does in an aircraft.

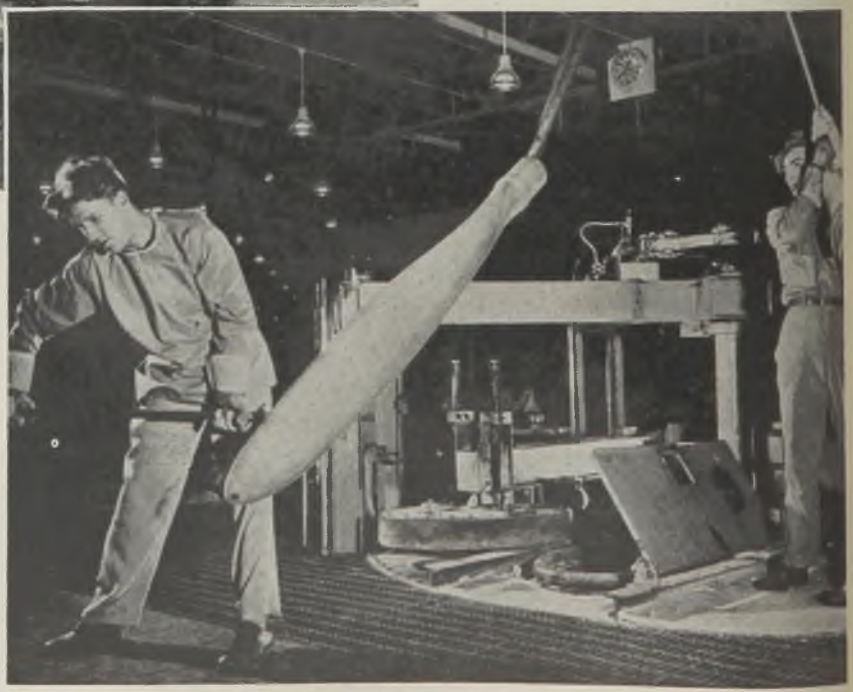
The Wright company also co-operated closely with the government of Brazil which has erected a modern factory outside Rio de Janeiro for the production of Whirlwind engines under license.

To achieve complete interchangeability between Wright and Studebaker-built engines, for example, so that Flying Fortress squadrons all over the world would be required to maintain but one stock of spare parts regardless of the factory in which they were built, the Wright company turned over all of its "know how" of engine production to Studebaker; and worked with the licensee to obtain exact duplication of casting, machining, assembling, quality control and testing techniques.

The amount of production engineering necessary to obtain this interchangeability is indicated by the fact that each Cyclone engine required 80,000 machining operations and 50,000 inspections, with tolerances as limited as one-ten-thousandth of an inch. The same type of interchangeability is resulting from the work of other licensees, with Wright engineers assisting until production is on schedule.

The Curtiss-Wright Propeller Division, which received this year the U. S. Army Air Forces' commendation for "accomplishing what no other nation has been able to do: Manufacture hollow steel blades for combat airplanes in quantity",

Production of the new Wright Cyclone 18 engines of 2200 horsepower, above, for super bombers and other long-range planes will be increased 750 per cent in 1944



Worker in a propeller plant of Curtiss-Wright Corp., right, moves a red-hot hollow steel propeller blade from a rotary pit furnace into a hydraulic press for die quench hardening, a transfer which heat treat specifications require must be made in 12 seconds

WHY EXTRA SCRAP IS NEEDED AGAIN!

The morning news flash reads: "Another beachhead was established. . ."

Sounds matter-of-fact, doesn't it? Yet back of every successful new landing are weeks—even months of preparation. Thousands of troops must be trained; thousands of tons of steel fighting equipment must be ready.

Steel must provide the spearhead and protect precious lives. But the plain fact is *there won't be enough steel* unless American plants overcome the normal "winter lag" in scrap collections. It is estimated that an additional *15 million tons of scrap* will be required.

This is not an appeal for the ARMCO furnaces alone. Actually, every steel mill in the country must go full blast all winter if military requirements are to be met. And the only assurance of this will be a flood of millions of tons of *extra* scrap.

You "did the job" last winter. This year, with a second front in view, the need is even more critical. Get your salvage committee back in action. Collect everything that doesn't serve a useful purpose. Separate the ferrous and non-ferrous metals and then call the scrap dealer.

Remember, every ton of scrap you collect will help win a battle —*and save lives.* The American Rolling Mill Company, 381 Curtis St., Middletown, Ohio.

ARMCO

FOR EXPORT: THE ARMCO INTERNATIONAL CORPORATION

TURN IN ALL YOUR SCRAP

disclosed two engineering achievements during 1943. One was the Curtiss automatic engine speed synchronizer, a simplified propeller control system designed to greatly reduce the complexity of controls and permit more efficient, overall operation of multiengined aircraft; the other was the thrust meter, which when perfected will enable aircraft engineers to pre-determine by flight test the available horsepower of airplane engines.

Many major improvements in production procedures were developed during the year. The Curtiss-Wright Airplane division, in an experiment to probe the possibilities of thermosetting plastics in replacing hard-to-get steel, produced a 1000-pound plastic casting 13 feet long and 3 feet wide. One metal part for the Commando transport which formerly required four hours to process is now made of industrial plastics in three minutes. A number of complex air scoops for the Warhawk fighter which required over a week of three-shift effort for production, are now made in 16 hours and are better. Plastics used as shields in electroplating tanks are now bringing about time savings of 76 per cent and more over older methods. The use of these new materials undoubtedly will have a lasting effect on postwar industry.

The development of "jam riveting" by the Airplane division was an important step in simplifying production procedures. Designed to eliminate the need for rivet "buckers" and the "gang squeezer", "jam riveting" combines flexibility and speed, and according to Curtiss-Wright planning engineers reduces by 40 per cent the number of two-men riveting teams when it is fully introduced in production departments.

Military Aircraft Production in 1943 Double 1942 Weight

Poundage produced in year represented frames and spare parts for an estimated output of 86,000 planes. On basis of unit weight production topped President's program of 125,000 units by wide margin

THE aircraft industry in 1943 set an all-time world's record in building 667,000,000 pounds of military airframes, nearly two and one-half times the weight produced in 1942 and approximately eight times 1941 production, the Aeronautical Chamber of Commerce announces.

"Poundage of airframes," notes James P. Murray, president of the chamber, "is the most accurate yardstick of aircraft production for the armed forces. Our 1943 poundage represented frames and spare parts for an estimated output of 86,000 planes, 80 per cent more than the number produced in 1942 and four and one-half times as many as in 1941."

These are the comparative figures:

	Pounds	Units
1941	83,500,000	19,403
1942	276,000,000	47,694
1943	667,000,000	86,000
Three year totals	1,026,500,000	153,097

With the average weight of planes built in 1943 nearly double that of 1941, a greater proportion of heavy bombers and transports is indicated. Total poundage produced in December, 1943, equaled that of the entire year 1941.

If the industry had continued building planes of the 1941 average size, production in 1943 would have been equivalent to 155,000 units. Thus, measured by average unit weight, the industry production last year far exceeded the President's program announced in January, 1942 (125,000 units).

Dollar value of airframes, engines and propellers produced in 1943 is estimated at $11,000,000,000, compared with the chamber's forecast of $12,000,000,000 made a year ago. The revised figure is more than twice the 1942 value of $5,000,000,000 and more than six times the 1941 value of $1,750,000,000. These figures, however, do not represent the total cost of the completed airplanes, since there are many items added such as armament, instruments, etc.

Increases in dollar volume are considerably less than the increases in airframe poundage, indicating substantial reductions in unit cost to the government.

The increases in aircraft production in 1943 were achieved with increases of only 50 per cent in plant area and 45 per cent in employes over 1942. Total employes in airframe, engine and propeller plants at the end of the year are estimated at 1,400,000, of whom 40 per cent are women, compared with totals of 970,000 at the end of 1942 and 423,000 at the end of 1941. An additional 450,000 are now working in subcontracting plants, and large numbers of others in related industries.

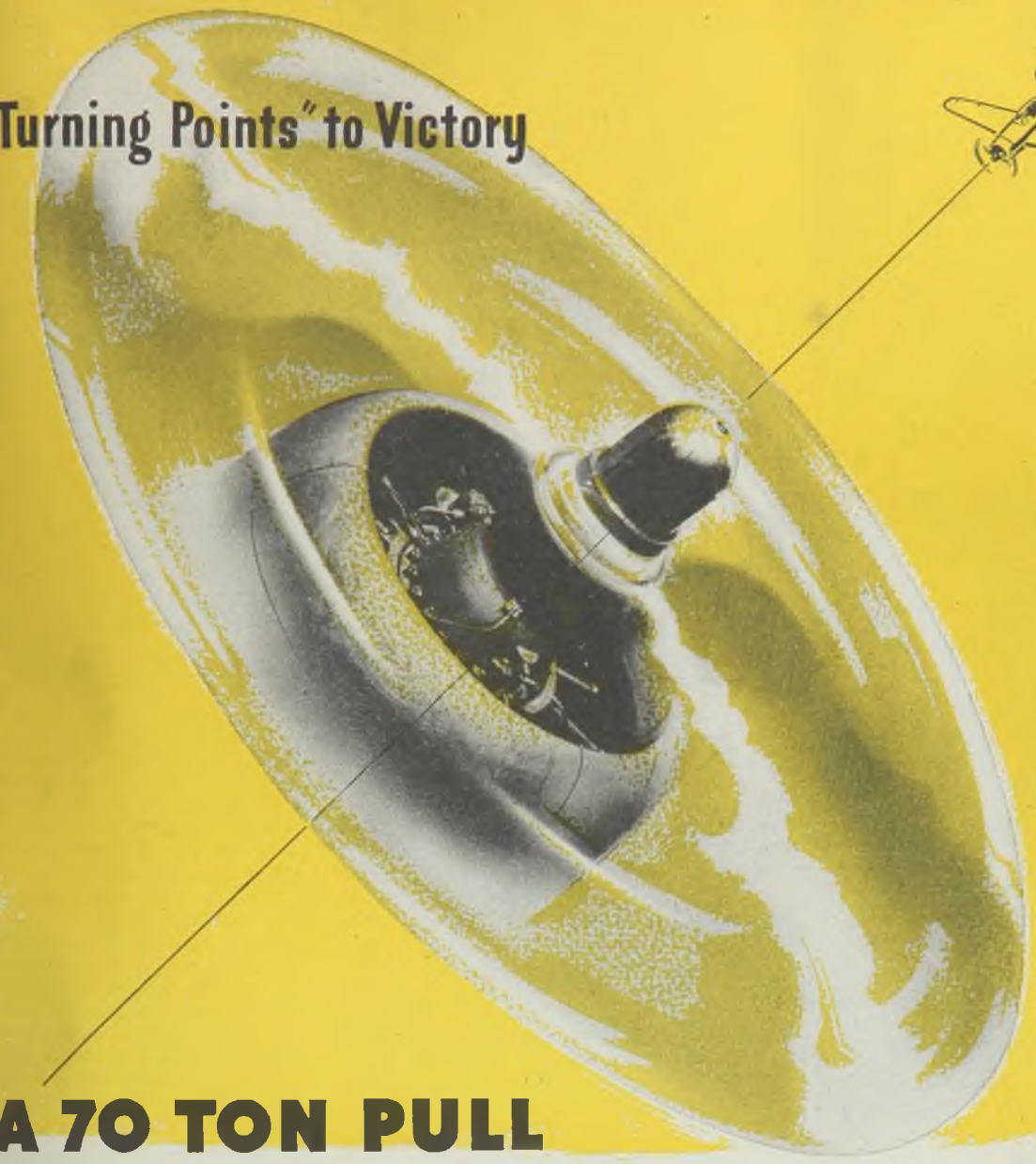
Corollary to the ACC report are figures released by the Aircraft War Production Council for seven major West Coast plants, indicating construction of 26,636 airplanes, or 31 per cent of the total for the country. On a weight basis, West Coast plants increased their 1943 poundage by 72 per cent over 1942, against numerical increase of 50.5 per cent. Schedules for this year call for another increase of 50 per cent in unit weight produced.

LIFE SAVER: This obsolete Airacobra, of the type originally built by Bell Aircraft Corp., Buffalo, for the British but which was converted for American use in the South Pacific after Pearl Harbor, has been retired as a fighter. It still performs for the Army, however, by carrying life rafts to pilots forced down at sea, enabling them to remain afloat until a crash boat can effect a rescue

Liberators Now Built on Fixed-Price Contracts

B-24 Liberator bombers which one of the North American Aviation plants in Dallas, Tex., is assembling are now manufactured for the AAF on a fixed price contract, instead of cost-plus-fixed-fee as heretofore, marking one of the first instances where an aircraft manufacturer has voluntarily requested conversion to this type of contract.

"Turning Points" to Victory



A 70 TON PULL

With its 2000 horsepower engine opened up, this 13 foot propellor exerts a pull estimated at 70 tons on the Fafnir blade bearings . . . a vivid example of power and speed carried frictionlessly on ball bearings.

After the heavy raid of the American 8th Air Force on Schweinfurt, center of Germany's ball bearing industry, the official report read in part:

"These Schweinfurt plants turned out a tremendous amount of ball bearings for German war machines.

"All high speed moving parts depend upon ball bearings to eliminate friction. They must have ball bearings to operate war equipment. This attack . . . amputates a huge part of the Nazi's ability to keep moving machinery in operation."

In a mechanized war, friction can be as destructive as enemy bullets. That is why ball bearings are at the "turning points" of practically every piece of fighting equipment.

Millions of Fafnirs are proving their worth in America's fighting machines and in busy industrial machines here at home. Their worth will be just as steadily proved in the machines and vehicles of the peaceful world toward which we fight. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR BALL BEARINGS

MEN of INDUSTRY

F. J. O'BRIEN

WILLIAM O. LIPPMAN

Paul S. Killian, senior assistant purchasing agent, Bethlehem Steel Co., Bethlehem, Pa., since 1941, has been elected purchasing agent. Mr. Killian is conspicuously active in the affairs of the Lehigh Valley Purchasing Agents Association.

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Lee Bergstrom has been named manager of the district sales office which Joseph T. Ryerson & Son Inc., Chicago, is opening in Los Angeles. Mr. Bergstrom is well known in western steel circles, having operated, with members of his family, the Bergstrom Steel Co. Ltd., Los Angeles.

—o—

Lieut. Col. Cecil P. Young, United States Army, Ret., has been appointed executive vice president, Wickwire Spencer Aviation Corp., subsidiary of Wickwire Spencer Steel Co., New York. Prior to his return to inactive duty in December, 1943, Colonel Young had been commanding officer of the Miami air region.

—o—

A. M. Donze, former factory manager, Timken Roller Bearing Co., Canton, O., has been named vice president in charge of production, and **John E. Fick,** superintendent of the Steel & Tube division, has been named vice president in charge of that division. **H. M. Richey** succeeds Mr. Donze as factory manager, and **E. S. Hoopes Jr.** has been appointed general superintendent of the Steel & Tube division. **Walter G. Hildorf** has been made director of metallurgy, a newly created office, and he is succeeded as chief metallurgical engineer by **Ralph L. Wilson.**

—o—

Joseph H. Carter, president, Pittsburgh Steel Co. has been named board chairman, succeeding **Henry A. Roemer,** who resigned recently to devote his time to Sharon Steel Corp., Sharon, Pa. **Carl L. Zak,** former secretary of the Seamless Steel Tube Institute, Pittsburgh, has been named manager of tubular sales.

—o—

F. J. O'Brien, executive vice president, Continental Can Co. Inc., New York, has been re-elected president of the Can Manufacturers Institute Inc. **H. Ferris White** was elected executive vice president of the institute, and **Clifford E. Sifton** was elected secretary and treasurer.

—o—

William O. Lippman, manager, Canton, O., Ordnance division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has received his company's highest award, the Order of Merit, for his leadership in converting the Westinghouse East Springfield, Mass., plant from peacetime to wartime production. Mr. Lippman was works manager of the Springfield plant from 1939 until May, 1943.

—o—

Dr. Rowland Burnstan, previously director of the Aeronautical division, Minneapolis-Honeywell Regulator Co., Minneapolis, has been elected president of Lawrance Aeronautical Corp., Linden, N. J. Mr. Burnstan succeeds **Charles L. Lawrance,** founder of the company, who becomes chairman of the board.

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Charles O. Guernsey, who has been serving in an administrative capacity with the Philadelphia ordnance district for the past 20 months, has resumed his position as vice president, J. G. Brill Co., New York.

—o—

Tilford E. Dudley, disputes director for the Sixth Regional War Labor Board, Chicago, has been called to Washington by the national WLB for special assignment on the hundreds of impending steel cases. Mr. Dudley's former post in Chicago is being taken over by **Samuel Edes,** his assistant since February, 1943.

—o—

Leon R. Ludwig, formerly head of the Circuit Breaker & Protective Devices division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been named manager of the company's Motor division, succeeding **R. W. Owens,** resigned. **Herbert L. Rawlins** takes over Mr. Ludwig's former responsibilities as manager of the Protective Devices Engineering department, and **A. W. Hill** becomes manager of the Power Circuit Breaker Engineering department, also formerly under Mr. Ludwig's management. Named to new posts in the Westinghouse Trafford Micarta department, Trafford, Pa., were: **David R. Rennie,** superintendent; **Henry C. Guhl,** engineering manager, and **Joseph E. Callahan,** application manager.

—o—

Robert W. Worley, formerly associated with United Engineers & Constructors Inc., Philadelphia, has been appointed chief engineer, Union Drawn Steel division, Republic Steel Corp., Massillon, O.

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Albert Bradley, executive vice president, General Motors Corp., Detroit, will add to his duties the responsibility of chairman of the Distribution Policy Group, succeeding **R. H. Grant,** who retired recently.

—o—

P. V. Moulder has been appointed general manager of the new Motor Truck division of International Harvester Co., Chicago, and will report directly to the president. Members of Mr. Moulder's divisional executive staff are: **W. D. Reese,** manager of engineering; **V. A. Guebard,** manager of manufacturing; **D. A. Conroy,** manager of supply and inventory; **W. C. Schumacher,** manager of sales, and **Glenn D. Wade,** divisional comptroller. Mr. Moulder is a director of the Automotive Council for War Production.

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Hugh M. Fenwick, former assistant to the executive vice president, Consolidated-Vultee Aircraft Corp., San Diego, Calif., and a close observer of military aviation here and abroad, has joined Curtiss-Wright Corp., New York.

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James E. Ashman has been appointed procedure supervisor in the accounting department, Carnegie-Illinois Steel Corp., Pittsburgh. He formerly held a similar position with American Steel & Wire Co., Cleveland.

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C. A. Young, former Chicago district manager, Sheffield Steel Corp., Kansas City, Mo., has been appointed manager of sales, Hot Rolled Products division.

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Charles R. Cox, president, National Tube Co. and Tubular Alloy Steel Corp., subsidiaries of United States Steel Corp., Pittsburgh, has been elected president of the Western Pennsylvania Safety Council. Among those elected vice presidents of the council were: **F. Rhodes Henderer,** Carnegie-Illinois Steel Corp., Pittsburgh, **J. P. Leonard,** Blaw-Knox Co., Pittsburgh, and **L. J. Bowker,** Mine Safety Appliances Co., Pittsburgh.

—o—

Edward C. Hoenicke, assistant to the general manager, Foundry division, Eaton Mfg. Co., Detroit, has been appointed consultant to the newly-created Gray Iron Castings Section, War Production Board. Also named to the WPB Gray

EDWARD MACKASEK

GRANT DAVIS

A. N. SWANSON

Iron Section was **A. Douglas Hannah,** a director of Barnett Foundry & Machine Co., Irvington, N. J., who has been with WPB since May, 1942.

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Edward Mackasek, former executive vice president, Beaver Enameling Co., Ellwood City, Pa., has been appointed development engineer for the Porcelain Enamel Institute, Washington.

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Thomas C. Weiser, Griffin Wheel Co., Chelsea, Mass., has been elected president of the New England Foundrymen's Association. Other officers elected at the annual meeting were: vice president, **M. A. Hosmer,** Hunt Spiller Mfg. Co., South Boston; treasurer, **Arthur W. Gibby** of East Boston, and secretary, **Ernest F. Stockwell,** Barbour Stockwell Co., Cambridge, Mass.

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Lowell F. Whisler has been appointed manager of purchases and expediting, a newly-created position, Waukesha Motor Co., Waukesha, Wis., and **Glenn R. Evans** has been named production manager.

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David Riesman Jr. has been appointed contracts settlement officer of Sperry Gyroscope Co., Brooklyn, N. Y., and will be in charge of handling contracts terminated by the government.

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J. H. Tice has been appointed district sales manager at Tulsa, Okla., for Jones & Laughlin Steel Corp., Pittsburgh. He succeeds **R. J. Woods Jr.,** who has transferred to Frick-Reid Supply Corp. as district manager of tube sales in Tulsa. **D. J. Ambrose** has been appointed assistant district sales manager at Cincinnati for Jones & Laughlin, and **C. T. Hapgood** has been named assistant manager of tubular products sales in charge of oil country goods, with headquarters in Pittsburgh.

At the company's Otis works, Cleveland, **Benjamin F. Scott** has been appointed steel order supervisor, a new position, and **William J. Leahy** succeeds him as superintendent of the 30-inch hot strip mill. **George R. Seeley** assumes Mr. Leahy's former responsibilities as superintendent of the 77-inch hot strip finishing department, in addition to continuing as superintendent of the blanking department.

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Grant Davis has joined Standard Steel Corp., Los Angeles, as sales manager. Previously, Mr. Davis had been associated with Koehring Co., Milwaukee, as West Coast district manager, and with Lima Locomotive Works, Lima, O., as general sales manager of the Shovel and Crane division.

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Raymond Diaz, formerly treasurer of Benner Chemical Co., Chicago, has joined Diamond Alkali Co., Pittsburgh, as supervisor of district offices of the Diamond Alkali Sales Corp.

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Eugene Mowlds Jr. has been appointed contracting manager at Philadelphia and **Joseph W. Small III** has been named to the same position at Baltimore, for American Bridge Co., subsidiary of United States Steel Corp., Pittsburgh. Mr. Mowlds succeeds **Charles Rieder Jr.,** retired.

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E. J. Westerlund has been appointed manager of the newly-established industrial relations division at Nela Park, Cleveland, headquarters of General Electric Co.'s Lamp department. Other members of the new division are: **R. E. Dirks, R. L. Howes, H. R. Nisley** and **A. A. Pergande.**

Fred G. Stebbins has been appointed sales manager, capacitor section, Transformer division, Central Station divisions, and **Edward V. Dillon** has been named assistant sales manager of feeder voltage regulators, Transformer division. Mr. Stebbins succeeds **Charles F. Miller,** who has been named senior transformer specialist for the New York district. **E. A. Green** has been named general assistant to the manager of the GE Motor division.

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K. E. Sutton has been named manager of the Wood-Ridge, N. J., warplane engine plant, Wright Aeronautical Corp., New York, and **A. M. Scheerer** has been named engineering manager of the same factory. Mr. Sutton replaces **A. Amundsen,** who has obtained leave of absence due to ill health.

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A. N. Swanson has been appointed chief process metallurgist in the Chicago Metallurgical division, Carnegie-Illinois Steel Corp., Chicago. Mr. Swanson is succeeded in the post of chief metallurgist at the corporation's Gary works by **C. J. Hunter.** Other appointments at the Gary works are: **H. W. Erler,** superintendent of No. 4 open hearth, succeeding **S. L. Moffatt,** resigned; **W. G. Hoffman,** superintendent of No. 1 open hearth, and **Ross Sibley,** assistant superintendent of No. 1 open hearth.

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R. S. Reed Jr. has been appointed manager of the newly-opened Pittsburgh office of McCarty Co., Los Angeles, industrial advertising counsellors. For the past 12 years Mr. Reed has directed the advertising of Pittsburgh Equitable Meter Co., and Merco Nordstrom Valve Co., Pittsburgh and Oakland, Calif.

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Harry W. Fortey, formerly assistant to the president, De Walt Products Corp., Lancaster, Pa., has been appointed sec-

DANIEL C. MILLS

Who has been appointed manager of industrial relations, Bethlehem Steel Co., Bethlehem, Pa., noted in STEEL, Jan. 17, p. 65.

retary of the public relations department, American Hotel Association, New York.

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Donald V. Graham has been appointed St. Louis district sales manager, Pennsylvania Salt Mfg. Co., Philadelphia, succeeding **Michael B. Dwyer,** who is retiring after 58 years with the company. **N. E. Bartlett,** vice president, also is retiring. **Robert W. Kress** has been assigned to the company's Chicago office, and **L. H. Brandt** has joined the technical service department.

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E. B. Files, chief of the Cold Finished Bar Branch, Steel Division, WPB, resigned Jan. 15.

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George E. Westerholm has been appointed an abrasive engineer for the Milwaukee territory by Norton Co., Worcester, Mass.

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S. D. Mahan, formerly vice president of Fuller, Smith & Ross, New York advertising agency, has been named director of advertising and public relations, Manufacturing division, Crosley Corp., Cincinnati.

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V. N. Crasnoff has been named assistant general superintendent, Western Cartridge Co., East Alton, Ill. **R. W. Merkle** succeeds Mr. Crasnoff as superintendent of the company's Ammunition division, and **D. R. Jones** has been appointed assistant superintendent of the Ammunition division. Mr. Crasnoff will supervise product engineering and manufacturing phases of the company's operations, while **S. R. Irish** continues as assistant general superintendent handling administrative matters.

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Col. T. H. Kruttschnitt has been appointed vice president and manager, Tonopah & Goldfield Railroad Co., Goldfield, Nev.

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Dean C. Smith has joined the executive staff of Fairchild Engine & Airplane Corp., New York, and will be in charge of development activities. Mr. Smith formerly had been director of transport, Airplane division, Curtiss-Wright Corp., New York.

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G. W. Dolan, former executive vice president, Mathieson Alkali Works Inc., New York, has been elected president, succeeding **E. M. Allen,** who retired Jan. 1. Mr. Allen continues as board chairman.

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Joel S. Hendrickson, auditor, A. O. Smith Corp., Milwaukee; **Thornton A. Rand,** treasurer, Acme Steel Co., Chicago; **Kenneth O. Swanson,** assistant comptroller, Pittsburgh Steel Co., Pittsburgh, and **Bayard E. Wynne,** comptroller, United Steel Fabricators Inc., Wooster, O., have been elected to membership in the Controllers Institute of America.

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J. P. Krumech, traffic manager, American Car & Foundry Co., New York, has been elected chairman of the board of governors, Traffic Club of New York and **R. J. Newberry,** general traffic manager, Johns-Manville Corp., New York, has been elected vice chairman and finance committee chairman.

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Kenneth E. Rowe has resigned as an executive officer in the Office of Price Administration to become industrial relations manager, Howard Aircraft Corp., St. Charles, Ill.

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Dr. Charles A. Getz, director of the Research division, Cardox Corp., Chicago, has been elected to fill the newly created position of vice president in charge of research.

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William H. Herron has been named comptroller of Budd Wheel Co., Detroit.

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John P. Roche has been appointed assistant to the president, Oliver Iron & Steel Corp., Pittsburgh, and **E. C. Eaglen** has been named head of the new department of market research. Mr. Roche continues as counsel and assistant secretary.

OBITUARIES . . .

Henry E. Miller, 80, president, Chicago Wheel & Mfg. Co., and one of the oldest active men in the grinding wheel industry, died Jan. 10 in Chicago. Born on an Illinois farm, Mr. Miller became an expert machinist, then traveling salesman for Minnesota Thresher Co. In 1894 he was made manager of the Chicago Emery Wheel Co., which he later purchased, and in 1895 he became president and gave the company its present name. Mr. Miller was one of the founders of the Grinding Wheel Manufacturers Association.

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Meyer Berkson, 59, president and treasurer, Berkson Bros. Metal Co., Chicago, died there Jan. 10. Mr. Berkson and his brother Jacob, who is vice president, founded the company 40 years ago.

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Walter H. Hallsteen, 53, vice president and treasurer, Ilg Electric Ventilating Co., Chicago, died Jan. 14 in Evanston, Ill.

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Albert T. Sebek, 57, president, Central Die Casting & Mfg. Co. Inc., Chicago, died there Jan. 16.

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Lawrence H. Dunham, 53, assistant manager of the metallurgical department, American Steel & Wire Co., Cleveland, died suddenly in Pittsburgh Jan. 19. Mr. Dunham had been associated with the company since 1916 when he joined it as assistant in the physical laboratory at Cleveland.

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Allan E. Hall, 70, manager of the milling machinery department of Allis-Chalmers Mfg. Co., Milwaukee, for more than 20 years, died Jan. 17 in that city.

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Russell Didier, 55, former vice president and member of the board of the former Rhinelander Iron Co., Rhinelander, Wis., died Jan. 11 in Washington. The Rhinelander Iron Co. went out of business in 1939. At the time of his death Mr. Didier was serving in the Navy Department.

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William E. Hill, 77, retired credit manager, Beals, McCarthy & Rogers Inc., Buffalo, died Jan. 11 after several years' illness.

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Frank H. Eastman, 61, vice president and general manager, Gannett, Eastman & Fleming Inc., Harrisburg, Pa., died there recently.

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Albert D. Troth, director of purchases, Sharon Steel Corp., Sharon, Pa., died Jan. 3.

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John B. Madden, 59, Buffalo agent for M. A. Hanna Co., Cleveland; American Engineering Co., Philadelphia; Syntron Co., Homer City, Pa., and Logan Co., Louisville, Ky., died in Buffalo Jan. 10

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Charles H. Warner, 71, who collaborated with his brother Arthur in developing one of the first magnetic speedometers for automobiles, and helped form the Stewart-Warner Corp., Detroit, to market the product, died Jan. 6 in Pasadena, Calif. Mr. Warner had sold his interest in Stewart-Warner Corp. in 1912.

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William H. Hoge, 71, retired locomotive brake lining manufacturer, died recently in Los Angeles.

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Charles E. Cochran, 50, plant protection chief, Mueller Co., Decatur, Ill., died there recently.

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Vernon D. Stewart, 46, president and general manager, Stewart Hog Ring Co., Paris, Ill., died recently in that city.

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Thomas E. Keating, 59, retired turbine engineer, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., died recently in New York.

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Samuel Meisel, president of Meisel Machine & Tool Co., Toledo, O., died recently in that city. Mr. Meisel organized the business bearing his name in 1929 and remained its head until his death.

War Production Passes Peak

Dominion's munitions program cut back as United States supplies more materiel. Manufacture of some civilian goods resumed. Demand for iron and steel decreasing

TORONTO, ONT.

CANADA has passed the peak in its war production program and there appears little chance the Dominion will again reach the level of production made in 1943. Production curtailment is affecting most materials considered critical a year ago and the changeover from defensive to offensive equipment is not resulting in the same high volume output as under former manufacturing conditions.

The United States now is filling more and more of the requirements for war equipment that previously had been supplied by Canada. The extraordinary production effort of Canada in the first four years of the war resulted in the building of extensive reserves of war materials—guns, automotive transport, shells, ammunition of all types, explosives, and numerous other articles—and until these stocks are moved out of the country there is little incentive to further large scale production.

C. D. Howe, minister of munitions and supply, announces that as a result of improvement in the antisubmarine campaign, Canada is reducing its program for the construction of frigates and corvettes and no new contracts will be let for this type of craft. Production of cargo ships was curtailed last year, and further cuts in the building of merchant ships will become effective this year. However, production of minesweepers will be continued in Canadian yards.

Contract cancellations and curtailment in Canada's war production program has substantially reduced demand for iron and steel, and unless there is a large upswing in civilian manufacturing there is little prospect of this country returning to capacity steel or iron production.

During 1943 blast furnace capacity in Canada was increased by 29.3 per cent to a total of 2,756,160 net tons per year, while capacity for production of steel ingots and castings rose 2.7 per cent to a total of 3,539,100 net tons a year. While basic open-hearth capacity was unchanged during the year, new installations brought electric furnace capacity up 21 per cent to a total electric ingot capacity of 492,500 net tons yearly, while rated capacity for steel castings rose from 272,775 tons at the close of 1942 to the present total of 281,500 tons.

Officials of the various Canadian steel producers visualize a very extensive market for iron and steel as soon as permission is granted to swing into full civilian production schedules, and a'so favorable prospects for obtaining a good share of business that will develop in the export markets and for the rebuilding of Europe at the conclusion of the war. Insofar as production of consumer goods is concerned, production on a minor scale has been started, and new items will be added from time to time. Rolling stock builders and the agricultural implement industry are shaping up as the largest consumers of steel in the civilian group and big volume buying is expected from these users this year.

Some Restrictions Lifted

Restrictions have been lifted on the manufacture of low pressure welded steel boilers for steam or hot water heating. A new order A-982 revokes A-560, which means that manufacturers do not have to wait until their supply of boilers is exhausted before producing more. Prohibition of manufacture of small-sized boilers also is removed.

Four types of five sizes of pumps may now be manufactured. A new order, A-946 has been issued to relieve the situation caused by the shortage of malleable castings by permitting the manufacture of pumps that require less malleable castings, or castings of similar nature, and which are easier to produce.

Donald Gordon, chairman of wartime prices and trade board, states manufacture of washing machines and home electric irons has been resumed on a limited scale. "The board has established the number of washing machines that will be needed. The number we will get depends on what materials will be available and even more on production facilities available. Needless to say, we won't get all we want."

Mark Lowe, electrical appliance administrator, estimates the rate of production on washing machines for the first quarter will be approximately 15 per cent of the output of first quarter of 1939.

Canadian mineral production in 1943 had a value estimated at $524,426,850, a decrease of $42,300,000 from 1942, chiefly due to a lower output of gold.

On the basis of reports from mines from Cape Breton Island to Yukon Territory, the Bureau of Statistics estimates the value of metals as a group at $357,269,-458, a decrease of 9 per cent compared with 1942.

Combined value of copper, nickel, lead and zinc in 1943 was $180,271,613, or 7.6 per cent more than in 1942.

Another group of strategic metals, including antimony, bismuth, cadmium, chromite, cobalt, magnesium, molybdenite, tin and tungsten, reached $7,-079,350 as compared with $4,338,808 in the previous year.

Because Canada now has more than enough magnesium for war requirements, restrictions on the sale and use of Canadian-produced magnesium have been removed. Under the rescinding order, the only magnesium transactions still requiring a permit will be purchases from suppliers outside of Canada.

SALVAGE: Unearthing an untapped source of waste paper, estimated to yield 25,000 tons a week among the nation's small industries, the Irving Subway Grating Co. collected and baled half a ton at its Long Island City plant in one week. President Walter E. Irving estimates small businesses could salvage 25,000 tons of waste paper every week

Industrial Casualties Exceed Military Toll Since Pearl Harbor

Accidents in war plants account for four times as many lost man-hours as strikes with deaths and injuries occurring at the rate of 270 million lost man-days yearly, reports Office of War Information

WASHINGTON

ACCIDENTS in war plants are a major production and manpower problem, the Office of War Information reported last week on the basis of information provided by governmental and other agencies.

The seriousness of worker accidents is indicated by the following:

1. Industrial casualties since Pearl Harbor (to Jan. 1, 1944) are 37,600 killed—7500 more than the military dead; 210,000 permanently disabled and 4,500,000 temporarily disabled—60 times more than the military wounded and missing.

2. Injuries account for four times as many lost man-hours as strikes. Manufacturing has 50,000 workers absent every day because of accidents.

3. Deaths and injuries on the job are occurring now at the rate of 270,000,000 lost man-days a year, the equivalent of the withdrawal of 900,000 workers for a full year from the production lines.

4. Accidents cost employers $35 a year for every worker employed.

In two respects these facts appear favorable, according to safety authorities:

1. Deaths are only two-thirds as frequent per 100,000 workers in this war as in the last. Contrasting the greater tasks and accompanying strains on industry of this war to the last, the lessened percentage of fatalities is even more striking.

2. The loss of life and limb would be incalculably worse if management, government, labor, insurance companies and safety agencies had not been able to effect the most accelerated adoption of safety practices in industrial history.

Although a co-operative safety program on a national scale has been under way since before Pearl Harbor, it has not yet begun to catch up with the needs of the production lines that have mushroomed to meet the war emergency. According to Verne A. Zimmer, director, Division of Labor Standards, Department of Labor and chairman of the National Committee for the Conservation of Manpower in War Industries, a majority of the nation's 100,000 war plants are operating without realistic and effective safety programs.

The manufacturing industries have an average frequency rate of 20-lost-time accidents per million man-hours worked. This means 20 out of every 500 workers are injured or killed in a year. Such industries as mining, lumbering and construction are estimated to have a still higher rate.

In hundreds of plants a persistent "will to safety" has brought about a frequency rate that can be considered almost the irreducible minimum—rates of one to five per million man-hours.

It could almost be said that the accidents that happen are the ones that "have to" happen. In the figures for the country as a whole these companies compensate for those without adequate safety controls.

All agencies reporting to the Office of War Information concurred in the following statement of the problem and its solution:

Industry has proved through safety engineering experience, with records to show, that nine-tenths of all worker accidents can be prevented. The fatigue of workers, the strain on equipment and the rush conditions of wartime production make that percentage less possible of attainment but it stands as a goal. Many companies with long-established safety methods began their war production with safety preparedness. The plants which have been most spectacular in reducing accident frequency are those in which management and labor, using government-industry facilities, pool their resources to operate against unsafe factors—factors which are both physical and psychological.

The experience of these safely operating plants has shown that a second front on safety is needed, one based on the initiative of both workers and management in taking individual plant safety programs out of the realm of superficial front-office promotion and superficial worker acquiescence and making it a live daily issue in the human contacts at the production-line level.

EXPORT FREIGHT RECORD

Railroads handled without serious congestion in 1943 the greatest volume of export freight traffic on record, according to the Association of American Railroads.

Cars of export freight unloaded at all ports in this country in 1943 totaled 1,401,186 compared with 893,576 cars in 1942, an increase of 67 per cent, and an increase of 147 per cent above that handled in 1940.

The number of cars unloaded at North Atlantic ports in 1943 was more than 75 per cent greater than the number handled in 1918 in the first World War. Due to the fact that the average tonnage per car in 1943 was considerably more than it was in 1918, the volume of tonnage was even greater than indicated by the increase in the number of carloads.

Maritime Commission Honors Shipbuilders, Manufacturers

Maritime "M" awards have been granted to seven manufacturing companies and two shipyards and gold star awards were presented to five shipyards and 35 manufacturing companies. The recipients are as follows:

J. A. Jones Construction Co. Inc., Brunswick, Ga.
St. Johns River Shipbuilding Co., Jacksonville, Fla.
Colonial Foundry Co., Louisville, O.
C. Lee Cook Mfg. Co. Inc., Louisville, Ky.
Steames Co., Chicago.
Los Angeles Steel Casting Co., Los Angeles.
Monarch Forge & Machine Works, Portland, Ore.
Wickes Boiler Co., Saginaw, Mich.

Star awards to shipyards made recently were as follows:

Concrete Ship Constructors, National City, Calif., first gold star.
Delta Shipbuilding Co. Inc., New Orleans, seventh gold star.
Houston Shipbuilding Corp., Houston, Tex., eighth gold star.
Ingalls Shipbuilding Corp., Pascagoula, Miss., first gold star.
Southeastern Shipbuilding Corp., Savannah, Ga., first and second gold stars.

First star awards have been made to the following manufacturing companies:

Air Preheater Corp., Wellsville, N. Y.
Air Reduction Co. Inc., New York.
Bevis Machine Co., Middletown, O.
General Cable Corp., New York.
Ingalls Iron Works Co. Inc., Birmingham, Ala.
Birmingham Tank Co., Birmingham, Ala.
Lynchburg Foundry Co., Lynchburg, Va.
Martin-Parry Corp., York, Pa.
Pennsylvania Range Boiler Co., Philadelphia.
Reading-Pratt & Cady division, American Chain & Cable Co. Inc., Philadelphia.
Union Metal Mfg. Co., Canton, O.
Watkins Inc., Wichita, Kans.
Westinghouse Electric & Mfg. Co., Philadelphia.

Second star awards were presented to the following companies:

American Locomotive Co., Dunkirk, N. Y.
Cooper-Bessemer Corp., Mt. Vernon, O.
Davis Engineering Corp., Elizabeth, N. J.
Enterprise Wheel & Car Corp., Bristol, Va.
Erie Forge Co., Erie, Pa.
Federal Telephone & Radio Corp., Newark, N. J.
A. P. Green Fire Brick Co., Mexico, Mo.
Homestead Valve Mfg. Co. Inc., Coraopolis, Pa.
Isaacson Iron Works, Seattle.
M. W. Kellogg Co., Jersey City, N. J.
Linde Air Products Co., New York.
Minneapolis-Moline Power Implement Co., Minneapolis.
National Russel & Erwin Mfg. Co., New Britain, Conn.
Security Engineering Co. Inc., Whittier, Calif.
Selby, Battersby & Co., Philadelphia.
Tube Turns Inc., Louisville, Ky.
P. J. Walker Co., Los Angeles.
Whitin Machine Works, Whitinsville, Mass.
Wickwire Spencer Steel Co., New York.
Wilson-Snyder Mfg. division, Oil Well Supply Co., Braddock, Pa.
Young Iron Works, Seattle.

NAM Publishes Study of Industrial Health Problem

A wartime guide to the industrial health of war workers was published recently by the National Association of Manufacturers in an unusually comprehensive study of workers' health.

The booklet, entitled *Health on the Production Front*, is the compilation of surveys and studies made of the health problem within the nation's plants, factories and shops during the past year. Dr. Victor G. Heiser, medical authority and medical consultant of the NAM, directed the preparation of the booklet.

The booklet covers every plant health problem from absenteeism to vitamins. It points out the job industry faces in rehabilitation and expands on such details as the value of music for war workers. The most effective methods for utilizing manpower in the healthiest way possible is suggested to industrial management.

BRIEFS . . .

Anstice Co. Inc., Rochester, N. Y., is the new name of the Josiah Anstice & Co. Inc.

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Dayton Rogers Mfg. Co., Minneapolis, has available for free distribution two sizes of decimal equivalent chart calendars.

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G. S. Rogers & Co., Chicago, have published a new bulletin on the subject of liquid bath carburizing salts and casing salts. It is the second bulletin of a series on heat treating salt.

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Worner Electronic Devices, Chicago, now has available a bulletin covering the operation of photo-electric devices for automatically controlling equipment for production, safety, lighting, etc.

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Titeflex Inc., Newark, N. J., is the new name of Titeflex Metal Hose Co.

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Formica Insulation Co., Cincinnati, has under construction a new cafeteria which will seat 500 persons.

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Revolvator Co., North Bergen, N. J., has published a folder titled, "The Art of Piling for Modern Industry."

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National Coal Publications, Pittsburgh, has just completed the twenty-first edition of MacQuown's coal directory and buyers guide.

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Western Electric Co., New York, has leased 200,000 square feet of floor space in two industrial buildings at Lincoln, Nebr., which will be devoted to war production.

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Philco Corp., Trenton, N. J., reports that production of industrial storage batteries totaled an estimated $66,000,000 in 1943, a 10 per cent increase over the preceding year.

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Western Cartridge Co., New Haven, Conn., due to unanticipated profits voluntarily returned $20,000,000 to the government.

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Metallizing Engineering Co. Inc., Long Island, N. Y., has published catalog 42B describing metallizing guns, wires, surface preparing tools and other metallizing accessories.

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Republic Steel Corp., Cleveland, reports that its blast furnace at Warren, O., broke its production record in December for the third successive month, bettering its previous record by more than 175 tons.

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Diebold Inc., Canton, O., has published an anniversary issue of its weekly sales bulletin "Contact".

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Food Machinery Corp., Riverside, Calif., which has been building amphibian landing barges, will be expanded into an assembly plant due to increasing demand for barges.

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Ingersoll Steel & Disc Co., New Castle, Ind., paid a $40,000 Christmas bonus to employes, including those inducted into the armed forces.

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Graham Transmissions Inc., Milwaukee, has appointed five sales engineering organizations as representatives. They are: Frank Campbell Coe, Commercial Trust building, Philadelphia; John B. Foley Jr. Co., 249 Erie Boulevard, west, Syracuse, N. Y.; Paul M. Kline, 2030 E. Twenty-second street, Cleveland; Bruce W. Rogers, 850 South High street, Akron, O., and D. W. Smith, 149 Broadway street, New York.

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Industrial Gear Mfg. Co., Chicago, has purchased the building and property at 4539 West Van Buren street which it has occupied during the past four years.

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Powdered Metal Products division, Midland Die & Engraving Co., Chicago, has added facilities for fabrication of powdered metal parts.

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Bethlehem Steel Co., New York, has acquired the plant and business of Atlas Steel Barrel Corp., Bayonne, N. J.

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Kellogg division, American Brake Shoe Co., Rochester, N. Y., has acquired the Crown Spray Gun Mfg. Co., Los Angeles.

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Foote Bros. Gear & Machine Corp., Chicago, produced its one millionth high precision aircraft gear during 1943 on Dec. 30 of last year, an increase of 53.3 per cent over 1942 production.

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Robert H. Clark Co., Los Angeles, has completed a new plant at Beverly Hills, Calif., for the manufacture of adjustable cutting tools and automatic tapping machine conversion units.

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Laister-Kauffmann Aircraft Corp., St. Louis, has completed negotiations for the acquisition of the Bowlus Sailplanes Co., Los Angeles.

MAINTENANCE SUPERVISORS: At their third annual conference in East Pittsburgh, Pa., maintenance supervisors of the Westinghouse Electric & Mfg. Co. from all parts of the nation met to plan ways and means for improving service in the field. Seated from left to right are: F. H. Stohr, East Pittsburgh; R. R. Benson, Boston; H. E. Becker, San Francisco; W. R. Jacobs, Chicago, and K. T. Shaw, New York. Standing, first row: H. R. Meyer, East Pittsburgh; L. C. Moore, East Pittsburgh; D. A. Roberts, East Pittsburgh; A. W. Rose, Atlanta, Ga., and J. J. Monroe, Philadelphia. Standing, second row: H. L. Huntley, Pittsburgh, and L. W. McLeod, St. Louis

THE BUSINESS TREND

Uncertainty Increased by Cutbacks, Other Problems

UNCERTAINTY continues to be the keynote of the industrial picture. Cutbacks breed confusion, particularly in cases where a company cannot switch to other war work and yet is unable to move into production of civilian goods. With some government agencies presenting contradictory reports on the labor supply, the true labor situation is anyone's guess. Disposal of surplus goods, renegotiation, taxes, etc., are other factors adding to management's state of uncertainty.

Industrial production continues at high levels. Steel and coal output has regained the ground lost during the recent wage controversies. Average daily output of petroleum is up moderately, and construction volume has achieved the highest weekly total recorded since midsummer of 1943.

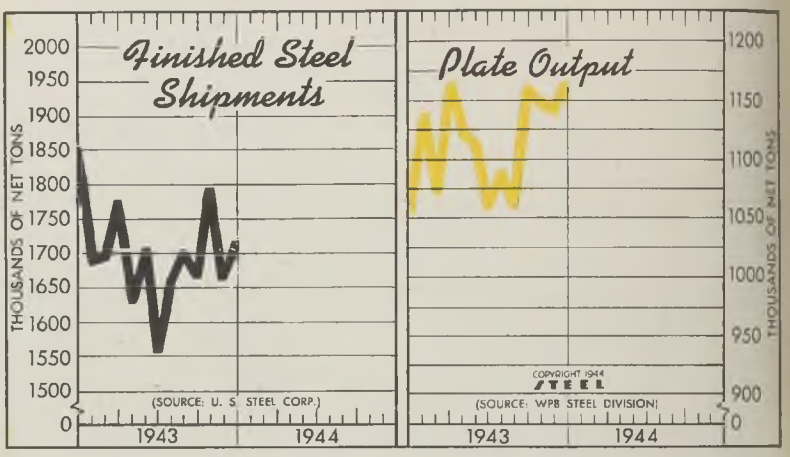
CONTRACT CUTBACKS — Net placement of war contracts is being sharply reduced by cutbacks and revisions of earlier awards. The effect is best shown by October figures, latest available, with net volume totaling around $3,000,000,000. Net aircraft awards amounted to slightly over $500,000,000, only about one-fourth of the third-quarter rate. Total value of all major contracts awarded since June of 1940 was $175,300,000,000.

Chicago industrial area secured the largest volume of awards, or $400,000,000, and took third position in the list of leading war-contract centers. Detroit received contracts to a total of about $200,000,000. New York, Philadelphia, and Cleveland made good gains, but Los Angeles, Newark-Jersey City, and Buffalo were adversely affected by contract revisions.

FARM MACHINERY—By July, output of farm implements and machinery is expected to reach its 1944 goal, or 80 per cent of the relatively high volume produced in 1940. Production of 125,000 tractors is included, compared with 25,000 units in the 12 months ending July, 1943. Trucks and replacement tires are expected to be the main tight spot.

LIVING EXPENSES—Increase of 0.2 per cent in living costs of U. S. wage earners and lower-salaried clerical workers during December is reported by the National Industrial Conference Board. Purchasing power of the dollar (basis: 100 cents per dollar in 1923) was 96.2 cents for December, against 96.4 cents per dollar in November and also October. Level of living costs was 2.8 per cent higher than that recorded a year ago.

CONSTRUCTION VOLUME—Volume of civil engineering construction for the latest period reached the highest figure since last July, the total being 357 per cent above that of the preceding weekly period and 86 per cent more than the figure for the comparable week of 1943. Private construction declined 28 per cent as against the previous week's total, but increased 79 per cent as compared with the corresponding week of last year. Public construction was 86 per cent higher than a year ago.



Steel Shipments†—Plate Production‡

	Shipments		Plate Output	
	1943	1942	1943	1942
January	1685.9	1738.9	1135.4	754.5
February	1691.6	1616.6	1072.0	758.7
March	1772.4	1780.9	1167.7	878.7
April	1630.8	1758.9	1121.6	895.9
May	1706.5	1834.1	1114.9	1012.2
June	1552.7	1774.1	1056.1	1050.9
July	1661.0	1765.7	1089.7	1124.1
August	1704.5	1788.6	1060.9	1097.9
September	1664.6	1703.6	1106.4	1061.8
October	1794.9	1787.5	1146.8	1101.4
November	1660.5	1665.5	1141.8	1013.0
December	1719.6	1849.6	1169.2	1060.0
Adjusted total	20,244.8	21,064.2	13,382.4	11,799.6

†U. S. Steel Corp. ‡War Production Board.

FIGURES THIS WEEK

INDUSTRY	Latest Period*	Prior Week	Month Ago	Year Ago
Steel Ingot Output (per cent of capacity)	99.0	96.5	98.0	99.0
Electric Power Distributed (million kilowatt hours)	4,539	4,568	4,542	3,952
Bituminous Coal Production (daily av.—1000 tons)	2,062	1,725	2,158	1,850
Petroleum Production (daily av.—1000 bbls.)	4,375	4,366	4,363	3,947
Construction Volume (ENR—unit $1,000,000)	$98.7	$21.6	$26.8	$53.1
Automobile and Truck Output (Ward's—number units)	17,770	18,090	18,850	18,380

*Dates on request.

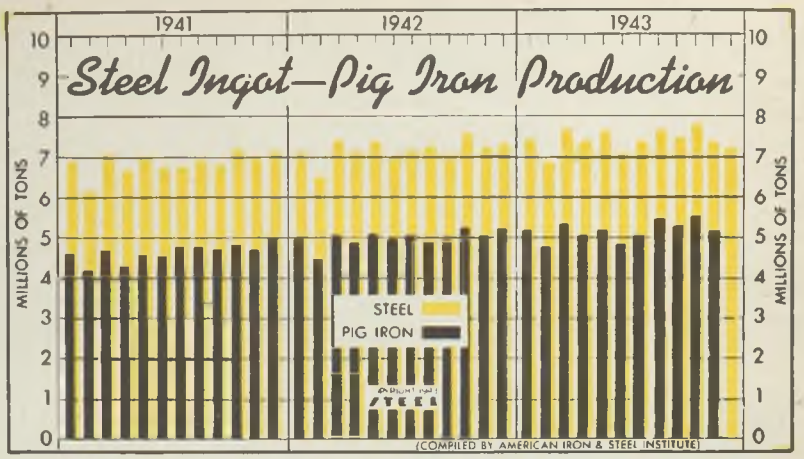
TRADE				
Freight Carloadings (unit—1000 cars)	778†	763	768	755
Business Failures (Dun & Bradstreet, number)	39	31	42	96
Money in Circulation (in millions of dollars)‡	$20,404	$20,436	$20,235	$15,322
Department Store Sales (change from like week a year ago)‡	−6%	+22%	+7%	+5%

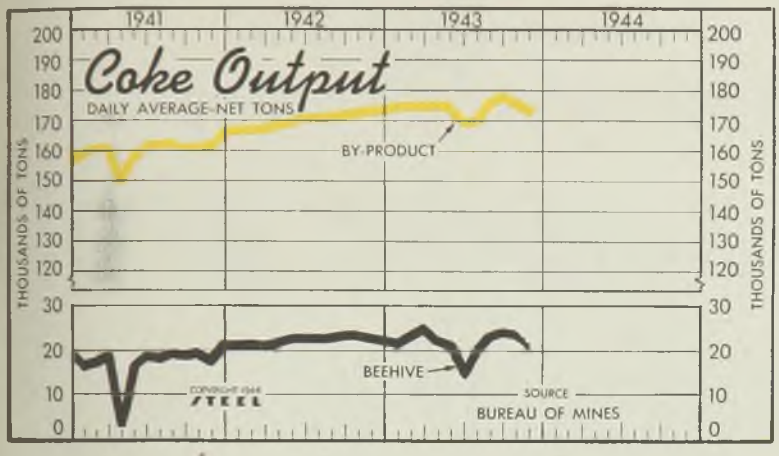
†Preliminary. ‡Federal Reserve Board.

Iron, Steel Production

(Net tons—000 omitted)

	Steel Ingots		Pig Iron	
	1943	1942	1943	1942
Jan.	7,424	7,112	5,194	4,983
Feb.	6,826	6,513	4,766	4,500
Mar.	7,670	7,392	5,314	5,055
Apr.	7,374	7,121	5,035	4,896
May	7,545	7,383	5,173	5,073
June	7,027	7,015	4,836	4,935
July	7,376	7,145	5,023	5,051
Aug.	7,562	7,228	5,316	5,009
Sept.	7,489	7,058	5,226	4,937
Oct.	7,786	7,580	5,324	5,236
Nov.	7,374	7,180	5,096	5,083
Dec.	7,266	7,305	.....	5,201
Total	88,873	86,030	.....	59,959





Coke Output
Bureau of Mines

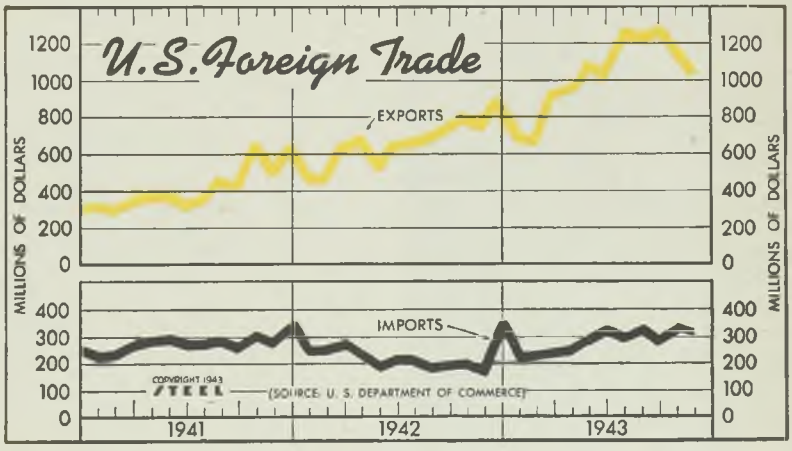
(Daily average—Net tons)

	By Product		Beehive	
	1943	1942	1943	1942
Jan.	174,044	168,508	21,440	20,874
Feb.	175,107	168,414	23,991	21,771
Mar.	175,051	167,733	24,369	21,032
Apr.	175,857	168,960	22,932	21,843
May	174,240	170,187	21,270	22,571
June	168,735	170,593	14,055	22,487
July	169,936	170,400	20,009	22 300
Aug.	176,396	171,443	23,102	22,333
Sept.	178,090	172,110	23,637	23,106
Oct.	175,492	172,211	23,495	23.148
Nov.	171,594	173,029	20,421	22.106
Dec.	.....	173,163	.....	22,000
Average	.....	170,549	.....	22,122

Foreign Trade
Bureau of Foreign and Domestic Commerce

(Unit Value—$1,000,000)

	Exports			Imports		
	1943	1942	1941	1943	1942	1941
Jan.	751	479	325	228	253	229
Feb.	732	478	303	234	253	234
Mar.	984	611	357	248	272	268
Apr.	963	695	385	257	234	287
May	1,069	525	385	281	191	297
June	1,004	618	330	302	215	279
July	1,251	627	359	300	214	278
Aug.	1,205	694	455	315	184	282
Sept.	1,233	718	417	280	196	263
Oct.	1,185	776	666	329	199	304
Nov.	1,036	750	492	318	174	280
Dec.	....	853	651	....	356	344
Total	....	7826	5126	.....	2743	3345



FINANCE

	Latest Period°	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—millions)	$8,963	$9,742	$9,127	$7,582
Federal Gross Debt (billions)	$170.3	$170.3	$169.9	$113.3
Bond Volume, NYSE (millions)	$97.2	$72.4	$54.9	$76.9
Stocks Sales, NYSE (thousands)	4,698	4,429	4,197	4,261
Loans and Investments (millions)†	$49,527	$49,734	$50,535	$41,344
United States Government Obligations Held (millions)†	$36,033	$36,109	$36,823	$28,025

†Member banks, Federal Reserve System.

PRICES

STEEL's composite finished steel price average	$56.73	$56.73	$56.73	$56.73
Spot Commodity Index (Moody's, 15 items)†	247.3	247.6	247.1	242.5
Industrial Raw Materials (Bureau of Labor index)‡	112.1	112.3	112.1	107.2
Manufactured Products (Bureau of Labor index)‡	100.4	100.3	100.4	100.2

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

Improved Technique Employed in Fabricating LARGE STEEL

EXPERIENCE gained by the American Welding & Mfg. Co., Warren, O., in the large scale production of turret rings for military tanks is expected to prove useful in turning out the company's normal, peacetime products.

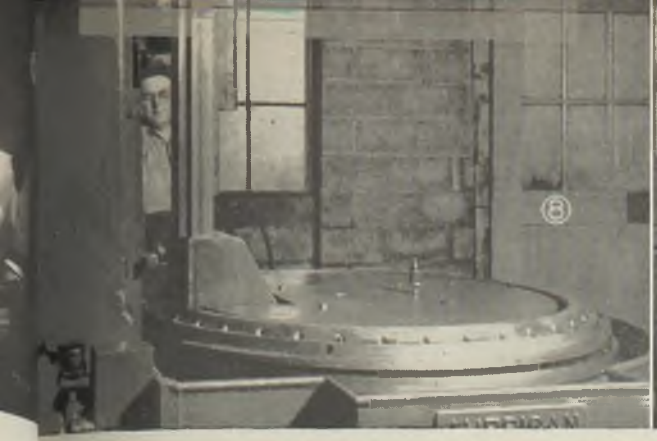
In ordinary times, American Welding specializes in the production of welded steel rings of all kinds, motor and generator frames, bearing races, gear blanks and similar products, most of which are fabricated from carbon steel. So, tackling a contract to produce tank rings several feet in diameter proved to be no particular problem for the company although it was necessary to use alloy steel and to form and machine the rings to extremely close tolerances. The rings must balance perfectly and be provided with multiple bearing and close fitting surfaces.

Each turret really has three rings fitted together in an assembly. Alloy steel with high percentages of chromium and molybdenum is used in making them. This steel comes from the mill with the cross section rolled nearly to the finished contour desired.

The first step in fabricating is to heat the steel to about 1200 degrees Fahr. in heating furnace, shown at right in Fig. 1. Then it is formed into a ring in a ring forming press, left in Fig. 1.

After cooling, the ring is moved on to a welding table, Fig. 2, where the ring joint is flash welded.

Then back it goes into the furnace. After reheating, the ring is pulled from the furnace with a tractor, Fig. 3, and taken to a sizing ring, Fig. 4, which



By GEORGE R. REISS

...RINGS

stretches the piece to the proper diameter.

A 500-ton hydraulic flattening press, Fig. 5, then is used to flatten the ring. In the next operation, the ring is checked against close ordnance hardness specifications. The ring then is ready for machining department, Fig. 6.

Its first step is at the 100-inch boring mill, Fig. 7, where it is machined to exact shape. Other rings for the same assembly go to similar boring mills which cut them to proper shape.

Then the larger outer rings are ready for the broaching machine, Fig. 8, which automatically indexes its cuts to form 330 teeth into the ring in an hour.

Other rings of the same assembly go to a dual drill press, Fig. 9, which drills the holes for attaching the ring to the tank or turret. Then tapping machines form the threads as shown in Fig. 10. There are about 100 tapped holes in three rings making up a single turret-ring assembly. Incidentally, American Welding uses a blind man and a partially blind man on two of the tapping units, finding them both very efficient and skillful workmen.

Next step in the operation is to flame harden the rings, Fig. 11, one of the most interesting steps in the whole procedure. Heat treating the whole ring before machining was virtually impossible with the furnace and quenching facilities available in the plant when the war came. In addition, the physical properties of quenched and drawn rings made it very difficult to perform the machining operations. Heat treating after machining was found impractical because this distorted the rings, greatly increasing the rejections of units on which much expensive work had been done. Besides these handicaps, the approximately 100 holes in the rings had to be plugged either with copper or powdered asbestos to prevent damage to the threaded interiors during heat treatment.

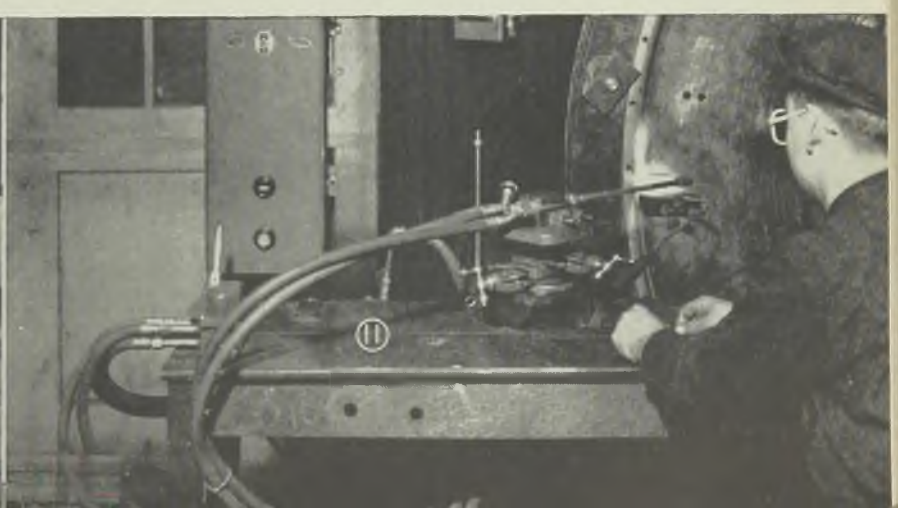
So, flame hardening was selected to harden the three faces forming the bearing race on which the turret revolves. Specially designed flame heads heat the contours of the races uniformly and rapidly. With flame hardening, hardness has been found uniform, distortion negligible, and the surface does not require additional machining or grinding.

The specially designed flame heads also carry ports for water jets which quench the race immediately after the flame passes. Circular jigs hold the rings vertically and rotate them past the flame at the proper speed to attain the right heat before quenching. The engineers found this vertical jig had several advantages over mounting the rings on an angle—including increased ease and speed in loading or unloading the work from the jig tables. Most important was the more certain elimination of distortion in the rings through quenching the rings completely by immersing them in a tank filled with a cooling medium, water containing 1 to 1.5 per cent soluble oil.

Straight water quenching was tried first but it was found that the less drastic quench was more desirable, and the oil also prevents rusting of the ring and jig.

Engineers frequently check flame hardening results, using rings rejected for other faults and testing them by sectioning and etching portions.

Final stop is the assembly station where the three rings are fitted together. Ball bearings are fitted in with brass retainers. A huge weight, scaling the same as a completed turret and gun, then is bolted to the ring to test its smooth, free operation around 360 degrees of the compass.



HIGH-PRODUCTION Flame Cutting

. . . . speeds fabrication work. Improved procedures on one job raise man-day output from 72 to 112 pieces. Detailed technique in plant of Lukens subsidiary described

By HAROLD LAWRENCE

MOST EVERYONE is familiar with the great contributions that flame cutting has made and is making toward the winning of the war. Many are aware that the prodigious production in the shipbuilding industry owes much to the cutting torch. Likewise the cutting work that is done as a matter of course in every fabricating plant is well understood. However, there are not many who fully appreciate the role of custom cutters such as the By-Products Steel Corp., division of Lukens Steel Co., Coatesville, Pa.

Through refinements in procedure, By-Products Steel Corp. has been able to increase production considerably. For example, on one part multiple torches were turning out 72 pieces per man day after the job got rolling, but a few changes brought this rate to 112 pieces per man-day. Look at the tank sprockets in Fig. 5 as a case in point. Once cut, these sprockets are cleaned to remove all adhering scale, after which they go into a furnace for heat treating and then to the machine shop for finishing.

Largest volume of parts has been for 3 and 5-inch Navy gun mounts, Liberty and Victory ship deck parts, tank parts. Other items also made in large quantities include strainer plates such as that shown in Fig. 2 for cargo vessels, mooring bits, pad eyes and fender guards, giant gear case parts, intricate diesel engine parts and the component parts of the cross head for a marine steering gear mechanism.

In order to undertake a comprehensive review of actual flame-cutting operations in the plant of a custom cutter, it may be well to follow the work through the normal sequence of operations including layout, template making, cutting, cleaning and repairing, heat treatment and inspection.

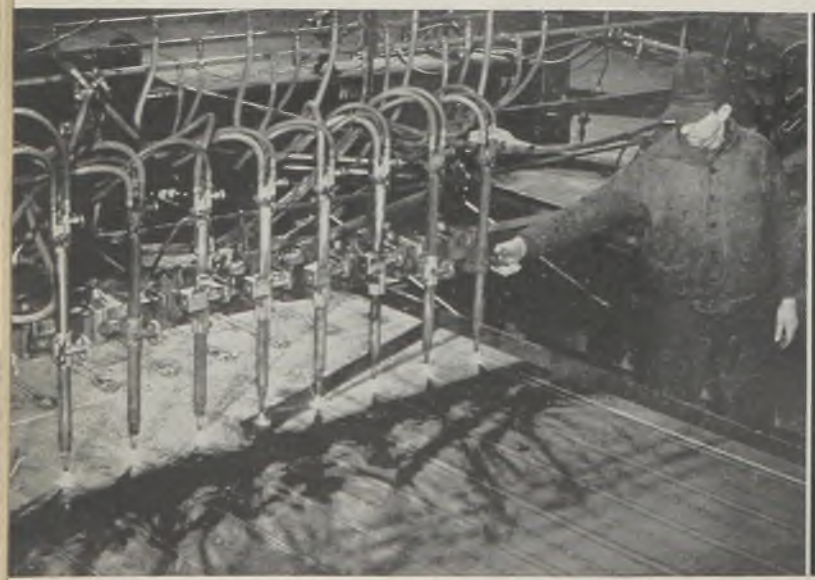
Design, the first step in the cutting program, includes in addition to the physical dimensions of the plate to be cut such factors as chemical and mechanical properties. Frequently the plate is available in stock while in other cases the steel must be made to specification.

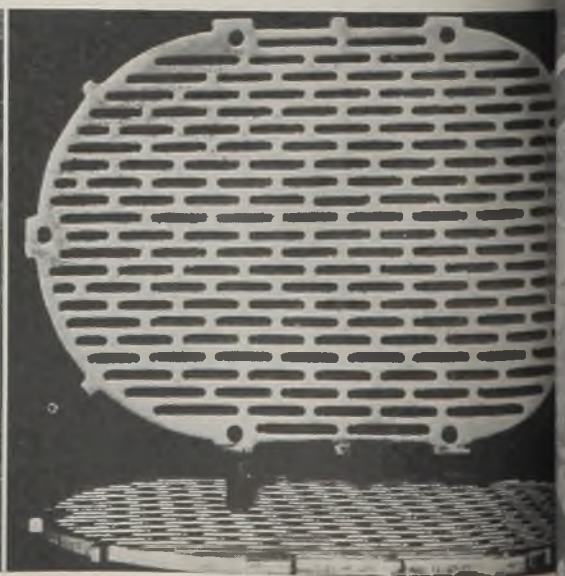
Appropriate templates for cutting are made of several different materials including paper, aluminum or steel plate on which the pattern is scribed. These can also take the form of a steel plate from which the pattern is cut or a steel plate on which an aluminum track for the torch head is riveted. The type of template used depends upon the number of pieces to be cut and the accuracy needed as well as being a function of the cutting equipment with which the work is to be performed.

Paper templates are used where a few parts are to be cut. The template is designed to allow for the cutting kerf and to provide for the contraction that takes place when the steel cools. Paper templates cannot be used, however, where extremely close tolerance limitations must be met as paper changes as much as ⅛-inch per foot in size with

Fig. 1 (Left below)—Here ten torches simultaneously cut steel plate for further fabrication. Note overhead gas manifold and the careful arrangement of the connection

Fig. 2 (Below)—Strainer flame cut from steel plate for use on cargo vessels. A hole is drilled at each end of each slot, remainder of cutting done by torch





nevitable variations in the humidity.

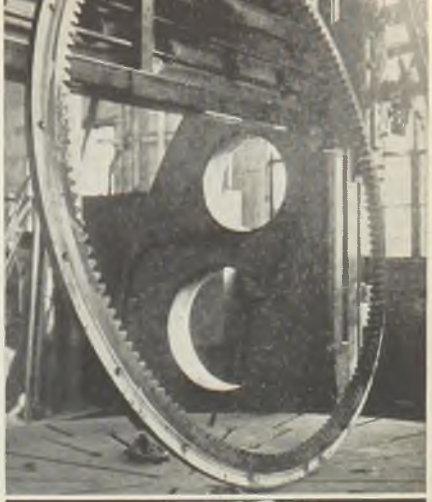
For greatest accuracy, templates are cribed on steel or aluminum plate. An dvantage of steel is that changes in dinension with room temperature variaions are alike for both template and tock to be cut.

Adherence to pattern is the responsiility of the operator who guides a tracng wheel over it. Where many parts are to be cut, templates are equipped with a track or arranged for a magnetic cam. In the first type the contour of the shape desired is scribed on steel plate or board. An aluminum track is formed to fit this contour and the track is fitted to the backing. In operation two knurled wheels fit over the track following it to guide the cutting torch.

With the second type of template, a steel shape is produced from plate. A magnetic cam follows the edge of the template and thereby directs the cutting torch or torches. Such templates leave the operator free to observe the operation of his torches and are especially desirable when several torches are being operated simultaneously.

Templates are placed on pattern tables which are adjacent to the cutting tables and sufficiently large to accommodate the patterns which are positioned time and again as the plate is cut. Tables must be level, smooth and sturdy enough to permit the operator to move about without disturbing the pattern. To keep the operators comfortable during cold weather, the pattern tables are provided with underneath heaters.

Adherence to pattern has reached rather extraordinary limits of precision on some jobs. A variation of no more than 1/32-inch has been achieved while an ordnance job calling for tolerances of minus zero, plus 1/16-inch is now in production. Routine work with toler-



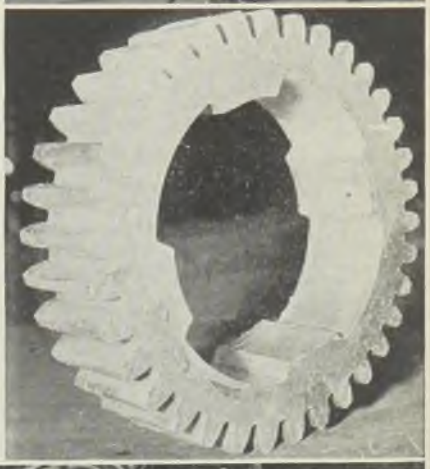
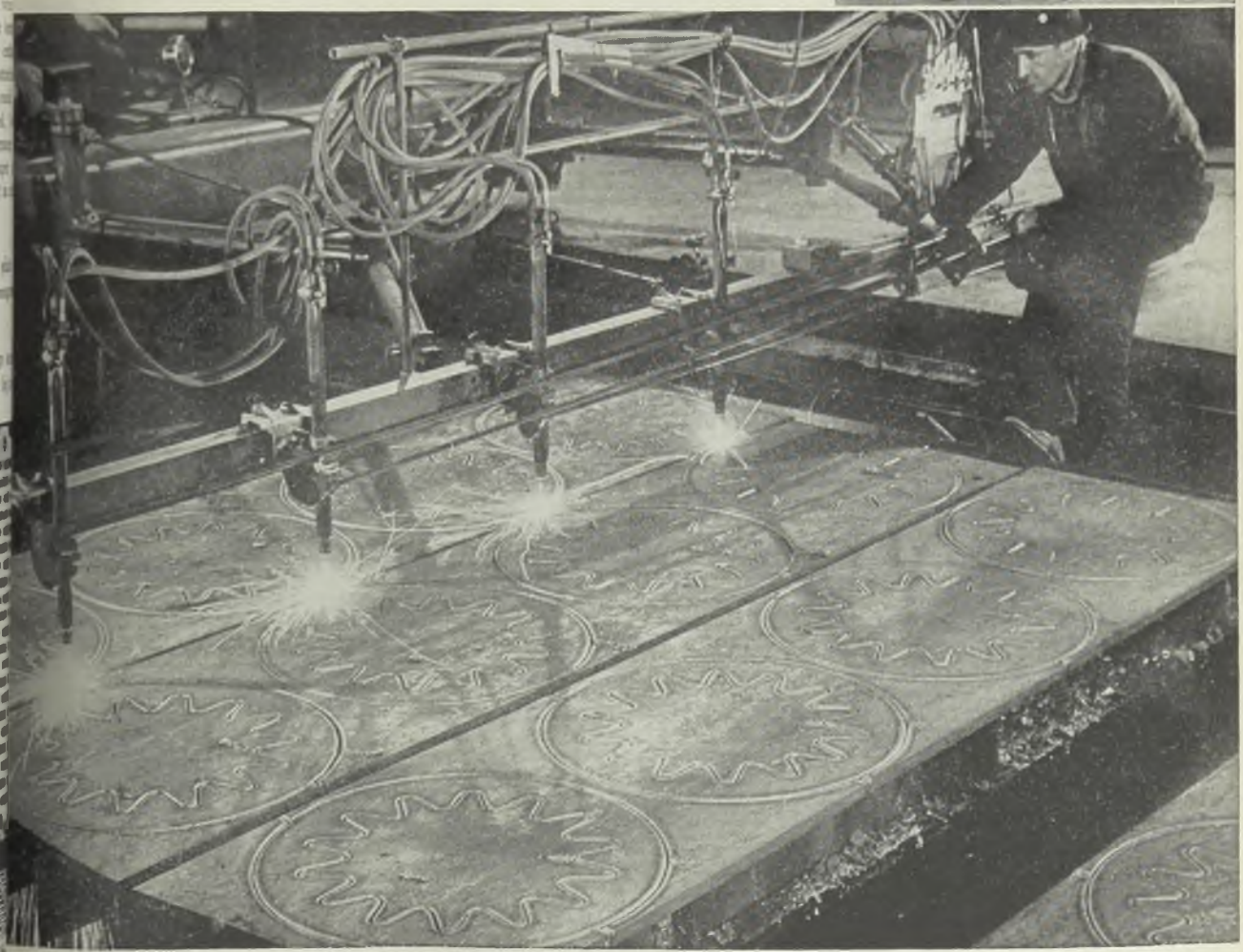


Fig. 3 (Above right)—With outside diameter of 120 inches, this gear was flame cut from 3-inch thick plate for a 2500-horsepower compressor motor. So accurate was the flame cutting that the teeth require no machining

Fig. 4 (Right)—Flame cut from steel plate in 5 hours, this drive gear replaced a broken cast gear on a steel mill. Gear was installed after only a small amount of machining on the inside diameter

Fig. 5 (Below)—Tank sprockets are flame cut on multiple torch setup. Operator watches while template at extreme right guides torches



ance limits of plus or minus 1/16-inch is regularly carried through the production line.

Plate thicknesses that pass under the torches range from ⅛ to 30 inches. These are cut to make parts either singly or in multiples as high as ten at one time. Fig. 1 shows ten torches simultaneously cutting plate sections that are to be fabricated by Lukenweld Inc. Incidentally although much multiple cutting is performed, stack cutting is not used. Cutting equipment includes Airco, Harris Calorific, Oxweld and Smith.

No special surface preparation is necessary although 5/16-inch and lighter plates may require grinding or sand blasting when the surface shows heavy oxidation or is contaminated with grease. Heavier plates are cut by slowing the torch travel slightly to allow for off-grade surfaces. Usually new plates are cut and mill finish offers no trouble at all.

Natural gas from Kentucky is used for preheating while the Driox system furnishes the huge volume of oxygen necessary. Some difficulty was experienced with natural gas at first but a gradual increase in operating pressure solved the problem. At the present, an operating pressure of 43 pounds per square inch enables the operators to pierce holes in heavy plates as rapidly as can be done with any other preheating gas. Plant engineers feel that quite large volumes of natural gas must be consumed before any savings may be had.

Diversified Sizes and Shapes

Oxygen is furnished in liquid form from a Linde "Driox" oxygen installation. After gasifying, the oxygen is pumped throughout the plant at a pressure of 150 pounds per square inch for distribution to points of use.

Cutting machines handle a diversity of sizes and shapes and in rectangular sections as large as 12 by 80 feet. Travographs, pantographs, camographs and radiographs are among the types in regular operation. Some are quite complex while others are extremely simple. The large machines are used for special shapes while the smaller units are devoted to simple cuts such as straight lines and circles.

Work is done on special cutting tables with steel strips inserted on edge in slots to provide a good support for the pieces and yet permit a smooth progression of the cutting stream. As soon as the supporting strips have been largely burned away, they are lifted out and new ones are inserted in the same slots.

Another excellent idea is the hinged undertray with which each table is equipped. The tray is lowered to remove slag or, when cutting small pieces, these are retrieved in the same manner instead of trying to sort a mixture of slag and stock from a conglomerate heap of material on the floor.

All deviations from prescribed methods must be approved by experienced supervisors who know what quality of cut is needed and what adjustments of speed and pressures may be permitted. Even when one operator succeeds another on the same setup, as happens when the shifts change, permission for deviation from standard must be obtained from the new foreman. In addition cutting supervisors check on adherence to cutting standards.

After the various shapes leave the cutting tables they are cleaned of all adhering slag before going to the checking department. Trained checkers or layout men inspect the cut parts for dimensions, surface, flatness, proper marking and quality of cut. They also check the part for its end use whenever they are provided with a final assembly drawing.

Hand Beveling Most Satisfactory

This checking work is performed after the first cut and does not constitute a final inspection, for the shapes often require additional cutting to provide bevels for welding. Many types of bevels are made, often the most satisfactory method of beveling is the hand torch although long straight bevels and bevels along a large diameter simple circle are done by machine. Irregular shapes cannot be so produced with bevels. However, By-Products engineers are working on a machine that will enable them to cut bevels automatically on some irregularly shaped parts.

Hand beveling can approach very closely to the accuracy of machine beveling when employing skilled cutters. Such beveling eliminates slower and more costly machining that would otherwise be required. Sometimes the bevels are ground, particularly where submerged melt welding is to be used later. Parts are again inspected after bevels are completed. Three Magnaflux stations are used for inspecting flame cut edges and whenever bad spots are located the piece is routed to the repair department.

Slag removing, chipping and welding are performed in one central location. Two types of racks for holding the work are provided. One is a tremendous plate of 1½-inch steel set 12 inches off the floor and provided with 15 slots 27 inches long by 3½ inches wide. A generous border surrounds the slots.

The second type of rack, also of 1½-inch plate, is set on edge with the slots cut from the top down instead of through the central area of a horizontal plate as in the first type. This positioning rack is 21 feet long with slots 10½ inches deep by 2½ inches wide. The arrangement is simple and effective as the men can place the parts in any of several different positions. Slag cleaning and chipping are performed with the usual pneumatic tools. Welding of repairs is done at the same point with 400-ampere direct-current single-operator sets.

Frequently, pieces need to be straightened after cutting, for which a 500-ton press and a 750-ton unit are used. Pieces can be held to a flatness tolerance of

(*Please turn to Page* 90)

Determining Defects in Forgings

AS AN AID in determining possible defects in forgings, Dr. George Sachs, Department of Metallurgical Engineering, Case School of Applied Science, Cleveland, has worked out the tabulation presented here. Doctor Sachs is well known for his many contributions to our knowledge of metallurgy and draws his conclusions from a wealth of experience in connection with forging operations.

In the accompanying tabulation, the first column details the type of defect or trouble that may be encountered. Then in adjoining columns, the possible causes are broken down according to material, design, processing. Note that headings include many related phases of the problem such as alloy composition of the part, melting and pouring practice, processing of the stock, heating prior to forging, forging equipment, design of the forging, forging operations, heat treating.

In a good many cases, there are two or more possible causes; in each case, the explanation in the table may afford a valuable clue to the particular one that may be responsible for the trouble under examination. It is believed that a study of this table may provide considerable assistance in those cases where difficulties are being encountered in forging.

It should be used more as a check list than as a final authority, because a particular trouble may involve more than one defect with possible complication of causes. Reference to this tabulation, however, will usually be of help in running down the cause of the trouble.

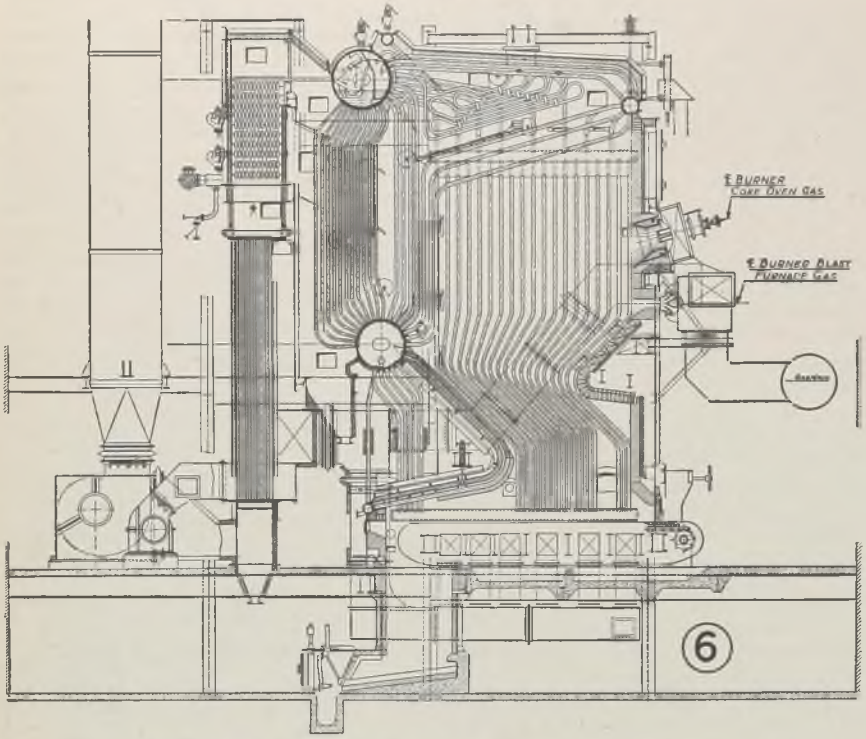
Additional copies of this tabulation may be had by addressing Readers Service Department, STEEL, 1213 [illegible] land 13.

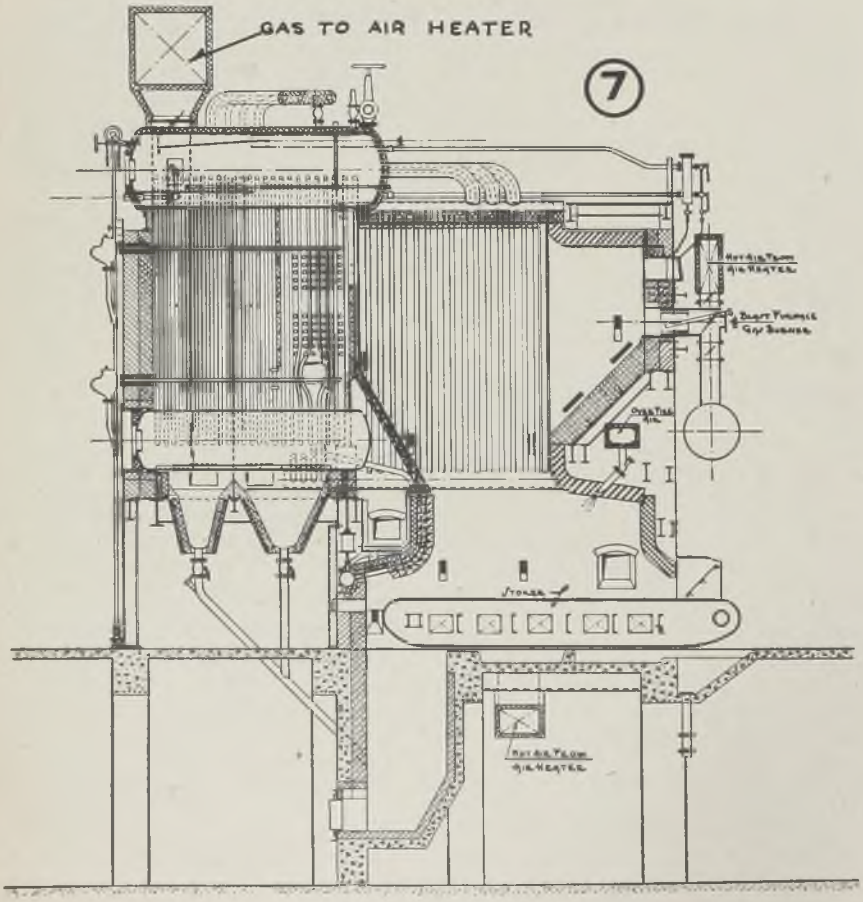
FORGINGS AND POSSIBLE SOURCES

Type of Defect	Alloy Composition	Melting, Pouring	Processing Stock	Heating Prior to Forging	Forging Equipment	Design of Forging	Forging Operation	Heat Treating
OUT OF TOLERANCE								
...t sections and ...rbs. etc., too thick	Too hard	.....	.....	Too low	Not sufficiently rigid; worn dies rough dies	Sections too thin; not sufficient draft; flash too thin	Poor lubrication	.....
...pressions	.....	Slivers, etc.	Rolled in scale	.....	.....	Dies not vented; scale not removable	Trapped lubricant; not clean; hammered in flash; start of fold	.....
...ift, or centricity of cavity	.....	.....	Uneven edges	Not uniform	Not lined up; not guided; not sufficiently rigid	Presence of side thrust; position of stock not definite	Stock not placed properly	.....
...arping (Can be frequently eliminated by straightening)	Presence of transformations	.....	.....	Not sufficiently soaked	.....	Sections too thin; sections not symmetrical	Distorted on removing	Cooling too fast; cooling not uniform; not sufficiently supported
SURFACE BLEMISHES								
...isters, dark spots, slivers, scabs, seams	Impurities	Inclusions; blow holes; segregations; checks on ingot	Not clean folds in rolling; checks from rolling, etc.	Overheated (burned)	.....	.....	Too high speed	Overheated
...ard spots	Too high alloyed; impurities	Inclusions; segregations	Pick-up in rolling	Overheated	.....	.....	Pick-up in forging	.....
CRACKS, TEARS, CHECKS								
...neral	Too high alloyed; too pure (large grain); impurities; presence of transformations	Inclusions; segregations; blowholes; ingot pipe	Not sufficiently soaked; too cold; too hot; too small reductions; too large reductions; folds in rolling; improper heating	Overheated; not sufficiently soaked; too cold; too fast; improper atmosphere	Too light blows; too fast; dirty dies	Sharp corners; variations in section thickness; localized reduction; expansion of sections	Too fast; too slow; localized forging; not sufficient flash; open dies; not sufficient lubrication; folds in preforging	Heating too fast (overheated); cooling too fast; cooling not uniform
...rface cracks or checks	See "General" (above)	Inclusions; segregations; rough mold blowing of ingot	See "General"	See "General"	See "General"	See "General"	See "General"	Overheated; presence of residual stress
...sh cracks	Too high alloyed	Impurities; segregations	Not sufficient reduction; too much reduction (fibre); overheated	Overheated	.....	Flash too thin; flash at wrong place; too much flash	Too much stock; too much reduction	Overheated; cooling too fast
...side tears or "flakes" (in steel)	.....	Hydrogen in alloy steel; cooling of ingot too fast; segregations; ingot pipe	Too cold; broken up core (piercing, extrusion); too much reduction	.....	.....	.....	.....	Cooling too fast; residual stress
...aminations and "wood fiber"	Impurities; too high alloyed	Ingot pipe; segregations; inclusions	Too much reduction fiber); laps in rolling; too cold	Too cold	.....	Too much reduction	Too much reduction; too cold	Overheated
...olds, laps or cold shuts	Too hard	.....	Originating in rolling	.....	Not properly guided; not sufficiently rigid; not lined up	Too much upset; not properly preforged	Too light blows; too heavy reductions	.....
...ib "cracks", wall "cracks" (These are frequently folds and not cracks)	.....	.....	.....	.....	.....	Metal flows under rib or wall; too small radii	Improper preforging and trimming	.....
LARGE GRAIN, COARSE GRAIN OR OPEN GRAIN								
	Too pure; absence of grain refiner	Too hot	Large grain after processing	Overheated	Slow dress rather than hammer or vice versa	Not sufficient reduction	Surface only reduced too hot; too cold	Overheated
PIPES, SHELLS, ETC.								
	.....	Ingot pipe; large blowholes; segregations	Not sufficient reduction; too much reduction; broken up core; extrusion pipe; extrusion core (oxide); improper heating	Too cold	.....	.....	.....	.....

Steel Mill Boiler Units Use Supplementary Fuels

By M. H. KUHNER
Chief Mechanical Engineer
Riley Stoker Corp.
Worcester, Mass.





Induced Draft Fan Power: The weight of combustion gas passing over the heating surfaces while burning blast furnace gas is approximately 70 per cent greater for a given steam output rate than that for most other fuels. (See Table I). Gas passages of the steam generating unit can be proportioned to the volume of combustion gas from blast furnace gas. This, however, results in large physical dimensions and comparatively high initial installation cost, but also in a reasonably low overall draft loss between furnace and fan and therefore low fan power; or the area of gas passages may be proportioned more in relation to combustion gas volumes produced by supplementary fuels. Then the physical dimensions of the equipment will be less and initial cost lower. But draft losses through the system and the required induced draft fan power will be as much as two and one-half times greater. It simply means balancing initial investment against cost of induced draft fan power.

The induced draft fan motors of the installation shown by Fig. 1 were cut in half by so arranging heat recovery equipment (economizer and air heater), that during highest steam output rates with blast furnace gas part of the combustion gases bypass economizer and air heater. Maximum steam loads are carried with pulverized coal alone and with the full use of economizer and air heater in series. Coal must be purchased from the mine while blast furnace gas is a low cost by-product. It is important, therefore, that the highest efficiencies be obtained while coal is being burned. A slight sacrifice in efficiency by only partial use of heat recovery equipment when burning blast furnace gas during top load is well justified by fan power saving.

Four dampers are placed between the economizer and air heater. During normal load with either fuel and during top load with pulverized coal, the dampers are positioned as shown in Fig. 1. All combustion gases pass first over the econ-

Fig. 6—This boiler generates 100,000 *lbs. steam per hr. at* 425 *p.s.i.,* 700° *F. Fig. 7—This small boiler* (36,000 *lbs./hr.,* 285 *p.s.i.,* 715° *F.) has efficiency of* 78% *on gas*

In this concluding installment of Mr. Kuhner's treatise on steel mill boilers the author discusses quick-cleaning burners for blast furnace gas and a recently designed unit for handling four types of fuel either independently or in combination and summarizes the details of successful performance of steel mill boilers fired with blast furnace gas in combination with other fuels. In the first installment presented in last week's issue the author dealt with boiler, furnace and superheater design and control of combustion air

omizer and then through the air heater. An independent automatic control system receives its impulse from the static suction in the inlet boxes of the induced draft fans. When the maximum static suction of 10 inches H_2O is approached in the inlet to the fans, damper *A* slowly opens, while dampers *C* start to close to maintain a pressure differential of approximately 0.2-inch H_2O between the gas exit of the economizer and the entrance to the air heater. Thus part of the gas passes directly from economizer outlet to induced draft fan inlets.

If steam output continues to increase, the control opens damper *A* further and also damper *B*. Part of the combustion gas will then bypass both economizer and air heater. The control system is entirely independent of any other control and is fully automatic. It is a reliable protection against overloading of induced draft fan motors and insures that gas bypasses are used only during top steam load carried with blast furnace gas alone.

Combustion Air Temperature: Air heaters are the least costly heat recovery apparatus to use with steam generating units. All modern installations illustrated are equipped with air heaters for preheating the combustion air by heat recovered from flue gases. Heated combustion air is, of course, beneficial for the combustion of all common fuels but when burning blast furnace gas, hot air is especially desired to improve combustion conditions. It is not difficult to obtain combustion air temperatures as high as 550 or 600 degrees Fahr. with a comparatively small air heater while burning blast furnace gas. The great difference in weight between flue gas and combustion air produces about 250 degrees Fahr. air temperature rise for every 100 degrees Fahr. gas temperature drop. With coal firing corresponding figures are 130 degrees Fahr. air temperature rise per 100 degrees Fahr. gas temperature drop. For both cases it is assumed that all combustion gas passes through the air heated and that approximately 95% of the combustion air is heated.

Preheated air improves burner performance. A shorter and more stable flame is produced when preheated air instead of room temperature air is used with blast furnace gas. The reason is probably twofold: volume of a given weight of air at 550 degrees Fahr. is almost double that of the same weight at 70 degrees Fahr. The larger volume of combustion air of lesser density mixes more thoroughly with the gas to be burned, so that oxygen in the air comes quickly in intimate contact with combustible gas. Hot air raises the mixture's temperature

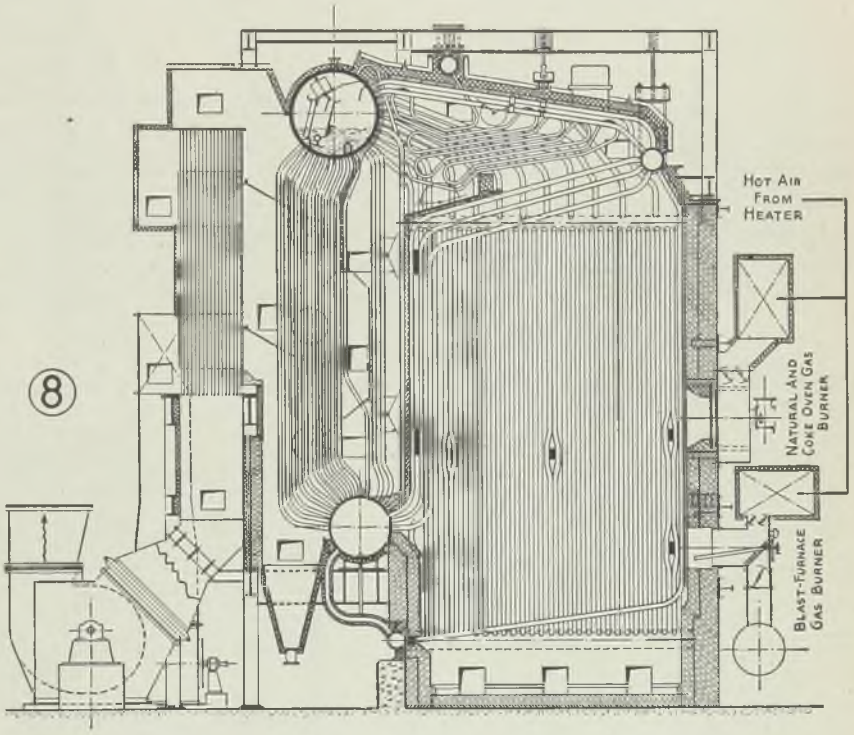
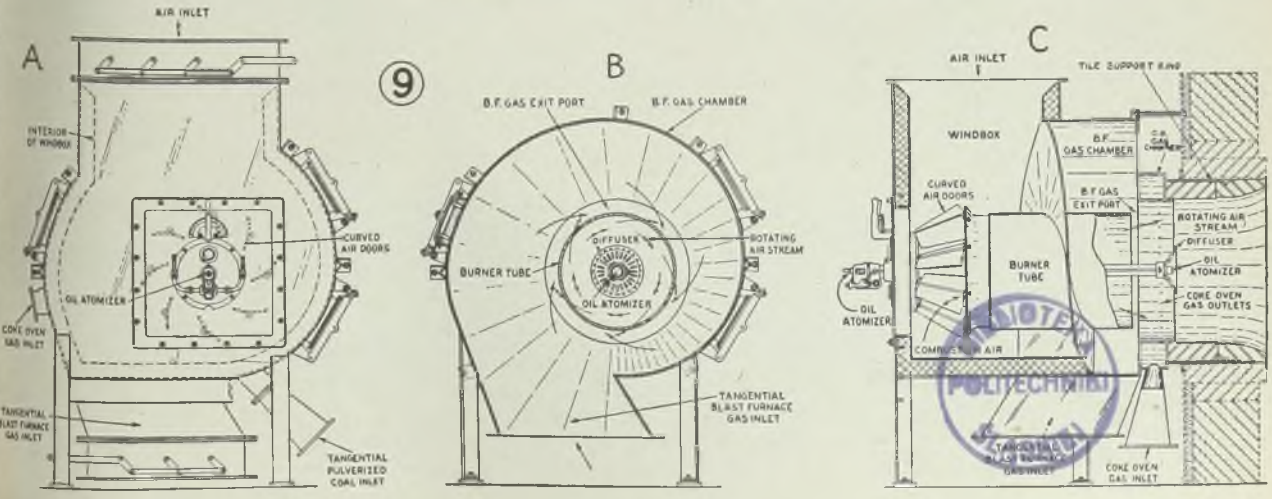


Fig. 8—Unit of 125,000 lb./hr. capacity, 425 p.s.i., 750° F. Tubular heater supplies 500-degree Fahr. combustion air with blast furnace gas

Fig. 9—Recent combination burner design. (A) handles blast furnace and coke oven gas, oil and pulverized coal. (B) is for blast furnace gas and oil. (C) burns blast furnace and coke oven gas and oil



and thereby accelerates combustion.

Burner Design: A brief description of the various designs of burners used with combination fuel-fired boilers may be of interest. With blast furnace gas burners separate and independent of other burners no compromise need be made in the design, but only features best suited for blast furnace gas are employed. The blast furnace gas burners shown by Figs. 10, 11, 12 have one common detail. Provision is made for convenient cleaning of the gas compartments. Periodic cleaning is necessary. The frequency is governed by dust loading and the stickiness of the dust of blast furnace gas. The burner is out of service while it is being cleaned, therefore to reduce cleaning time to a minimum it is important that access to the gas compartments be obtained quickly and conveniently through gas-tight cleanout doors. Fig. 12 shows a premix type burner. Gas and combustion air enter a mixing nozzle in thin, wide streams. Hand-operated vanes in the nozzle control the thickness of the two streams and assist in producing the turbulence required for thorough mixing of gas and air. The boiler in Fig. 6 uses this burner. Blast furnace gas, coke oven gas and coke breeze are burned separately or in combination; a traveling grate stoker handling the coke breeze. Two flare-type coke oven gas burners, shown above the blast furnace gas burners, are designed for future pulverized coal firing. Economizer and air heater are used and produce overall efficiencies over 84 per cent with blast furnace gas. Two units are in service at a Michigan steel plant.

The small unit shown in Fig. 7 burns blast furnace gas and high-ash high-moisture lignite. It is designed for the production of 36,000 pounds of steam per hour at 285 pounds per square inch and 715 degrees Fahr. and has an efficiency of 78 per cent on gas. The superheater is installed in the first gas downpass, the economizer is integral, and the tubular air heater (not shown) stands alongside. Because only part load is carried with gas, the furnace is small and only partly cooled.

In the 125,000-pound per hour, 420-pounds per square inch, 750-degree Fahr. unit shown in Fig. 8, combination coke oven and natural gas burners are 8 feet nearer the superheater than the blast furnace burners. Natural gas pilots are used in the blast furnace gas burners. Because the dust content of the blast furnace gas is less than 0.10 grains per cubic foot, a simple floor screen is placed

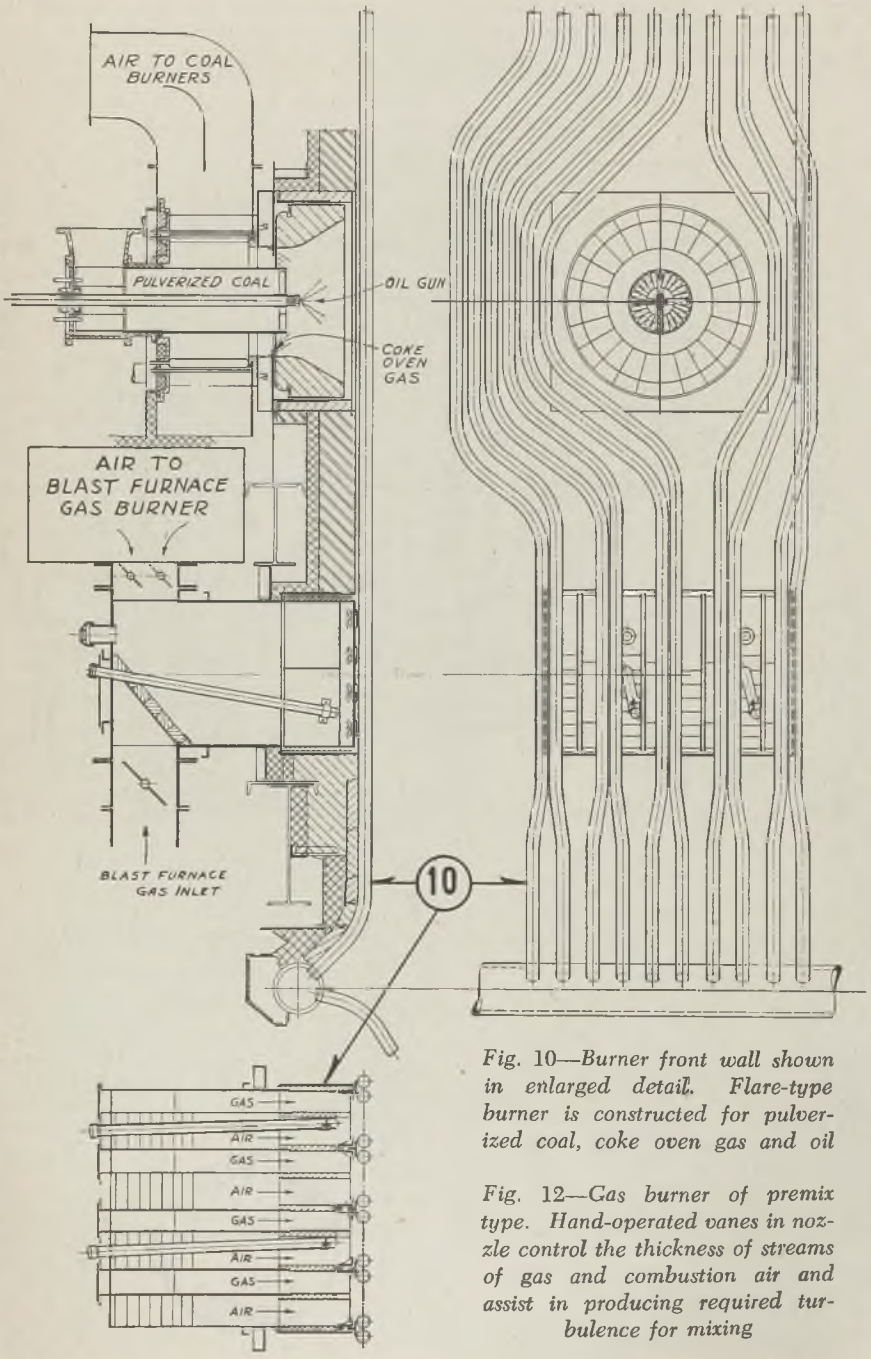
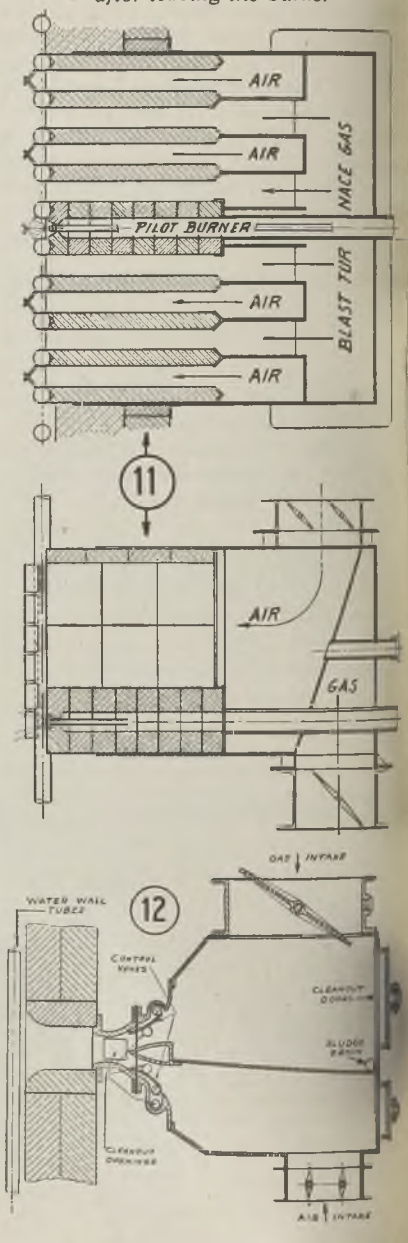


Fig. 10—Burner front wall shown in enlarged detail. Flare-type burner is constructed for pulverized coal, coke oven gas and oil

Fig. 12—Gas burner of premix type. Hand-operated vanes in nozzle control the thickness of streams of gas and combustion air and assist in producing required turbulence for mixing

Fig. 11—With this type burner the gas and air enter the furnace through narrow vertical slots and make contact with one another after leaving the burner



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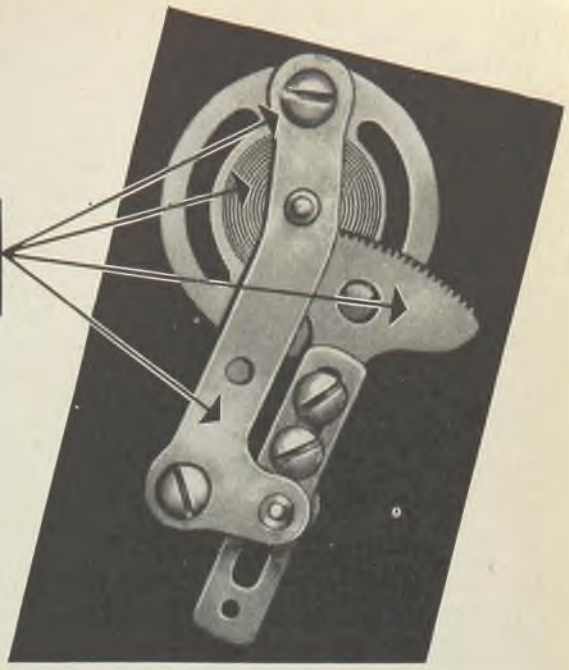

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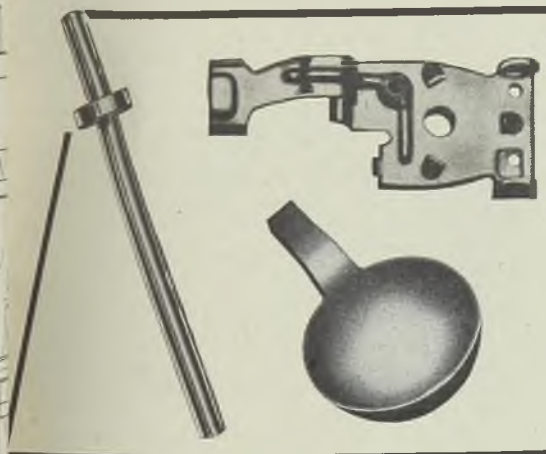

It takes a wide range of Stainless properties *for the economical production of ladles for non-ferrous metals, switch parts and valve stems. The ladle must resist high temperatures, while the switch part is made from ductile Stainless Strip that makes possible intricate shapes and sharp bends. And still another Stainless is used for the long-wearing valve stem.*

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above the ash settling chamber from which the dust is removed manually. The tubular heater, furnishing 500 degree Fahr. combustion air with the blast furnace gas, is the only heat recovery equipment. Plant is in Northern Texas.

Fig. 11 shows a burner in which gas and air enter the furnace through narrow vertical slots and come in contact only after they have left the burner. Staggered vanes attached to the water wall tubes at burner openings assist intimate mixing by directing air and gas streams into each other. Fig. 10 illustrates an enlarged detail of a burner frontwall. The blast furnace gas burner which is a modification of that shown by Fig. 11 is placed as low in the furnace as practical. A flare type pulverized coal burner is located some 10 feet higher. Water wall tubes protect the furnace frontwall and the openings of the blast furnace gas burner from furnace heat radiation. The flare type burner shown is constructed for pulverized coal, coke oven gas and oil. Either of these supplementary fuels may be burned independently or in combination.

A recent combination burner design, Fig. 9, handles blast furnace gas, pulverized coal, coke oven gas and oil in combination or separately. Blast furnace gas enters the burner through a scroll similar to a fan scroll from which the gas discharges through an annular opening into the burner throat. Combustion air is brought in through the center burner tube. The scroll-shaped gas inlet imparts rotation to gas and curved air inlet vanes produce rotation of combustion air in the same direction. Gas and air mix effectively in the refractory lined burner throat.

Two such burners are in use with the 150,000 pound per hour boiler in Table II. This installation maintains remarkably steady flame conditions while burning blast furnace gas without supporting fuel in spite of the completely water-cooled furnace and wide steam load swings. Although the gas in this plant has high dust and moisture loading, burners have operated during the past 12 months without being cleaned. Scrubbing action of gas flowing through the scroll-shaped inlet at comparatively high velocity prevents deposits, but gas-tight access doors are provided to permit cleaning gas compartments when necessary. With the use of this combination burner all supplementary fuels enter the furnace at the same distance from the superheater. Therefore, steam temperature variations must be expected when changing from one fuel to the other. Some sacrifice in steam temperature during off periods can be tolerated if blast furnace gas supply is assured and the use of supplementary fuels is infrequent.

Conclusions: In the foregoing paragraphs an attempt is made to point to some of the more important design requirements and to discuss facts which experience with the installations described showed to be essential for the successful performance of boiler units fired with blast furnace gas in combination with other fuels. A brief summary of these facts follows:

1. Because heat is absorbed mainly by convection and combustion gas weight is 60 to 90 per cent greater for blast furnace gas than other common fuels, boiler heating surfaces must be more liberally proportioned.

2. Boiler furnaces must be at least as large as for pulverized coal to permit time for complete combustion of blast furnace gas.

3. Extensive water cooling is desirable, especially for blast furnace gas combined with pulverized coal because dust carried in gas appears to flux coal ash.

4. The large portion of noncombustible gas in blast furnace gas requires thorough intimate mixing of gas with combustion air to insure complete combustion.

5. Preheated air is desirable because larger air volume insures more thorough mixing with gas; the higher temperature of gas-air mixture accelerates combustion.

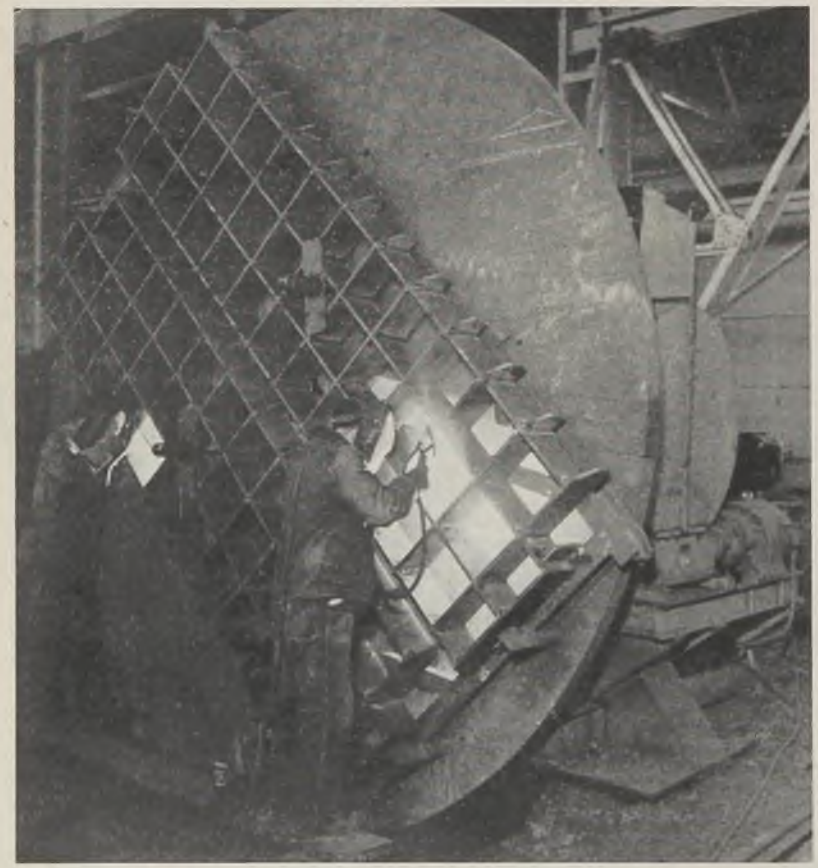
6. More uniform steam temperature from high-temperature superheaters is obtained by placing auxiliary fuel burners closer to the superheater.

7. Closer control of fuel-air ratios for each fuel is possible if blast furnace gas burners are separate and independent of the auxiliary fuel burners.

8. Combustion gas weight from blast furnace gas is 60 to 90 per cent greater for a given steam output than for any other common fuel. Therefore, gas passages and induced draft fans must be larger.

9. Efficient utilization of blast furnace gas for steam generation results in attractive fuel cost savings. Blast furnace gas is wrongly called a waste fuel, rather, wherever it is available for steam generation it should be employed as the principal fuel.

10. Development of the design of a steam generating unit to be fired by blast furnace gas in combination with other fuels presents great opportunities for the skill of the designer. Problems to be solved are never the same for two different plants. A thorough study of conditions and requirements, both physical and economic, must precede the selection of auxiliary fuels. Type and cost of the fuel combination then govern the design of the steam generating unit.



A-C WELDING DOES IT—A welding speed about 20 per cent higher than was possible with direct-current welding is reported by Mississippi Valley Structural Steel Co. as a result of switching to a 500-ampere alternating-current arc welding transformer to fabricate these heavy steel gratings. Magnetic disturbance to the arc and consequent undercutting, experienced with the direct-current method, has disappeared and operators are able to deposit weld metal the full length of the joints on the inside of each cell-shaped opening. This also permits higher current and, in turn, more speed. Electrodes used are General Electric type W-24

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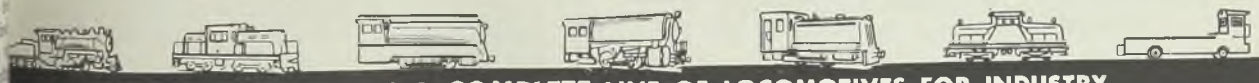

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Fig. 1—Heavy duty all-welded Rooter and cable controlling power unit illustrate how quality control is being applied to assure successful welding that withstands most abusive service

QUALITY CONTROL

In Production Welding

By WALTER J. BROOKING

Director of Testing and Research
R. G. LeTourneau Inc.
Peoria, Ill.

A PRIME requisite of any manufacturing process to be applied on a broad scale and with a high degree of economic success is ease of quality control. Effective inspection and quality control of the arc welding process has been shown possible by the tremendous quantities and great variety of products fabricated to exacting specifications in the past few years.

Methods of inspection and control for arc welding vary considerably. Much welding is controlled today by simple, nondestructive, visual methods of inspection and a reasonable degree of supervision prior to and during the welding process. The heavy duty earth-ripping rooter shown in Fig. 1 was built on a mass production basis, with controlled processing and visual inspection.

Aside from the nondestructive, visual type of inspection, other methods used when the design or end use of the equipment requires a more complete analysis include X-ray, gamma ray, the electromagnetic flux method and the stethoscopic method.

This discussion will confine itself to visual examination and quality control, methods which must of necessity be used in all kinds of welded construction whether other specialized means of inspection follow or not.

Specifications Come First: Before any controlled production can be achieved, certain engineering information must be made available to both welding operator and inspector. This control is sometimes organized by word of mouth and by individual judgment on the part of workmen. Such control is very precarious in even the smallest of welding organizations and is almost certain to involve very considerable l of efficiency and economy in the ma facture of products on a large scale.

The orderly presentation of the fun mental engineering information requi by the welding operator who deposits metal and the inspector who must upon its quality may be presented several ways. Probably the most effec and simplest is to use welding symb on the blueprint showing parts or sembly to be welded.

Such symbols have been standardi by the American Welding Society to s such fundamental things as:

—The specific joints of the struct which are to be welded and where.

—The size of the weld (amount weld to be deposited).

—A cross-sectional view of the finish welded joints so that the form of weld as it is completed is known.

In addition to these fundamental thin it is entirely practical (and economica profitable) upon a large scale weldi operation to further show on the w symbol base the following informati

—Type of welding electrode to be u for each joint.

—Machine settings (welding curr and voltage values to be used.

—The number of separate layers passes of the weld metal for each jo

—The position in which each joint shall be deposited.

To organize such specific informa and present it in symbol form on the gineering print from which the wo man, foreman and inspector all ope is to standardize and make possible c plete control of the arc-welding proc Such a system of control obligates organization to provide required jigs fixtures, to standardize on correct of joints.

Weld Metal Vs. Parent M Since weld metal deposited to together various parts of a str

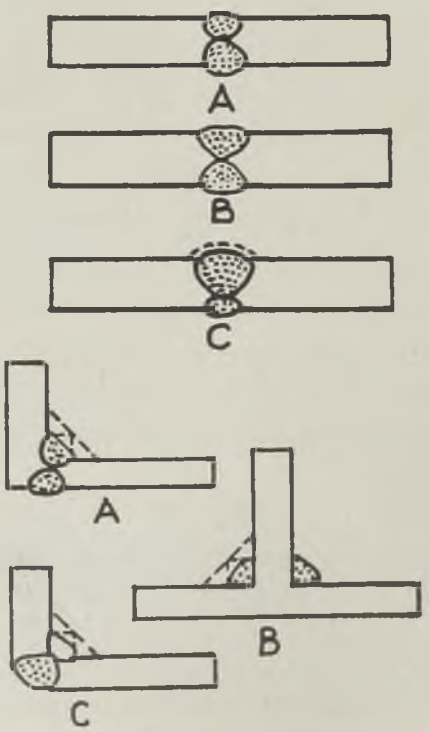

Fig. 2 (Right above) — Various types of butt joints, while employing different joint preparation, all depend upon welded joints no thicker than plate itself. Excess weld metal as at C is wasted and usually weakens the joint instead of strengthening it

Fig. 3 (Right)—Fillet welds such as those shown here also can easily be overwelded. Weld bead measurement by inspectors is method of controlling this factor

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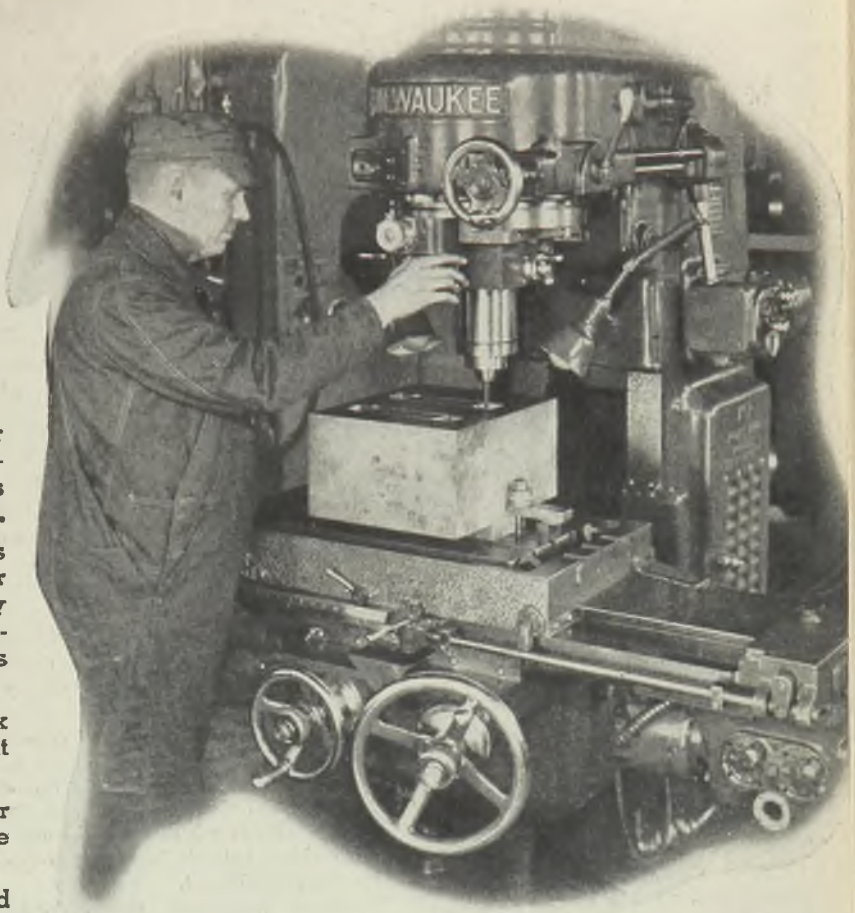

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A. A. Rines
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Fig. 4 (Left)—Gage of this type allows inspector to check size of fillet welds accurately, the first step toward standardization and also elimination of overwelding

Fig. 5 (Above)—Stages of a test bar: Top, butt welded joint, machined for tensile test; next, etched in acid to reveal number of passes and fusion zones; third, pulled to failure; fourth, set together to measure elongation; bottom, examination of weld metal appearance

becomes an integral part of the unit, it is very helpful for welding inspectors to bear in mind certain relationships between the strength of weld metal to the strength of parent metal and also fundamental principles regarding its function in the welded joint.

To prevent the curse of overwelding, the common result from the worker's desire to do a job a little better than necessary, an examination of certain types of welded joints should be made in order to evaluate properly the need for the correct amount of weld metal.

Fig. 2 shows several types of joint preparation for welds which automatically limit the quantity of weld metal to the thickness of the plate plus a reasonable amount of crown. Normally the crown should be maintained at the least amount possible without resulting in undercutting at the junction of the parent metal and weld metal: It has been demonstrated by means of polarized light examination of plastic or celluloid reproductions of such joints that any additional crown (such as at C, Fig. 2) tends to concentrate stresses through the welded joint and lead to early failure.

Common fillet welds which occur in T-joints often comprise a large percentage of the welds. Because length of the legs may be increased to much more than the thickness of the metal, it is extremely important that the size of such joints be controlled carefully.

Fig. 3 shows fillet joints in which the amount of metal deposited depends upon the welding operator and not the thickness of the plate. It also shows the importance of maintaining proper size relationship since the increase of weld dimensions on that type of joint increases the volume of weld metal deposited and therefore the cost by the cube, not the direct ratio of lineal dimensions.

Such excess metal is not only expensive but is accompanied by stress concentrations that may reduce overall strength of the joint. Also it leads to grain growth in the metal adjacent to the weld which seriously weakens the metal structure and further brings about the possibility of failure.

Most satisfactory method of measuring fillet welds is to use a gage which measures the length of the legs of the weld and also the throat, see Fig. 4. Such a gage affords positive measurement of the weld and should be a part of the inspector's equipment.

Visual Inspection While Welding: Visual inspection of welding depends upon observations while the welding is being done and after it has been completed.

Preliminary to actually taking a welding hood and observing the actual deposition of metal, there are certain things which should be checked. Fitup of parts should be normal as determined by the inspector's making a simple examination of the structure being welded, and his having a knowledge of what a normal fitup should be on that particular structure.

A glance by the inspector will tell whether the correct type of electrode and size of electrode is being used according to the specifications for the job.

Fig. 6—By cutting a section across the welds of a test specimen after it has been broken, polishing and etching will show fusion and heat affected zones, number of passes, and cracks produced by the breaking stresses—all indicating quality of the weld

It is also assumed that the ground from the work to the machine is properly made in order to facilitate proper welding technique and that the welding machine and power source is what it should be.

The inspector should make a checkup on the machine setting by using a clip-on ammeter clipped over the welding lead. Such a meter will indicate on a dial the amount of current being used by the welding operator. This is especially important in checking difficulties usually associated with excessive welding currents. It is important that the clip-on ammeter be used rather than the ammeter on most welding machines.

Next the inspector will take a welding hood and observe the weld actually being deposited. He must know how to "see into" an arc and a pool of metal so that he can observe the way in which the electrode is being manipulated by the welder, the length of the arc, the manner in which he is penetrating into the parent metal, the amount of fusion, the way in which the slag is being worked out and the weld metal built up to proper size.

Much can be told about the quality of a weld simply by observing the sound of the welding arc. The normal arc should emit a sharp, consistent, crackling sound, free of hissing, sputtering and whirring. It should maintain a steadiness without interruption or special punctuation of any kind.

Indication of excessive current setting too high is a violent crackling explosive sound, accompanied by a shower of sparks from the arc.

The other extreme is indicated by a weak, pulsating arc which has no "snap" and seems to die down and start up as

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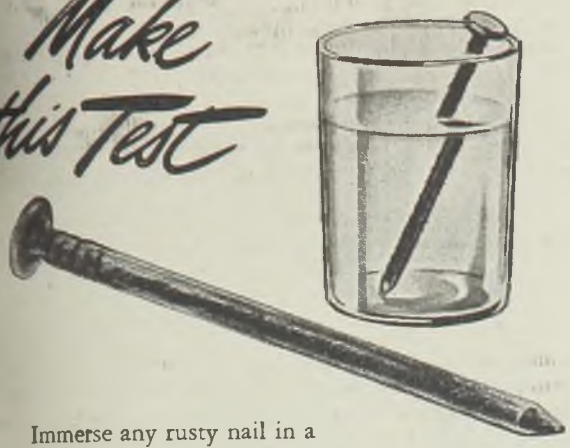

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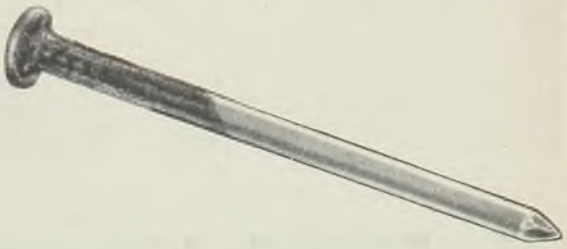

Remove nail and wipe dry with cloth or tissue. Note the complete absence of rust and the way the original surface reappears.

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if the operator were "fighting the arc."

Even if the machine setting is correct, variations in sound of the arc will indicate when the operator is holding too long or too short an arc. A violent whirring or hissing sound, punctuated by explosive crackles and a shower of sparks indicates too long an arc.

Too short an arc is indicated by a subdued steady sound lacking the normal crackle of a correct arc, accompanied by an occasional sputter as if it were being choked down into the metal itself.

The Finished Weld: Examination of the finished weld can almost always quickly afford a good indication of the quality of the weld. If the inspector can see it before the slag has been removed and himself remove the slag from the finished weld, the way in which the slag lies upon the weld and the ease with which it is removed almost always indicates something about the quality of the weld. Most mild steel welding electrodes of the shielded arc type used today have slag which removes relatively easily if weld is deposited properly.

Slag difficult to remove often indicates a weld deposited at lower current than should have been used, therefore indicates insufficient penetration. Then if there also is slag included along one side of the weld or any pores with slag in them throughout the surface of the weld, the weld should be cut out and remade because the penetration and fusion probably are not satisfactory.

If the slag clings too tightly to the edges where the weld metal has been fused with the parent metal, the weld should be examined carefully because this indicates slightly too great a speed of travel or too much current, resulting in a slight undercut. A small amount of undercut is a serious flaw in a weld because it concentrates stresses and may cause failure at that point in the weld.

In case the slag has been removed before the inspector examines the weld, if the margin where it has been removed is smooth and neat, and there are no signs of the operator having done excessive chipping to remove the slag, it usually indicates a good weld, especially if the weld itself is free of overlap, undercut, blisters and porosity.

A glance at a completed weld shows the informed inspector in what position a weld was deposited. Whatever the position while the weld is being made or whatever the type of joint, the finished weld should be smooth, free from marked irregularities.

A series of small blisters which come to little pointed peaks in the middle of the weld usually indicate that slightly excessive heat was used. If some of these spots are found to contain slag pockets, it may be advisable to remove and reweld that portion or to cut out a whole section of the weld and examine it to see if excessive dirt in the weld or excessive heat or poor material were used. Often such welds are too brittle.

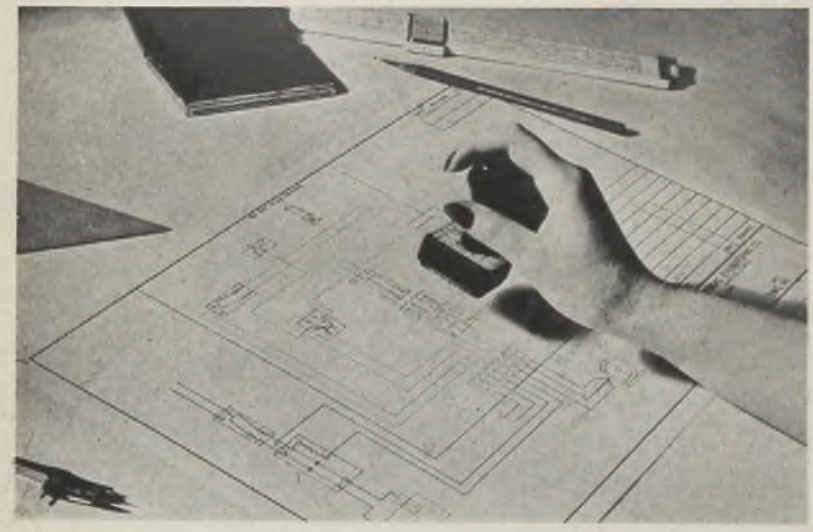
Examination of the weld where the weld has been stopped at beginning and the end of each electrode is important. These places should be smooth and free from slag pockets in order to indicate the proper kind of a weld.

The tie-in at the ends and beginnings of the weld, especially where they go into deep corners or connect with other welds, are important indicators of quality. These tie-ins are especially important where they occur in points of natural stress concentration in the structure.

Checking: The most important single step in quality control is setting up the proper welding procedure, specifying the size of welds, position in which they should be deposited, type of electrode, number of passes, amount of welding and all of the other engineering factors. Special tests should be made by destructive examination of welds so made to demonstrate that the procedure is adequate. Such examinations do not require expensive testing equipment or highly specialized techniques, but can be effectively done with the usual machinery to be found in the welding shop if a little ingenuity is used.

Tests of joints themselves, such as the test bars shown in Fig. 5, rather than the all weld metal tests on separate and special plates, are most valuable.

Fig. 5 shows a typical series of steps in such testing. Note that the test specimens are made so the welds are pulled apart, since that particular joint must withstand tensile stress in use. These tests indicate exactly what this joint would do under that type of stress. Note test bars were made so that the break would be most likely to occur in the welded joint. Also note the amount of yield and elasticity of the welded joint, and that the welds themselves were etched with acid to define their limits and



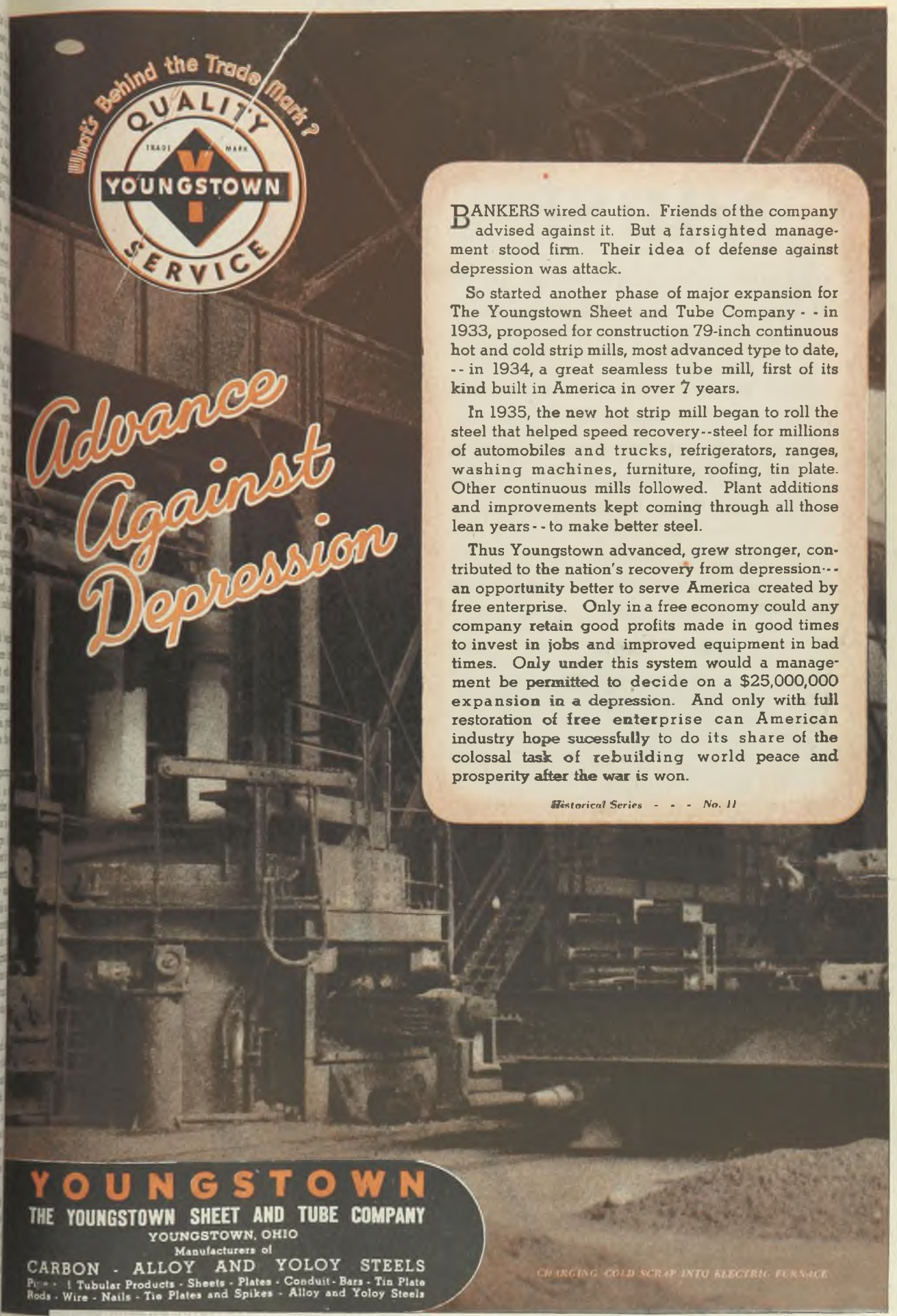
Symbol-Stamps Symplify Drafting Room Detail

RUBBER STAMPS have been used for years in drafting rooms to speed up the handling of repetitive work like the stamping of names, dates, cities, etc., on engineering drawings and specification sheets. But the utilization of rubber stamps to print engineering symbols in the body of the drawing and as a duplicating medium for quantity reproduction is something new.

At Lindberg Engineering Co., Chicago, manufacturers of heat-treating equipment, new uses are being found each week for the lowly rubber stamp—to represent symbols for switches, pipes, valves and to simplify the making of shop, assembly, erection or instruction drawings. L. H. Remiker, chief engineer, says the results have been exceptionally good. Valuable time is saved in doing routine work, the possibility of errors on drawings is reduced, and manufacturing time is shortened because of better and clearer drawings for the shop.

During past months a considerable number of the company's draftsmen have been taken into the armed forces, particularly detail men, and it has been necessary to replace them with girl trainees. In training this group during a period of many new processes and frequent changes in design and tools, the Lindberg concern is pleased with the low error rate and tremendous saving in time achieved by use of the stamps.

Accompanying illustration demonstrates use of a connector block symbol-stamp on the wiring diagram for a Lindberg furnace. Use of symbol-stamps has been constantly extended so that they now reproduce such items as mercury switches, transformers, motors, controls, push-buttons, relays, motor starters, valves, governors, blowers and solenoids, as well as commonly used names of parts where there is considerable repetition.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Advance Against Depression
BANKERS wired caution. Friends of the company advised against it. But a farsighted management stood firm. Their idea of defense against depression was attack.
So started another phase of major expansion for The Youngstown Sheet and Tube Company - - in 1933, proposed for construction 79-inch continuous hot and cold strip mills, most advanced type to date, -- in 1934, a great seamless tube mill, first of its kind built in America in over 7 years.
In 1935, the new hot strip mill began to roll the steel that helped speed recovery--steel for millions of automobiles and trucks, refrigerators, ranges, washing machines, furniture, roofing, tin plate. Other continuous mills followed. Plant additions and improvements kept coming through all those lean years - - to make better steel.
Thus Youngstown advanced, grew stronger, contributed to the nation's recovery from depression - - - an opportunity better to serve America created by free enterprise. Only in a free economy could any company retain good profits made in good times to invest in jobs and improved equipment in bad times. Only under this system would a management be permitted to decide on a $25,000,000 expansion in a depression. And only with full restoration of free enterprise can American industry hope sucessfully to do its share of the colossal task of rebuilding world peace and prosperity after the war is won.
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These TYPE G-MV ANGLE Engines Must Not Fail

Entire water supply of giant Port Neches synthetic rubber project is pumped by two continuous-running Cooper-Bessemers

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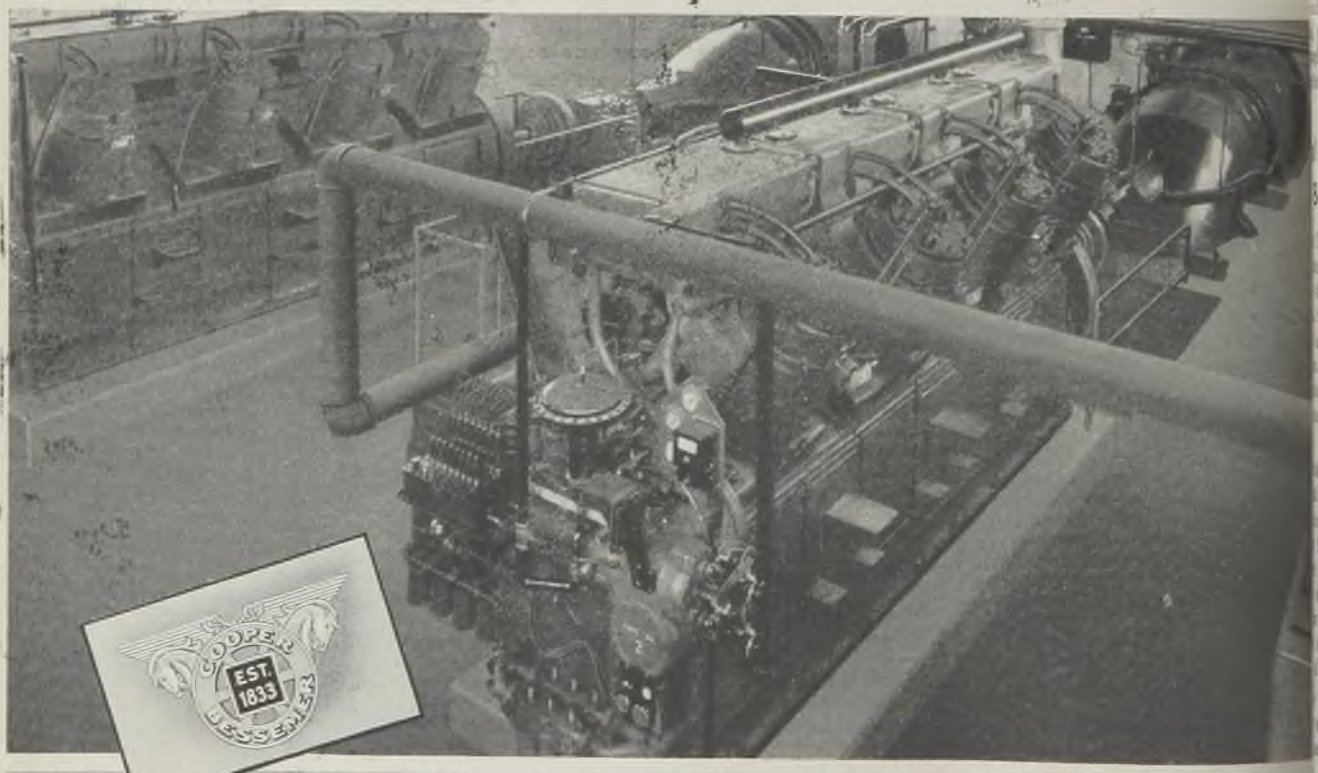
Dependability and freedom from operating troubles are well-known Cooper-Bessemer qualities—proved by millions of horsepower working steadily for years in the oil fields, in refineries, natural gasoline plants, gas transmission stations and processing plants. No wonder men turn to Cooper-Bessemer whenever they need utmost reliability in an engine or compressor.



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to observe how they reacted to stressing and breaking.

Another simple method of checking welds on structures where a procedure is being proven is to break a test structure, cut a piece across the welded joint as shown in Fig. 6, and examine it for fusion, penetration and number of passes. An acid etch can be used to show the number of passes.

This method of examining welds may be applied in a lesser degree to any welds on an ordinary welded structure where an inspector feels that there is some question as to the quality of the weld. That weld may be cut out with oxyacetylene cutting torch along with a narrow margin of parent metal and examined by cutting in cross sections in order to check the penetration and other features of the weld.

A big advantage of weld fabrication is that such sections afford a means of checking workmanship. They may be patched by simply welding the checkhole full of weld metal. Naturally, this test will be required on but very few units.

Inspection by X-ray, gamma ray, magnetic flux and such specialized means of inspection is thoroughly justified on many applications, either as a means of regular inspection or to prove the correctness and quality of first procedures. Yet, considerable amounts of today's welded structures may be manufactured, controlled and inspected without the use of these specialized testing units.

While the importance of adequate inspection should not be underestimated or minimized, yet inspection can easily be made complicated far beyond actual needs. Inspection can be excessive.

Isothermal Transformation Atlas To Be Distributed

An Atlas of Isothermal Transformation Diagrams containing 56 "S-Curve" charts representing the time response of particular steels to specified conditions of temperature has been published by the United States Steel Corp. for metallurgists, technologists and others interested in the science and practice of ferrous metallurgy.

Incorporating the results of a 15-year experimental investigation by the corporation's research laboratory pointed at separating the effects of temperature from those of time at temperature, the collection of diagrams presented in the booklet are designed to guide the practical man to the proper heat treatment of each of the steels studied.

In the practical heat treatment of steel, as ordinarily conducted, the steel is first heated to a temperature higher than its so-called transformation temperature at which the carbon goes into solution, and then it is cooled in some specified way, as by quenching in water or oil, or allowing it to cool slowly in the furnace. In this process the step which most significantly influences the properties developed is the initial rate of cooling, a matter of both temperature and time. Because the results are difficult to interpret usefully in general terms, the different effects of temperature and those of time at temperature are analyzed separately and graphically presented in the isothermic diagram.

Each of the 56 charts includes sufficient information to identify the steel with respect to chemical composition, the austenitizing temperature employed, and the austenite grain size established at that temperature. In cases where the curve of a given steel was determined for two austenitizing conditions, a separate diagram is given for each.

Statistical Control Gains Adherents by Its Record

Pioneers in the science of statistical control for industry look for an extension of its use generally to problems of management because of greater familiarity with its merits in wartime service and the growing number of trained men available to install and operate the systems.

The November *Industrial Bulletin* of Arthur D. Little Inc., Cambridge, Mass., credits such use of statistics with having introduced a new mode of thinking, wherein "assignable causes" for product variation—whether due to different qualities of raw materials or badly adjusted machines—are segregated and the random remaining variation which cannot be eliminated is accepted, but quantitatively measured and allowed for.

Keystone of all systems is the control chart on which the per cent defectives, or other measure of inspected quality established by sampling, is plotted for the samples of successive production lots. Limit lines represent the accepted range of variability shown by statistical calculations. Normally, the successive points will cluster about a line midway between the two limits and rarely approach them. If the points stray too far from their norm, something has gone wrong and action must be taken. When all assignable causes for the variation are eliminated and only the random variation remains, inspection procedures are then designed so that the chart will best reveal assignable causes for variation which may later creep into the process.

The American Standards Association, in setting up clear procedures for control, together with numerous special war-training courses, has done much to overcome the shortage of trained personnel. Outside the quality control field, mathematical statistics have found wartime applications in personnel administration and in industrial, operational and market research.

UPS INDIVIDUAL OUTPUT: Air-operated hand tools today are stepping up the tempo of wood patternmaking in pattern shops and foundries throughout the nation. The small tool shown above is one of the many types available for wood cutting which in no way disturb the skill of the operator yet increase his output many times. Both light and heavy jobs of routing, carving, logging and chiseling are standard assignments for such equipment

Fig. 1—Closeup of induction heating setup. Hydraulically operated fixture in left foreground feeds wrist pin through inductor coil at correct speed, part being quenched automatically as it comes from the heating coil

Induction hardening

. . . . cuts heat treating time in half in production of diesel engine parts; originally planed for only 35 parts, application has been so successful that process is now used on more than 158 different items

By T. E. EAGAN
Chief Metallurgist
Cooper-Bessemer Corp.

ALTHOUGH the process of hardening by electrical induction has been in use for some time, the successful application of high frequency currents for hardening specific areas with accurate control as to depth, width and location has been a comparatively recent development.

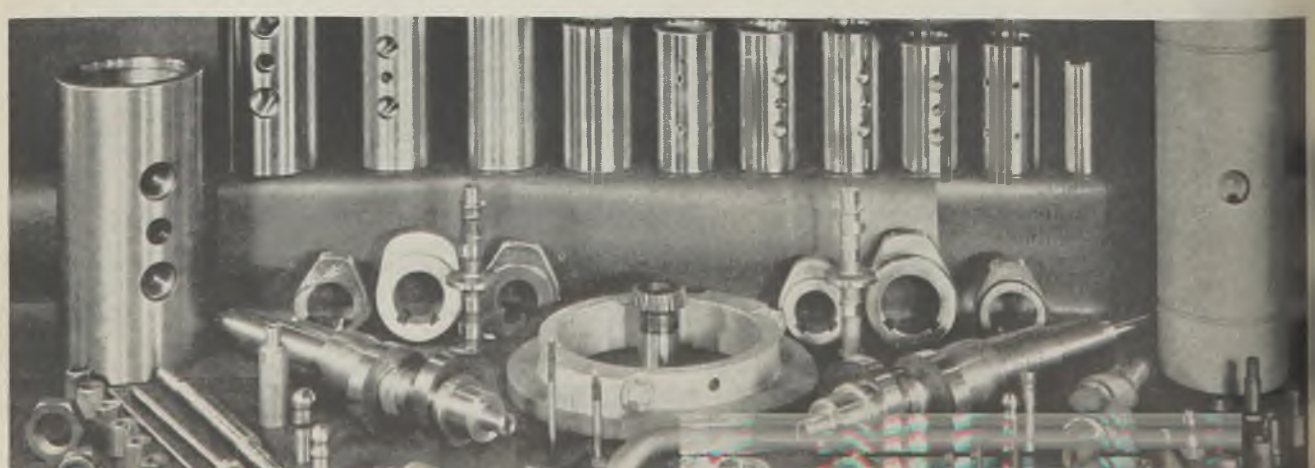
Some of the most notable advancements in induction hardening have been made in the production of internal combustion engines for which the process was originally developed. Here at Cooper-Bessemer, for example, our diesel engines, gas engines and compressors must be produced with all possible speed to meet the unprecedented demand of the Navy, Maritime Commission, Coast Guard, Army and numerous industries producing essential war materials and equipment.

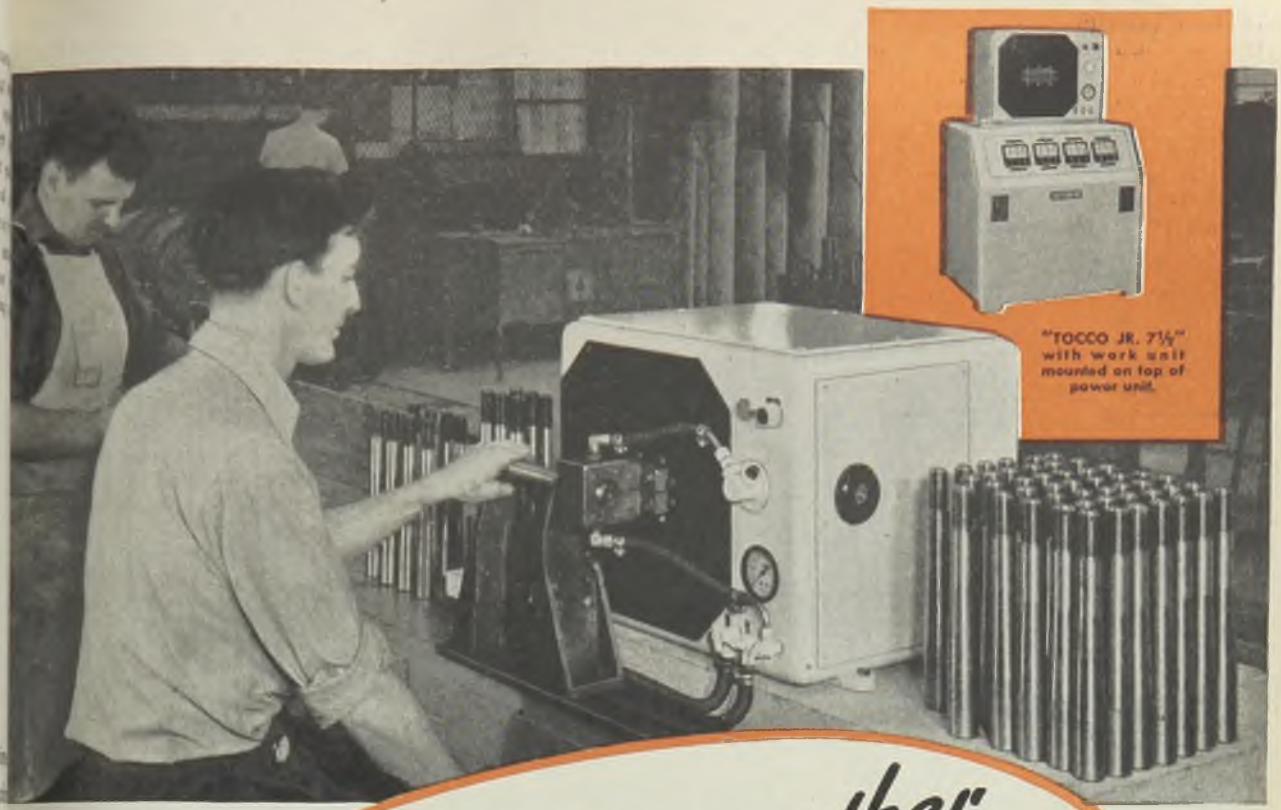
In order to increase our rate of output in the face of a diminishing supply of skilled labor, we explored the possibilities of adapting electrical induction hardening, a process obviously much faster than previously used carburizing methods, which would harden selected portions of numerous engine parts that are subjected to severe operating conditions. These parts ranged from a set screw weighing ½-ounce to a cross-head pin 186 pounds in weight.

A modern, compact heating and hardening machine was installed and 35 different parts were immediately scheduled for hardening. As the actual process consists of passing a high frequency current through an inductor which surrounds but does not touch the area selected to be hardened, it was necessary to construct copper induction coils to conform to the size and contours of each differently shaped part. By introducing a current of high frequency through the induction coil, a magnetic field is produced which intercepts the surface it surrounds, thus heating it rapidly by the dual effect of induced currents and hysteresis losses.

The degree of heating and hardening of the specified surfaces of each type of part is controlled principally by the rate

Fig. 2—Originally planned for use on 35 items, induction hardening has proved so successful at Cooper-Bessemer that it is now being used on more than 158 different parts. These pins, shafts, nuts, cams and other vital engine parts shown here are typical of units so treated





...chable work unit of new ...CCO JR. 7½" conveniently ...nted on bench in production line.

Announcing another LOW-COST TOCCO

To revolutionize heat treating in thousands of plants

TYPICAL RESULTS

BRAZING carbide tool tips—all sizes. Time: 10 to 50 seconds.

ANNEALING 75 mm. steel cartridge cases to 70-75 R.B. Time: 10 seconds.

HEATING to 2200° F. for forming 1″ on end of 1″ bars. Output: 90 per hour.

HARDENING wearing surface of teeth of small bevel gears. Time: 18 seconds.

The "TOCCO JR. 7½" offers thousands of shops a thrifty head start in the race for *better products at lower cost* with TOCCO Induction Heat Treating.

This new TOCCO has a DETACHABLE WORK UNIT which can be mounted on a suitable bench in the production line (as shown above), handy to related operations, with the power unit located wherever desired. This higher degree of versatility and adaptability of heat treating affords greater production flexibility for fast-moving manufacturers.

Here are the cost-cutting advantages of larger TOCCO machines in a complete motor-generator type induction heat treating unit at a new *low cost*. Output is 7½ K.W. (9600 cycles).

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of power input to the inductor and the time in which power is applied before quenching.

In hardening the entire 18¼-inch length of a wrist pin, for example, the desired magnitude of hardness, a minimum of 60 rockwell C, as well as the depth of the hardened circumference, was pre-calculated and required 38 seconds, less than one-fifth the time required by former methods.

In hardening parts such as these wrist pins where an unusually long surface must be treated, an automatic hydraulically operated fixture is installed which feeds the pin through the induction coil at a controlled speed. This operation, shown in Fig. 1, illustrates how the pin is progressively heated, then the heated portion is quenched as the pin is automatically lowered. In all our electrical induction hardening procedures using this process, jets of water directed against the heated surfaces through orifices in the respective induction coils furnish the quenching medium.

The range of various materials we are now successfully hardening with this new equipment includes SAE-4615, SAE-1112, NE-8620, which are carburized before hardening; SAE-1045, SAE-1050 and SAE-52100, which are hardened directly as are a variety of parts cast of Meehanite, a metal which has many desired physical properties in addition to its ability to harden. As we progress, more and more parts now being made of the carburizing grades of material will be changed to the SAE-1050 grade to eliminate the expense of carburizing.

Other advantages beside the much greater rate of speed are the extremely simple procedure for changing fixtures, the elimination of need for straightening formerly caused by distortion, and the reduction in grinding and machining time.

The rapidity of the method was evidenced recently when we hardened 1800 pieces consisting of 12 different kinds of parts in 12 man-hours.

The value of the electrical induction process in our war production program has increased to the point where we have now scheduled 158 different parts for hardening as against the 35 parts which we originally planned to handle. These parts include various sizes of wrist pins, cams, nuts, shafts, valves, gears and many other items that go into our engines. The group of items shown in Fig. 2 is typical of the variety and scope of part sizes.

The complete hardening unit takes up only a few square feet of valuable floor space in our plant and requires the attention of only one operator.

Unique Air-Recovery System Removes Hazards of Deburring, Polishing

WOMEN employed at the new plant of Cleveland Graphite Bronze Co. to deburr and polish alloy steel machine parts are well fortified against the hazard of flying particles of pumice and metal by a special dust collecting apparatus whose main features are a glass shield and air filter.

The shields, several of which are shown in use in accompanying photo, are made of shatter-proof glass. Each shield is fastened at an angle to the top of the bench so that it stands between the operator's hands and her face. Design is such that the worker can place her arms around it with sufficient freedom of arm and hand motion for the work of buffing and polishing. Equally as important, there is a clear field of vision through the glass port, making for greater comfort of the operator than if she worked with a mask on her face.

At the bottom of the shield is an air duct which extends down through the top of the work table to connect with an air filter placed under each bench and so planned that it functions as an exhauster and dust collector combined. Drawn into the filter in a horizontal blast, the contaminated air hits a vertical plate, causing the larger particles to fall and collect on the bottom of the filter housing where they can be drawn out through a door in the side. Air then passes through a steel wool matting which removes the finer particles but allows the completely purified air to pass out into the room. Filter matting is collected once a week and cleaned every three or four weeks. The air filters are run by fractional horsepower motors, generally of ½ to ¾-horsepower.

A modification of this type of compact filter unit is used by the company in connection with some grinding operations in this fully air-conditioned, windowless plant.

Steel Packaging Manual for Overseas Shipment Issued

When an order of steel products is ready for shipment abroad, it is frequently the case that no one in the mill where it was rolled knows its destination. For this reason, it must be packaged so that neither the extreme heat of the tropics nor northern sleet storms can damage it. To bridge this gap the American Iron and Steel Institute has issued a fully illustrated, 180-page manual on "Packaging, Marking and Loading Methods for Steel Products for Overseas Shipment".

Contained in the volume are complete instructions for wrapping, tying, boxing, marking and loading the various steel products in standard packages which have been approved by the Army Service Forces, the Navy and the Procurement Division of the Treasury. Compilation was prepared by the Institute's Committee on Packaging, Loading and Shipping Problems.

Most commonly used packaging materials are wood, paper and steel itself. Many packages employ all three. All approved methods of preparing for shipment the more highly finished products such as wire, cold finished bars, cold rolled sheets and strip and stainless steel are discussed in minutest detail, even including the special rust-inhibiting oils and greases used for protection of the metal. Palletizing of loads is thoroughly reported. Preparation of small packages that can be transported by airplane or on the backs of animals is covered, as is the carloading of ingots, slabs, billets and other large or bulky freight.

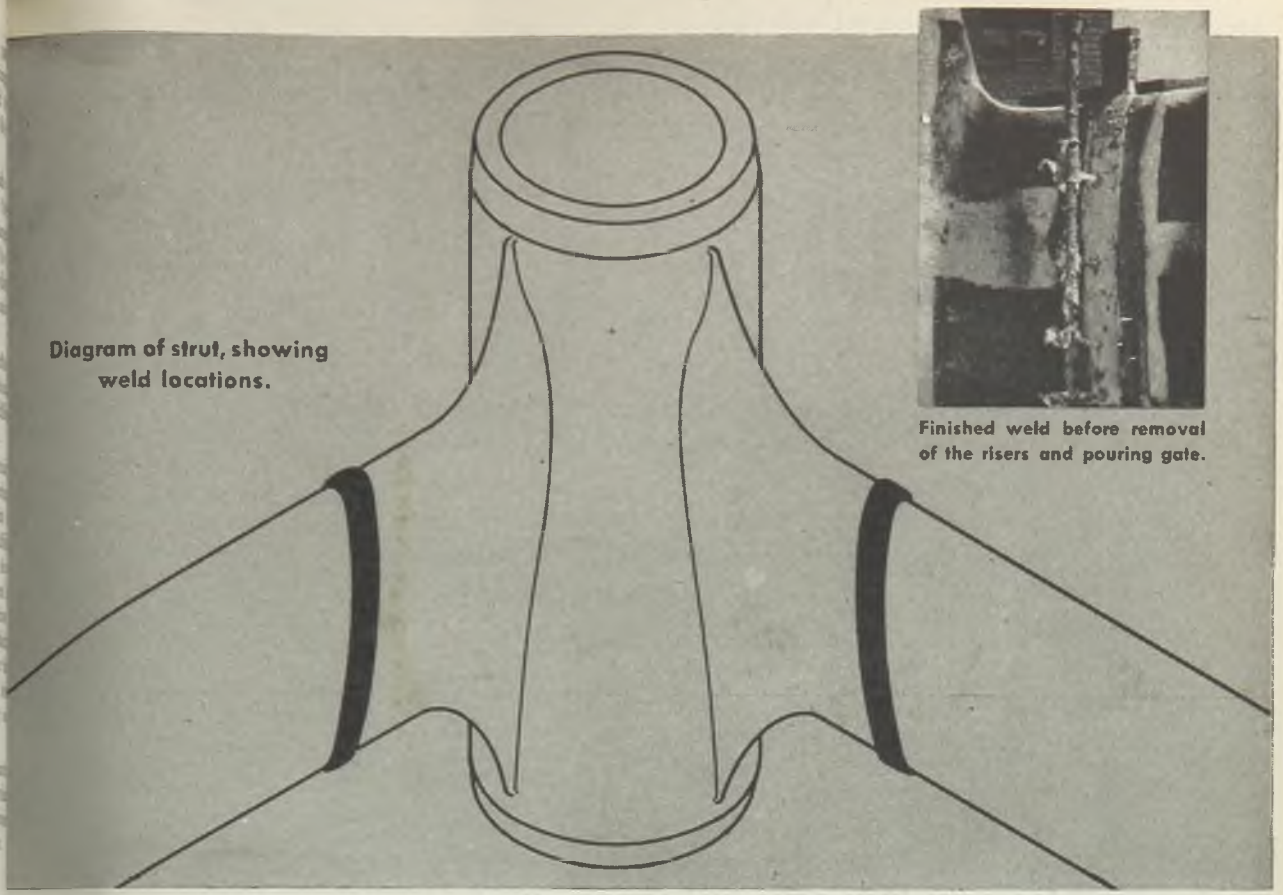

Diagram of strut, showing weld locations.

Finished weld before removal of the risers and pouring gate.

STERN STRUTS SPEEDILY BUILT BY *Thermit Welding*

Long used for the repair of heavy parts, Thermit welding is finding increasing application in the fabrication of large, heavy units from smaller and more easily transported castings, forgings and flame cut shapes.

An interesting example, illustrated above, is the fabrication by Thermit welding of stern struts for twin-screw ships. Only three days were required from the time workmen began preparing the mold for the first weld until both welds were completed, stripped of excess metal and ready for inspection. The mold for the second weld was prepared while the first weld was preheated. Pouring of the Thermit metal for the two welds took place within 24 hours.

Thermit welding obviates delays due to the unavailability of casting facilities for very large parts. Imperfections which may occur in larger castings and which result in rejection and consequent further delay need no longer be a source of concern. In point of fact, Thermit welding produces welds which are even stronger than the original castings of the same cross-section. As only one shrinkage is involved, serious local stresses do not develop...thus making stress relieving unnecessary.

For more complete information, send for 30-page booklet "Thermit Welding" describing many applications for both fabrication and repair of heavy parts.

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AN ENGINEERING APPROACH TO THE SELECTION, EVALUATION AND SPECIFICATION OF

METALLIC MATERIALS

By H. W. GILLETT

Testing metals which will be used for high temperature service presents problems not otherwise encountered where service conditions may be less severe. The factors involved are discussed by Doctor Gillett in the ninth installment of his report for the War Metallurgy Committee presented here. In previous installments, the author explained the meanings of other conventional tests

High Temperature Testing

USES for metals at high temperatures in furnace parts, oil stills and other equipment for the petroleum industry, in high pressure, high temperature steam power generation and conversion to electrical energy, in pressure vessels for the chemical industry, in engine parts, etc., etc., etc., seldom present simple problems, the service conditions usually demand resistance to more than one deteriorating factor.

The parts are often bathed in hot gases of combustion, which, despite the combustion engineer's terminology of "oxidizing, neutral and reducing flames" as relating to completeness of combustion and content of carbon monoxide, are generally strongly oxidizing. Chemically reducing conditions are sometimes met and the atmosphere may change from reducing to oxidizing, in normal service.

The fatigue problem is ordinarily overshadowed by other problems, at least at the higher part of the high temperature range. In those cases in which a long service life is inherent in the design, the loads which produce the low limiting creep rates and total deformations are considerably lower than the endurance limit, so creep rather than fatigue is the controlling design factor. In those cases in which a very limited service life is the basis for design, resulting in high loads and appreciable allowable deformations, the stresses which produce fracture in 1000 hours are sometimes of the same order of magnitude as the endurance limits, and fatigue problems need to be considered.

The damping capacity of alloys used at high temperatures is known to vary considerably with composition. Care must be taken so that in materials with low damping capacity, vibrations do not build up stresses in excess of the fatigue limits. It is a disturbing factor that in many high-temperature fatigue tests, there is no apparent tendency for the stress-cycle-to-fracture graphs to level off and develop an apparent endurance limit as in the case of many steels at room or moderately elevated temperatures. Fractures have been obtained in some austenitic alloys after 2.5 x 10^8 cycles at 1200 degrees Fahr. and until tests of still greater duration are available, it is conservative to assume that at still lower stresses fractures may occur after a considerably greater number of stress reversals. However, a considerable program of high temperature fatigue tests, in specially designed apparatus[101], is under way which should make clear how far the designer can continue to disregard the fatigue question in relation to high temperature behavior.

The requirements in some cases, as in steam turbines, require very great freedom from deformation, while in some furnace parts with "air-fits", relatively large deformation is acceptable. The criterion as to permissible formation in determination of load-carrying ability, or what might be termed "long-time high-temperature yield strength", and is generally termed "creep resistance", therefore, varies widely.

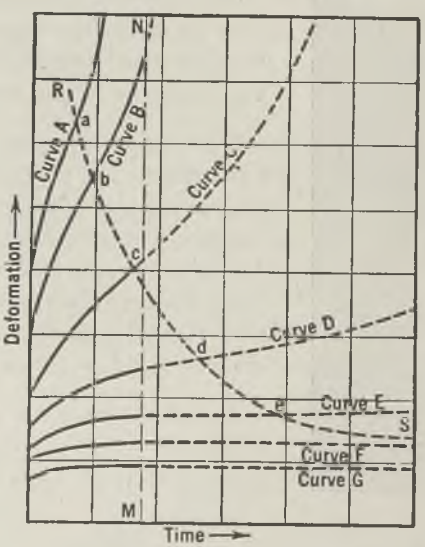

Fig. 47—Schematic plot of typical creep curves for different stresses, ranging from very high load, Curve A, to very low load, Curve G, at a constant temperature. McVetty[102]

It would be convenient to be able to say that a material has a certain creep strength at high temperatures of so many pounds per square inch analogous to the yield strength used in engineering design at normal temperatures. The trend is toward running creep tests at a series of loads on the material in question at the desired temperatures and from the creep curves to evaluate the stresses required to produce certain rates of deformation such as 1 per cent in 10,000 or 100,000 hours. Obviously such an evaluation involves appreciable extrapolation and the trend now is toward quoting the actual rates in per cent per hour for the various stresses used, or giving the stresses to produce a rate of deformation of 0.01, 0.1, and 1.0 per cent deformation in 1000 hours. With these data and the actual time-deformation curves, the designing engineer is fully acquainted with stress-time-deformation characteristics of the material under test. The difficulties of obtaining reliable creep test data are enormous compared to determining room temperature yield strength.

Stretching Excessive at High Load

In the lower ranges of temperature, where ability to work-harden or strain-harden still exists, the part may get better as it stretches, so, if we can stand some initial deformation, and strain-hardening comes to our aid, deformation thereafter slows down or even stops entirely. At higher, annealing temperatures, this is not the case and, at a sufficiently high load, stretching will occur and continue until, in the extreme case, the part stretches and necks down to too small a cross section to carry the load.

If in forcing the use of a material to the extreme temperature it will stand, we run just on the boundary between strain-hardening on one hand, and annealing on the other, it is obvious that small changes in operating temperature, or in testing temperature, will vastly affect the results. This boundary is not very clear cut, strain-hardening tendencies and annealing tendencies compete