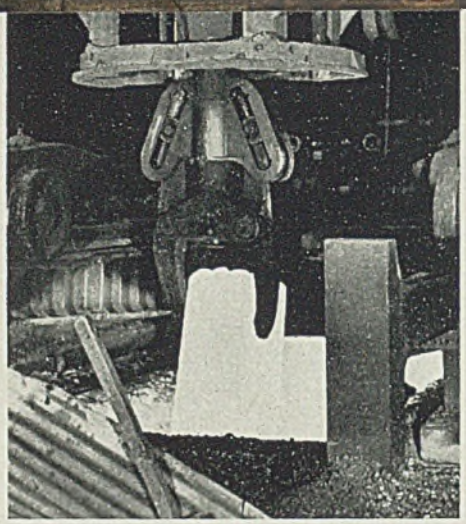

Ingot is removed from soaking pit after being equalized to desired temperatures. Page 49

STEEL

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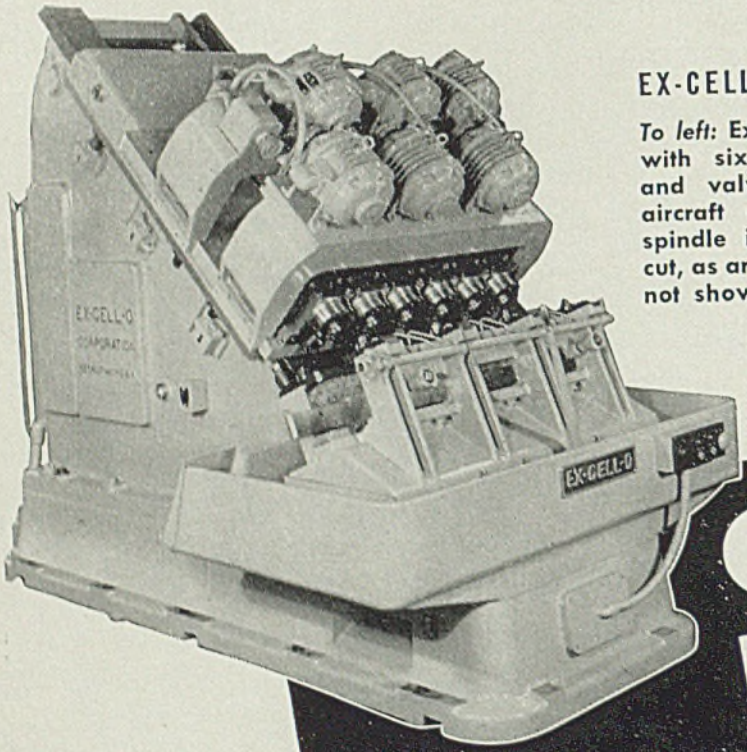


EX-CELL-O CYLINDER BORING MACHINE

To left: Ex-Cell-O angular type machine equipped with six spindles to finish bore valve seats and valve guide holes in cylinder head of aircraft engine on a production basis. Each spindle is individually adjustable for depth of cut, as are the tools in the boring bars (boring bars, not shown in picture, are piloted in the fixture).

SPECIAL MACHINES

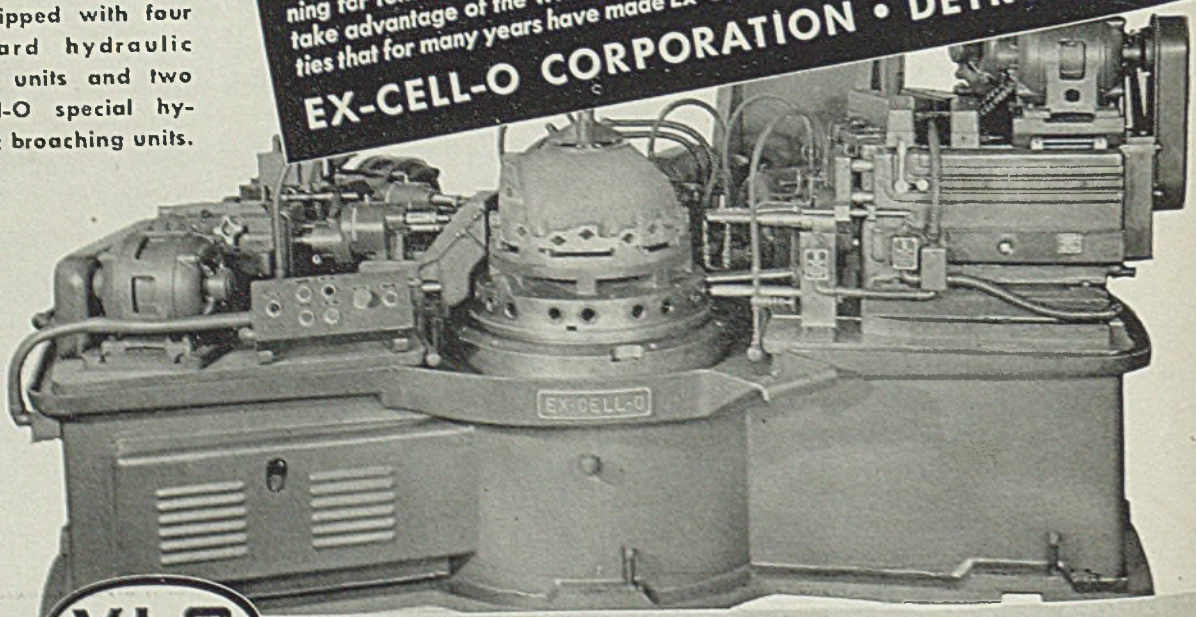
...for today's production...and tomorrow's

For years Ex-Cell-O has been familiarly known as "the headquarters" for special single-purpose machines for turning out accurate parts at a high rate of speed . . . machines that frequently perform numerous operations in one setting of the work and often bring not only a substantial increase in the number of parts produced hourly but also improved quality and reduced unit cost. . . . This is why so many manufacturers have turned to Ex-Cell-O for equipment to meet their war production schedules; why Ex-Cell-O designed machines will figure in the post-war plans of an increasing number of American industries. . . . If you are planning for tomorrow, when the new standards will necessitate costs that are competitive, take advantage of the wide engineering experience and extensive manufacturing facilities that for many years have made Ex-Cell-O a leader in the precision machine tool field.

EX-CELL-O CORPORATION • DETROIT, MICH.

EX-CELL-O SIX-WAY MACHINE

Below: Ex-Cell-O six-way machine for drilling, broaching and reaming valve guide holes in a magnesium crankcase. This machine is equipped with four standard hydraulic power units and two Ex-Cell-O special hydraulic broaching units.



XLO

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STEEL
August 9, 1943

Watch the Pacific Coast!

War has brought an unprecedented upsurge in industrial activity to the West Coast. Aircraft plants, shipyards and light metal industries have attracted workers from all over the country. In three years, industrial employment in the area comprising California, Oregon and Washington has increased by from 200 to 300 per cent. So hectic is the Pacific industrial scene today that native sons refer to it as the second gold rush.

How significant is this second bonanza in less than a century? To what extent can the West Coast retain its wartime ascendancy after peace comes? What does the future hold for this far western industrial empire?

STEEL sent two of its editors to the West Coast to seek facts to help answer these questions. Arthur H. Allen studied the economic developments of the area. John D. Knox looked into the sources of raw materials and the expanding iron and steelworks facilities. The results of their observations will appear in a series of articles which will begin in next week's issue.

Their findings should prove interesting not only to industrialists on the West Coast but also to producers and manufacturers in the remainder of the country whose business will be affected by developments in the Pacific states.

Before the war, California, Oregon and Washington, with 7.39 per cent of the nation's population turned out 6.73 per cent of its manufactures. If the impetus of war is to place the West Coast in a position after the war to supply a considerably greater portion of the country's manufactures, that fact will be important to everybody concerned with industrial markets.

The factor of population alone will help the Pacific states appreciably. The area will emerge from war with a consumer market of 11,000,000 or more persons. Undoubtedly it will produce a greater proportion of the goods required by its own people than during the prewar days. It will be more "self-contained" than heretofore.

But the spirit of the West Coast will not be satisfied with mere gains in self-sufficiency. It envisions postwar industries whose products will be in demand by consumers in other sections of the United States and in the Orient and other foreign markets.

No one can predict the extent to which this vision will materialize. Editors Allen and Knox found evidence of interesting new potentials—some of which are so promising that one can only say "Watch the Pacific Coast!"

ROB PETER TO PAY PAUL: As a result of the mandatory 48-hour week for the iron and steel industry which went into effect Aug. 1, all but a small percentage of the industry's 600,000 employes are working at a rate of 48 hours or more per week. Those who are working fewer than 48 hours are clerical, maintenance and other workers for whom the employers have claimed exemption.

The compulsory shift to the longer week results in a substantial increase in pay, inasmuch as employes will receive time-and-a-half for all hours over 40 per week. This will further reduce the earnings of steel companies and at the same time will reduce the taxes the steel companies pay into the United States treasury. Higher wages and, to a lesser extent, higher costs of materials, already had cut the first-half earnings of 18 steel companies from $90,489,745 in 1942 to $86,827,257 in 1943. Taxes paid by fifteen steel producers were reduced from $298,844,021 in the first half of 1942 to $235,223,106 in the first half of 1943.

One effect of the wage and hour ruling is to shift

(OVER)

money from earnings, where the government's recovery in taxes is high, to employes' income where the tax recovery is low. The resultant loss in federal revenue must be made up by all of the taxpayers.
—pp. 52, 79

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HIGH-GRADE INSURANCE: Numerous geologists, mining engineers, metallurgists, business executives and others identified with a dozen or more private and government organizations deserve a lot of credit for the present comfortable position of this nation in regard to supplies of manganese and chrome ore.

At the outset of the war emergency these men prepared for the worst. They set out to see what could be done if access to foreign supplies were almost completely shut off. They uncovered large deposits of domestic ores and developed processes for utilizing them.

As it happened, foreign supplies were not shut off. Shipments have been coming from many foreign countries. The American steel industry has and will continue to have ample stocks of these ores. However, if worst came to worst, it is believed the total manganese requirements of the industry could be supplied from our domestic material for a number of years.

This standby domestic low-grade ore is high-grade insurance.
—p. 60

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SIMPLE AND EFFECTIVE: Stamped steel landing mats for airplanes, which are playing such an important role in this war, are almost exclusively a contribution of the American steel producing and fabricating industry. The broad idea of a steel mat for airfields originated in the United States army, but the unit perforated steel "plank" which met the army's specifications was developed by a steel company salesman and the planks themselves are being turned out by the mile in 29 steel fabricating shops.

Steel plate, ¼-inch thick, is stamped and punched to form a section or plank 10 feet long and 15 inches wide, weighing only 40 pounds. The planks are designed to interlock. With a little supervision, native laborers in almost any foreign land can put down or take up a landing field made of the planks in a short time.

Simplicity in design, fabrication, transportation, erection and dismantling makes this emergency product one of the outstanding developments of the war.
—p. 112

DOWN TIME UNDER 1%: Any manufacturer who is experiencing chronic lubrication headaches will do well to read the story of how a systematic supervision of lubrication is paying dividends for the Thompson Aircraft Products Co.

With the help of a lubrication engineer the lubrication department evolved a progressive plan of lubrication systems and methods. It assures use of the proper lubricants and provides the necessary checks for seeing that they are applied at the right time. The system also involves simple but effective records which afford the lubrication department a valuable continuous chart of experience. Machine time lost through lubrication failures, based upon productive hours, has been reduced sharply to considerably under 1 per cent.

Incidentally, Thompson Aircraft has abolished the terms "oiler" and "grease monkey." The men and women who lubricate machines and equipment are known as "lubrication servicemen" and "lubrication servicewomen."

This idea deserves universal adoption. —p. 82

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STEEL FOR ESSENTIALS: Everybody will welcome the news that steel is being allocated to permit an increase of 6000 freight cars in the third-quarter carbuilding schedule and the building of 5000 locomotives for delivery up to the end of July, 1944.

Not all of this equipment will go to hard-pressed American railroads. Some of it is tagged for the army, lend-lease and other export. However, the sizable portion earmarked for domestic roads will go a long way toward alleviating shortages of motive power and rolling stock.
—p. 53

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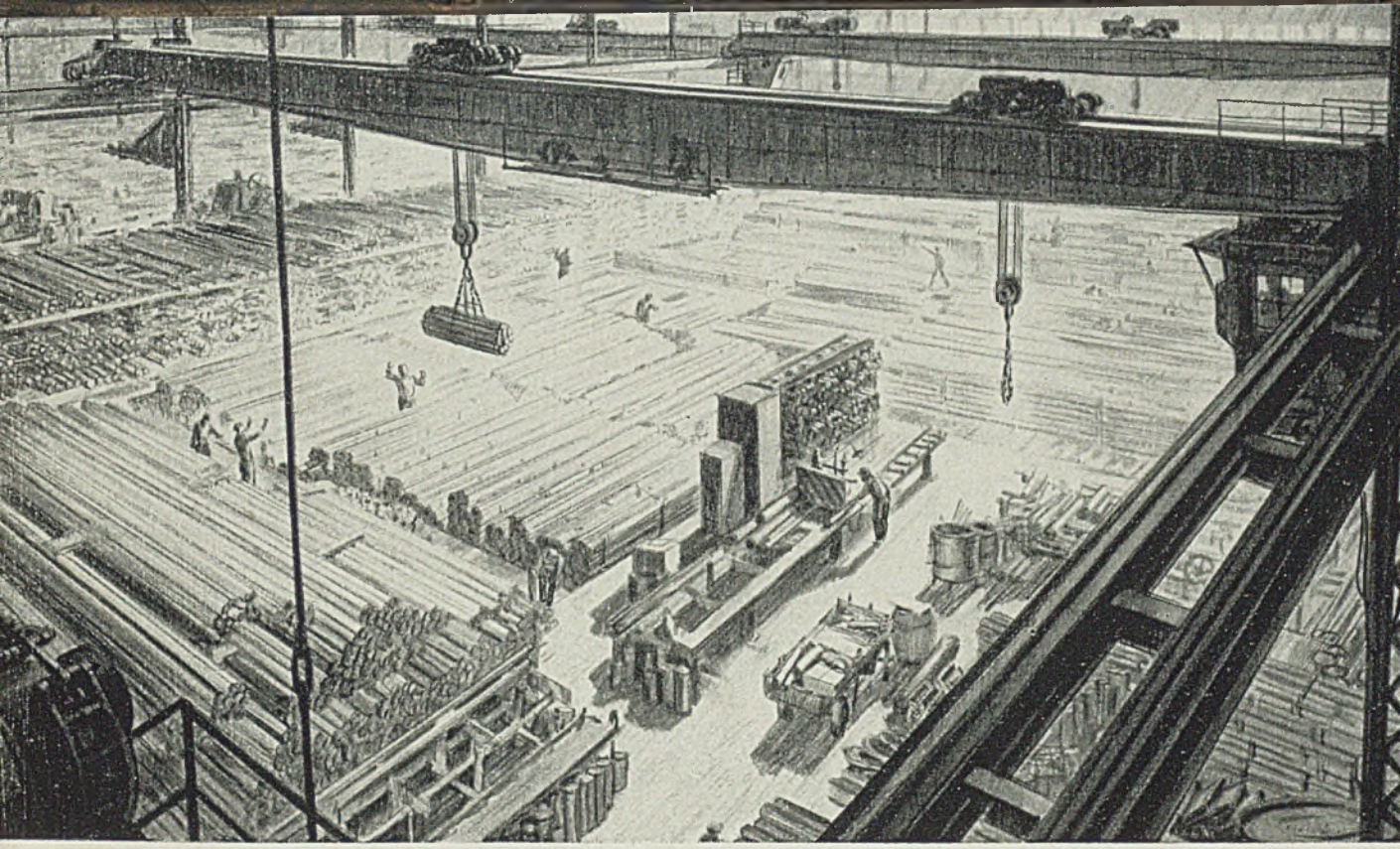
P.S.—While on the subject of allocating steel for essential needs, we wonder if the government knows that its tin can collection program is falling down because housewives can't get can openers at the stores. To flatten a tin can in the prescribed way, one must cut both ends cleanly. This cannot be done with a hatchet or an ice pick. A few tons of steel allocated for can openers might still save the tin can collection drive.

E. L. Shaner

EDITOR-IN-CHIEF



STEEL—In Ryerson Stock

for Immediate Shipment

Ryerson Steel-Service Plants carry every kind of steel to meet your war time requirements. Bars, shapes, plates, sheets, hot rolled, cold rolled, carbon, alloy and stainless are all in stock for quick delivery.

In fact, Ryerson Steel-Service makes it practical to reduce high inventories—eliminate idle steel and make every ton work for victory.

Whether it is a factory breakdown, a rush war order or some other emergency—you can depend on Ryerson.

JOSEPH T. RYERSON & SON, INC.

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RYERSON STEEL-SERVIC

Official photo U. S. Army Signal Corps

DOUBLE TROUBLE... *Gritty Mud and Racking Grind!*

Rurrhr...uhrurrhr...has a familiar ring, hasn't it? And, it wasn't a pleasant sound, was it? Sitting there with your foot on the gas and your hand on the gear-shift, you listened to wear and strain tearing the life out of your car. It was something you always thought about *afterwards*. You probably gave *the car* all the credit for taking the beating . . . never thinking of the bearings that absorbed most of the punishment.

You can bet your bottom dollar, our boys in the Army know how important bearings are . . . for the fellows that push trucks and tanks around know exactly where wear and strain attack. Most of the time, they can't take the *time* to be careful. If a bearing fails, it might mean that a link in an important supply chain is broken. That's why bearings have to be better than good, more reliable than just dependable. To help produce enough of that kind of bearings for the Army, the Navy, and industry here at home is our job. The Fafnir Bearing Company, New Britain, Conn.

FAFNIR

BALL BEARINGS

By R. L. HARTFORD
Pittsburgh Editor, STEEL

WAR GIVES TREMENDOUS LIFT TO ALLOY GRADES

Heavy gains in production capacity and increased utilization seen assuring broad postwar market for high-grade steels. . . Not only will they be more plentiful and better known, but may be less expensive than before the war

ALLOY STEELS face a bright future.

They will be more plentiful in the postwar era. More people will have been educated to their advantages. More people will have been trained to handle them, and more specific data will be available to guide fabricators in choosing the best analysis for the job.

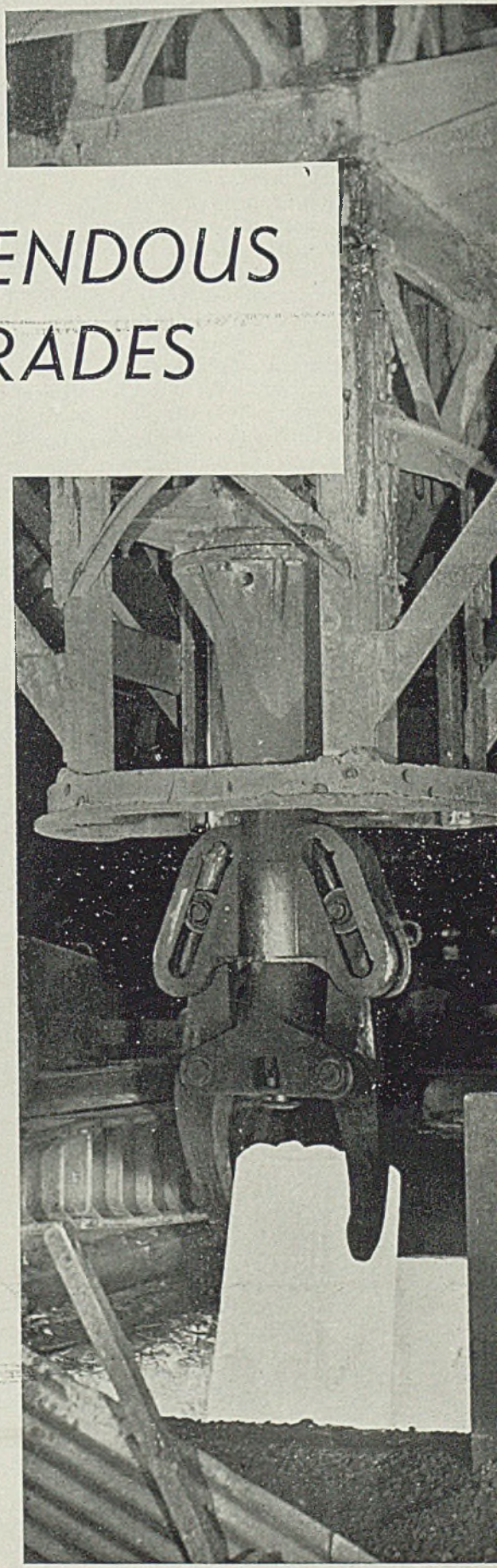
And while it is too early for definite prediction, there are good possibilities they will be less expensive.

The gains to be made by the alloys, however, will not necessarily be made at the expense of carbon steels. Both types will continue to have their respective fields of usefulness. The knowledge acquired by necessity during the emergency may enable the use of carbon steels in applications where alloy steels formerly were considered necessary.

While the war program increased the applications of alloy steels and prompted vast expansion in producing facilities, the shortage of alloying materials has forced many fabricators and producers into an intensified study of carbon steels and what can be done with them through proper heat treating technique. As a result of these studies, physical properties of carbon steels are being sharpened to a point where they compete with alloys in some applications.

Furthermore, the very nature of postwar markets, if they develop on a scale as foreseen by some of the ablest economic thinkers, will contribute considerably to the use of carbon steels because of the cost angle. Vast increases in production bring into sharper focus the importance of small cost increments, and the lower cost of carbon steels may be the deciding factor in many applications.

On the credit side of the ledger, it must also be pointed out that alloy steels will probably cost less. Large volume production, with its accompanying increase in the number of trained men, will bring about economies in the production of alloy steels which will be passed along to the customer. Increased use of scrap with suitable alloy content can be cited as one factor which will cut



Steel ingot is removed from the soaking pit. In this pit ingots are thoroughly equalized to the desired temperatures required for conversion into slabs, billets, or sheet bars for further conversion. OWI photo

down cost of materials used to produce the alloy steels, and the large increase in tonnage of alloy steels used brings with it a larger volume of scrap.

There is, of course, a middle ground which may provide at least a partial answer to the controversy. This is the range of low alloy steels brought on to conserve critical material during the war period. The NE steels are here to stay, and they will be used widely after the war to supplant both carbon steels and high alloy steels. Because many fabricators were forced to adopt such material, the introduction of these steels has not met the resistance which would be expected during peace times. Where normally a fabricator would be loath to change from an accepted material which provided satisfactory results, under present conditions he has had to go to substitutes, and in many cases these substitutes have proved the equal of former steels, and will continue to be basic to his manufacturing processes. Furthermore, workers are becoming accustomed to such materials, and have developed the technique necessary for their use. Since their introduction in 1942, the NE steels have developed to a point where 20 per cent of all alloy steel is now in the NE range.

Types of Demand Shift

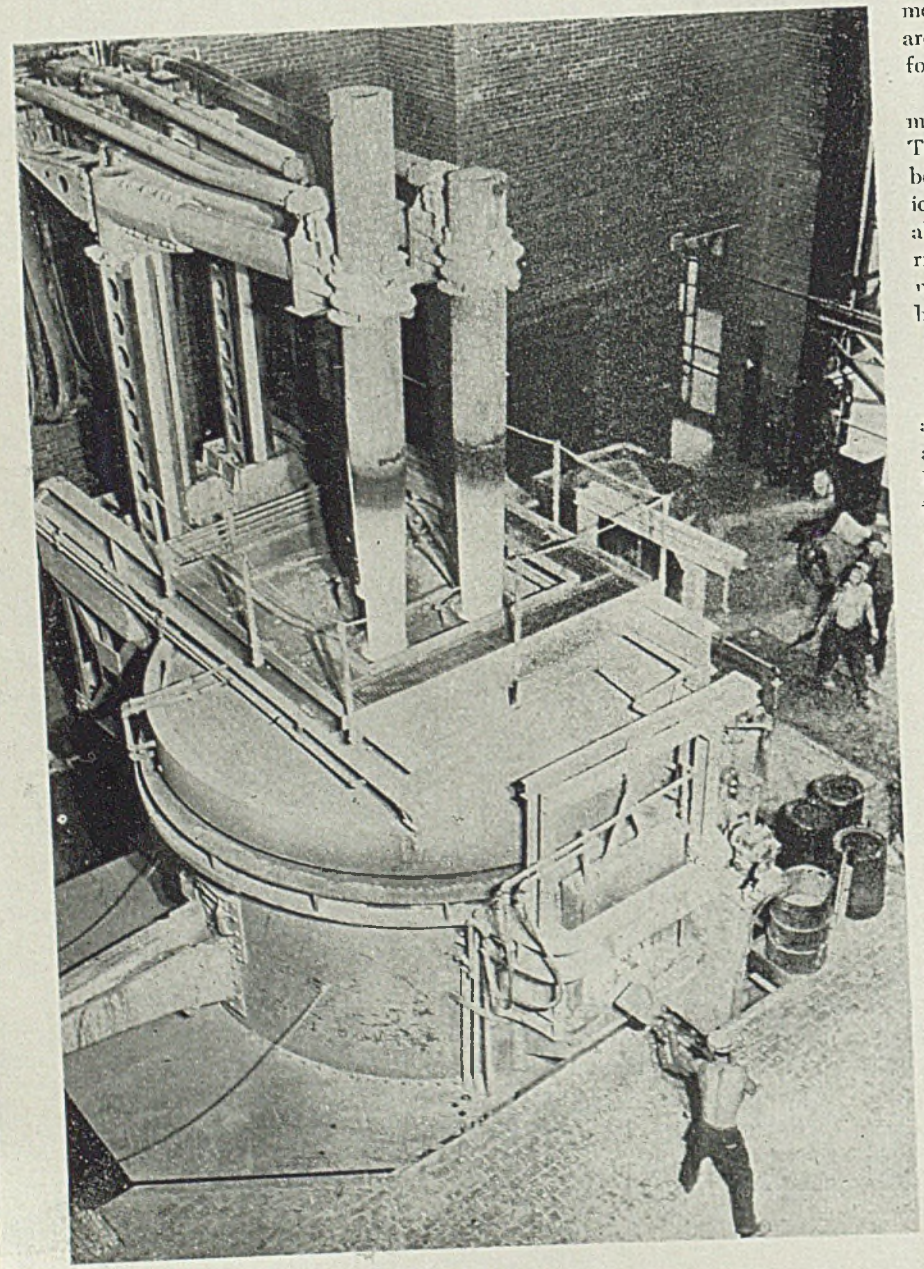
There are other changes brought about by the war in demand for alloy steels. A brief look at the figures for several of the more popular types shows distinct shifts which will probably have some effect on postwar demand patterns. For example, the 2300 series in 1939 accounted for about 5 per cent of alloy production. In 1943 so far it totals only about 0.75 per cent. The 3100 series shows an even more rapid drop during the same period, from 30.48 per cent to less than 1 per cent, while the 3300 series dropped from 8.38 per cent to 4.28 per cent. These three series are nickel and nickel-chromium steels. A look at some of the other varieties shows that straight molybdenum steels of the 4000 series have dropped from 7.16 per cent to 3 per cent, while the chrome-moly steels have jumped from about 8 per cent to 15 per cent of the total. Table I shows the relative position of various other grades, including the rapid rise in the NE steels.

Other factors are involved in the demand picture which do not show on the surface of these figures, of course. Probably the primary one is the fact that peacetime articles are not being produced, and in many cases the steel used in war goods is much different from that used in peacetime. As a result, high tonnage items have dropped to nothing, while more obscure analyses are in heavy demand. This does not alter the primary fact that more fabricators are training more men to use low alloy steels, and are becoming well versed in their performance.

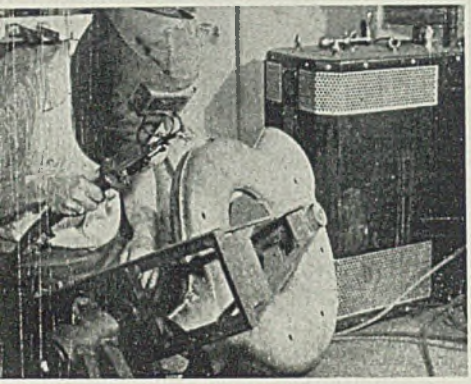
So much for the types of alloys which may be expected to come out of the war. Total number of analyses available may be fewer, but the knowledge and experience built up around these grades will also be extensive, and selection of the right steel will not be as appalling a problem to the user as it might have been before the war.

Volume Is Vital Question

What about volume? Is the market for alloy steels going to be large enough to absorb the increased tonnage which will be available? Is the tonnage increase in alloy steels keeping pace with the overall steel expansion, or is it running ahead? How about open-hearth alloys after the war—will the electric furnace become the only means of producing alloys? In the first place, and for the record, expansion in alloy steels since the start of the war is tremendous. In 1915, 3.18 per cent of all steel produced was alloy material. For 25 years alloy production grew right along with the rest of the steel industry, gaining a little here and there, but in 1940 the per cent of alloy steel to the total had reached only 7.52. In the past two and a half years the expansion of alloy steel producing



Electric arc melting furnace in operation. Furnaces of this type convert scrap iron and steel into high quality alloy steel. This type of furnace gives much faster heating and permits the accurate temperature control so necessary in producing high quality steels. OWI photo



Supercharger turbine nozzle box, made of strong and heat-resistant stainless steel, is fabricated with atomic-hydrogen welding. Essential to today's war planes, the design of turbo superchargers presented difficult problems due to the extremes of temperatures encountered. Alloy steels supplied the answer

facilities has been so rapid that estimates show this year's production will reach more than 15 per cent of all steel output, and that in a year which will see more steel produced than in any year in history. Table 2 shows comparative growth of the alloy branch of the industry with total steel production.

Despite a rapid advance in electric furnace capacity, the majority of alloy steel tonnage continues to be made in the open hearth. This is particularly true of the low alloy steels, and in view of the increasing importance of these alloys it may well be that the open hearth will continue to be the bulk producer of these grades of alloy steels.

This is important, because it means that new equipment is not necessary for production of alloy steels. In fact, the exigencies of the war have made it neces-

(*Please turn to Page* 135)

TABLE NO. 1
DISTRIBUTION OF ALLOY STEEL PRODUCTION BY GRADES

SERIES	PERCENTAGE OF TOTAL 1940	PERCENTAGE OF TOTAL 1st. 3 mos. 1943
1300	°	5.85
2300	4.52	0.83
2500	1.45	0.50
3000	1.51	.
3100	19.99	0.86
3200	.	0.35
3300	0.46	4.35
3400	.	0.13
4000	4.13	2.65
4100	9.78	15.93
4300	3.85	6.15
4600	23.68	3.37
4800	3.73	0.46
5000	0.69	0.46
5100	10.49	0.93
52100	9.82	2.94
6100	1.52	0.62
9200	4.38	3.00
N.E. Steels	....	19.43
All Others	....	31.17
TOTAL	100.00	100.00

°Figures not available
Data from "Trends in Alloy Steels", by John Mitchell

TABLE NO. 2
Share Of Steel Production
REPRESENTED BY ALLOY STEELS

YEAR	TOTAL STEEL PRODUCTION—TONS	TOTAL ALLOY STEEL PRODUCTION—TONS	PERCENTAGE OF ALLOY STEEL
1915	36,000,000	1,143,685	3.18
1916	47,000,000	1,526,129	3.25
1917	50,000,000	1,841,655	3.68
1918	49,000,000	2,002,394	4.08
1919	38,000,000	1,658,930	4.39
1920	47,000,000	1,859,527	3.95
1921	22,000,000	906,694	4.12
1922	39,000,000	1,874,316	4.81
1923	50,000,000	2,359,268	4.71
1924	42,000,000	2,269,578	5.40
1925	50,000,000	2,724,930	5.45
1926	54,000,000	2,759,023	5.10
1927	50,000,000	2,835,558	5.67
1928	57,000,000	3,600,698	6.32
1929	63,000,000	4,433,072	7.02
1930	45,000,000	2,736,508	6.07
1931	29,000,000	1,630,623	5.62
1932	15,000,000	894,436	5.95
1933	26,000,000	1,732,845	6.66
1934	29,000,000	1,805,748	6.22
1935	38,000,000	2,374,017	6.25
1936	33,000,000	3,229,657	6.10
1937	56,000,000	3,396,541	6.06
1938	31,000,000	1,653,510	5.34
1939	52,000,000	3,211,955	6.18
1940	66,000,000	4,965,887	7.52
1941	82,000,000	8,206,129	10.00
1942	86,000,000	11,526,374	13.40
°1943	90,000,000	14,000,000	15.56

°ESTIMATED
Data from "Trends in Alloy Steels", by John Mitchell

Present, Past and Pending

■ CHICAGO "SHARE THE STEEL" CANCELLATIONS HEAVY

CHICAGO—More than 140,000 tons of steel on order books of local district mills were canceled in the "Share the Steel" campaign. The figure is expected to reach 160,000 tons when final tabulations are completed.

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■ ELECTRO ALLOYS CO. BOUGHT BY AMERCAN BRAKE SHOE

ELYRIA, O.—Consolidation of the Electro Alloys Co., this city, with American Brake Shoe Co. was announced last week. The Elyria plant will be operated as a subsidiary. Plans for expansion are reported under consideration. Walter G. Hoffman will head the Electro Alloys division, and W. C. Whyte, who has been president of Electro Alloys, will serve as vice president.

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■ BALDWIN PLACES $65,000,000 IN SUBCONTRACTS

PHILADELPHIA—Baldwin Locomotive Works and subsidiaries awarded subcontracts of approximately $65,000,000 on war orders in the first six months of 1943, according to Ralph Kelly, president. This is an increase of about 15 per cent over 1942. Total of 1035 subcontractors located in 28 states and the District of Columbia is sharing in the Baldwin program.

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■ HIGGINS CANCELLATION OFFSET BY NEW CONTRACT

NEW ORLEANS—The Maritime Commission has cancelled its contract with Andrew J. Higgins, New Orleans, for wooden Curtiss C-76 Caravans, but has replaced the cancelled order with a contract for construction of metal Curtiss C-46 Commandos, which the Army has decided are less costly and more efficient than the wooden type.

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■ AMERICAN MERCHANT MARINE HAS MORE THAN DOUBLED

WASHINGTON—American merchant marine increased by 158 vessels during June, bringing total delivered for first seven months this year to 1046, aggregating 10,485,500 deadweight tons. Since Pearl Harbor the merchant marine has grown from 10,500,000 deadweight tons to 26,000,000.

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■ REPORTS $3,555,174,000 SAVED THROUGH RENEGOTIATION

WASHINGTON—A joint report of the Army, Navy, and Maritime Commission price-adjustment agencies states excessive profits of $3,555,174,000 have been eliminated through renegotiation of contracts. By the end of June written or oral agreements had been completed with 3611 war contractors.

Some Exceptions Sought As Steel Industry Goes on 48-Hour Week

War Manpower Commission asked to exempt certain classes of employes where longer week is impracticable. . . Majority of workers on new schedule. . . Overtime estimated to add $100,000,000 annually to payrolls

MANDATORY 48-hour week in the iron and steel industry went into effect Aug. 1 on a nation-wide basis.

While exemptions have been claimed for various classes of employes, for all practical purposes the industry's 600,000 employes now are on the longer work week. Reports from the various steel producing districts indicate exemptions are being sought for certain departments involving mainly clerical, maintenance workers and similar groups.

Extension of the longer week to the entire industry is expected to increase total steel payrolls by $100,000,000 a year. This was the estimate made by the American Iron and Steel Institute earlier this year. The increase will come from the payment of time-and-a-half for more than 40 hours work per week. In effect this is a pay increase, and as such is the third since 1941, resulting in aggregate increase in steel payrolls since that year of approximately $300,000,000 annually. During that time there has been no increase in the composite price of steel products.

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PITTSBURGH—In this district practically every steel company is understood to have applied for exemptions from the compulsory 48-hour work week schedule ordered by the War Manpower Commission. In most cases exemptions are claimed for workers in offices and non-continuous operations.

WMC has been fairly liberal in granting exceptions to supervisory, sales, administrative and clerical workers and in the non-continuous operations. Youths under 18, women, and physically handicapped men also have been exempted from the order after agreement between the United Steelworkers of America and representatives of management. Pat Fagan, local WMC area director, stated that most works have been placed on the 48-hour-week basis. Exemptions will apply on a month-to-month basis and as the manpower supply diminishes, exceptions will be cancelled. In most cases the exemptions have been allowed on a verbal basis subject to approval from Washington.

The Pittsburgh district still has a fair backlog of office workers and is not too hard pressed for common labor, although skilled workers are scarce.

Persons for whom applications for exception have been filed generally will be permitted to work their former work-week until their applications have been processed.

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CHICAGO — Steelmaking operations in this district are at present and for some time past have been as completely on the 48-hour week as it has been possible to place them in view of production quotas. With the 48-hour week compulsory beginning Aug. 1, exceptions are covered by exemptions already filed with the regional WMC office but not yet acted upon. No information is available on the number of exemptions which have been sought, but it is understood the number is large.

Generally, round-the-clock, or continuous operations, such as blast furnace, coke oven and open-hearth departments, have been running on the 48-hour week or longer work-week basis for months. It is in the rolling mills, finishing and clerical departments where plant managers have been unable to arrange the 48-hour minimum.

There are reasons to feel Chicago regional WMC office may be more insistent on full 48-hour week compliance here than in eastern sections. If this proves true, it may enforce its position by ordering the United States Employment Service to stop sending new workers to the mills. The labor supply situation already is critical.

Steel plant managements have placed before WMC considerable evidence supporting the contention certain departments cannot be placed 100 per cent on

RECORD PAYROLLS

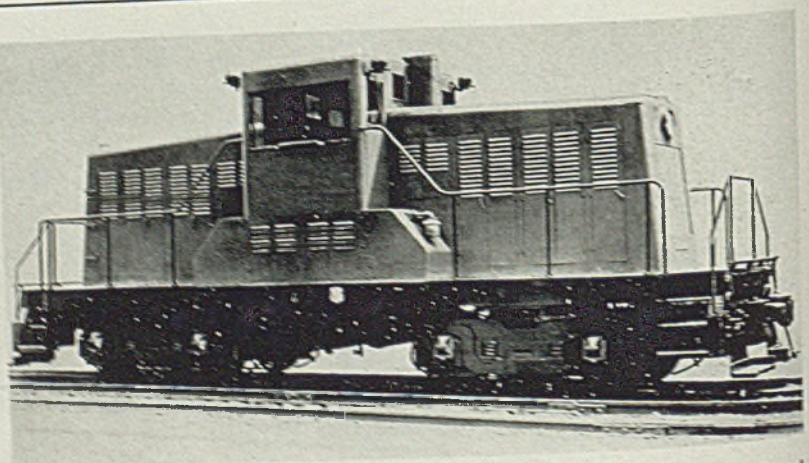
Steel industry payrolls during June were the highest for any thirty-day month on record, totaling $136,217,000, according to the American Iron and Steel Institute.

In May payrolls amounted to $137,404,000 while in June a year ago $118,067,000 were distributed.

Employment declined slightly during the month to 631,000, against 632,000 employes in May and 659,000 in June last year.

Average hourly earnings of wage-earning employes amounted to 112.7 cents in June, compared with 113.4 cents in May and 102.0 cents in June, 1942.

Average number of hours worked per week by all wage-earning employes was 43.3 in June, compared with 41.9 in May and 38.7 hours per week in June a year ago.



DIESEL ELECTRIC: Double power plants feature the new 100-ton diesel electric locomotives designed by H. L. Porter Co. Inc., Pittsburgh. Electric equipment is so designed that with only one engine operating the unit can be used efficiently to carry light loads, traveling as fast as the two engines can travel with a heavy load. Besides gaining economy, the asset of being able to operate with one engine out of service is particularly valuable in remote places, or where there is only one locomotive

a 48-hour week basis. Labor organizations, on the other hand, are insisting upon 48 hours of work for every worker.

° ° °

BUFFALO — At least 95 per cent of the Buffalo area's steel industry workers are now working 48 hours or more in accordance with the War Manpower Commission's order. Survey by STEEL's reporter showed two large mills in the area with "100 per cent of our workers" on at least 48 hours a week. Another has an average work-week close to 50 hours, but about 8 per cent of its workers were still putting in less than 48 hours weekly.

Complaints have been registered by labor forces over failure to engage the remaining steel workers the extra eight hours. Also it was reported there was some dissatisfaction in labor circles over the manner in which a worker receives the overtime.

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BIRMINGHAM — Of approximately 20,000 men in the manufacturing departments of the steel industry in Alabama, 80 per cent now are on the 48-hour week and the plan is working smoothly, J. A. Downey, area WMC director, states.

Virtually all of the steel and iron producers in the district have asked for exemptions from the longer work-week for certain classes of employes. According to Mr. Downey, the only exceptions being claimed are in line with allocations of steel directives by WLB.

° ° °

CLEVELAND—All but a few of the 84 companies classified as steel interests in the WMC Fifth region—covering Ohio, Michigan and Kentucky—already have complied with general order No. 8 placing the industry on a 48-hour week basis; or they have reached an agreement on certain departmental exemptions.

It is estimated the order affects over 100,000 employes in this region, and will add millions of dollars annually to companies' payrolls.

In general, exceptions from working the 48-hour week have been permitted in those finishing operations where production directives make it impossible to increase operating schedules. However, the majority of companies are operating 48-hours or more each week.

The order does not apply to administrative office forces. In a number of instances companies have been given 30 to 60 days with which to place plant office employes on a 48-hour week basis. A few companies have been granted exemptions in those instances where they are training key men to be the nucleus of the working force in new plants scheduled to be completed this year.

Substantial Locomotive and Car Building Programs Projected

Schedule reported set up calling for construction of 5000 motive-power units for delivery by next July. . . Car program for third quarter enlarged with 6000 units on order. . . Steel tonnage to be provided

RAILROADS are in the news again—this time not for the usual reason of what they lack in the way of equipment, but for what they are going to get. After months of warning by railroad officials, followed by a sharp increase in breakdowns, action is in process to supply substantial number of new cars and locomotives.

A primary need of the carriers has been for more motive power. This locomotive shortage has been building up for several years.

Schedules now have been set up on a construction program that will result in the building of more than 5000 locomotives to be delivered by July, 1944.

Army needs account for a large share of this gigantic program. A sizable number are for the domestic roads and some are for foreign countries, principally South American.

Six locomotive builders and two railroad shops will build these units it is understood. They are: American Locomotive Works, Baldwin Locomotive Works, Lima Locomotive Works, H. K. Porter & Co., Davenport-Besler Corp., Vulcan Iron Works, Norfolk & Western railroad and the Pennsylvania railroad.

The locomotives range in size from small 0-6-0 switch type to giant 4-6-6-6 units used primarily for hauling long coal trains in the southern Appalachians.

Steel requirements for the program are expected to exceed 1,000,000 tons.

An increase in the third quarter car program of nearly 6000 units also has been announced and plans are already under way to assemble the necessary materials. It is understood the War Production Board is reversing an earlier position and will allocate plates through Office of Defense Transportation for construction of these cars.

Plates will be provided, however, with the restriction that the bulk of tonnage comes out of mill accumulations. A large tonnage of the plates required already has been booked.

Following current patterns, cars will be built of noncritical materials insofar as possible and feasible. Cast wheels will be used in all but about 800 cars, mostly 70 ton hoppers, which will be equipped with rolled steel wheels. Wood construction will be used extensively on flats and box cars. Steel for axles has been placed.

The program stipulates that delivery is to be made on 75 per cent of the cars during third quarter. The remaining 25 per cent will carry over into the fourth quarter if necessary. There is also a good possibility that additional cars, possibly as many as 10,000, may be placed in the fourth quarter.

Already in the market with inquiries for fourth quarter cars are at least five railroads—Baltimore & Ohio, Nickel Plate, Chesapeake & Ohio, Erie, and Pere Marquette. Outside of the Baltimore & Ohio, none of these roads shared in the 6000 new third quarter cars. The table below shows a complete breakdown of the car orders by builders and railroads.

DISTRIBUTION OF ORDERS ON THIRD QUARTER CAR PROGRAM

Carbuilder	No. of Cars	Type	Railroad
American Car & Foundry Co.	502	50-ton box	Chicago, Milwaukee & St. Paul
American Car & Foundry Co.	100	50-ton box	Central Railroad of Georgia
St. Louis Car Co.	600	70-ton hopper	Missouri Pacific
Huntington Car & Foundry Co.	200	50-ton hopper	Clinchfield
Bethlehem Steel Co.	150	50-ton hopper	Atlantic Coast Line
Bethlehem Steel Co.	350	50-ton hopper	Baltimore & Ohio
General American Transptn. Corp.	600	50-ton box	Atchison, Topeka & Santa Fe
General American Transptn. Corp.	200	20-ton gondola	Atchison, Topeka & Santa Fe
General American Transptn. Corp.	200	50-ton gondola	Atchison, Topeka & Santa Fe
Greenville Steel Car Co.	165	50-ton flat	Central Railroad of Georgia
Mather Car Co.	62	40-ton gondola	Mather Car Co. (lessor)
Mt. Vernon Car Co.	200	50-ton flat	Denver, Rio Grande Western
Pullman Standard Car Mfg. Co.			
Bessemer, Ala.	400	50-ton box	Atlantic Coast Line
Bessemer, Ala.	100	50-ton box	Birmingham Southern
Bessemer, Ala.	200	50-ton box	Georgia Railway
Butler, Pa.	417	50-ton box	Chicago Northwestern
Chicago, Burlington & Quincy	330	50-ton box	Chicago, Burlington & Quincy
Chicago, Milwaukee & St. Paul	300	50-ton box	Chicago, Milwaukee, & St. Paul
Fruit Growers Express	300	50-ton refrig.	Fruit Growers Express
Reading Railroad	200	50-ton hopper	Reading Railroad
St. Louis Southwestern	150	50-ton box	St. Louis Southwestern

First Half Plate Production Heavy

Averaged 140.4 per cent of capacity. . . Total of all products promises 66,490,146 tons for year. . . June output slightly under May. . . Sheet tonnage sacrificed to plates

PRODUCTION of steel and iron for sale during first half totaled 33,245,073 net tons, almost equally divided between first and second quarters, 16,632,962 tons in first and 16,612,111 tons in second, according to figures by the American Iron and Steel Institute. This rate, if continued during last half, would result in production of 66,490,146 tons for the year.

June total was 5,464,593 tons of steel products, 728,676 tons of pig iron, 79,053 tons of ingot molds and 15,092 tons of iron products, including bars, pipe and tubes. In May steel production totaled 5,586,447 tons, 121,854 tons more than in June, a difference accounted for by the additional working day in May.

Bars represent the largest tonnage, 1,087,241 tons in June, 6,504,598 for six months, 89.9 per cent of capacity in June and 89.2 per cent for first half. Plates are first in point of percentage of capacity engaged, 132.8 per cent in June and 140.4 per cent for the year to July 1. Plate production in June totaled 1,004,005 tons, against 1,067,858 tons in May. For six months plate output aggregated 6,399,825 tons.

Sheet mills, deeply curtailed by conversion of many units to plate production, in June operated at only 62.7 per cent of capacity and turned out 695,833 tons. In first half sheet production was 4,340,519 tons, representing 64.8 per cent.

During first half 2,441,030 tons were shipped to members of the industry for conversion into further finished products.

Companies included in these statistics numbered 183, which in 1942 represented 98.8 per cent of total output of finished rolled products. In accordance with government policy export figures cannot be published and these columns are blank in the accompanying table, which supplies full statistics for June and first half, 1943.

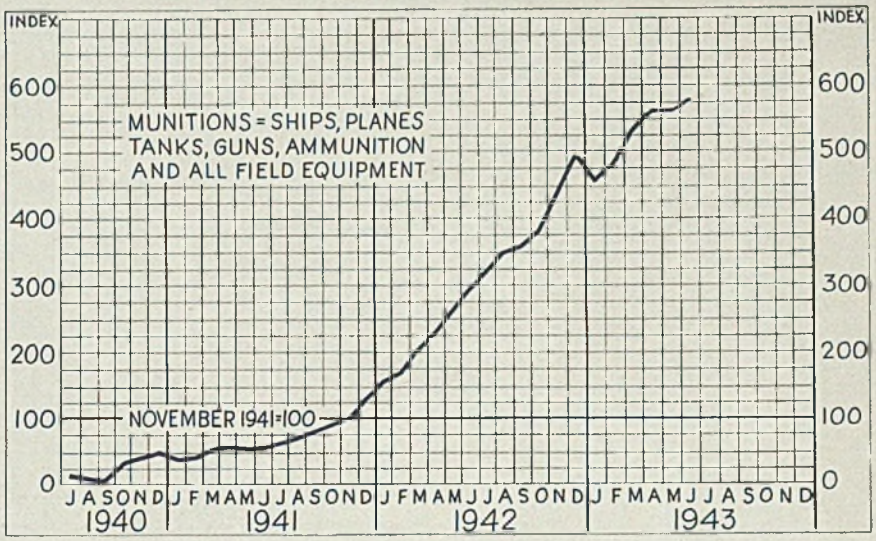
AMERICAN IRON AND STEEL INSTITUTE
Capacity and Production for Sale of Iron and Steel Products

JUNE - 1943

		Number of companies	Items	Annual Capacity Net tons	Production for Sale—Net Tons: Current Month: Total	Current Month: Per cent of capacity	Current Month: Shipments: Export	Current Month: Shipments: To members of the industry for conversion into further finished products	Year to Date: Total	Year to Date: Per Cent of capacity	Year to Date: Shipments: Export	Year to Date: Shipments: To members of the industry for conversion into further finished products
STEEL PRODUCTS	Ingots, blooms, billets, slabs, sheet bars, etc.	44	1	xxxxxxx	589,551	xxx		188,283	4,079,568	xxx		1,175,127
	Heavy structural shapes	10	2	5,412,580	279,717	62.8		xxxxxxx	1,886,415	70.2		xxxxxxx
	Steel piling	4	3	336,000	4,660	16.8		xxxxxxx	14,064	8.4		xxxxxxx
	Plates—Sheared and Universal	21	4	9,189,740	1,004,005	132.8		2,169	6,399,825	140.4		19,380
	Skelp	6	5	xxxxxxx	65,648	xxx		34,228	401,239	xxx		211,929
	Rails—Standard (over 60 lbs.)	4	6	3,629,260	145,589	48.8		xxxxxxx	893,169	49.6		xxxxxxx
	Light (60 lbs. and under)	6	7	309,690	15,243	59.8		xxxxxxx	81,759	53.2		xxxxxxx
	All other (Incl. girder, guard, etc.)	2	8	102,000	1,021	12.2		xxxxxxx	12,887	25.5		xxxxxxx
	Splice bar and tie plates	13	9	1,120,270	51,991	56.4		xxxxxxx	323,873	58.3		xxxxxxx
	Bars—Merchant	40	10	xxxxxxx	570,295	xxx		80,934	3,548,636	xxx		472,892
	Concrete reinforcing—New billet	15	11	xxxxxxx	41,315	xxx		xxxxxxx	214,153	xxx		xxxxxxx
	Rerolling	16	12	xxxxxxx	10,028	xxx		xxxxxxx	47,501	xxx		xxxxxxx
	Cold finished—Carbon	23	13	xxxxxxx	145,509	xxx		xxxxxxx	877,532	xxx		xxxxxxx
	Alloy—Hot rolled	20	14	xxxxxxx	264,382	xxx		37,700	1,525,007	xxx		229,188
	Cold finished	19	15	xxxxxxx	44,002	xxx		xxxxxxx	240,437	xxx		xxxxxxx
	Hoops and baling bands	4	16	xxxxxxx	11,710	xxx		xxxxxxx	51,332	xxx		xxxxxxx
	TOTAL BARS	63	17	14,696,525	1,087,241	89.9		118,634	6,504,598	89.2		732,080
	Tool steel bars (rolled and forged)	17	18	200,840	19,231	116.4		xxxxxxx	119,787	120.2		xxxxxxx
	Pipe and tube—B. W.	15	19	2,231,040	109,516	59.7		xxxxxxx	655,017	59.2		xxxxxxx
	L. W.	8	20	845,400	47,862	68.8		xxxxxxx	282,911	67.4		xxxxxxx
	Electric weld	8	21	1,149,250	95,292	100.8		xxxxxxx	519,395	91.1		xxxxxxx
	Seamless	15	22	3,082,400	168,848	66.6		xxxxxxx	1,061,468	69.4		xxxxxxx
	Conduit	7	23	190,000	5,291	33.8		xxxxxxx	31,362	33.3		xxxxxxx
	Mechanical Tubing	11	24	597,800	61,573	125.2		xxxxxxx	373,676	126.0		xxxxxxx
	Wire rods	22	25	xxxxxxx	102,266	xxx		19,666	597,871	xxx		118,833
	Wire—Drawn	41	26	2,366,150	160,653	82.5		5,167	975,267	83.1		29,077
	Nails and staples	19	27	1,116,640	67,560	73.5		xxxxxxx	424,581	76.6		xxxxxxx
	Barbed and twisted	15	28	482,280	21,062	53.1		xxxxxxx	122,087	51.0		xxxxxxx
	Woven wire fence	16	29	778,060	21,450	33.5		xxxxxxx	106,402	27.6		xxxxxxx
	Bale ties	12	30	128,420	10,404	98.5		xxxxxxx	55,485	87.1		xxxxxxx
	All other wire products	8	31	78,220	5,039	78.5		xxxxxxx	31,088	80.1		xxxxxxx
	Fence posts	11	32	112,065	2,893	31.4		xxxxxxx	11,868	21.3		xxxxxxx
	Black plate	10	33	339,700	27,766	99.3		-	147,902	87.8		
	Tin plate—Hot rolled	4	34	483,620	1,383	3.5		xxxxxxx	9,551	4.0		xxxxxxx
	Cold reduced	10	35	3,841,340	218,607	69.2		xxxxxxx	1,076,259	56.5		xxxxxxx
	Sheets—Hot rolled	25	36	xxxxxxx	474,993	xxx		19,879	3,017,737	xxx		100,236
	Galvanized	14	37	xxxxxxx	64,759	xxx		xxxxxxx	401,889	xxx		xxxxxxx
	Cold rolled	14	38	xxxxxxx	124,089	xxx		xxxxxxx	737,825	xxx		xxxxxxx
	All other	14	39	xxxxxxx	31,992	xxx		xxxxxxx	183,068	xxx		xxxxxxx
	TOTAL SHEETS	28	40	13,497,570	695,833	62.7		19,879	4,340,519	64.8		100,236
	Strip—Hot rolled	22	41	3,200,890	121,548	46.2		14,232	765,901	48.2		67,388
	Cold rolled	39	42	2,057,340	98,672	58.3		xxxxxxx	568,121	55.7		xxxxxxx
	Wheels (car, rolled steel)	5	43	424,820	17,576	50.3		xxxxxxx	111,863	53.1		xxxxxxx
	Axles	6	44	453,470	13,189	35.3		xxxxxxx	83,294	37.0		xxxxxxx
	Track spikes	11	45	308,350	12,444	49.0		xxxxxxx	76,064	49.7		xxxxxxx
	All other	5	46	42,000	13,969	404.2		xxxxxxx	99,937	479.6		xxxxxxx
	TOTAL STEEL PRODUCTS	159	47	xxxxxxx	5,464,593	xxx		402,258	33,245,073	xxx		2,441,030
	Pig iron, ferro manganese and spiegel	26	48	xxxxxxx	728,676	xxx		355,637	4,483,259	xxx		2,142,381
	Ingot moulds	5	49	xxxxxxx	79,053	xxx		xxxxxxx	479,269	xxx		xxxxxxx
IRON PRODUCTS	Bars	10	50	170,110	7,965	56.9		298	49,212	58.3		1,679
	Pipe and tubes	2	51	106,000	6,409	73.5		xxxxxxx	43,686	83.1		xxxxxxx
	All other	1	52	56,000	718	15.6		-	7,340	26.4		
	TOTAL IRON PRODUCTS (ITEMS 50 to 52)	11	53	xxxxxxx	15,092	xxx		298	100,238	xxx		1,679

June Production Gains but Falls Behind Schedule

Intensive effort required to effect small increases with industry in the "stratosphere" as regards output



MUNITIONS production is still going up, but the rate of climb has lessened, Donald M. Nelson, chairman War Production Board, stated last week, reporting a 2 per cent overall increase in June output over that of May.

The production curve shows signs of leveling off, even relatively small gains in some items being obtained only by efforts far more intensive than anything in previous experience.

"America," said Mr. Nelson, "is now in the stratosphere of production, and to reach higher altitudes requires supercharging."

In his report, the twelfth of a series, Mr. Nelson said scheduled requirements for munitions are rising sharply. During June total output, while up compared with May, did not meet schedules.

The following shows the rate of progress of munitions production month by month so far in 1943: January output was 7 per cent below December, 1942; February, 6 per cent above January; March, 9 per cent above February; April, 6 per cent above March; May showed no gain over April; June, 2 per cent above May.

Aircraft production increased 3 per cent in the month. Total ground ordnance and signal equipment rose 3 per cent, with the following specific variations in this category: self-propelled artillery decreased 13 per cent; combat vehicle production increased 2 per cent; artillery (excluding self-propelled) decreased 7 per cent; small arms and infantry weapons increased 14 per cent; naval vessels (value put in place) decreased 3 per cent; merchant vessels (value put in place) increased 11 per cent; miscellaneous munitions increased 1 per cent.

Airplane production fell short of expectations. Increase over May was 3 per cent on a weight basis. Total acceptance, while over 7000, rose only slightly in number from May to June.

Merchant ship deliveries were down about 100,000 deadweight tons from the May record of 1.8 million.

June naval tonnages delivered reached a new peak of 229,457 displacement tons, 13 per cent above May.

Segments of the Army program are lagging. Ammunition and most components are in abundant supply, and schedules have been cut back.

Net orders for machine tools, new orders less cancellations, declined during the month to $38,322,000, a 21 per cent decrease from May. Shipments amounted to $108,689,000, drop of 5 per cent from May.

Accumulated backlog of unfilled machine tool orders was $511,478,000 at the end of June. At the June rate of shipments, this backlog would be eliminated in 4.7 months.

Government-financed war construction completed in June is estimated at $1,010,000,000, decrease of 4 per cent from the revised May total of $1,050,000,000.

MUNITIONS PRODUCTION INDEX
(November 1941 = 100)

Month	1940	1941	1942	1943
January		41	160	457
February		45	173	482
March		52	202	530
April		60	233	563
May		57	265	563
June		59	293	580
July	23	64	321	...
August	22	72	350	...
September	22	83	365	...
October	27	91	386	...
November	34	110	436	...
December	50	1133	496	...

Wilson Says Last Half Munitions Output Must Increase 30 Per Cent

WHILE all has been going better than anticipated on the battle front, this country has more to fear from over-confidence and optimism than from Hitler and Tojo, Charles E. Wilson, executive vice chairman, War Production Board, told 1000 industrial executives from the New York metropolitan area at a meeting in that city, Aug. 3.

War production schedules in the first half, Mr. Wilson declared, amounted to only 43 per cent of the year's program. Thus, if the goal for 1943 is to be achieved there must be an increase in the current half of almost 30 per cent over the first six months.

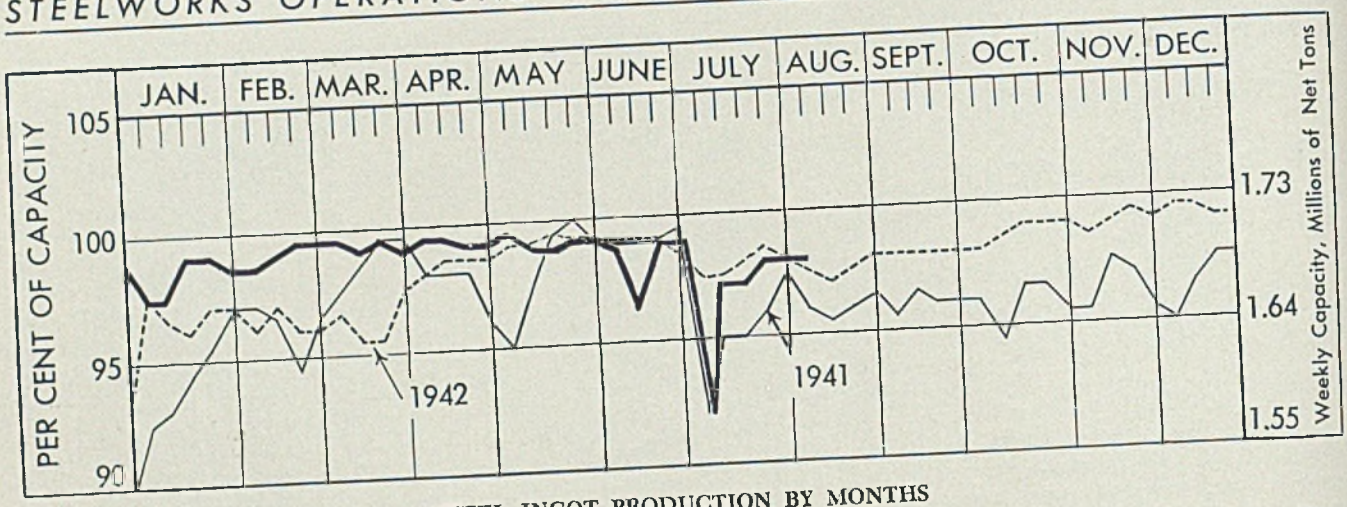
Lt. Gen. Brehon H. Somervell, chief, Army Service Forces, pointed out May production was 5½ per cent below schedule, June showed no improvement, and that preliminary reports for the first 20 days of July showed a further reduction in output. There must be a shift in this trend, he declared, for military successes, such as the Allies are now experiencing, only quicken the need for implements of war.

Mr. Wilson suggested that plant managers re-examine their production quotas, and see whether, in terms of all available plant, materials and manpower, it might not be possible to increase these quotas.

He suggested also that the plant managements make sure that the workers clearly understand the importance of their work. It must, he said, be driven home to each worker, individually, "that any needless absence from his job may in the near future bring a terrible penalty for some young American facing the enemy overseas."

Asserting that there are labor-management committees in approximately 2300 plants throughout the country, Mr. Wilson said that such committees are playing an important part in cutting down absenteeism and promoting production.

STEELWORKS OPERATIONS



STEEL INGOT PRODUCTION BY MONTHS

Net Tons, 000 omitted

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1943	7,424	6,826	7,670	7,374	7,545	7,027						
1942	7,112	6,512	7,392	7,122	7,382	7,022	7,148	7,233	7,067	7,584	7,184	7,303
1941	6,922	6,230	7,124	6,754	7,044	6,792	6,812	6,997	6,811	7,236	6,960	7,150

PIG IRON PRODUCTION

1943	5,194	4,766	5,314	5,035	5,178	4,836						
1942	4,983	4,500	5,055	4,896	5,073	4,935	5,051	5,009	4,937	5,236	5,083	5,201
1941	4,666	4,206	4,702	4,340	4,596	4,551	4,766	4,784	4,721	4,860	4,707	5,014

Iron Output Up 7%

Value $1,227,389,689 at furnace. Pennsylvania made 31 per cent of total; Ohio, 22

DOMESTIC production of pig iron, exclusive of ferroalloys, increased 7 per cent in 1942 over 1941 and established a new record, Bureau of Mines reports. Total output in 1942 was 59,077,593 net tons. Pennsylvania was the largest producer with 18,064,888 tons, 31 per cent of the total. Ohio was second with 13,140,362 tons, 22 per cent. Other large producers were, Indiana, 6,430,820 tons; Illinois, 5,850,070 tons; Alabama, 4,081,710 tons; New York, 4,040,756 tons.

Pig iron shipments, also exclusive of ferroalloys, gained 7 per cent over 1941, totaling 59,100,601 tons, valued at $1,227,389,689. This value represents approximate amounts received f.o.b. furnaces and does not include freight costs, selling commissions and other items figured in market prices generally quoted.

Basic iron production was 44,317,871 tons, bessemer 8,892,477 tons, foundry 2,656,089 tons, malleable 2,455,295 tons, low phosphorus 520,642 tons, charcoal 104,813 tons and all others, not ferroalloys, 153,414 tons.

Production of pig iron in 1942 required 104,053,422 tons of iron ore and manganiferous iron ore, 6,368,611 tons of mill cinder and roll scale and 1,372,599 tons of purchased scrap, an average of 1.892 tons of metalliferous materials, exclusive of home scrap and flue dust, per ton of pig iron produced. Because of low grade ore used in Alabama, furnaces in that state used more ore per ton of pig iron than in any other district, averaging 2.537 tons of metalliferous material for each ton of pig iron.

DISTRICT STEEL RATES

Percentage of Ingot Capacity Engaged in Leading Districts

	Week Ended Aug. 7	Change	Same Week 1942	Same Week 1941
Pittsburgh	100	+ 1	93.5	100
Chicago	98	— 0.5	100.5	100.5
Eastern Pa.	96	None	95	95.5
Youngstown	98	None	94	98
Wheeling	94	+ 5	84.5	93
Cleveland	94	— 2	96	92.5
Buffalo	83	— 7	90.5	90.5
Birmingham	95	None	95	90
New England	97	None	95	87
Cincinnati	89	+ 3	92	87
St. Louis	89	— 3	98	98
Detroit	89	None	88	83
Average	98	None	*97.5	*96.0

*Based on steelmaking capacities as of these dates.

American Steel & Wire Co. Creates Research Division

Creation of a Sales Research and Development division headed by W. H. Cordes, advertising manager of the company, was announced last week by American Steel & Wire Co., Cleveland, subsidary of the United States Steel Corp., New York.

The new division will study postwar markets for existing products of the company and will study and investigate effect of use of substitute materials and new application of old ones. In addition, it will explore new ideas for new products and possible new uses for normal products.

Also to be considered is the possible need for altered distribution and merchandising methods.

Ingot Rate 98%

Strike at Buffalo cancels gain at other points. Several changes in blast furnaces

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week remained unchanged at 98 per cent of capacity. Three districts advanced, four declined and five were unchanged. A year ago the rate was 97½ per cent; two years ago it was 96 per cent, both based on capacities as of those dates.

A strike at Wickwire Spencer Steel Co., Buffalo, caused a sharp cut in production, three open hearths being interrupted and two blast furnaces were banked.

Carnegie-Illinois Steel Corp. blew in its Ohio No. 5 blast furnace July 29 after being down since July 14 for patching. Carnegie also blew out its No. 4 stack at South Chicago July 29 for relining. The only other idle stack in the Chicago district is Carnegie's No. 3 at Gary Works, also being relined. Three stacks are idle in the Birmingham, Ala., district.

Fourth Quarter Requests For Steel Top Supply

The overall War Production Board Requirements Committee last week took action on fourth-quarter allotments.

Requests for carbon steel for the fourth quarter are reported 4,200,000 tons in excess of probable supply, while alloy requests are 250,000 tons over prospective supply.

War Department Says Rumors of Further Cancellations Unfounded

Increased emphasis on airplanes, landing mats, prefabricated bridges, road-building equipment seen but no further reductions in existing contracts are in prospect because of recent battle experience

REPORTS circulating to the effect additional heavy cutbacks in military equipment orders are impending as a result of experience gained in the North African and Sicilian campaigns were declared absolutely without foundation by War Department officials last week.

Cutbacks will continue to develop in various military items as the war goes on and manufacturers will be affected by them. These cutbacks will in turn affect demands for forgings, machine operations, etc. But nothing in the way of drastic cancellation of contracts is in the cards as the result of recent experience in North Africa and Sicily.

It was pointed out the tank program was cut back last October and that various adjustments in anti-aircraft and munitions contracts were made. These adjustments were due to the fact production had far exceeded expectations and need for additional equipment was not pressing.

No Heavy Cuts Expected

At the same time it was emphasized by War Department officials that no additional heavy cuts are in prospect.

Military experience in recent months, including the campaigns in North Africa and Sicily, has developed some new angles which it is likely may lead to increased emphasis on equipment requirements.

Increased emphasis is expected to be expended on production of airplanes and mobile equipment. Need for temporary airplane landing fields and the building of roads over which mobile equipment can be moved rapidly is expected to bring about an increased demand for equipment to prepare landing fields and roads. For example it is rumored in the trade that a new landing mat program will be launched in the fourth quarter involving several hundred thousand tons of steel.

Increased production of prefabricated bridges also is said to be in prospect.

In still another direction, it is reported emphasis on road building and other construction machinery will be increased since efficiency of a mechanized army is stepped up in direct ratio to the condition of the roads over which mobile equipment must travel, and to the adequacy of landing fields, etc.

Practically all new construction equipment manufactured during the past year has been sent overseas, often to the actual battle front in advance of, or in support of the infantry. A report made by the War Production Board's Construction Machinery Division shows peacetime construction equipment is a prime necessity in actual battle.

H. G. Batcheller, WPB operations vice chairman, commenting on the report said:

"Bulldozers are used extensively to hammer rough paths for the heavy guns, and have on occasion actually operated as prime movers to haul guns into position.

"When airfield runways are bombed, engineers must have—on the spot and when they need them—track-laying tractors, cranes, shovels, graders, bituminous and concrete machinery, and jaw and roll crushers.

"When artillery-shattered streets have to be cleared to permit passage of vehicles, temporary bridges or new roads built, emergency dockage and unloading facilities set up—these and other types of construction machinery go to work; another example of the products of peace that have gone to war and are doing a vital job.

"A year ago, we were faced with the knowledge that huge quantities of construction equipment would be needed overseas for these purposes. At the same time, large quantities would still be needed at home for essential activities.

"The War Production Board, therefore, acted to screen all home front requests for new construction machinery, and at the same time instituted a 38-state pooling arrangement for the loan and purchase of used machinery of this type."

The result has been, Mr. Batcheller said, that $75,000,000 worth of equipment more than would otherwise have been available is doing a job on many war fronts.

Domestic needs are being covered mainly by used and rebuilt equipment.

DRIVE SUCCESSFUL

Up to late last week, 812,000 tons of steel on mill order books had been cancelled in the "Share the Steel" campaign. Of the total, 80 per cent was for third quarter and the remainder for fourth.

The campaign, a part of the "Steel for Victory" drive, has now been concluded and is described as very successful. Norman W. Foy, assistant director, War Production Board's Steel Division, last week gave a dinner at the Mayflower hotel in Washington for officials of the division who participated in the "Share the Steel" campaign.

WPB is hoping that the balance of the 2,000,000 additional tons required for the war effort in the last half of the year will be obtained through increased output of existing steelmaking facilities, as well as the bringing in of new capacity now under construction.

Steel Committee Discusses Industry's War Problems

The Steel Advisory Committee met in Washington Aug. 4 with the War Production Board's Iron and Steel Division officials. The committee and key officials of the Steel Division later visited the Proving Grounds at Aberdeen, Md., as guests of the Army Ordnance Department.

At the meeting the committee discussed ferroalloys, the "Share the Steel" program, scrap, steel expansion program, and the CMP fourth-quarter report.

It also decided that the steel companies will carry on their own mass meetings with respect to production stepup and WPB will not participate unless specifically asked for speakers.

The scrap report was not optimistic, especially as regards manpower in yards. Reports on the steel expansion program were optimistic.

New Scrap Drive Expected

The War Production Board's Salvage Division last week was reported revamping its program with the idea of possibly putting on another scrap drive early this fall along the lines of that last year. However, it is believed that if such a drive is held it will be for industrial scrap rather than household scrap.

WINDOWS of WASHINGTON

Things Going Better

The way things are going in this war is reflected in the atmosphere encountered in various government agencies. When one visits almost any of the strictly war agencies, such as the War Production Board, or the Army or the Navy, the one-time intense activity and excitement, with working days usually extending far into the night, no longer is noted.

One reason is that Congress is in recess; Washington always calms down to some extent when Congress is away. But the principal reason is that the war agencies have gotten thoroughly organized. They know what their jobs are and how to get them done. As the progress of the war brings shifts in strategy, the war agencies quickly adjust themselves and go along smoothly as a rule. In short, the war is going well.

In sharp contrast is the atmosphere that prevails in the agencies that have to do with civilian economy. The Office of Price Administration, the War Labor Board, the War Food Administration, the War Manpower Commission and a number of other agencies created to guard the home front still are without clear-cut programs.

Use Substitutes!

The ninth "Material Substitutions and Supply List" of the Conservation Division, War Production Board, just issued, reports these metals or metal products are unavailable in sufficient quantities for war demands alone or for war plus essential industrial demands, and recommends use of substitutes whenever possible: Bismuth, cadmium, tin, copper, zinc, tantalum, molybdenum, nickel, columbium, chromium-nickel stainless steel, straight chromium stainless steel, seamless steel tubing, steel forgings and steel bars 1½-inch and larger.

New OPA Policy Pends?

Chester Bowles, new general manager of the Office of Price Administration, told a press conference he proposes to strip price, rent and rationing officials of much of their present authority. At present these officials not only develop OPA programs but they administer them. Regional directors, now largely figureheads, are to administer them. The idea is to administer OPA rulings more intelligently by on-the-spot contacts.

"If you are a businessman, you don't want to be haled into court for a couple of mistakes made by high school girls working for you," Mr. Bowles explained. "On the other hand, you are certainly going to dislike OPA if it allows the store across the street to run a black market."

Mr. Bowles said he favored price subsidies. "Subsidies are a necessary evil," he said, but "chaos would result if they were not used."

Also, he favors overall rather than piecemeal price control.

Seek Production Spur

The *Labor-Management News* is the title of a new weekly to circulate among members of plant labor-management committees. The publication of the War Production Drive Division, War Production Board, is aimed at stimulating still further the activities of these committees in finding new ways of stepping up output.

Organization of these committees has proved to be among the most resultful measures making for more effective and efficient use of plant facilities, of labor, and of materials.

HOW IT WAS NAMED

Of interest to many readers of STEEL should be the origin of the name of the Foundry Methodist Church, one of Washington's leading religious institutions. When the British set fire to Washington in the war of 1812, one of their objectives was the destruction of a foundry in nearby Georgetown where a patriot named Henry Foxall was manufacturing supplies for the American army. Foxall was not only a foundryman but was also a Methodist preacher. He vowed if his foundry were preserved "in order that it might continue to furnish the instruments of war to make tyranny tremble", he would build a Methodist chapel.

A terrific electrical storm halted the British and before they were in a position to raze the foundry American reinforcements were brought up from Virginia, thus ending the threat.

While the church was being built Bishop Francis Asbury settled a debate as to its name by deciding on the Foundry Methodist Church, not only in tribute to the foundry operated by Mr. Foxall, but also because John Wesley at one time had preached in an abandoned foundry in London.

Need Program

Under discussion in administrative circles is a plan to meet Eastern fuel oil requirements after the war by importing fuel oil from Latin America. Under the Good Neighbor policy, the government is in need of a good peacetime import program. The administration also wants to keep our merchant marine strong and wants to make us of our huge tanker fleet instead of scrapping it. The disposition of the administration to find ways of conserving our dwindling supplies of petroleum also is a factor. The conservation policy is favored by most large oil producers.

Hot Potato

How to get labor unions and employers to obey rulings of the National War Labor Board is the hottest potato the administration now has in its hands. The Smith-Connally act, while giving greater power to the board, does not compel a union or an employer to accept a board finding.

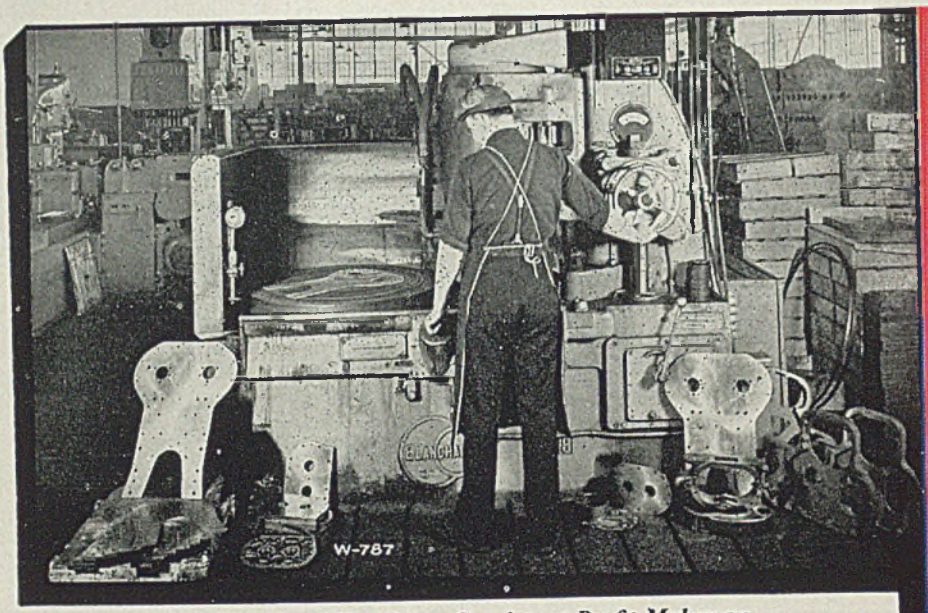
Not Much Chance

Plans to "integrate" all forms of public transportation were disclosed at a recent hearing of the Senate Interstate Commerce Committee. All forms of transportation, it appears, would be zoned throughout the country and collected into single ownership and control in each zone.

Under the Transportation Act of 1940, a Board of Investigation and Research held hearings in July of 1942 but its investigations were not disclosed prior to recent hearings which were held by the Interstate Commerce Committee of the Senate.

Testimony included a recommendation by Donald M. Conn, Chicago, executive vice president, Transportation Association of America, that the country's 38,000 truck lines, 4700 bus lines, 2600 water lines, 500 short-line railroads, 139 trunk-line railroads and 20 airlines be integrated. The Association was identified as a "non-political, nonpartisan educational and research organization of 4000 corporations and 20,000 individuals." Air transport, water and motor truck carrier representatives, however, see it as a front for a railroad lobby. The Department of Justice strongly opposes the idea of integration on the grounds it would set up monopolies.

There is small likelihood Congress would pass any legislation that would make it possible to carry out the integration program proposed.



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Supply Position Comfortable as Developments Improve Outlook

Initial shortage fears removed with access to foreign sources maintained. . . Because of favorable overall conditions and other factors many domestic properties are not likely to be developed at this time. . . Chrome ore situation similar

INITIAL fears that supplies of manganese ore might prove insufficient to enable us to fight the war with the full output of our total steelmaking capacity have proved groundless.

Our present situation in manganese ore is a comfortable one. It will continue so—unless the war stretches out over an interminable period, or unless we are cut off from areas of the world now open to our ships.

Main reliance continues to be placed on imports. Manganese ore is coming in right along from Brazil, Cuba, Africa and India. This being a global war, our ships continually travel to many ports. Inasmuch as they have to come back loaded or in ballast it is a simple matter to find bottoms to bring in cargoes of manganese ore.

The question as to insurance of an adequate supply of manganese ore under any circumstances was taken up by the Council of National Defense as early as 1940. Since then it has received attention by many experienced men. For many months, as will be recalled, the shipping situation did not look nearly as promising as it does now. There were periods when the loss of India was threatened. There was a long period during which ship losses by submarine attacks were on the increase. There were uncertainties about the scope of our operations in the Pacific.

Nation Prepared for the Worst

In studying the overall manganese problem, therefore, it became necessary to prepare for the worst, and to prepare to depend on our own reserves of low-grade manganiferous ores on a large scale even though this would mean much higher costs in converting these ores into usable material.

In informed circles it is believed that if it became absolutely necessary to do so, we could supply as much as 40 per cent of our current manganese requirement out of low-grade domestic material by using metallurgical processing methods which have been worked out. In fact, it is believed that by further laboratory work additional methods might be worked out to permit use of even more of our low-grade material—sufficient, in fact, to supply all of our manganese needs over a period of a number of years.

Most important workable deposits in this country are five in number and are located in or near Butte, Mont., Las Vegas, Nev., the Cuyuna range in Minnesota, Aroostook county, Me., and Artillery Peak, Ariz. In each case the beneficiation and metallurgical processing operations are costly, but they have been worked out on a practical basis.

Because of the favorable overall situation, and because full exploitation would divert steel and other critical materials from the war program, also because of the manpower shortage, not all of these properties are being developed at this time and there is little likelihood that the present domestic manganese producing industry will be expanded further.

Of the five districts mentioned above, only one is shipping beneficiated manganese concentrates at this time. This is Butte, where a plant owned and operated by the Anaconda Copper Mining Co. is delivering to the government at a guaranteed price.

Late in 1941, after the ore in the Las Vegas area had been studied, construction of a concentrating plant there was authorized. This project has gone forward and this plant is expected to go into operation this month. It is a government-owned plant and is to be operated by the Manganese Ore Co., subsidiary of the M. A. Hanna Co., Cleveland.

Early in 1942, after a metallurgical process had been worked out for the manganiferous ore in the Cuyuna range, construction of a plant in that district was authorized. Shortly after, however, this project was "frozen," on the ground that the need for manganese was not sufficiently pressing to warrant diversion of critical materials and manpower to this project.

No Maine Operations Yet

Exploratory work in the summer of 1942 revealed that the Maine deposit approaches in size the "black ore" deposits of the Cuyuna range. It also is quite similar in grade, although the metallurgical processing operation is somewhat different. Mining and concentrating operations could be inaugurated in the Maine area at any time the War Production Board deemed such action necessary, which, as indicated above, is not at all likely.

The Artillery Peak deposits are considered to be least promising among those of the five largest areas and the costs there would be even higher than costs in the other areas. Present thinking is that the Artillery Peak deposit should be held in reserve to supply crude concentrates to the Las Vegas mill should that be considered necessary when the Las Vegas deposits become exhausted.

From Butte, Las Vegas, Cuyuna and Maine it appears possible to produce some 400,000 gross tons of 60 per cent manganese concentrates annually over a period of five to ten years. After that the rate of production would start to decline.

Actually total domestic production is expected not to exceed 300,000 gross tons annually.

There are several other districts where concentrating plants may or may not be practicable. Government-owned plants have been proposed at one time or another for location near Batesville, Ark., Shady Valley, Tenn., Deming, N. Mex., Delta, Utah, Battle Mountain, Nev.,

OUTSTANDING JOB

Since 1940 an increasing number of geologists, mining engineers, metallurgists and others, associated with the War Production Board, the War Metallurgy Committee of the National Academy of Sciences, National Research Council, the United States Bureau of Mines, the United States Geological Survey, the Office of Scientific Research and Development, the Board of Economic Warfare, the Department of State, the Reconstruction Finance Corp. and other bodies, have done an outstanding job in making strategic minerals available in required quantities to support production of carbon and alloy steels.

Despite the fact we are hampered importing from some areas, large quantities of the strategic minerals continue to be received from abroad — and in not a single instance has a ship been sent out in ballast to bring in such cargo.

In addition, intensive exploratory work has uncovered huge domestic deposits of manganese ore, chromite, tungsten ore and other ores, while laboratory work has resulted in development of processes for using these ores.

Phillipsburg and Butte, Mont. Construction of a government-owned mill at Butte will be under way shortly. It will be operated by the Domestic Manganese & Development Co. At Battle Mountain private operators are operating their own mills. In the other areas the government has bought and continues to buy low-grade material but the construction of more concentrating mills is considered unlikely.

South Dakota Has Largest Deposit

There is still another deposit of low-grade material—the largest of them all. This is in the locality of Chamberlain, S. D., where there is a vast amount of shale containing about 1 per cent manganese. A successful mining and preliminary concentrating procedure has been developed to produce nodules containing 16 per cent manganese. The next step—that of converting these nodules into usable product—has not been worked out. It is felt that the principles that would have to be followed are well understood. Again in this instance, because of the critical situation in materials and manpower, it cannot be assumed that any further effort is to be expended at this time aimed at converting Chamberlain shale into a suitable manganese concentrate.

To further ease the manganese situation and provide insurance against developments that might cut our sea lanes, the government continues to buy and stockpile manganese ore in Cuba, Brazil and Chile.

As stated above, the government is paying a very high price for domestic manganese concentrates. It is paying $1.00 a unit for 48 per cent concentrates, with premiums and penalties for manganese content above or below 48 per cent. This is the price paid for concentrates delivered at the nearest rail point or delivered at government buying stations. On top of this price the government pays freight rates and sampling and handling charges that come to 25 to 30 cents a unit. In turn, the government sells the concentrates at the 90 cent ceiling price. It thus absorbs a loss of 35 to 40 cents a unit, or about $17 to $19 per gross ton. In normal times the market on high grades of imported manganese ore usually is somewhere within the range of 35 to 45 cents a unit, duty paid, Eastern seaboard.

In chrome ore the situation is quite similar to that in manganese ore. In spite of the fact that 1943 consumption of chrome ore is about 80 per cent above 1940 consumption, with a further expansion to around 100 per cent scheduled for 1944, we actually are increasing our stocks of chrome ore.

This happy situation is due largely to the fact that the Allied nations did not lose Madagascar and New Caledonia.

Cuba now is capable of supplying sufficient chrome ore to take care of all our refractory requirements, and the known reserves in Cuba now are considerably larger than even two years ago.

Promote Use of Low-Grade Chromite

As was the case with manganese, every effort was made to make it possible to use low-grade domestic chromite in large quantities and three large government-owned operations were established, two in Montana and one in Oregon. In addition the government buys from small-lot producers.

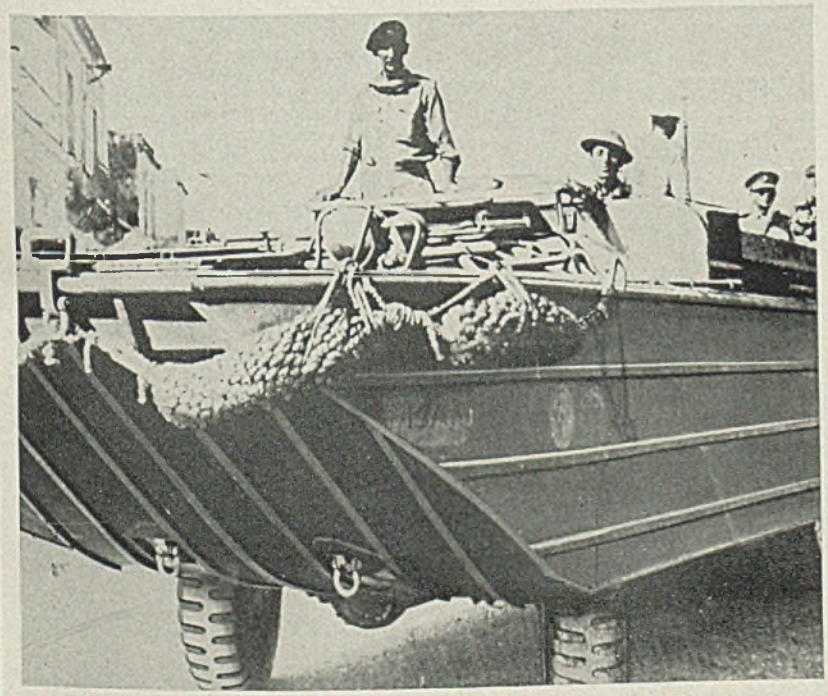
For chrome ore of standard metallurgical quality, containing 48 per cent chromium oxide and having a 3 to 1 chromium-iron ratio, the government pays $52.80 per gross ton, delivered at the nearest railroad point or at small-lot purchasing stations. On top of this the government pays an average freight of around $13 and incurs other expenses coming to around $2. After selling this material at the ceiling price the government's loss comes to $23 to $24 a ton.

It is believed that we could produce well in excess of 500,000 gross tons of chrome concentrates annually for a period of several years from domestic sources—if that were necessary. Due to the present comfortable situation in bringing in high-grade chromite from abroad, nothing like this tonnage will be produced from domestic sources. In fact, domestic production is tending to decrease because of the greater need for miners in copper and other mines.

Presents Postwar Headache

One of the headaches that lies ahead is what to do about these wartime mining operations when the emergency is past. The Scrugham bill, under which the government would continue to buy the product of marginal and submarginal mines at the highest wartime prices and stockpile it, is but one indication of the pressure that is going to be brought to bear. Recent hearings on the Scrugham bill revealed that this measure has powerful support and will be a campaign issue in a number of the interested states.

After all, a subsidy of $18 a gross ton on 300,000 tons of manganese ore comes to $5,400,000, and when you add the other ores that the government is buying from domestic producers at a loss it all adds up to a total that is not to be sneezed at.



AMPHIBIOUS TRUCK:—In this radio photograph from Sicily, Gen. Sir Bernard L. Montgomery, leader of the British eighth army, is shown touring captured Sicilian cities in this 2½ ton truck, familiarly known as the "Duck." Although in volume production at General Motors Truck & Coach for some time and having seen action in the South Pacific, this is the "Duck's" first appearance in the European theater of war. Combining the qualities of a 31-foot all-steel landing boat and a sturdy, 6-wheel drive truck, it is particularly useful in amphibious operations. Acme photo

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

STEEL PRODUCERS: Production directives for tin mill products give the maximum tonnage of primes and seconds to be produced. They do not cover production of waste waste or black plate rejects. A producer must not accept orders for waste waste and black plate rejects in excess of tonnage of such material which will result, in the ordinary course, from his production of primes and seconds in accordance with his production directive.

Production directives for other steel products cover total production, including both primes and less than prime quality material. Therefore, a manufacturer's total acceptance of orders for both types of material must not exceed 110 per cent of his production directive adjusted for carry overs from an earlier month. It follows that, in accepting orders for prime quality material, a producer must make allowance for his normal production of second quality material.

ALUMINUM PRODUCERS: Each producer of aluminum controlled material (except companies producing only in the form of castings and the rivet departments of aircraft companies) must report any stoppages or slowdown of production and its cause. This report must be made by telegram to the chief of the Fabrication Branch, Aluminum and Magnesium Division, War Production Board.

Aluminum rivet producers operating under subcontractual arrangements must report to their contractors in the same manner as other producers of aluminum fabricated products are required to report to WPB.

Under a provision of CMP regulation No. 1 controlled materials producers are to fill orders which are not authorized controlled material orders if delivery is "made pursuant to a specific direction of the WPB." This refers only to directions issued under the CMP formerly issued by the director of the Aluminum and Magnesium Division, but since March 24 issued by the WPB over the signature of its recording secretary. It does not refer to authorizations on form PD-26A or authorizations issued by the Aircraft Scheduling Unit.

ALUMINUM CONSUMERS: All consumers of aluminum for alloying and deoxidizing purposes, thermit reaction and chemical uses must file WPB-2360 (formerly CMP-13) with the Aluminum and Magnesium Division by Aug. 20 for requirements of aluminum for the fourth quarter for items enumerated in section I of the report form.

SECONDARY ALUMINUM: In conjunction with the recent price revision by OPA of secondary aluminum ingot, and in order to insure a readier flow of scrap into consuming channels, the Aluminum and Magnesium Division again will entertain applications for allotment of secondary grades of aluminum for fourth quarter requirements by producers of aluminum bronze, manganese bronze, magnesium-base and zinc-base alloys. This will afford consumers an opportunity to take advantage of the price reduction, while at the same time relieving pressure of order loads on primary producers.

Users of intermediate aluminum hardeners are reminded that if the aluminum content of the material requested is 85 per cent or more, the gross weight should be reported; if less than 85 per cent, net aluminum content should be reported in section III, column (c), and full alloy specifications in column (e).

CMP REGULATIONS

WELDING ROD: Preference rating of AA-2 has been assigned to repair shops for the acquisition of welding rod. It may be used regardless of whether or not the shop carries welding rod as an operating supply. Repair shops may use the rating to buy only as much welding rod per month as it used during the previous month, up to $100. However, any shop may purchase up to $15 worth of welding rod regardless of the amount used in the previous month. Additional rod may be purchased by: (1) Use of a customer's rating for a specific job; (2) by applying for a rating for a specific amount of welding rod on PD-1A; (3) if the shop also needs controlled material, by filing CMP-4B and using the rating assigned for all the welding rod it needs. (CMP No. 5)

CONSTRUCTION: In cases where specific WPB authorization is not required under order L-41 to begin construction, CMP regulation No. 5 procedures may be used to obtain required materials and products up to $500 in cost. (CMP No. 5)

INDEX OF ORDER REVISIONS

Subject	Designations
Abrasives	M-319
Caskets and Vaults	L-64
Construction	CMP No. 5
Cooking Appliances	L-23-c
Equipment, Heating	L-107
Furnaces	L-22, L-22-a
Heaters, Water	L-185
Silver	M-199
Turbines, Steam	L-154
Welding Rod	CMP No. 5
Price Regulations	
Ferromanganese	No. 138
Forgings, Ferrous	No. 351
Magnesium	No. 314
Pig Iron, Silvery	No. 405
Transit Controls	No. 136
Wire and Cable	No. 82

L ORDERS

FURNACES: Control of furnace production has been placed directly under the Controlled Materials Plan, enabling WPB to meet the fluctuating demand so prevalent with respect to this product. Materials will be allocated for the production of furnaces at a rate based upon actual requirements of the Army, Navy, Maritime Commission, War Shipping Administration, war housing and essential civilian needs. Furnaces may be delivered only on orders rated A-10 or higher. Further simplification of furnaces produced and a limitation on number of models which can be made also have been established. The order, L-22, now covers production and distribution of cast iron and steel furnaces, the latter having been previously controlled by order L-22-a, which is revoked. (L-22, L-22-a)

COOKING APPLIANCES AND HEATING STOVES: Quota restrictions have been imposed upon individual producers of domestic cooking appliances and domestic heating stoves have been removed but the quantity of the different types of stoves that may be produced by the industry as a whole is now definitely specified. This quantity is only to the extent necessary to meet approved programs. Return to production of the larger firms is provided as it is determined that their production is needed. A simplification program also is provided which specifies the number or models and types of which will be permitted. (L-23-c)

CASKETS AND VAULTS: Prohibition on the use of any iron and steel for reinforcing purposes in concrete burial vaults after June 30, 1943, has been removed. Manufacturers are limited, however, as to the kinds and amounts of steel they can use. Caskets which have been made from parts fabricated prior to May 1, 1943, and which exceed dimensions specified in order L-64 can be sold now without a certification of need. (L-64)

HEATING EQUIPMENT: Distribution of extended surface heating equipment now is restricted to orders which specify a delivery date, are rated AA-5 or better, or which are for repair parts. Schedule I of the order provides an extensive simplification program for the industry, reducing the number of sizes and types which may be made. (L-107)

STEAM TURBINES: No person now is permitted to install on any steam turbine for land use, with certain exceptions, sheet metal lagging, asbestos or other high temperature molded insulation, ornamental trim, gage equipment larger than specified sizes or larger than the minimum practicable size, duplicate instruments, more than a single oil pump or tubing or other special materials not customarily furnished by the manufacturer for the conditions under which the turbine is to operate. (L-154)

WATER HEATERS: Production of water heaters for essential civilian uses, including necessary replacements, may be resumed on the basis of a specified percentage of similar equipment produced in 1941. Sales are restricted to orders rated A-10 or higher. (L-185)

M ORDERS

SILVER: Foreign silver now is permitted only in manufacture of medicines and health supplies, photographic industry, manufacture of electrical contacts and other products or parts used for electrical current-carrying purposes, manufacture of miscellaneous "other products" and on orders carrying a preference rating of AA-5 or higher, with some exceptions. Foreign silver may no longer be used for certain restricted uses defined in the amendment, regardless of preference ratings.

Use of treasury silver is permitted only in the manufacture of engine bearings, official military insignia, brazing alloys, and solders.

Domestically mined silver is channeled to nonessential industry for restricted uses upon the basis of 50 per cent of 1941 or 1942 consumption, whichever is larger. These uses include those for manufacture of silverware, jewelry, badges and insignia (other than official military), church goods, clothing and container closures, pens and pencils, toilet articles, picture frames, musical instruments, electroplating not necessary for operational purposes (except for use in manufacture and repair of surgical instruments, appliances and equipment.)

Scrap generated by manufacturers in processing of treasury silver becomes "foreign silver" at the 45-cent price if it does not remain in the ownership of the manufacturer who produced it. Manufacturers are prohibited from purchasing or accepting delivery of silver of any kind if they have more than a 30-day accumulation of scrap silver, with certain qualifications. No manufacturer may have scrap melted, reformed, or redelivered, under toll agreement, if this redelivery should raise his inventory in excess of a minimum practicable working inventory.

Requirement for a delivery certificate is discontinued but a use certificate is required. (M-199)

ABRASIVES: Applications for authorization to use or accept delivery of manufactured crude abrasive during September-October must be made to WPB on form WPB-2779 (formerly PD-888) by Aug. 10 and by tenth of the month preceding each subsequent two-month period. Applications for authorization by a producer or importer who desires to use, or any person who desires to accept delivery of abrasive grain must be filed on WPB-2781 (formerly PD-886) by the first day of each month preceding each subsequent two-month period. By Aug. 10 and bi-monthly thereafter by the tenth of each alternate succeeding month, each producer or importer must

file with WPB his proposed schedule of production and importation of manufactured crude abrasive and/or abrasive grain for the next succeeding two months. Proposed schedules for manufactured crude abrasive must be filed on WPB-2782 and for abrasive grain on WPB-2780. Schedule A, annexed to the order, is amended to permit use of aluminum oxide grain coarser than grit size 80 for roughing operations on optical lenses and other precision optics. (M-319)

PRICE REGULATIONS

WIRE AND CABLE: Provisions for the individual adjustment of ceiling prices for producers and sellers of wire, cable and cable accessories have been made by OPA. The tests of essentiality are specifically spelled out in the amendment as are various cost, price, and competitive data factors which OPA will consider in reviewing the applications for adjustment. (No. 82)

TRANSIT CONTROLS: All sales of trucks, busses and trailers manufactured after Aug. 12 at any level are now controlled by price regulation No. 136. Prices may be calculated under a formula method resulting generally in prices reflecting March 31, 1942, levels. All units designed for use as military vehicles are excluded. Cars and trucks classified as material handling equipment remain covered by appendix A of the regulation which provides formula prices generally reflecting October, 1941 levels. It prohibits payment of any fee by the buyer, which if added to the purchase price of the machinery results in an amount exceeding the applicable maximum price. (No. 136)

FERROMANGANESE: Maximum prices at which independent warehousemen may sell manganese alloys and metal are established at the producers' maximum price to the warehouseman plus 10 per cent for quantities of 500 pounds or over, 15 per cent for amounts of 100 to 500 pounds, and 20 per cent for amounts less than 100 pounds. Maximum silicon content permitted in standard grade high-carbon ferromanganese is raised from 1.25 per cent to 1.50 per cent. Quantity premium on sales of less than 2000 pounds of electrolytic grade manganese metal is raised from 0.4 cent to 4 cents a pound, correcting a typographical error that appeared in the original regulation. Premiums for delivery of this metal to the western zone also are raised to 3.35 cents a pound from 0.55 cent in carload lots; to 4.75 cents from 3.05 cents in less-than-carload lots, correcting allowances for freight costs. (No. 138)

MAGNESIUM: Sellers of magnesium or magnesium alloy ingot in special non-standard shapes which cannot be produced at the premium of 1 cent a pound permitted for non-standard shapes are authorized to submit proposed prices for such shapes to OPA for approval. The producer may sell the non-standard shape at the proposed price pending approval by OPA. If not disapproved within 15 days by OPA, the seller may consider the price approved. (No. 314)

FERROUS FORGINGS: Ferrous forging producers may obtain an adjustment of his maximum ceiling prices by qualifying under specified tests based on the essentiality of his production and its service in the war program. To apply for an adjustment, an essential producer must complete form OPA 694,411. If the producer turn out $500,000 or more of ferrous forgings per year, the application must be filed with the Washington OPA office; if under $500,000, it must be filed with his regional OPA office. (No. 351)

SILVERY PIG IRON: Ceiling prices of 15 per cent electric furnace ferrosilicon, popularly known as silvery pig iron, are established as follows: (1) Price differentials for silicon content are set up on a range of ½ of 1 per cent; (2) premium for each additional ½ of 1 per cent of silicon content now is permitted for any part of the increment in the premium bracket; (3) penalty for a phosphorous content of 0.70 per cent or more is abolished; (4) premium of 50 cents for each ½ of 1 per cent or fractional part of manganese in excess of 1 per cent is established. (No. 405)

Aircraft Industry Directed To Conserve Corrosion-Resisting Steel

USE of corrosion-resisting steel by the aircraft industry has been restricted by a directive issued by the operating committee on aircraft materials conservation. This directive has been approved by joint action of the Army Air Forces, Navy Bureau of Aeronautics, Aircraft Resources Control Office, and Aircraft Production Board of the War Production Board.

The aircraft industry now uses approximately 50 per cent of all the corrosion-resisting steel melted, the directive pointed out. Inasmuch as the aircraft program is increasing steadily and the supply of the alloying elements necessary for corrosion-resisting steel is not increasing at the same rate, it is necessary for the industry to conserve this material, particularly when relatively high in critical elements, wherever practicable.

It is believed that through the practice of using no richer alloy than is required for a given application sufficient corrosion-resisting steel can be provided. Of the several limiting factors on availability of this type of steel, two are currently most critical. These are:

"(a) The shortage of columbium and the impracticability of complete conversion to titanium. These are necessary constituents of material conforming to AN-QQ-S-757 (steel; corrosion-and-heat-resisting—18Cr-8Ni—plate, strip and sheet.)

"(b) The shortage of molybdenum, a necessary constituent of material conforming to AN-QQ-S-771 (steel; corrosion-resisting—18Cr-8Ni—bars and rods; grade MCR) AN-QQ-S-772 (steel; corrosion-resisting — 18Cr-8Ni — sheet and strip; grade MCR) AN-QQ-W-423 (wire; steel, corrosion-resisting.)"

Corrosion-resisting steel, conforming to the specifications listed in the above paragraphs or having compositions similar to those listed in the current issues of the Army and Navy Aeronautical Specifications may be used only in the following applications in airframes and airplane engines, unless otherwise specifically approved or requested by the procuring agency (Army Air Forces-Materiel Command, Wright Field, Dayton, O.; Navy Bureau of Aeronautics, Washington.)

"(a) All parts of the exhaust system which come into contact with exhaust gases and which are exposed to high temperatures.

"(b) Supercharger systems.

"(c) Vital engine or engine accessory parts exposed to temperatures in excess of 800 degrees Fahr. during fabrication or service, which during service are subject to severely corrosive conditions or to conditions likely to result in fatigue failures. Requests for material for such applications shall be marked 'High Temperature Stressed Parts.'

"(d) Hinges and hinge pins.

"(e) Welding rod and electrodes used in welding the above material."

The directive may be considered by all contractors as necessary authority for action as directed therein, for products under current and future contracts without waiting receipt of revised drawings, specification or change orders. This directive does not prevent utilization of stocks already on hand which have been processed to the stage at which they are no longer suitable for other acceptable and more desirable applications.

WPB Issues Instructions On Filing New Report Forms

Chemicals Division, War Production Board, has issued a revised version of PD-600, now designated as WPB-2945.

Several hundred WPB-547 forms (formerly PD-1X) are being returned each week because of failure to fill out the blanks properly. The blanks, used by distributors in obtaining priority assistance for replenishment of inventories, should be filled out carefully and all information which is called for should be provided, officials of the Wholesale and Retail Trade Division said last week. Otherwise, no action can be taken on the application and there will be no alternative but to return them to the applicants.

The previous PD-1X form became obsolete on Aug. 1 and cannot be used. Any request for priority assistance received on this form postmarked after Aug. 1 will be rejected and returned to the applicant.

Output of Heat-Treated Aluminum Castings Soars

Wartime demands have resulted in the doubling of production of high-strength heat-treated aluminum castings during the past 18 months, the War Production Board says. At the same time output of non-heat-treated sand castings has remained at the same level.

Since the start of the war use of dense castings made on high-pressure cold chamber machines for aircraft and ordnance uses has grown to the point where these constitute over 80 per cent of total shipments.

MEN of INDUSTRY

R. E. KENNEDY

CHARLES L. BEARD

C. L. HUSTON Jr.

FRED E. HARRELL

R. E. Kennedy has been elected secretary of the American Foundrymen's Association, Chicago, with which office the office of executive vice president has been combined. Mr. Kennedy thus becomes the administrative head of the American Foundrymen's Association, filling the vacancy created by the resignation of **C. E. Westover** as executive vice president earlier this year.

At the same time **C. E. Hoyt** was elected treasurer, **N. F. Hindle**, assistant secretary, **William W. Maloney**, staff assistant, and **J. Reininga**, assistant treasurer.

Mr. Kennedy was born in Vincennes, Ind., and graduated from Winona Technical Institute, Winona, Ind., and from the University of Illinois, Urbana, Ill. Following graduation he was an instructor in foundry practice at the University of Illinois from 1910 to 1917. During World War I Mr. Kennedy served in the United States Army Ordnance Department.

After the war he returned to the University of Illinois as assistant professor in charge of foundry work, and also served as assistant superintendent of foundry training, U. S. Training Service, U. S. Department of Labor. In 1921 Mr. Kennedy became assistant secretary of the American Foundrymen's Association; he was elected technical secretary in 1925, and secretary in 1938, to which post he has been re-elected with the additional duties formerly assigned to Mr. Westover.

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William M. Rand, vice president, Monsanto Chemical Co., St. Louis, and former general manager, Merrimac Division, Everett, Mass., has been elected to the executive committee of the company. **Daniel S. Dinsmoor** has been elected a vice president and will succeed Mr. Rand as general manager, Merrimac Division. **Julius A. Berninghaus**, general manager, Organic Chemicals Division, St. Louis, will retire, and be succeeded by **Osborne Bezanson**, a vice president, and now general manager, Texas Division. The Texas Division, with plants at Karnack and Texas City, Tex., will be consolidated with and become a part of the Organic Chemicals Division. All these changes are effective Nov. 1.

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Charles L. Beard has been elected vice president, Bell Aircraft Corp., Buffalo. Mr. Beard will continue as secretary of the corporation, but will resign as treasurer, being succeeded by **Louis Fenn Sperry**. **Leighton W. Rogers**, a former president, Aeronautical Chamber of Commerce, has joined Bell Aircraft as assistant to the president and special company representative.

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C. L. Huston, Jr., previously assistant to the president, Lukens Steel Co., Coatesville, Pa., has been named president of Lukenweld, Inc., a subsidiary of Lukens Steel also located in Coatesville. Mr. Huston, a member of the Association of Iron and Steel Engineers, succeeds **Everett Chapman**, who resigned to establish his own business as consulting engineer.

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Ralph J. Cordiner, former president of Schick Inc., Stamford, Conn., was named assistant to the president of General Electric Co., Schenectady, N. Y.

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Henry Dreyfuss, New York industrial designer, has been appointed a consultant in the design of aircraft to Consolidated Vultee Aircraft Corp., San Diego, Calif.

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John J. Yezbak has been appointed manager of the News Bureau, Timken Roller Bearing Co., Canton, O., succeeding **S. L. Huffman**, resigned.

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Malcolm Farmer, formerly vice president, Phoenix Iron Co., Phoenixville, Pa., has been elected vice president and general manager, Plastic Manufacturers Inc., Stamford, Conn.

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Fred E. Harrell, assistant chief engineer, Reliance Electric & Engineering Co., Cleveland, since 1934, has been appointed chief engineer, reporting to A. M. MacCutcheon, engineering vice president.

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Oscar N. Lindahl, vice president, finance, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed chairman of the Committee on Federal Taxation, Controllers Institute of America, succeeding the late F. G. Hamrick. Mr. Lindahl is a former president of the Institute.

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Vollmar W. Fries, on leave to the War Production Board in Washington, has returned to White Motor Co., Cleveland, as vice president.

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Earl K. Clark has been appointed manager, appliance engineering department, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., succeeding **W. J. Russell**, who resigned to become vice president of Landers, Frary & Clark, New Britain, Conn. **H. R. Cummins** was named assistant to Mr. Clark.

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Charles F. Kettering, vice president, General Motors Corp., Detroit, has been named chairman of a new advisory committee on the development of the Technological Institute of Northwestern University, Evanston, Ill.

—o—

K. C. Gardner, formerly vice president and general manager, United Engineering & Foundry Co., Pittsburgh, has been elected executive vice president and general manager. **Geoffrey G. Beard** has been elected vice president in

charge of sales engineering, **John L. Young** has been named manager of industrial research, and **William Hagel** has been appointed manager of machinery sales.

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Frank A. Rudolph has been named eastern regional manager, Aircraft Accessories Corp., with headquarters in New York.

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Lieut. (j. g.) Herbert E. Cragin Jr., U.S.N.R., formerly foundry manager, Taylor-Wharton Iron & Steel Co., High Bridge, N. J., has reported for duty with the Bureau of Ships, Navy Department, Washington.

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George W. Ellis and **Henry F. Mullaney** have been placed in charge of the recently opened Philadelphia branch, H. M. Harper Co.

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James L. Hagen has been named district manager for the state of Michigan, Alloy Casting Co., Champaign, Ill., and **E. W. Bock** has been appointed representative for the states of Wisconsin and Minnesota. Mr. Hagen is located in Detroit and Mr. Bock in Milwaukee.

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J. B. McOwen has been appointed field metallurgical engineer, General Alloys Co., Boston, for New York city, Long Island, northern New Jersey, and eastern New York. Other changes in the field personnel of General Alloys Co. are: **E. E. Whiteside** named representative in northern and northwestern Ohio, with headquarters in Cleveland; **Paul A. Ford,** Michigan representative, with headquarters in Detroit; **A. H. Valentine,** representative in southern Ohio, headquarters, Dayton; and **R. W. Luzius,** representative in the Pacific Coast area, with Beverly Hills, Calif., his headquarters.

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Robert P. Willey has been appointed sales manager, Washington office, Bethlehem Steel Co., Bethlehem, Pa., succeeding the late Emeric R. Leonard.

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Knute Peterson has been named assistant production manager, Bell & Howell Co., Chicago.

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Harold D. Kelsey has been appointed assistant to the manager in charge of engineering, Ft. Wayne Works, General Electric Co., succeeding the late R. H. Chadwick.

—o—

Ralph C. Stuart has been appointed manager, Lamp Division, Westinghouse Electric & Mfg. Co., Bloomfield, N. J. Previously, Mr. Stuart had been manager of the West Plant, Canadian Westinghouse Co., Hamilton, Ont., from 1930 until 1941.

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Herman C. Price has been appointed a vice president, Kalamazoo Stove & Furnace Co., Kalamazoo, Mich.

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Palmer M. Craig, for the past two years chief engineer in charge of radar and radio communications equipment development, Philco Corp., Philadelphia, has been named chief engineer of the radio division.

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Luther L. Sheppard, previously manager, Indianapolis office, International Business Machines Corp., has been appointed resident manager of the company's plant in San Jose, Calif. **Roger R. Williams** has become superintendent of the new plant.

Forrest Jernberg, former general sales manager, refrigerator department, Mills Novelty Co., Chicago, has been appointed manager of war contracts procurement.

—o—

E. B. Newill has been appointed general manager, Allison Division, General Motors Corp., Indianapolis, Ind., succeeding F. C. Kroeger, vice president, who has been granted a leave of absence due to illness. **C. R. Osborn** has been elected a vice president and will be in charge of the Electro-Motive Division, La Grange, Ill., and **A. W. Phelps,** has been made assistant to **E. F. Johnson,** General Motors vice president in Detroit.

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A. J. Couture has joined the Stolper Steel Products Co., Milwaukee, as personnel manager. Previously, Mr. Couture had been employment manager at the George J. Meyer Mfg. Co., Cudahy, Wis.

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C. Harold Lource has been appointed district manager, New Orleans sales office, Ingalls Iron Works Co. Inc., New Orleans.

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John Hardman Logan, treasurer, Visible Index Corp., New York, has been elected vice president of the company. He will continue also as treasurer.

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N. H. Schwenk has resigned as divisional vice president of Cramp Brass & Iron Foundries Division, Baldwin Locomotive Works, Philadelphia, after 39 years with the company.

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Frank R. Pierce has been named head of the Detroit public relations office, General Motors Corp.

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Roy A. Peterson has been appointed manager of purchases, United States Steel Supply Co., Chicago.

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George D. Ramsay, formerly in charge of raw material supplies for Kaiser Co. Inc., Fontana, Calif., has been appointed director of technical laboratories and materials development.

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William B. Corbett has been appointed plant engineer, Willys-Overland Motors Inc., Toledo, O. In 1928 Mr. Corbett laid out and built the Los Angeles assembly plant of Willys-Overland.

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George Bluth, formerly a member of the inspection staff, U. S. Army, at Ft. Wayne, Detroit, with the Quarter-

ALBERT V. DOLAN

Who has been elected chief engineer, Ft. Pitt Bridge Works, Pittsburgh, as announced in STEEL, Aug. 2, p. 84.

MATTHEW R. ROSSE

Who has been appointed sales manager, export division, Wickwire Spencer Steel Co., New York, noted in STEEL, Aug. 2, p. 84.

master Corps has been named general chief inspector at Willys-Overland Motors Inc., Toledo, O.

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G. A. MacGillivray has been appointed West Coast sales manager, Eutectic Welding Alloys Co., New York. Mr. MacGillivray, a graduate of the Massachusetts Institute of Technology, had been associated with the Franklin Process Co., Providence, R. I., for several years.

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Julain E. Tobey has been reappointed chairman of the Technical Advisory Board, Bituminous Coal Research, Inc., Washington.

—o—

Elliott W. Beckett, formerly St. Louis sales manager, Continental Can Co., has been named vice president and general manager, Continental Can Co. of Canada, Ltd., with headquarters in Montreal. He succeeds **Walter M. Tomkins,** who has been transferred to Chicago to assist **Paul E. Pearson,** vice president in charge of equipment manufacture.

G. A. MacGILLIVRAY

W. S. Cowan has been named to the field service staff, Minneapolis region, Monmouth Products Co., Cleveland, and **Edwin H. Busch,** formerly manager, U. S. Gypsum Co., San Diego, Calif., has joined Monmouth as West Coast manager. Mr. Busch will be associated with Colyear Motor Sales Company's west coast organization, headquarters in Los Angeles. The territory covered by the company's representative **Lou M. Air,** who has been serving Pennsylvania, Virginia, and West Virginia, has been increased to include northwestern Pennsylvania and western New York.

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Millar Brainard, director of Cleveland Automatic Machine Co., Cleveland, has been appointed president of the company's newly-acquired G & N division, mentioned on page 78 of this issue. **G. V. Patrick,** executive vice president of Cleveland Automatic Machine Co., will also be executive vice president of the new division, assisting Mr. Brainard. **George A. Collier,** sales manager for Cleveland Automatic, has been appointed general sales manager of the combined divisions, and **Ward Martin** is sales manager, G & N division. **James Hammond,** president of Cleveland Automatic, also has been named treasurer of the new division.

OBITUARIES . . .

Col. Leonard Sherman Horner, 68, former president, Niles-Bement-Pond Co., and more recently adviser to the American Hardware Manufacturers' Association, New York, died Aug. 1 in Wolfboro, N. H.

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Frederick Paul Wessolek, 56, general superintendent, Ohio Crankshaft Co., Cleveland, died there July 28.

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Philip B. Heintz, 82, president and general manager, National Casket Co. Inc., Boston, died July 28 in Centerville, Mass.

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Major William B. Robertson, 50, president, Robertson Aircraft Corp., died Aug. 1 in the crash of a glider at Lambert-St. Louis Field, St. Louis. **Harold A. Kreuger,** vice president and general manager of the Robertson company, was also killed.

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Frank Longstaff, 75, a partner in the Longstaff & Meredith Automobile Radiator Co., Milwaukee, died recently.

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Edgar F. Collins, 69, former consulting engineer, General Electric Co., Schenectady, N. Y., died recently at Brown Lake, N. Y.

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Charles Mitzman, 49, owner and president, Ohio Smelting Co., Cleveland, died there July 28.

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W. K. Cooper, vice president, sales, Aviation Corp., Williamsport, Pa., died July 29 in an airplane crash near Trammel, Ky. Also killed in the crash was **R. H. Anderson,** business manager, Vultee Aircraft Corp., Nashville, Tenn., and **Harold Caminez,** 45, chief engineer, Lycoming Engine division, Aviation Corp., Williamsport, Pa., also was killed in the accident. Mr. Caminez was widely known in aviation circles as an inventor and design engineer of aircraft engines.

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Arthur S. Hecker, 63, general manager, Arthur W. Hecker Co., Cleveland, and formerly president of the Hecker-Moon Construction Co., Cleveland, died there July 27.

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Charles Goodnow Rice, 76, retired president, United States Smelting, Refining & Mining Co., Boston, and a director of United Shoe Machinery Corp., Boston, died July 29, in Ipswich, Mass.

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Gould Grant Rheuby, 74, retired vice president, director, and member of the finance committee, Hercules Powder Co., Wilmington, Del., died July 28 at Glen Mills, Pa.

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L. Clinton Hamlink, 68, vice president for the past 32 years of Gas Machinery Co., Cleveland, died in that city Aug. 3.

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Albert Kingsbury, 80, founder and president Kingsbury Machine Works, Philadelphia, died in Greenwich, Conn. July 28. Mr. Kingsbury invented the Kingsbury thrust bearing used in warship and steamship driving shafts, land and marine turbines.

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E. P. Jeffery, vice president in charge of manufacturing, American Blower Corp., Detroit, died in that city recently.

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Julian D. Sargent, 59, former sales engineer, Chain Belt Co., Milwaukee, died recently in Los Angeles, Calif.

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Elton G. Grammes, 50, production manager, John Harsch Bronze & Foundry Co., Cleveland, died July 27 in that city.

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Robert K. Morton, 67, president, H. B. A. Steel Co., New York, died there July 26.

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Wilson F. Clemens, associated with Great Lakes Steel Corp., engineering division, since 1929, died recently in Detroit.

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Conrad Newton Lauer, 73, chairman. Philadelphia Gas Works Co., Philadelphia , died Aug. 2 in Pennlyn, Pa.

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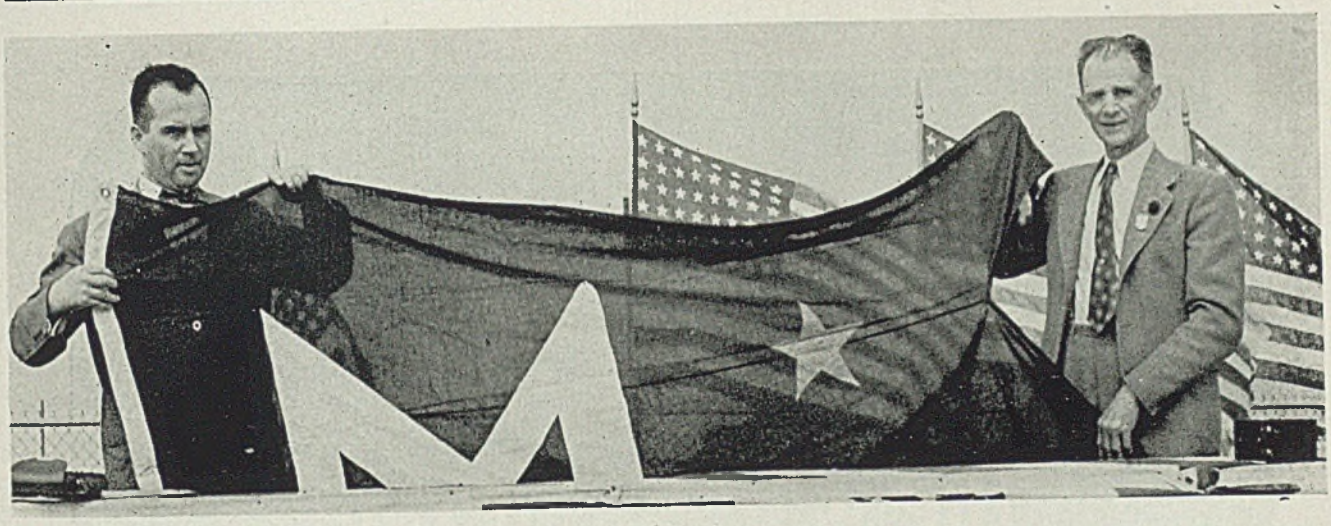
J. C. Agnew, 61, vice president, Winston Bros., Los Angeles, died there July 27. Mr. Agnew was formerly assistant to the president, Midvale Steel & Ordnance Co., Philadelphia. He also was associated with the Coatesville Plate Washer Co., Coatesville, Pa., and was a member of the American Iron and Steel Institute.



Above, E. A. Watkins, president, Watkins Inc., Wichita, Kans., is shown accepting the Maritime Commission's M award for the company and employes

To the right is shown Henry E. McWane, president, Lynchburg Foundry Co. (extreme right), at recent M award ceremonies at company's plant at Lynchburg, Va.

Below is shown Maj. Gen. Ralph Royce presenting the Army-Navy E banner to Ralph S. Damon, president, Republic Aviation Corp., Farmingdale, N. Y.

More Plants Are Honored With Army-Navy Pennants

Additional plants have been honored recently with the Army-Navy E award.

Allis-Chalmers Mfg. Co., La Porte Works, La Porte, Ind.

American Car & Foundry Co., Berwick Plant, Berwick, Pa.

American Cyanamid & Chemical Corp., Bauxite Mining & Processing Operations in Pulaski & Saline Counties, Little Rock, Ark.

Bell Machine Co., Oshkosh, Wis.

Camillus Cutlery Co., Camillus, N. Y.

Century Boat Co., Manistee, Mich.

Dewey & Almy Chemical Co., Cambridge Plant, Cambridge, Mass.

Fansteel Metallurgical Corp., North Chicago Plant, North Chicago, Ill.

General Machine & Mfg. Co., Berwick Plant, Berwick, Pa.

Indian Motorcycle Co., Springfield, Mass.

Link Belt Co., 39th Street Plant, Chicago.

Modine Mfg. Co., Racine Plant, Racine, Wis.

Simmons Co., Elizabeth Plant, Elizabeth, N. J.

Steel Products Co. Inc., Savannah, Ga.

Tantalum Defense Corp., North Chicago, Ill.

United States Spring & Bumper Co., Vernon, Calif.

The War...And You!

Friend—don't think this war doesn't affect you. It does. It's pushing the world twenty years ahead of time; stimulating the development of devices you may now be making or using. After the war, the average American's life is destined to be fuller, more exciting, more comfortable due to these new products. And just as Weatherhead has helped build the nation's automobiles, airplanes and refrigerators in the past, peace will find us prepared to join you in building these established products as well as the many new ones certain to come out of the war.

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

By A. H. ALLEN Detroit Editor, STEEL

MIRRORS of MOTORDOM

Second-quarter data of General Motors reflect sharp stepup in war materiel production by automotive industry during period. . . Corporation's output soars to new three-month high. . . June deliveries set monthly peak

DETROIT

INDICATION of the motor industry's stepup in production of war materiels through the second quarter of the year is given in figures just released by General Motors Corp. which show the corporation's production for April, May and June soaring to a new three-month high of $832,275,349, or 8.7 per cent ahead of the first quarter.

Increase in physical volume is even greater when account is taken of voluntary price reductions. Thus, June deliveries were under May in dollar volume but over in physical volume—in fact, breaking all of the monthly totals previously recorded.

During the second quarter, voluntary price reductions of approximately $80,000,000 were made on individual GM contracts, applicable to shipments which had already been made.

A comparison of wartime and peacetime industrial economies can be drawn from the fact that while total deliveries for the first six months of 1943 were 26.7 ahead of the dollar volume for the first six months of 1941—last year of peacetime operations—net income showed a decrease of 41.3 per cent.

GM Employment High

For the second quarter of 1943 there was an average of 426,554 employes on GM payrolls, 20,000 more than the average for the first quarter and far ahead of the 281,464 average for the same period a year ago. Average weekly earnings of hourly rated employes were $56.20, compared with $53.80 in the same period a year ago.

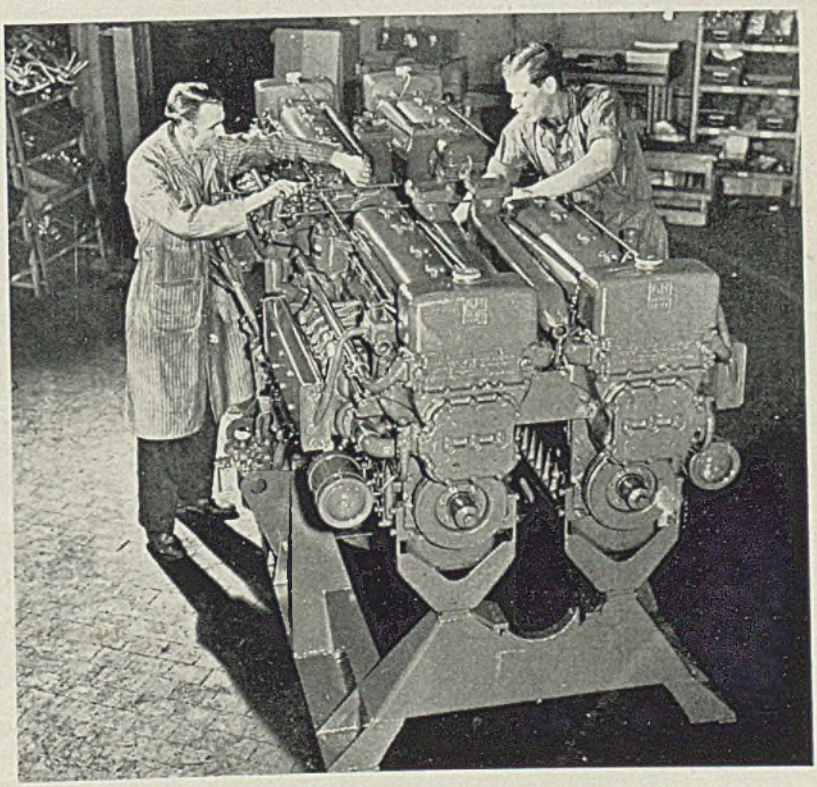
General Motors sliced $8,322,753 from second-quarter income for postwar contingencies and rehabilitation. This brought the total provision on this account for the year to nearly 16 million dollars, which together with amounts provided prior to this year makes a total of $56,562,971 available for postwar adjustments, or the equivalent of about a two weeks' payroll on the present basis. In addition the corporation has deducted $42,704,000 from six months' operations this year for retroactive price and other adjustments which may arise in connection with renegotiation of contracts.

Progressive easing off in the manufacture of combat tanks, of which the automotive industry has been a leading supplier (No. 10,000 rolled off the Chrysler tank line on July 20), may logically proceed much further. The tipoff came with the end of the North African campaign in which tanks were the star performers, not always in roles for which they were intended but at least in large numbers. Then the word came that the Russians had issued stop-orders for American tanks, and according to Lend-Lease figures they were getting something like one-fourth of U. S. production of medium tanks. Finally the war moved out of Africa and practically out of Sicily. New fields of operations likely will not call for near the numbers of tanks that the Army at one time envisioned. Furthermore the pipelines to the battlefronts are just about filled, so requirements will slow down to merely the demands of attrition.

There is another angle. It can be developed by looking back over the design progress of both medium and light combat tanks. First, the M-3 medium with its side-mounted 75-millimeter gun and limited field. This gave way to the M-4 on which the heavy gun was placed at the top with full-circle sweep. Then came the first of the so-called tank destroyers or self-propelled gun mounts—the M-7 and then the M-10—both of them design modifications of the basic medium tank aimed at stepping up firepower and mobility, while reducing armor protection. At one time not so long ago, a motor company supplier was building four M-10 tank destroyers for every one M-4 tank.

Design Changes Are Numerous

The tank destroyer command in Texas steadily grew in importance and in diversity of new vehicles, both wheeled and tracklaying and combinations or half-tracks. Sizes of guns mounted on these mobile units kept going up. High-velocity barrels replaced the old "cannon" barrels. Speeds and mobility kept climbing and still are. A basic change appeared in process in the army's attack philosophy in favor of the "hit and run" and "sneak punch" tactics as opposed to the lumbering break-through with massed heavy armor. It was mindful of the old arguments in football on the



DIESEL POWER PLANT: In production for several months and used in various types of Navy landing barges, this diesel power plant is known as the Quad. The four 6-cylinder two-cycle diesels are geared to a common propeller shaft at the center of the tandem unit. All four engines are attached to a centrally located gearbox

relative merits of the "end run and forward pass" against the "off-tackle smash and line buck."

All this process of evolution in the armored force has a very real significance to suppliers of materials and parts in the field. The end is not yet in sight and probably will not be until the last day of battle. Right now, however, it looks like a sure thing that the armored car and high-speed tank destroyer, both half-track and full track, are consigning the old conception of the combat tank to the substitute bench.

Abnormal Wear on Bogie Wheels

One of the principal difficulties reported from the field in connection with tanks is the inordinate wear on tracks, bogies and sprockets. Bogie wheels in American tanks have always been comparatively small in diameter, around 12 inches, which would seem to be productive of heavy wear, particularly as speeds increased. Photographs of captured German track-laying vehicles seemed to suggest that their engineers had gotten around this trouble by making large-diameter bogie wheels, possibly 28 or 30 inches, some of them even overlapping in the train on each side. It will be interesting to see if this design principle is adopted on future versions of U. S. tank destroyers and self-propelled gun mounts.

Behind the design and development of these various old and new type vehicles is the well-knit organization of the Tank-Automotive Center of the Ordnance Department here in Detroit. Over the past year this group, rather hastily thrown together around a nucleus from Washington, has been gradually simmering down to something resembling efficient operations. Originally the Center occupied most of the Union Guardian building downtown and several floors of the Fisher building three miles out from downtown. Now, by process of weeding out excess and inefficient personnel and consolidating certain offices it has been possible to look forward to concentrating the entire group in the downtown location. Hence the Fisher building offices will shortly be vacated. They have been occupied chiefly by the Development branch in charge of Lieut.-Col. J. M. Colby, and the Engineering section of the Engineering and Manufacturing branch under Lt. Col. F. R. Young.

Packard has confirmed its occupation of the $5,000,000 Toledo, O., plant built originally for the Liquid Cooled Engine Division of Aviation Corp. New activity will include processing and machining of several hundred component parts of the Rolls-Royce aircraft engine. R. R. Rees, chief plant engineer for Packard, will head the Toledo operation, which is expected to reach full capacity by the end of the year. Employment, including practically all key positions, will be recruited locally, and annual payroll of this operation is estimated at $10,000,000.

K. R. Parker, former construction engineer in the Packard aircraft plant, will succeed Mr. Rees in the position of chief plant engineer.

Mass production X-ray machine capable of inspecting as many as 17,000 airplane castings in a 24-hour day has been developed by Westinghouse and is now being installed and tested in a Ternstedt Division plant in Detroit. Key to the new unit's speed is a moving conveyor 40 feet long and 3 feet wide which moves castings through the X-ray inspection area. An exposed film of six castings is made every 30 seconds. Designed to inspect both engine and fuselage castings up to 5 inches in thickness, the mechanism has two steel towers, each 12 feet high and located near the middle of the conveyor, each tower housing an X-ray tube—one of these tubes operating at 140,000 volts and the other at 220,000 volts.

Castings move along the conveyor on trays which stop automatically under the X-ray tubes. Lead-lined hoods protect workmen from X-radiations while the exposure is made. The unit can be operated by from one to eight men, depending on the speed of testing desired.

A comprehensive cross index of chemically equivalent specifications for ferrous and nonferrous metals, with an identification code, has been completed and published by General Motors under direction of C. L. McCuen, vice president in charge of engineering. The project was initiated about a year ago at the request of the armed services and has been developed in co-operation with various materials suppliers, national technical societies and a number of trade organizations.

Index Will Prove Helpful

The publication, a copy of which should be on the desk of anyone concerned with specification, purchase or use of iron and steel and nonferrous metals in war production, is divided into three parts. Part I presents exact chemical analysis of the various specifications, broken down into ten groups of code numbers: 0-999 for manufacturers' use in reporting analyses which are not covered by existing code numbers; 1000-9999, carbon and alloy steel (in most cases code numbers are identical with corresponding S.A.E.-A.I.S.I. specifications); 10000-12500, copper alloys; 13000-13500, nickel alloys; 14000-14500, lead or tin alloys; 14750-14850, silver alloys; 20000-20999, aluminum alloys; 21000-21500, magnesium alloys; 21700-21800, zinc alloys; 23500-23600, bismuth or cadmium alloys.

In addition to code numbers and chemical analyses, this section lists the material in its form, as well as the "source" specification number, sources being ten in number—army, army-navy aeronautical, air corps, NE steels, federal, A.I.S.I., Aeronautical Material Specifications (S.A.E.), navy, S.A.E., and A.S.T.M.

Part II lists the specifications of each of the various organizations named above, together with the code number identifying the group to which each specification number is indexed.

Part III is a numerical listing of the code numbers and their nominal compositions. The code numbers obviously are useful in making bills of materials reports, particularly for CMP reports.

Copies of the index may be obtained by addressing R. L. McWilliams, Room 8-133A, General Motors building, Detroit 2.

NEW METHODS PAY

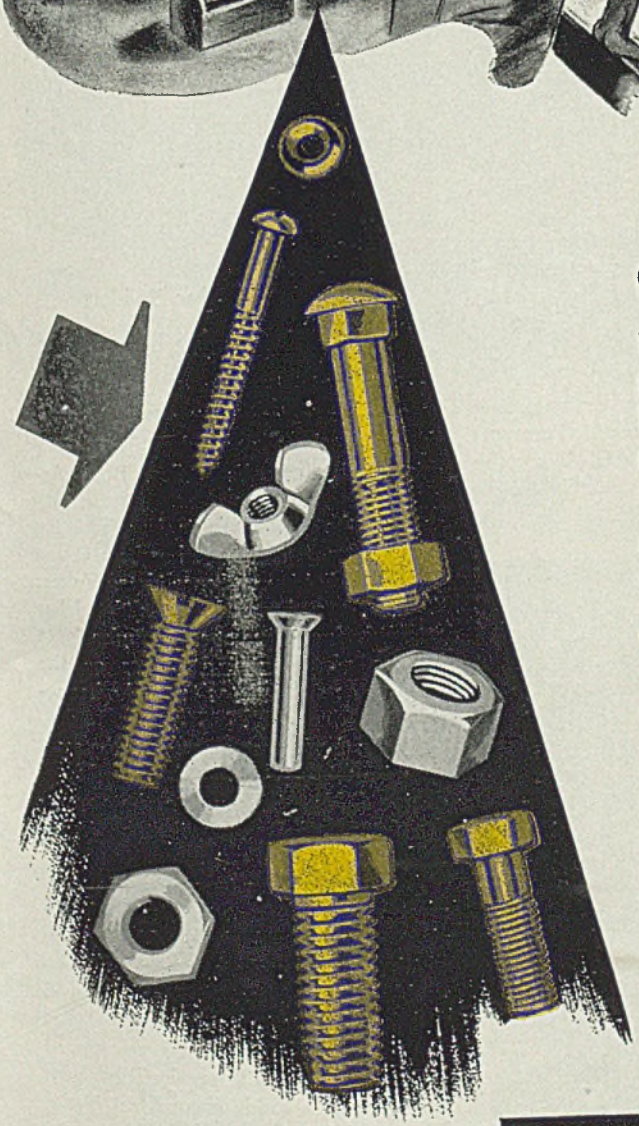
Substantial savings in material, manpower, facilities and money have been effected by the airplane industry through utilization of improved manufacturing processes. Use of solid bar stock, forgings and sand castings which require extensive machining, milling, boring, and profiling has been supplanted wherever possible by processes employing stamping, die casting, permanent mold castings, centrifugal castings, welded assemblies and powder metallurgy.

An aircraft engine component, for instance, previously machined from stainless steel solid bar and tubing is now stamped from sheet with a material saving of 80 per cent and at a cost reduction of 45 per cent.

An aircraft hardware item formerly machined from critical stainless steel bar stock is now drawn and drilled from non-critical carbon steel strip. The old method required 285 pounds of steel for production of 1000 units while the new method requires only 62½ pounds. Scrap production has been reduced from 83½ to 24½ per cent.

2¢ WOULD HAVE PREVENTED THIS SHUT DOWN

. . . 2¢ MORE FOR A NON-RUSTING BOLT IN A VITAL PART



CAN A COUPLE OF PENNIES more per bolt save thousands of dollars? Indeed they can . . . and Harper Fastenings are proving it every day. Saving huge sums by preventing hidden destruction by rust and corrosion. They help war production machinery to stand up under today's grueling speed and overtime.

Such tremendous trifles, these Harper non-ferrous and stainless fastenings. Trifling too, in their extra cost. Yet tremendous in their usefulness.

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WING TIPS

Bright future foreseen for Douglas Aircraft Co. in postwar production of transport planes. . . Use color system to solve troublesome steel marking problem. . . Labor troubles notably absent in plants because of good employe relations setup

AMONG principal aircraft manufacturers, Douglas Aircraft Co. has an exceedingly good postwar opportunity to continue a fair share of its present plane-building activity because Douglas has occupied a prominent position in supplying commercial airliners like the well-known DC-2 and DC-3 ships flying many airlines today. The company's scout bombers, torpedo bombers and attack bombers may go into oblivion with the day of peace, but there is general agreement on a bright future for greatly expanded air transport.

Douglas began operations in southern California 23 years ago, although its founder, Donald W. Douglas, became interested in aviation as far back as 1909 when he saw the Wright brothers fly their first plane. A native of Brooklyn, N. Y., he resigned from the Naval Academy after being bitten by the aviation bug and studied aeronautical engineering at Massachusetts Institute of Technology. He later worked with Commander J. C. Hunsaker on development of the first wind tunnel and for a time was chief engineer for Glenn L. Martin.

First design of Douglas Aircraft was a 3-place biplane called the "Cloudster". In 1922 Douglas introduced the DT-1, first torpedo-carrying airplane; in 1925 the M-1, first mail plane, and the C-1, first cargo-carrying plane. In 1924, Douglas "World Cruisers" became the first planes to circumnavigate the globe with army pilots and crews. The DC series began in 1932 and by 1935 they were flying in 57 nations.

B-19 Still Largest Bomber

It was a long trail of progress from the first Cloudster to the giant 82-ton experimental bomber, the B-19, which Douglas finished a couple of years ago at a cost of something like $3,500,000. It is still the largest bomber ever built.

Douglas Aircraft now operates a network of plants in southern California and in the Southwest and Midwest. They include the home offices and plants in Santa Monica, El Segundo and Long Beach, Calif. In the Southwest, Douglas operates vast new plants at Oklahoma City and Tulsa, Okla., while in Chicago a new plant featuring practically all wood construction is manufacturing C-54 cargo planes. Latest project is a $10,000,000 modification center which the company operates at Daggett, Calif.

A word may be in order regarding current production models. Transport and cargo versions of the DC-3 are the C-47 Skytrain for cargo and C-53 Skytrooper for personnel, and, for the Navy, the R4D-1, 3, 4 and 5, depending on various structural details but the same basic ship. This is a two-engine ship, commonly called the "work horse" of the air lines", weighing about 9 tons empty and capable of carrying 3-5 tons load. It has a normal range of about 1500 miles and is built in California and Oklahoma.

Better than twice the size of this basic design is the military version of the DC-4, a four-engine ship being built in California and in Chicago, called the Skymaster, the C-54 for passenger transport and C-54A for cargo in the Army design, and the R5D for the Navy. It will carry 54 hospital litters, or a light tank, or a heavy truck, and has an interior hoist for loading purposes. Normal gross weight is 66,000 pounds, of which approximately 26,000 pounds are payload.

In the single-engine field, Douglas supplies the SBD Dauntless dive bomber for the Navy and the similar A-24 dive bomber for the Army. In the two-engine class are the A-20 Havoc attack bombers and the DB-7 Boston, U. S. Army and R.A.F. designations for the same craft.

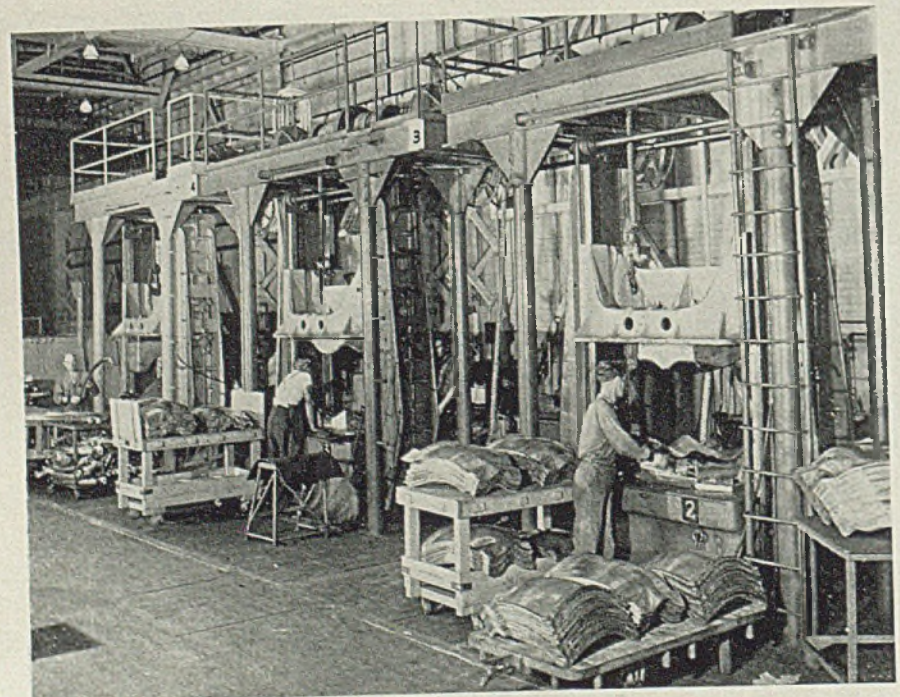
Works With Other Builders

Douglas also co-operates in the Boeing Flying Fortress B-17-F west coast pool, building them at the Long Beach plant; likewise assembling B-24 Consolidated bombers at Tulsa from parts shipped from Ford's Willow Run. Another co-operative venture, just the reverse of the B-24 setup, is the production of Douglas A-20 attack bombers at the Nashville division of Consolidated Vultee. As a matter of record, Consolidated has established an office at the Douglas Santa Monica plant, with engineers on the scene to co-ordinate tooling and other activities.

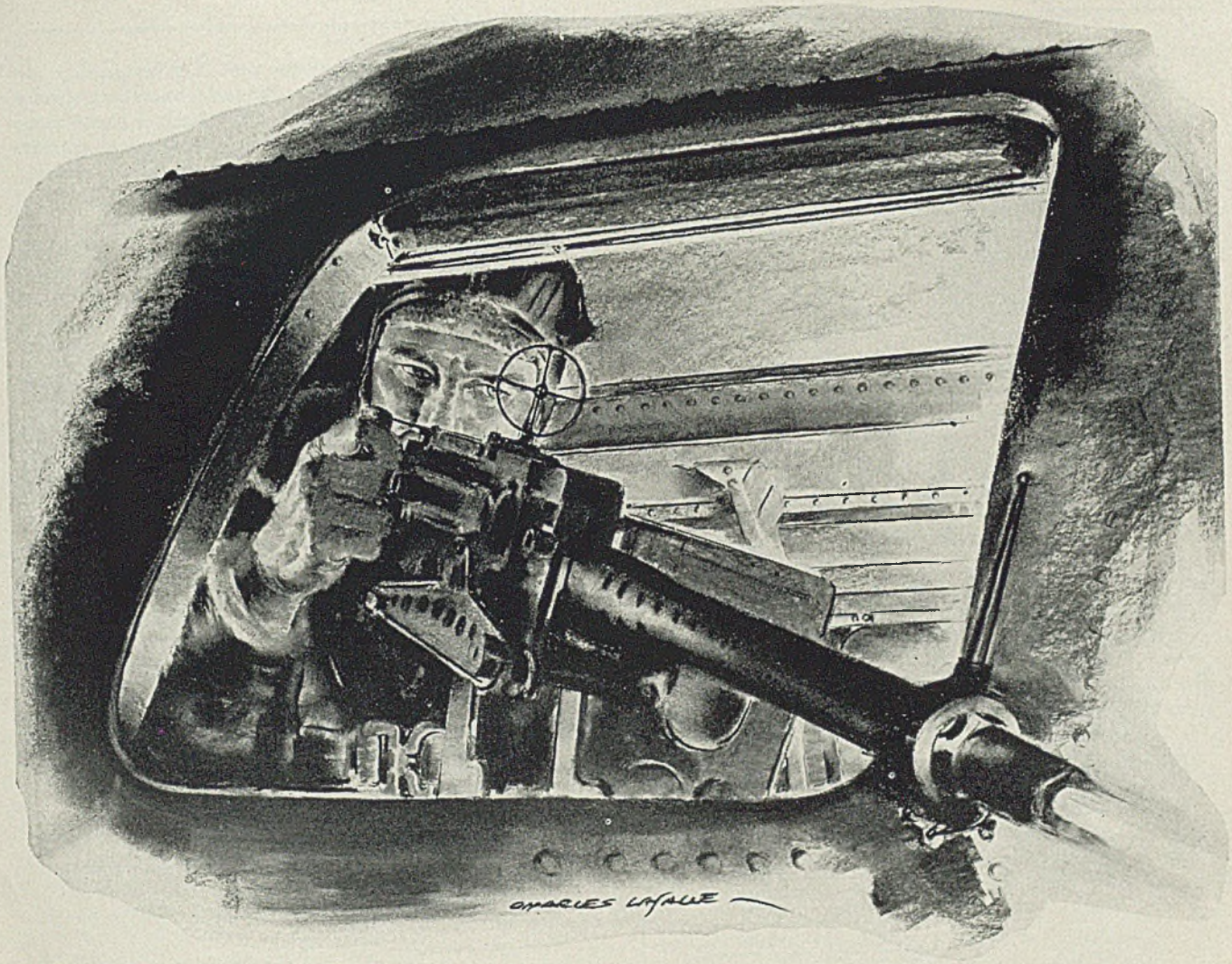
By far the largest capacity of the company is concentrated in the two and four-engine fields. This points the way to the future of Douglas in the aircraft field.

Among numerous innovations in manufacturing practice at the Santa Monica plant is a gravity-feed assembly floor on which A-20 bombers are finally assembled. The concrete floor is sloped slightly (6 inches in 200 feet) so that carriages on which the planes are moved through the shop will travel of their own weight along a guide channel set in the floor, avoiding the need for power to move the partially completed planes through assembly stations.

The Douglas El Segundo plant near Inglewood is unusual in that employment is 65 to 70 per cent women, near the highest ratio of any airplane plant in the country. Since the planes being



Rope drop hammers with Kirksite dies used to form aluminum alloy shapes. Some plants are replacing this equipment with powered hammers known in the industry as Cecostamps



HIS "SCATTER GUN" EATS FROM A NEW FEED BOX!

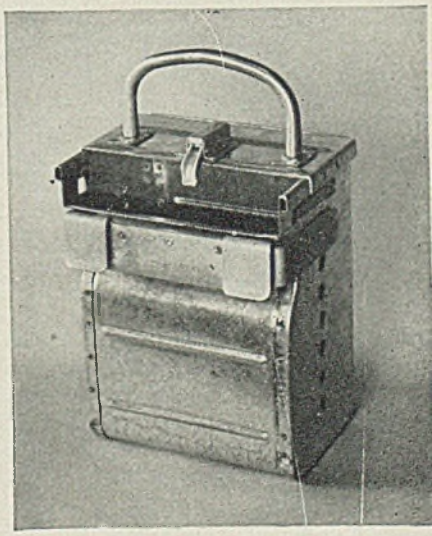
When the sharpshooter in a bomber goes into action, his pet "scatter gun" literally *pours* .50 caliber shells. These are fed into the machine gun from cartridge belts carefully packed in special ammunition boxes.

Formerly these "feed boxes" were constructed of a scarcer metal. Now many are made of ARMCO ZINCGRIP — a zinc-coated steel with a tightly adherent coating. Because the zinc does not flake or peel when severely formed, it gives protection to the corners as well as the flat parts.

Shells must be safeguarded against contact with corroded surfaces to insure a smooth flow of deadly lead from machine guns. Rust caused by corrosive atmospheres would play hob with boxes made of ordinary metals.

This is only one of many fighting jobs for ARMCO ZINCGRIP and other ARMCO *special-purpose* sheet steels. When you need sheet steels for wartime tasks, or for the products you will make when peace comes, remember there is an ARMCO grade for every requirement.

For complete information on any of these grades, just address The American Rolling Mill Company, 1701 Curtis St., Middletown, Ohio.



MADE OF ARMCO ZINCGRIP

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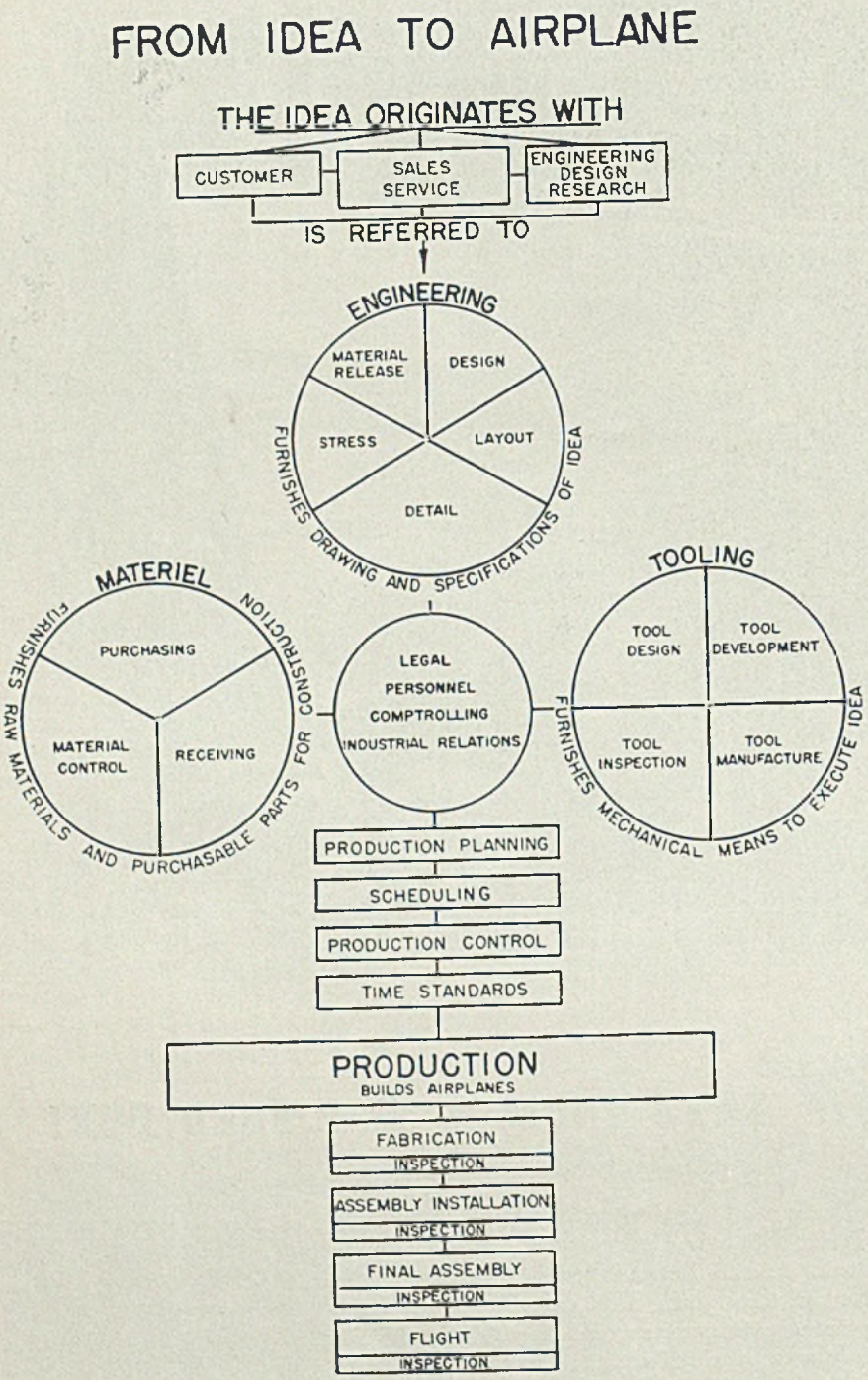


Organizational chart developed by Douglas Aircraft to show how an idea for a new plane progresses through various planning and production departments to final inspection

built there are the relatively small single-engine dive bombers, there is a minimum of heavy manual work involved. Women have proved eminently successful in all departments with the possible exception of the Kirksite foundry and drop hammer department.

Rope drop hammers are operated in a good many of the airframe plants on the west coast, where they adhere to the belief that a hefty smack provides the best forming pressure for certain aluminum shapes. One of the newer techniques at Douglas El Segundo is the use of both rubber pads and chunks of sponge rubber on top of the piece being formed particularly where the draw is deep. Rubber absorbs some of the impact of the falling male die and tends to prevent stretch wrinkles and tearing in the formed piece. The idea springs from the use of a rubber female die in the Guerin process for blanking and light forming work. Douglas developed the Guerin process and now has licensed many others to use it.

The Long Beach plant is among the newer Douglas plants. Both B-17 Flying Fortresses and C-47 cargo ships are built there, the plant comprising a series of adjoining but entirely separate units. This layout was developed to conform with suggestions made by the Army in respect to plant protection, the theory being that if one unit should be hit by an enemy bomb attack it would not incapacitate the entire plant because of the dispersion of the manufacturing, stores and assembly units. Over 22,000 tons of structurals went into the various buildings.

Use 35 Vertical-Lift Doors

Movement of large planes in and out of assembly buildings calls for special treatment of doors. There are in all 35 Firguson vertical-lift doors installed at Long Beach, each made in four horizontal sections with motors, reduction gears, counterweights and pushbutton controls combined to facilitate opening or closing the wide span in 80 seconds. A single door may be as much as 150 feet wide by 30 feet high. Framing is light structural steel between vertical I-beams, with sheet steel on the outside and a pressed insulation fiber on the inside. The door installations at Long Beach required 870 tons of steel, 107,350 square feet of insulation, 68 tons of steel castings, 832 hydraulic equalizers, 764 tons of counterweight balances, 63,500 feet of wire rope and motors totaling 163 horsepower.

Because of the great diversity of manufacturing operations and the large number of small parts processed, material control problems at Douglas are of considerable magnitude. Consider the single case of alloy steel used both in tooling and in production parts. About 150 types of tooling and production steels are in regular use and one of the most serious difficulties is in maintaining their proper identification both in storage and through processing. A color system for marking bars along their full length has been devised, but it has many deficiencies.

Purchase orders specify identification of steel at the source, but suppliers are so rushed these days that this detail is often overlooked. Douglas materials-control officials suggest that perhaps the aircraft industry should co-operate further in the simplification of the numbers and types of steel in use, and also in persuading mills to do a better job of marking.

Importance of steel marking is explained as the outgrowth of unending changes in specifications of thousands of parts going into airplanes—changes dictated by safety or design improvements, substitutions to relieve shortages, or by instructions from Wright Field. F. L. Dean, Douglas metallurgist, says it is

often worth more to know what a given material in process is than the intrinsic value of the steel itself.

An accompanying chart shows how material control, purchasing and receiving departments fit into the general flow chart of "idea to airplane" developed by Douglas. This arrangement does not apply to the Long Beach plant alone, but to all operations under the company's direction.

Douglas Aircraft is credited on the Coast with having done an exceptional job of industrial and public relations. Labor troubles have been notably absent, and union attempts to organize one or another of the Douglas plants have been unsuccessful, the most recent example being the defeat of both the UAW-CIO and AFL in an election at El Segundo. Much of this labor harmony doubtless springs from the quiet skill of A. M. Rochlen, industrial and public relations director, and his staff, who maintain close contact with employes and top management. Douglas was one of the first West Coast companies to adopt the 10-minute rest periods twice on each shift, and to organize lunch-time entertainment and athletic contests for its employes.

Latest management wrinkle at Douglas plants is the organization of a "high command" to provide a more compact and streamlined administration of the nation-wide network of operations. The committee is headed by President Donald W. Douglas, and includes Frederic W. Conant, vice president and director of manufacturing; A. E. Raymond, vice president, engineering; John M. Rogers, vice president, contract administration; Ralph V. Hunt, vice president and comptroller, and Mr. Rochlen.

Announcement of the committee's organization followed closely the revelation that Douglas in May broke all production records by turning out more than 13,000,000 pounds of warplanes, an increase of 150 per cent over May, 1942, and 698 per cent over May, 1941.

Cutting Tool Conservation Being Pushed by NIAA

National Industrial Advertisers Association has joined forces with the Division of Information of the War Production Board and the War Advertising Council, to promote the national campaign to cut down the alarming waste of industrial cutting tools.

More than 9,000,000 workers with little or no previous experience in the metalworking industries now are concerned in one way or another with operations involving broaches, milling cutters, drills, taps, reamers, and many other standard and special tools whose total annual output, running to $450,000,000, is in danger of being insufficient to keep up with current demands.

Analysis of the situation by WPB indicates three main causes of undue wastage:

(1) Breakage and spoilage of tools due to carelessness or lack of knowledge of tool handling and use;

(2) Dulling and other damage resulting from lack of care when the tool is not in use;

(3) Needless scrapping when tools can be repaired or new tools created by tipping, grinding, brazing and other methods of reclamation.

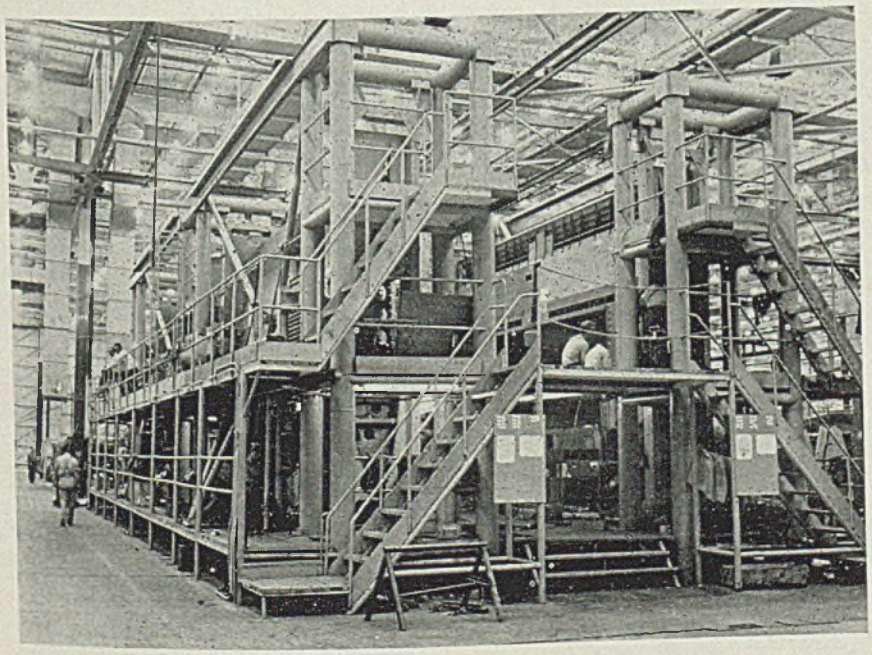
The government campaign centers in the Conservation Division, WPB, which is working closely with the Tools Division, War Training Activities and War Production Drive authorities.

Needless breakage, under wear and thoughtless scrapping of vital tools can only be halted by a nation-wide campaign which will reach right down into the plants where this spoilage is occurring. Featuring the slogan, "Tools Are Weapons—Treat 'em Right!" industrial advertising will be used to drive home the crying need for, and practical ways and means of, tool conservation. At the same time, local chapters and members of NIAA will take direct action in industrial centers and in individual plants to see that conservation meetings are held, that posters are mounted in prominent positions and that workers are given intensified instruction in the proper handling of tools.

To further this important phase of the campaign a text book for industrial advertisers and trade publications has been prepared by the War Advertising Council and the War Production Board.

This book explains the objectives of the campaign and contains a wealth of material useful in developing advertising copy to key in with this vital phase of the war production program. Copies of this book are available from WPB Division of Information, Conservation Section, 11th and H Sts., Washington.

Particulars on this campaign can be obtained by writing to National Industrial Advertisers Association, Inc., 100 East Ohio street, Chicago. Wilmer H. Cordes is vice president in charge of war activities and Bernard Dolan is tool conservation campaign manager.



This is a jig in which inner wing for C-47 cargo ship is assembled. Note the three working levels on this massive jig, end towers of which are built of 10-inch steel pipe and weigh nearly three tons each. Towers are set in 2 x 6 foot reinforced concrete islands to insulate the structure from vibration

Colorado Fuel & Iron Adding 74 Coke Ovens

The Colorado Fuel & Iron Corp., Denver, plans construction of 74 coke ovens at its Minnequa steel plant. Colorado Fuel & Iron now has 192 coke ovens at Minnequa, and the new equipment means a capacity increase of around 40 per cent.

The company expects a new iron ore bedding plant and sintering plant at Minnequa to be finished by September.

Officials anticipate that the new open shaft, hoist and head frame being installed at the corporation's iron mines at Sunrise, Wyo., will be completed this fall.

GETTING OUT THE SCRAP

Increased dependence on plant waste stresses urgent need of effective collection systems. . . Improved worker efficiency and morale are programs' byproducts. . . Collection of 15,000,000 tons required before end of 1943

URGENT need for iron and steel scrap has not yet been satisfied. Collection effort must be intensified over coming months if the steel industry's production goal of 92,000,000 tons of ingots this year is to be attained.

For the first half of 1943 the steelmakers established a new production high of 43,866,912 ingot tons. But even assuming that the "Steel for Victory" drive uncovers the desired 2,000,000 additional tons of steel ingots in the last half of the year, this still leaves an even higher new production record of 46,133,088 tons to be achieved during the current six months—that is, output of 2,266,176 more tons of steel than were turned out in the first half. Can the steelmakers do it?

They can if tonnage of iron and steel scrap is increased to the point where steel companies' stocks on hand are always adequate, in the view of government officials. But latest figures from the Scrap Processors Branch of the War Production Board's Salvage Division are not reassuring.

In May auto wreckers and scrap dealers shipped 155,677 net tons of iron and steel scrap to steel mills. For June, however, this figure slumped to 91,548 tons—drop of 41.2 per cent. Number of old cars purchased for wrecking likewise skidded, showing a loss of 32.6 per cent for June compared with May.

Without production of new cars, stocks of old automobiles are shrinking. In June, 1942, auto wreckers reached the pinnacle of tonnage delivery, shipping 454,038 tons to mills. Since then the number of cars wrecked and volume of scrap shipped have steadily diminished. For the six-month period ending December, 1942, an estimated 934,620 cars were scrapped; the six months ending this June the total was only 538,524 cars. Last month some 65,350 junked cars were processed, and it is believed that for the remainder of 1943 the monthly average will be around 55,000—a total of 330,000 for the current six-month period.

This sharp drop in potential scrap material constitutes a threatening situation in the opinion of the WPB Salvage Division. Paul C. Cabot, who resigned recently as director of the division because of ill health, stated before leaving the post:

"With increased steel requirements for the last six months of the year, our scrap position must be stepped up accordingly. To this end we have increased our collection quota to 15,000,000 tons for the period.

"This means that all salvage workers throughout the country, in all phases of salvage activities, must work harder to make good this increased scrap quota. With less scrap available in the wrecked-auto field, we must work even harder in all other fields constituting sources of iron and steel scrap, such as agricultural areas, railroads, industrial sources, and worn out and abandoned properties. We are assured by the consuming mills that they will take prepared scrap in the areas where they are located. So we have this added incentive to get in all material available.

"Only in this way can we expect to meet the heavy additional requirements placed upon us by the increased steel quotas."

Considering the inevitable decline in stocks of old cars, and the lower quality of household and general collection scrap as supply sources dry up, it seems apparent industrial plants must be depended upon increasingly for the scrap gathered during the July-December period.

This war production "harvest scene" is part of the process of salvaging metal chips and turnings at the Pioneer-Eclipse division, Bendix Aviation Corp., Teterboro, N. J. Chips must be crushed or briquetted prior to remelting

Scrap Collection Pays

Wartime expansion of the nation's industrial plants and their heavy production schedules have brought about development of improved methods for collecting and processing waste metals.

Disposal of plant scrap improves the safety factor, makes for greater efficiency of employes, and improves worker morale. Beyond that many industrial companies are discovering that modern scrap-handling processes return otherwise wasted dollars.

For example, the Perfect Circle Co., Hagerstown, Ind., has found cast-iron borings salvaged from its plants need no longer be termed scrap; they rate as a byproduct. These "chemical borings" are

now being sold to E. I. du Pont de Nemours & Co. for use in manufacturing dyes for troop uniforms. DuPont also uses the borings to produce a chemical needed in reclaiming rubber, and they go directly into the production of smokeless powder and other explosives. Such use of scrap points to the extra dividends possible when every type of plant scrap is utilized to best advantage.

Plant "scrap hounds" are not new, but Willys-Overland Motors Inc., Toledo, O., presents a record of the benefits possible with such a device. The company's "hound" consists of a 4-cylinder jeep motor, a generator, a magnet able to lift a 700-pound manhole cover, and a jeep trailer. Energized by the motor, the magnet is driven around the plant to pick up nails, steel turnings, and other metal objects along the route.

In its first four days' operation the "hound" added 3145 pounds of metal to the Willys-Overland scrap pile. Furthermore, during its first month of use the device reduced by 75 per cent the nail and metal damage of tires on company cars, trucks and tractors; and rejections of jeep tires, because of cuts sustained on test runs, were reduced to a negligible figure by this means.

Some large plants have installed complete systems for exact control of every type of metal scrap with gratifying results. An example of the economies possible can be cited in experience at the Teterboro, N. J. plant of the Bendix Aviation Corp., which is operating a salvage system which the War Production Board recommends as a model for other industries.

Plan Based on Segregation

Basis of this successful system is segregation of metals from start to finish of each manufacturing process through simple card identification. Each month this program salvages 500 tons of steel in 6 basic alloys; 85,000 pounds of aluminum, segregated into 6 groups; 35,000 pounds of magnesium; 35,000 pounds of brass in 10 different alloys; 35,000 gallons of oils and solvents.

As described by its designer, F. P. Joralemon, Bendix Pioneer-Eclipse salvage superintendent, the system is based on a simple plan plus application of mass-production methods, and is operated with less than half of 1 per cent of total plant manpower.

Recovery of metal turnings and oils starts with each working shift, as the plant setup men assign jobs to cutting, drilling or boring machines. The setup man posts on every machine a printed card stating the type of metal and alloy being worked on that machine.

For positive identification the steel alloys are classified in 6 basic groups: high-carbon steel containing no nickel; steel containing 1 to 3 per cent nickel alloy; steel containing 3 to 5 per cent nickel alloy; steel containing molybdenum or "toughener"; chrome vanadium steel; stainless steels. The cards subdivide each group in from 2 to 12 grades. Cards are also printed to classify 4 grades of aluminum, 30 types of brass, bronze, and copper, and 1 type of magnesium.

Cards Are Kept Posted

The machine operators are specifically instructed to keep the cards posted on their machines until each job is completed, to insure positive identification of scrap by types. Then it is the setup man's task to see that each machine is thoroughly cleansed of one type of chips before the change is made to a job requiring another metal.

Cleanup men are provided with oil tight containers built to fit various types of machines and mounted on wheeled carts resembling mine cars. These carts are operated by hand or by electric lift trucks.

As soon as a machine has been cleansed of chips or turnings the scrap-filled cars —each carrying its identification card— are hauled to the salvage department, housed in a separate building. There the oil-soaked turnings are dumped into a hopper and lifted 20 feet by skip-hoist to a sorting table, where butt ends or rough parts are separated by hand before the entire mass is dumped into a crusher.

In the crusher the rough metal is pulverized into what the salvage expert terms "shoveling chips." The crushing process also starts the separation of oil and metal. A belt then conveys the chips into a huge basketlike steel container; a switch is pressed and the container whirls. Within a few moments the cutting oil has been separated from the metal chips by centrifugal force.

Oil recovered in this extractor flows out the bottom of the iron basket into a sump. It is next pumped into a hopper tank, where it is pasteurized at a temperature of 160 degrees Fahr. The oil is then filtered to eliminate powdered metal and slime, after which it is pumped to supply tanks for further issue and use.

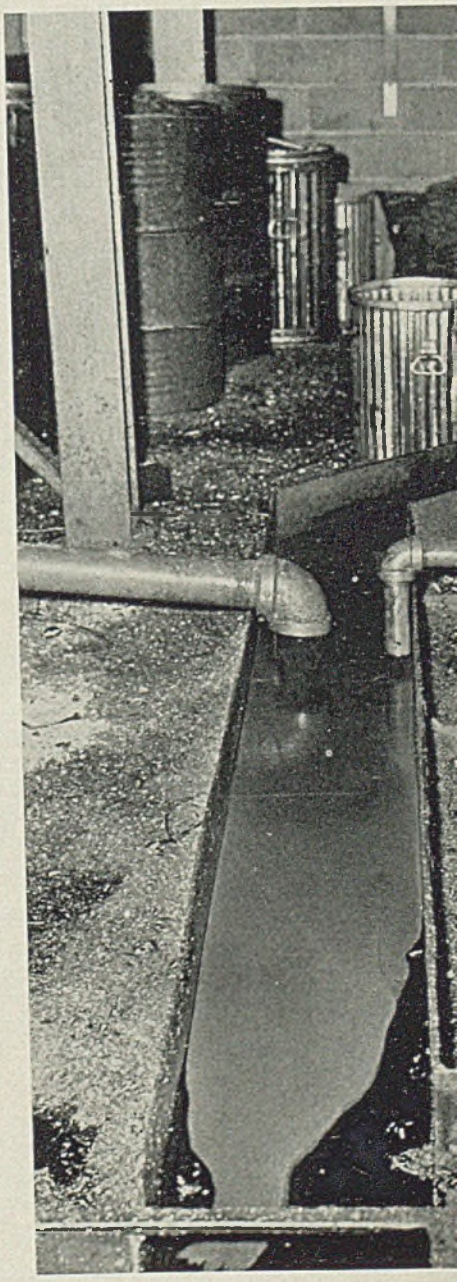
Air Conveyor Carries Chips

The oil-free metal chips are next fed into an air conveyor and blown 25 feet into hard steel hoppers. They are then loaded into trucks which carry them to smelters for reprocessing, after which they are put back into use.

System Has New Building

This system for recovering metals and oils speedily and efficiently has been occupying its new building for several months.

By these and similar methods industrial plants are conserving critical metals and aiding the "Steel for Victory" drive in this crucial six-month period. That these efforts are critically needed is suggested by the figures of the Bureau of Mines, with May consumption higher than for April, and month-end stocks slightly down. Scrap consumption for May totaled 4,723,000 tons, against 4,642,000 for April. Scrap stocks on hand at end of May amounted to 6,905,000 tons, compared with a total of 6,918,000 tons shown at April's end.



Cutting oils drain from the bottom of a centrifugal force extractor and are recovered for reuse at the Pioneer-Eclipse division, Bendix Aviation Corp. More than 30,000 gallons of oil per month are salvaged at the Bendix plant

Ordnance Plans For Conversion

Chicago district completes termination of 90 contracts. . . H. P. Isham now district chief on terminations

CHICAGO

ALTHOUGH army ordnance production in the Chicago Ordnance District is increasing and the district is administering 3338 prime contracts with total valuation of $3,696,248,799, steps already are being taken to smooth conversion of industry in this area back to peacetime production.

This was seen in the recent announcement by Brig. Gen. Thomas S. Hammond, district chief, that H. P. Isham, ordnance executive, will hold the newly created position as chief of Purchasing, Termination and Renegotiation Policy. He will be assisted by Lt. Col. Francis W. Parker Jr., assistant chief, and will have the co-operation of the Chicago district's price adjustment board set up in August, 1942.

"Our first consideration, of course," Gen. Hammond said, "is to continue to provide American soldiers with the best equipment in the world . . . enough and on time. But we know that the war will end some day in complete victory, and American industry eventually will return to normal operations. When that time comes, we want to be in a position to help manufacturers make the conversion with maximum speed and minimum distress. The men who will handle that work for the War Department in this district will have had sufficiently broad business experience to guarantee the realization of that objective."

Mr. Isham, who has been with the ordnance district since May, 1942, as chief of the planning division, was formerly president of the Clearing Industrial District. Col. Parker, in civilian life an attorney, was a member of Parker & Carter, patent lawyers, until as a major in the ordnance reserve he was called to active duty early in 1940.

Appointment of George F. James, for the past year a member of the price adjustment section, as chief of that section, also was announced by Gen. Hammond. He succeeds William R. Odell Jr., who left his post as assistant treasurer, International Harvester Co., Chicago, a year ago for temporary service with the ordnance district and is now returning to his former position.

"Terminations of contracts are certain to become increasingly important when the war effort passes its peak," Gen. Hammond asserted, "and we are determined that such terminations shall be handled promptly and fairly. Already the Chicago district has completed termination of 90 contracts."

A.F.A. Picks Buffalo for Its 1944 Convention

The third War Production Foundry Congress and the forty-eighth annual meeting of the American Foundrymen's Association will be held in Buffalo, the week of April 25, 1944, according to announcement following the annual meeting of the association's board.

All phases of the event will be housed in Buffalo's Memorial Auditorium.

Provision will be made for suppliers of equipment and materials to demonstrate the utility of their products through use of exhibit booths for conference and consultation and displays of models, products and equipment.

Annual meetings of the A.F.A. have been held in Buffalo twice previously.

BRIEFS . . .

Worthington Pump & Machinery Corp., Harrison, N. J., announces acquisition of Ransome Machinery Co., Dunnellen, N. J., as a wholly owned subsidiary.

—o—

McKenna Metals Co., Latrobe, Pa., has been succeeded by Kennametal Inc. Personnel, management, products and policies remain the same. Directors are Philip M. McKenna, Alex G. McKenna and Donald C. McKenna. The following officers were elected: Philip M. McKenna, president; Alex G. McKenna, vice president; Donald C. McKenna, vice president; George T. Kearns, treasurer, and Robert M. Zacharias, secretary.

—o—

Cleveland Automatic Machine Co., Cleveland, manufacturer of automatic screw machines, has purchased the G & N Mfg. Co., Cleveland, maker of high-pressure hydraulic die-casters. The G & N company will be operated as a division of Cleveland Automatic. Officers are president, Millar Brainard; executive vice president, G. V. Patrick, also vice president of the controlling company; treasurer, James Hammond, Cleveland Automatic Machine Co. president.

They Say:

"If we Americans, in the peace that lies ahead, prepare for World War III with thoughtful adherence to our experiences and lessons of the past, World War III will in all probability never be fought."—**J. Carleton Ward, Jr.**, president, Fairchild Engine & Airplane Corp., and head of East Coast Aircraft War Production Council.

° ° °

"There must be more and more industry. It is essential to political and economic freedom, and anything that hinders industry is harmful to the American ideal. Industry can give the only social security human beings can know—the security of being able to produce what they need."—**Henry Ford** on his eightieth birthday, July 31.

° ° °

"When we realize that taxes must be uniform, it is clear that further drastic increases would be backbreaking and destructive to the middle class and to the lower upper class."—**Sen. Walter F. George** (D., Ga.), chairman, Senate Finance Committee.

"The first and most difficult phase of the war—overcoming the enemy's initial superiority in arms and in experienced fighting men—is now drawing to a close. Millions of Americans have been trained and equipped for combat, and America's production of war materials has risen far above that of the Axis countries. Our military might has made itself felt in Africa, the South Pacific and the Aleutians, setting the stage for more decisive operations to come."—**B. F. Fairless**, president, United States Steel Corp.

° ° °

"There has been so much talk about postwar planning by professors, government and business leaders that the need for such planning by individuals and families has been largely overlooked. Wartime payrolls call for some personal planning on the part of every man and woman now holding a job. There is a real challenge to good sense in every paycheck nowadays. This is particularly true since so many workers are drawing extra pay for longer hours at overtime rates."—**E. J. Kulas**, vice chairman, executive committee, Jones & Laughlin Steel Corp., Pittsburgh, in a statement to employes.

Steel Producers' First Half Net Earnings Slightly Below Year Ago

Second quarter returns show little change from initial three months—Profits sharply below like 1941 periods

COMBINED net income of the first 18 steel producers to report for the initial six months this year totaled $86,827,257, off slightly from the $90,489,745 aggregate net profit reported by the same group in the corresponding 1942 period.

In the first half of 1941 net earnings were substantially higher at $149,527,722.

Sharp increase in payrolls, and to a lesser extent higher material costs were the chief factors accounting for the decline in first half earnings. New records were established in steel ingot output and steel produced for sale during this period.

Tax provisions for the first half reported by 15 companies in the group were off moderately, reflecting the lower earnings before taxes in most instances. Only five of those companies reporting taxes made larger provisions during the first half than in the like period a year ago. Provision for taxes in the first half of 1942 were largely guess work in that estimates were made on the basis of the likely increase in tax rates then in the process of being formulated by Congress. First half taxes for 15 steel interests reporting aggregated $235,223,106, compared with $298,844,021 in the same period a year ago and $138,929,086 for the corresponding first six months during 1941.

Second quarter net earnings for the group of 18 steel producers, representing close to 90 per cent of ingot capacity, amounted to $42,960,382. This was substantially unchanged from the $43,066,874 reported by the like companies in the initial three months this year. In the second quarter of 1942 and 1941 the aggregate net income for this same group totaled $33,742,844 and $64,324,087 respectively.

Allegheny Ludlum's First Half Net Is $2,583,319

First half net profit of Allegheny Ludlum Steel Corp., Pittsburgh, totaled $2,583,319, equal to $1.97 a common share. In like period of 1942 and 1941 the company earned $1,963,362 and $4,169,847 respectively.

Second quarter earnings amounted to $1,164,079, against $1,419,240 in the initial three months this year and $1,047,718 in the June period last year.

Tax provisions for the first half aggregated $10,487,500, compared with $7,324,900 in corresponding 1942 months.

National Steel Has First Half Net of $5,218,865

National Steel Corp., Pittsburgh, reports first half net income of $5,218,865, equal to $2.36 a share on capital stock. In like 1942 period earnings amounted to $5,426,282, or $2.46 a share.

June quarter net profit totaled $2,538,015, compared with $2,680,850 in the initial three months and $2,750,445 in the corresponding 1942 quarter.

Tax provisions for the first half aggregated $12,075,000, against $12,750,000 for the same period last year.

Cleveland-Cliffs Iron Profit Totals $967,674

Earnings of Cleveland-Cliffs Iron Co., Cleveland, are reported at $967,674, equal to $1.98 a share on $5 preferred stock, for the six months ended June 30. In like 1942 period profit totaled $1,874,-

(*Please turn to Page* 158)

Comparison of Steel Producers' First Half and Quarterly Earnings

	First Quarter 1943	Second Quarter 1943	Second Quarter 1942	First Half 1943	First Half 1942	Taxes First Half 1943	Taxes First Half 1942
United States Steel Corp.	$15,406,597	$15,679,456	$ 5,945,373§	$31,086,053	$33,866,907	$52,800,000	$117,000,000
Bethlehem Steel Corp.	6,228,693	6,614,210	6,070,913	12,842,903	12,211,601	61,610,000	49,400,000
Republic Steel Corp.	3,666,557	2,337,175	3,355,158	6,003,732	8,072,121	29,600,000	35,800,000
Jones & Laughlin Steel Corp.	2,399,369	2,411,248	2,438,752	4,810,617	4,930,470	11,500,000	11,800,000
National Steel Corp.	2,680,850	2,538,015	2,750,445	5,218,865	5,426,282	12,075,000	12,750,000
Youngstown Sheet & Tube Co.	2,147,023	2,257,425	2,291,119	4,404,448	4,867,698	12,613,000	16,377,000
Inland Steel Co.	2,796,321	3,011,333	2,782,391	5,807,654	5,471,481	10,721,000	14,521,000
American Rolling Mill Co.	1,535,205	1,694,492	1,602,688	3,229,697	3,334,323	8,219,023	7,131,459
Wheeling Steel Corp.	961,391	1,329,010	795,558	2,290,401	1,995,648	2,433,000	5,346,000
Pittsburgh Steel Co.	600,121	421,403	731,840	1,021,524	1,377,175	.....	.....
Crucible Steel Co. of America	1,915,905	1,798,164	2,170,731	3,714,069	3,846,775	19,374,416	18,133,162
Copperweld Steel Co.	216,332	227,809	258,811	444,141	597,868	21,567†	895,440
Sharon Steel Corp.	445,564	489,871	386,900	935,436	637,202	3,347,000	1,550,000
Allegheny Ludlum Steel Corp.	1,149,240	1,164,079	1,047,718	2,583,319	1,963,362	10,487,500	7,324,900
Granite City Steel Co.	121,560	100,352	176,833	221,912	254,490	137,000	210,000
Continental Steel Corp.	118,159	216,179	234,410	334,338	403,747	284,600	605,060
Follansbee Steel Corp.	187,133	255,803	37,668	442,936	202,976	.....	.....
Keystone Steel & Wire Co.	220,854	414,358	665,536	635,212	1,029,619	.....	.....
Totals	$43,066,874	$42,960,382	$33,742,844	$86,827,257	$90,489,745	$235,223,106	$298,844,021
FINISHING CAPACITY ONLY							
Acme Steel Co.	$422,316	$509,554	$380,285	$931,870	$896,963	$2,875,283	$2,821,251
Eastern Rolling Mill Co.	123,226	48,158	36,479	171,384	175,405	911,208	473,364
PIG IRON CAPACITY ONLY							
Interlake Iron Corp.	$260,430	$230,397	$247,840	$490,827	$692,602	$885,000	$1,070,000
Pittsburgh Coke & Iron Co.	152,311	191,374	202,900	343,686	336,072	270,000	424,955
Woodward Iron Co.	251,815	300,283	66,553°	552,098	330,784	342,173‡	644,651‡

†Gives effect to a net credit of $115,091 for estimated recovery of 1941 excess profits taxes. ‡Excess profits taxes. °Loss. §Includes tax adjustment.

THE BUSINESS TREND

Production Fluctuates Within Narrow Range

INDUSTRIAL production is well sustained at recent peak levels, with most business barometers recording only slight gains or negligible declines. Output of essential war products continues in tremendous volume, despite cancellations in some lines.

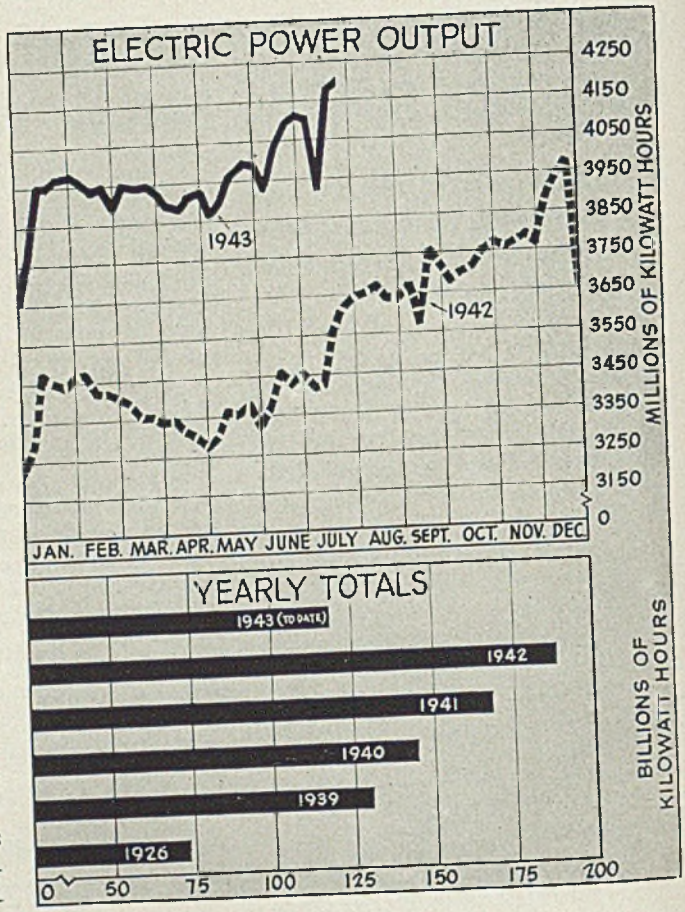
Among weekly industrial indicators slight gains have been recorded in electric power consumption, petroleum production and freight carloadings. Steel ingot and bituminous coal production held unchanged, while slight declines were registered in heavy engineering construction awards and truck and automobile output.

ELECTRIC POWER—New all-time records in electric power generated have been established in recent weeks and further gains are seen for the remainder of the year.

Increase in power facilities from the start of the war program through 1944 is expected to exceed 8 million kilowatts, bringing total installed capacity for class I utilities to 45,000,000 kilowatts and capacity in industrial plants and small utilities to more than 10 million. The war has brought about a 43 per cent increase in power consumption from 1939 to 1942. To date this year there has been a 17 per cent gain in consumption over 1942. Relatively small amount of additional power capacity is scheduled for the duration of the war program.

The electric power systems in conjunction with government officials are proceeding with plans for an intensive nation-wide voluntary conservation program for the purpose of saving manpower, steel, copper, coal, oil, natural gas, tungsten and other critical materials and equipment.

STEEL CASTINGS—Manpower shortage, particularly in the unskilled labor group, continues to limit steel castings production to slightly under 90 per cent of capacity. The industry's war expansion program is practically completed, but despite sufficient plant capacity many interests are behind in meeting war production schedules. Deliveries, while varying widely, appear to average about three months. There is some doubt the 1943 production goal of 3,154,000 tons can be met, due to inability to bring production up to capacity because of manpower lack.



Latest official production figures show a slight upturn during May to 163,812 tons, compared with 161,403 in April, and the all-time peak of 176,470 tons recorded during March. Orders also increased in May to 192,531 tons, but were still below the high point in recent years of 213,130 reported for January.

SCRAP—Decline of 3 per cent in steel and iron scrap stocks held by producers and suppliers during May more than offset a one per cent increase in consumers' stocks, the Bureau of Mines reports. Despite the latest decline, stocks on May 31 last were about 75 per cent above that recorded in the like 1942 month. However, recent curtailment of pig iron production resulting from the coal strike has forced steelmakers to dip further into supplies.

FIGURES THIS WEEK

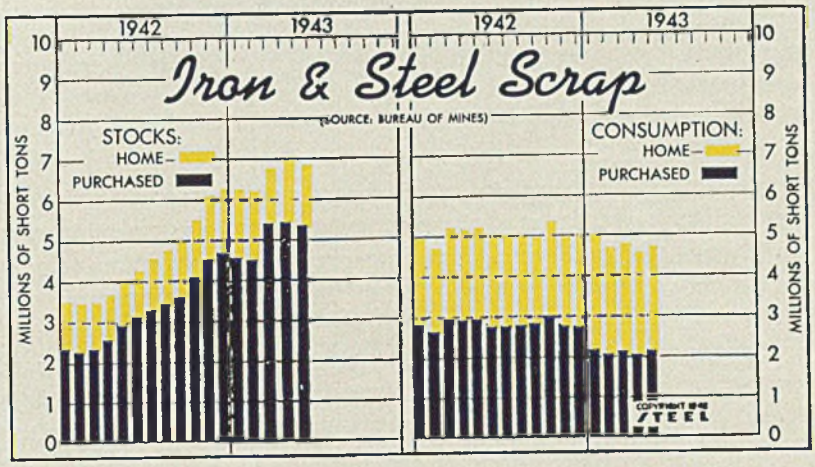
	Latest Period*	Prior Week	Month Ago	Year Ago
INDUSTRY				
Steel Ingot Output (per cent of capacity)	98.0	98.0	92.0	98.0
Electric Power Distributed (million kilowatt hours)	4,227	4,196	4,111	3,649
Bituminous Coal Production (daily av.—1000 tons)	1,983	1,983	775	1,843
Petroleum Production (daily av.—1000 bbls.)	4,133	4,119	4,008	3,383
Construction Volume (ENR—unit $1,000,000)	$41.2	$49.0	$60.1	$259.8
Automobile and Truck Output (Ward's—number units)	19,900	20,130	18,645	18,260
TRADE				
Freight Carloadings (unit—1000 cars)	886†	884	852	864
Business Failures (Dun & Bradstreet, number)	48	50	66	168
Money in Circulation (in millions of dollars)‡	$17,799	$17,706	$17,420	$12,647
Department Store Sales (change from like week a year ago)‡	+20%	−1%	+12%	+5%

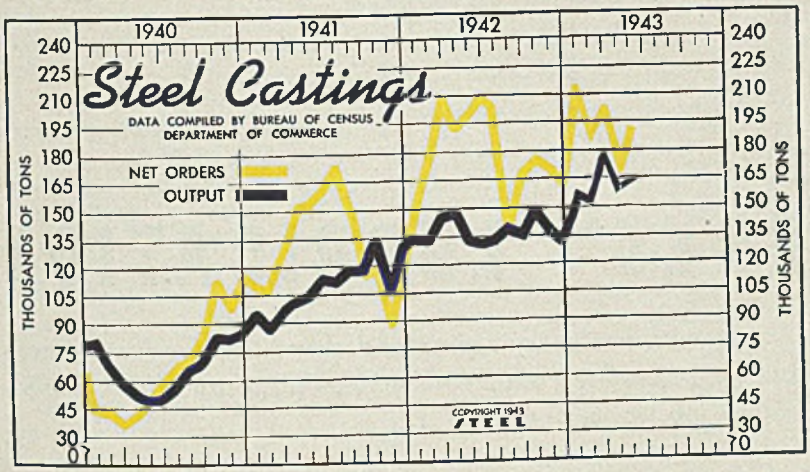
*Dates on request.
†Preliminary. ‡Federal Reserve Board.

Iron and Steel Scrap
Bureau of Mines

(Gross tons—000 omitted)

	Consumers' Stocks		Total Consumption	
	1943	1942	1943	1942
Jan.	6,233	3,503	5,031	4,956
Feb.	6,209	3,455	4,680	4,708
Mar.	6,850	3,460	4,787	5,221
Apr.	6,918	3,582	4,642	5,156
May	6,905	3,972	4,723	5,225
June	.....	4,297	.....	5,000
July	.....	4,579	.....	5,006
Aug.	.....	4,780	.....	5,015
Sept.	.....	4,993	.....	4,955
Oct.	.....	5,530	.....	5,342
Nov.	.....	6,078	.....	4,930
Dec.	.....	6,274	.....	5,037
Total	.....	54,503	.....	60,551





Commercial Steel Castings

(Net tons in thousands)

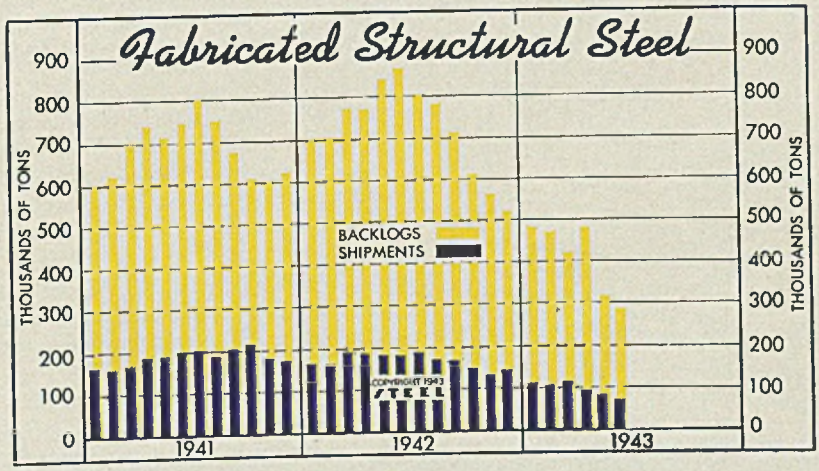
	Orders		Production	
	1943	1942	1943	1942
Jan.	213.1	150.5	154.7	134.8
Feb.	191.2	179.9	151.5	133.7
Mar.	202.7	211.1	176.5	146.5
Apr.	165.8	191.2	161.4	149.6
May	192.5	199.6	163.8	131.5
June	.....	.....	208.9	132.0
July	.....	.....	202.3	135.7
Aug.	.....	.....	141.2	139.2
Sept.	.....	.....	177.5	139.8
Oct.	.....	.....	179.5	152.1
Nov.	.....	.....	173.3	140.4
Dec.	.....	.....	172.3	143.9
Total	.....	.....	2,187.3	1,679.2

Fabricated Structural Steel†

(1000 tons)

	Shipments			Backlogs		
	1943	1942	1941	1943	1942	1941
Jan.	109.9	167.8	164.6	489.3	704.4	601.5
Feb.	109.1	164.6	161.4	475.6	706.7	624.2
Mar.	113.3	191.3	170.2	424.4	777.7	697.2
Apr.	96.5	187.2	189.8	385.3	772.4	741.9
May	88.5	184.2	191.9	306.6	843.8	718.9
June	77.6	182.7	200.5	290.3	869.8	747.4
July	.....	189.9	203.0	.....	808.6	802.7
Aug.	.....	173.9	189.3	.....	783.5	754.5
Sept.	.....	169.8	204.1	.....	716.0	678.5
Oct.	.....	152.9	217.7	.....	617.7	614.4
Nov.	.....	130.4	182.6	.....	566.6	602.9
Dec.	.....	145.3	176.1	.....	523.5	626.0

†Source: American Institute of Steel Construction.



FINANCE

	Latest Period°	Prior Week	Month Ago	Year Ago
Bank Clearings (Dun & Bradstreet—billions)	$7,936	$8,612	$8,503	$6,221
Federal Gross Debt (billions)	$144.8	$144.4	$140.7	$81.6
Bond Volume, NYSE (millions)	$70.1	$61.8	$64.0	$31.4
Stocks Sales, NYSE (thousands)	8,162	4,714	5,279	1,490
Loans and Investments (millions)†	$46,612	$46,822	$46,147	$33,396
United States Government Obligations Held (millions)†	$32,510	$32,287	$31,753	$17,178

†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)†	243.8	244.2	245.4	230.0
Industrial Raw Materials (Bureau of Labor index)‡	113.3	113.4	114.2	99.8
Manufactured Products (Bureau of Labor index)‡	99.8	99.6	99.7	98.8

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

MARSHALL-SMITH, INC. P-2001

THOMPSON AIRCRAFT PRODUCTS CO.

FORM A-377

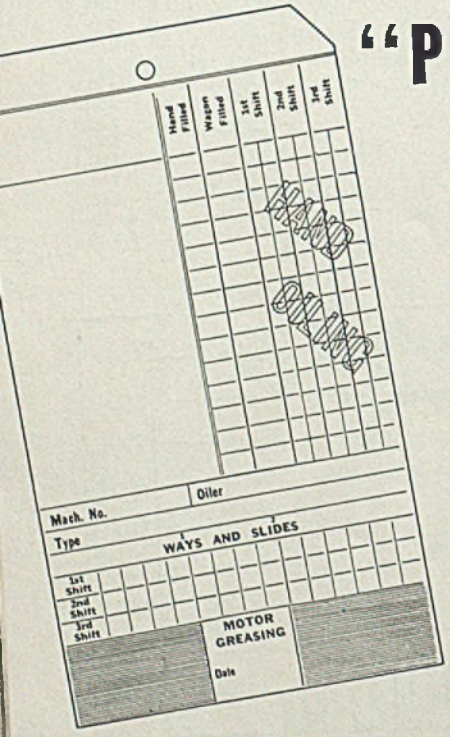
LUBRICATION LOG

RECORD DATES OF ALL OIL CHANGES ON ITEMS DESIGNATED

TYPE OF LUBRICATION	PERIOD	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
	2 WEEKS									
	3 WEEKS									
	MONTHLY									
	6 WEEKS									
	2 MONTHS									
	3 MONTHS									
	4 MONTHS									
	5 MONTHS									
	6 MONTHS									
	YEARLY									

MACHINE 1 3 5 7 9 11 13 15 17 19 O P. C. 21 23 25 27 29 31 J F M A M J J A S O N D

Fig. 1. (Left)—Visible file card for system that automatically assures lubrication will occur at proper intervals by providing data for daily work orders to lubricating crew



"PLANNED" LUBRICATION

. . . . cuts machinery repair and down time, reduces grease and oil inventories, enables new workers to do effective lubricating job, lowers costs

By O. M. ALBL
Lubrication Engineer
Thompson Aircraft Products Co.
Cleveland

"SAY, BILL, this makes the second time this week that the hydraulic pump on this machine has gummed up; the other machines like this one are getting just as bad. Something has to be done about it".

"Well", answered Bill, "I put the oil in that the manufacturer recommended; I'm not going to stick my neck out by trying some other oil."

"Yes, and what about the slides on the No. 2 centerless grinders? They have to be scraped in almost every month. We have at least three or four jobs down a week."

"Well, I put grease on some and 600-W on others; you have to satisfy the operators; they're fussy about their machines."

It was conditions like these and many others which gave the machine repair department of Thompson Aircraft Products Co. a headache. The general foreman was in the middle, since he was in charge of both repair and lubrication departments—a tough spot for any man—no buck passing here. A general lubrication man seemed the answer to the problem.

He was hired and soon after, the lubrication department evolved a pro-

Fig. 2. (Center, left)—Daily record card is punched in appropriate square every time a "lube" job is performed. These, with permanent record, provide full account of lubrication

Fig. 3. (Left)—Visible filing system answers questions as to when, how and with what a lubrication job was performed and indicates when it should be done again. Left to right: O. M. Albl, lubrication engineer; Wm. Galinas, supervisor; E. B. Finley, general foreman, machine maintenance

gressive plan of lubrication systems and methods. The first thing done was to make a survey of the lubricants used in each machine and to record them. This record served as a basis from which to work. In the forge shop and the heat treat it was found that a high priced automotive motor oil was used where a low priced machine oil was recommended. Here, a duplication of hydraulic oils; there, several cylinder oils where two would suffice, etc. Needless to say, these extra oils were eliminated along with many others.

In the end, 40 per cent of the oils were disposed of and 40 per cent of the headaches with them, since the possibility of applying the wrong lubricant was cut by the same percentage. Bookkeeping and other records were simplified, too.

A second survey was made, at which time recommendations were recorded for the proper lubricants for each type of machine and equipment, keeping in mind the manufacturer's recommendations, the oil company's recommendations, and our own past experience.

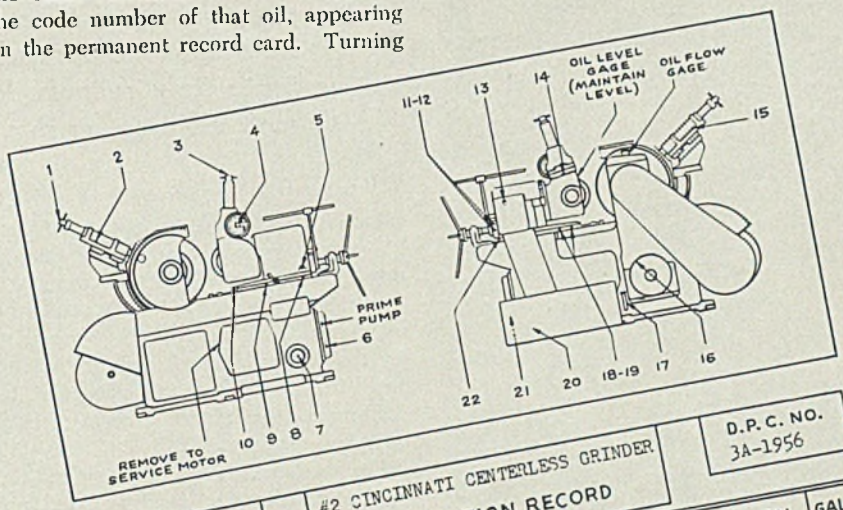
Samples of the lubricants were then submitted to the plant laboratory where they were approved by the chief chemist after extensive tests. The rule is that all lubricants must first be approved by the chief chemist before actual testing or use in the plant.

Yes, the lubrication man stuck his neck out and tried a straight mineral oil in place of an oil with an additive over the objections of the machine manufacturer. It worked. The machines ran for a period of from 3 to 5 months without gumming up, and without changing the oil.

The slides? Oh, yes. This problem brought up two questions: One, the frequency of lubrication; two, definite recommendations for each type of machine.

Taking the latter first, a permanent record card was found to be the answer. A transparent envelope is attached to each machine in which the permanent record card, Fig. 5, is placed. This bears the machine name, number, bay in which it is located, name of the parts to be lubricated, code of the oil opposite the part name, the gallon capacity and the station numbers. The station numbers correspond to the numbered arrows on a photostatic copy, Fig. 4, of the machine, placed in the transparent envelope so it can be seen from the opposite side. The numbered arrows on this diagram designate each point to be lubricated; the numbers of the arrows using the same lubricants are listed opposite the code number of that oil, appearing on the permanent record card. Turning to the reverse side of the permanent record card, the date is posted under the category of lubrication performed, providing the frequency is longer than a two-week interval. Those occurring more often are listed on separate cards. There are over 60 of these special jobs. On the cards the machine part to be lubricated is listed, together with the future dates, usually covering a period of several months. For example, when all the spindle reservoirs using a mixture of kerosene and oil are drained and flushed, the date is punched out on the

(*Please turn to Page* 99)



DEPT. NO. Bay 2

#2 CINCINNATI CENTERLESS GRINDER
LUBRICATION RECORD

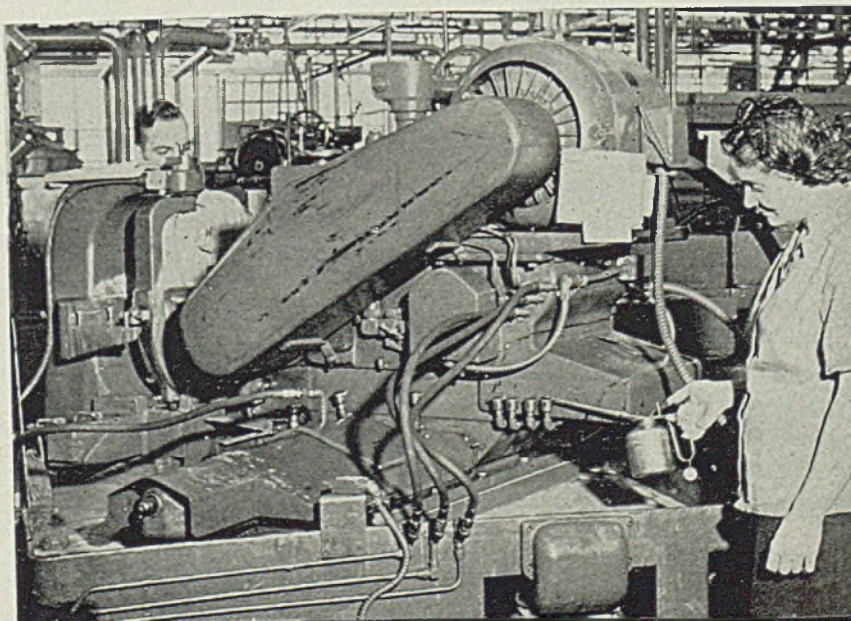
D.P.C. NO. 3A-1956

PARTS TO BE LUBRICATED	LUBR. NO.	METHOD	STATION	GALS.
Spindle bearings-hydraulic system	S-12	Main reser.	17	10
Tractor wheel	S-12	Wick feed	14	1/4
Speed change transmission	S-12	Splash	6	1
Hand oiled parts	M		1-2-3-4-11-12-13-15	
All grease fittings (except pump)	600W		5-7-8-9-10-18-19-20-21-22	
Motor bearings	HS-2	Oil lubri.	Remove to Service motor	
Coolant pump	G-2	Gun	Not on later models 16	

Fig. 4. (Top, right)—A chart like this is visible through back of transparent envelope and is used to show points where lubricant is to be applied to machine

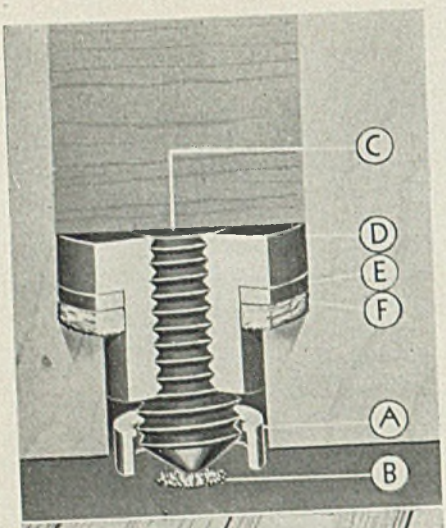
Fig. 5. (Center, right)—Card carried in front of transparent envelope attached to each machine to show permanent record of parts to be lubricated, lubricant, method and where work is to be done. Amount of lubricant is also shown

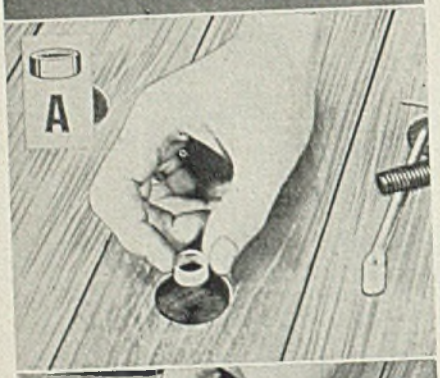
Fig. 6. (Right)—Lubrication system permits inexperienced workers to do reliable and expert job of lubrication because they are definitely instructed as to what lubricant to use, where to apply it, and how much. It's all in writing and chart form, they need not depend upon their memories to do the job correctly

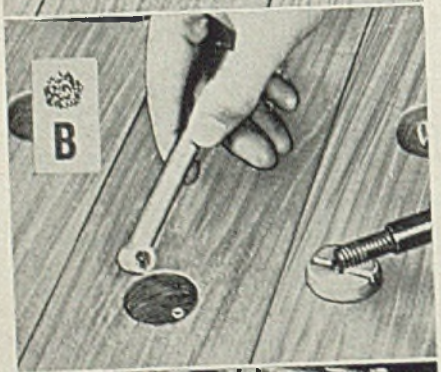


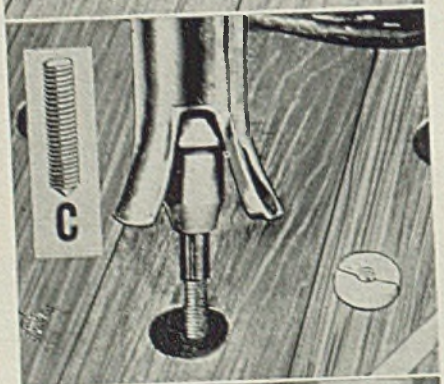
Stud welding

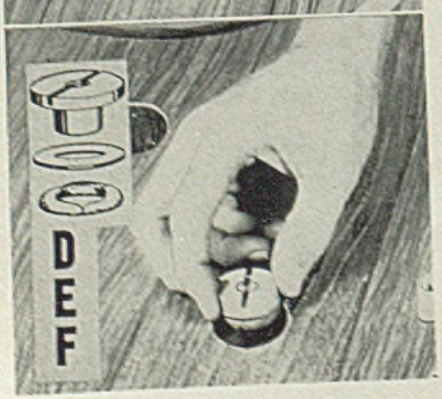
. . . . automatically assures perfect welds in applying studs or other metal sections endwise to plates or similar flat surfaces; is particularly suitable for application of hold-down studs through planking on ship decks











A METHOD of stud welding with all operations under precise automatic control was designed especially for use in ship deck work and is described for this application. However, it fully meets the requirements of many other uses calling for the end-welding of steel sections to metal surfaces. These operations can be performed at substantial savings of both time and material.

Due to its automatic operation and the production of perfect welds without long training and experience for the operator, welding by this method is made practical for a large number of applications where other methods have not been satisfactory.

Advantages of Welded Stud Deck Fastening: The costly operation of drilling holes through the metal deck is eliminated and the deck plating remains watertight with no danger of seepage through loosened bolts.

—Deck planking may be laid at any time—there is no necessity for delaying interior work until deck bolts have been installed. There is no interference with wiring, ducts, fittings, etc., on the underside of the deck and the studs may be "spotted" at any point—even over deck beams.

—In the wood planking itself, a much smaller hole is required for the installation of a given size stud than by any other method, thereby retaining greater strength in the planking. The stud fits snugly into the lower part of the hole and the wood is protected from heat of the arc by a lava ferrule.

—The shoulder in the counterbored hole can be made wide enough to give shearing strength in the wood planking equal to the strength of the stud.

—The special form of fastening nut used on the stud allows for a much deeper hole for the wood filler plug, materially increasing the life of the planking since the greater usable thickness permits more replanings; see Fig. 1.

—The cost of studs and nuts is frequently considerably less than the cost of bolts required by the older methods.

—Finally, there is a great saving in the time and labor necessary for installation and complete freedom in the location of studs so that they may be placed to the best advantage. Highly trained labor is not necessary.

—The gun is simple to operate and eliminates personal judgment because all operations are automatic and do not require skill nor long training for the operator. The construction throughout is rugged and capable of standing continuous hard use, with the weight of the tool kept low by the use of light metals and alloys so that the operator can work rapidly and without tiring.

With very little practice the ordinary

From top to bottom, left—

Fig. 1—Cross section through National stud weld and fittings as used in application of deck planking

Fig. 2A—Lava ferrule is dropped through hole in planking, first step in process

Fig. 2B—Second step is to pour in a measured amount of arc inducing material or flux

Fig. 2C—Third, the cocked and stud-loaded gun is inserted in hole, trigger pulled, weld automatically made. For gun details, see Fig. 3

Fig. 2D—Fourth, stud is used as hold-down bolt by applying special nut fitted with a grommet and washer as shown here and in Fig. 1. Nut is tightened with T-wrench

operator can consistently produce 150 perfect welded studs per hour.

The method combines arc welding with impact or forge welding. The duration of the arc is automatically controlled by an electric timer in the control cabinet. At the exact instant the molten crater has been formed, the gun plunges the stud into place in the molten metal and holds it in precise position. The operator simply cocks the gun, places it in position and presses the pistol grip trigger. The entire cycle is then completed automatically and the gun is withdrawn.

The result is uniformly perfect welds, so strong that the stud will break through the body before it will break at the weld. Automatic action permits the welding current to enter the gun only at the precise instant of welding. At all other times the gun is "dead" so that there is no danger of accidental arcs or of the formation of an arc on the stud when the gun is withdrawn. Loading and cocking the gun are so simple that they can easily be performed by a blindfolded operator.

How It Is Done: With the wood deck planking laid in position and with holes bored where the studs are desired, the operator simply loads and cocks the gun, inserts the lava ferrule in the hole, drops in a metered amount of arc inducing material, places the gun over the hole and presses the trigger. The entire welding operation is automatic. The stud is then ready for the special nut assembly. Less than 30 seconds are required for the entire operation. No skill is required.

Fig. 1 shows a section through deck plank and complete setup for a National stud weld. The letters refer to the parts and steps shown in Fig. 2.

Let's see the procedure in operation: In Fig. 2A, the first step, the lava ferrule is dropped into the hole and serves to shield the wood planking and the stud threads from the flare of the arc. This eliminates one of the greatest difficulties in other methods of welding. The heat and flare of the arc is completely shielded. The ferrule also serves as a protecting medium for the arc and molten metal similar to the covering on shielded arc electrodes.

In Fig. 2B, a measured spoon of arc inducing material is being poured inside the ferrule. This serves to establish the arc and improve the quality of the weld metal. The stud itself does not touch the metal plate until after the molten crater has been formed.

In Fig. 2C, the cocked and stud-loaded gun is shown located over a hole in plank. No welding current flows until the operator presses the pistol grip trigger. This starts the complete welding

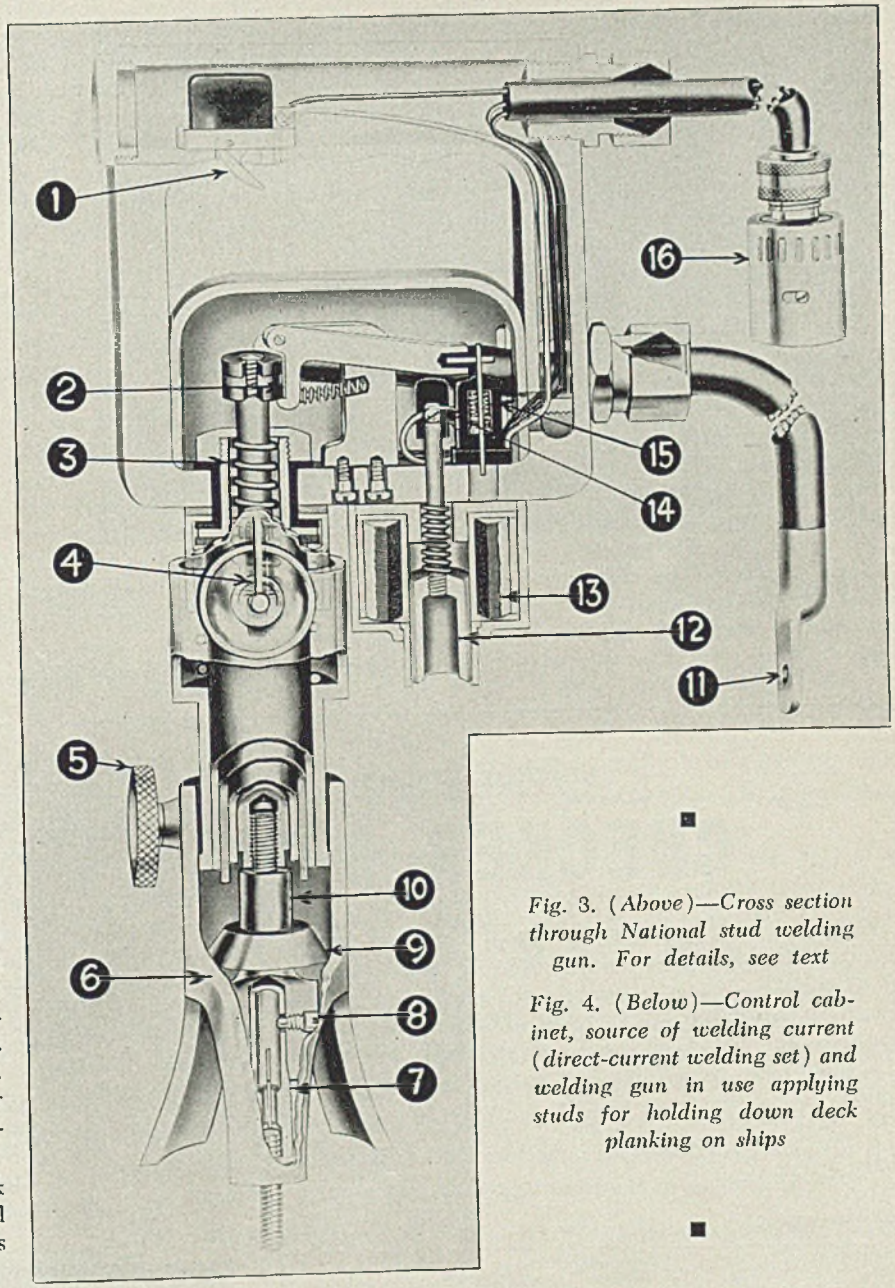
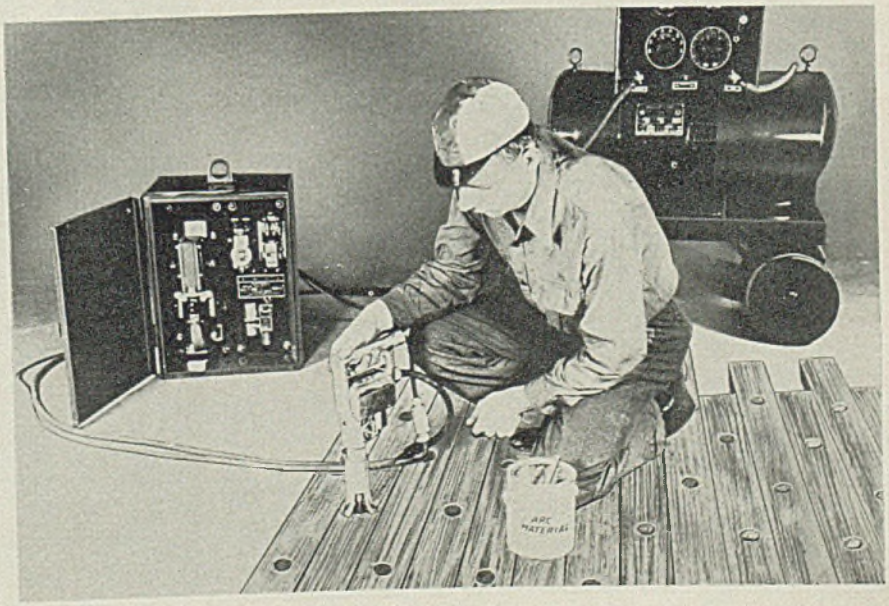


Fig. 3. (Above)—Cross section through National stud welding gun. For details, see text

Fig. 4. (Below)—Control cabinet, source of welding current (direct-current welding set) and welding gun in use applying studs for holding down deck planking on ships



cycle. The current flows for approximately a third of a second; then, as the welding current is interrupted, the gun automatically plunges the stud into the molten crater and the "dead" gun is withdrawn, leaving the stud welded in place.

In Fig. 2D, the stud is shown ready for fastening. A shipwright follows the welder and applies the special nut fitted with a grommet and washer on the stud. A forked T-wrench tightens the nut. A wood plug with white lead seals the hole. Notice the depth of wood available for replaning as shown in the section drawing, Fig. 1.

The process is easily adjustable to various plank thicknesses, stud length and stud diameters. A standard wrench and vise are the only tools required to change adapters. The adjustments required for minor variations in plank thickness to bring the stud in contact with the steel plate, are made with the large knurled nuts. Interchangeable collets handle different studs.

Preparatory work is simple and easy. Stud holes are bored in planks before they are placed in position. Each stud is welded to the deck plate through a hole after plank is in place. The use of a square-end drill is recommended to remove paint and scale from the metal deck at the bottom of each hole. Installation of nuts and plugs is usually done by a shipwright who follows the welder.

Foolproof Safety Features: The automatic control permits welding current to flow only during the fraction of a second when crater is formed. At all other times the gun is "dead" and its interlocking control prevents current from entering the gun unless it is cocked. Accidental shorts and flashes are thereby eliminated when the gun is being withdrawn after making a weld.

Loading the gun is extremely simple —the operator simply inserts the stud in the collet. The gun is cocked by pressing the stud against the planking. This compresses the spring which is automatically released just prior to completing weld. The only other operation is to press the trigger switch which initiates the welding cycle when the gun is in place.

Examination of a polished and etched section through a 7/16-inch diameter stud welded to a plate in the downhand position shows the depth of penetration into the plate. The stud, having been at negative terminal of the arc, is fused to a blunt point which is surrounded by a fillet of weld metal. About ⅛-inch diameter section at the stud end is welded directly to the plate by the forging action of the process. The fillet of weld metal is produced largely from the end of the stud which loses about $\frac{5}{16}$-inch of its length in this process.

(*Please turn to Page* 124)

Develops Cross-Vent

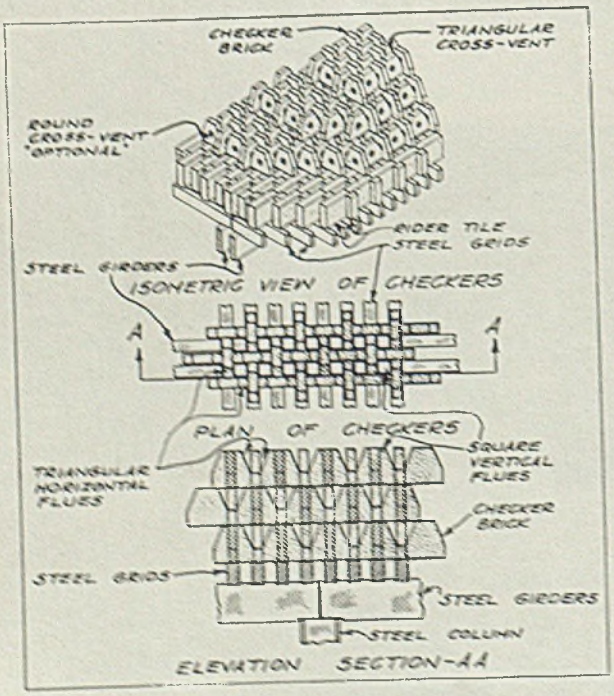
CHECKER BRICK

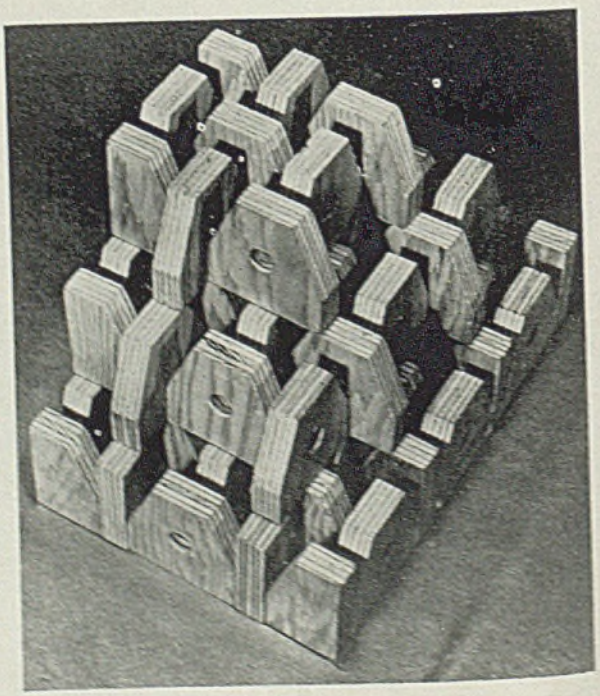
A NEW type checker brick has been developed for blast furnace stoves and other regenerative furnaces which is a simple and cheap shape to manufacture. Checkers made of this shape have a high heating surface because of the large percentage of brick volume exposed to air and heat.

Thickness of the brick and size of the flues can be adjusted to suit any degree of cleanliness. Beveled-off corners of cross vents are staggered thus compelling the gas to impinge on the opposite flue surface in passing from one flue to another. This arrangement of cross vents and holes creates turbulence and heat exchange in the flue corners where the gas is inclined to be inactive and also permits an equalization of heat and pressure over the entire checker area.

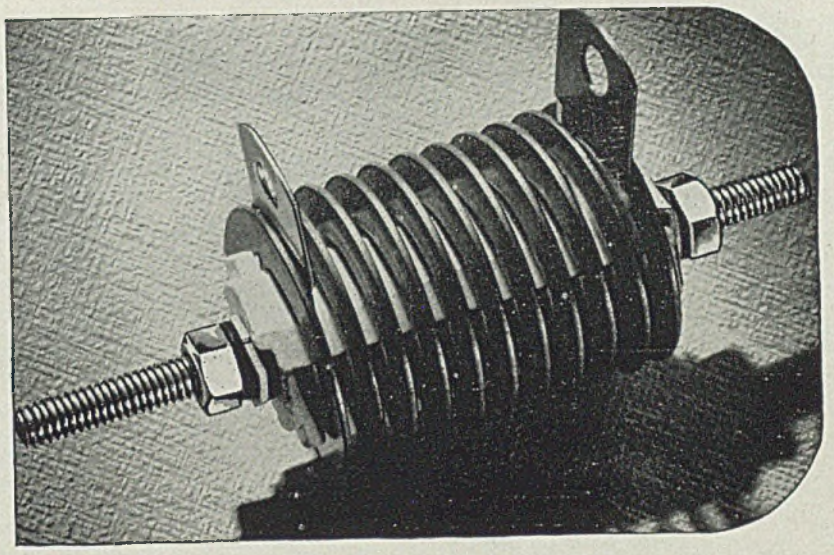
The shapes are stable with the center of gravity below the center of the brick and are laid up in standard basket-weave style with alternate courses interlocked. They were designed by J. J. Seaver, vice president, Day & Zimmerman, Inc., Philadelphia.

Model of Seaver-type checkers showing arrangement for laying up Seaver cross-vent checkers for regenerative stoves and furnaces

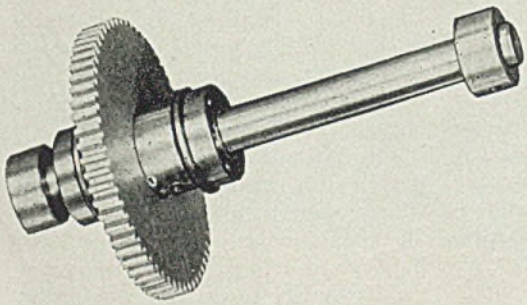




This Stainless Strip is easy to bend — and is ideal for products like resistor units, where temperature changes must not affect the metal's electrical characteristics.



How you can take advantage of Carpenter's experience with Stainless Steel . . .

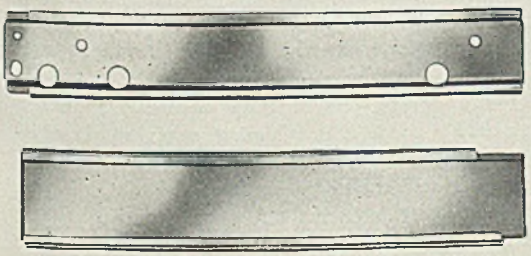


Constant uniformity *from lot to lot — plus unusually close Stainless bar tolerances — helped one manufacturer turn this specialty war product into a mass production item.*

From your engineering department to final inspection floor, Carpenter can help you lick tough problems involving Stainless Steel.

In the shop, your nearby Carpenter representative can often offer suggestions to help you speed output, reduce rejects and cut scrap loss. He can provide useful information on fabricating operations and the properties provided by various types of Stainless.

And for cooperation in working out your product-design problems, get in touch with Carpenter's Metallurgical Department. Add our many years of experience with Stainless problems to your design-engineering knowledge—and together we can work out the solution.



Severe bending, *forming and punching can be done faster when uniformly annealed Carpenter Stainless Strip is used for parts like this radio slide channel.*

Here are Fabricating Helps and Design-Engineering Data

Ask for your copy of this cross-indexed working data book. It is free to Stainless users in the U. S. A. and can really help you find *quick* answers to your questions about Stainless Steels for:

- √ *Special Corrosion Resistance*
- √ *Highest Tensile Strength*
- √ *Heat Resistance Properties*
- √ *Uniform Electrical Resistance*

This book also contains a helpful 24-page Fabricating Section, Glossary of Terms, Tables, etc. For your copy of "Working Data for Carpenter Stainless Steels", drop us a note on your company letterhead.

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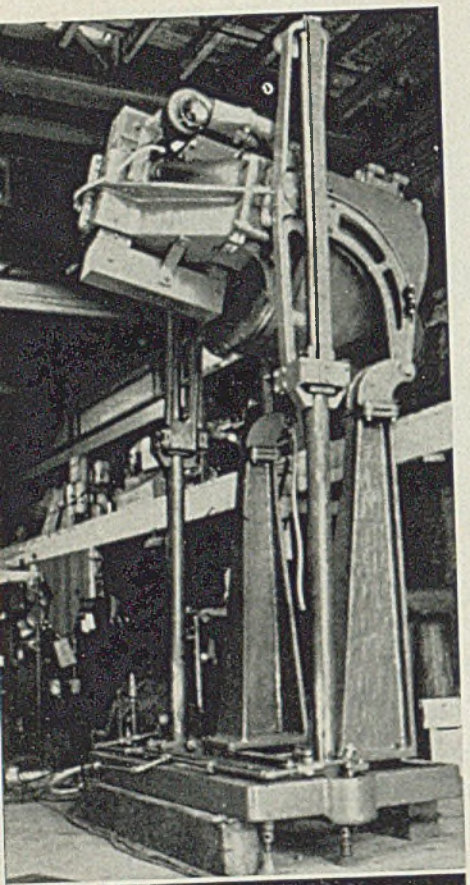
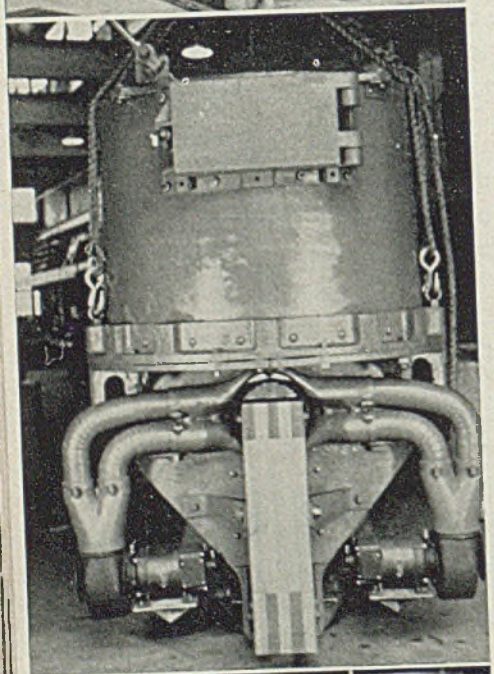
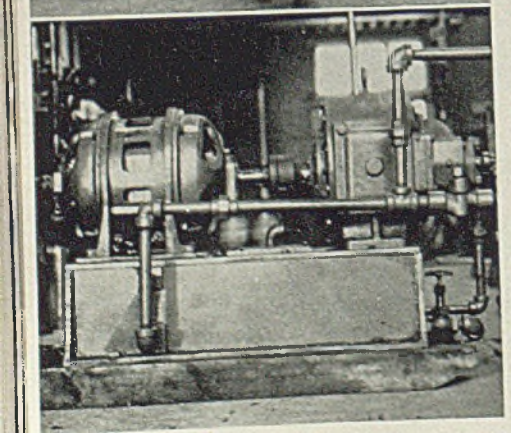






Making Custom Built Furnaces . . . on a PRODUCTION LINE

By HOWARD LINN EDSALL
Ajax Electric Furnace Corp.
Philadelphia

SPECTACULAR production of war machines on a large scale has interesting parallels in the manufacture of heavy equipment, an unusual case being the Ajax Electric Furnace Corp. Ajax is producing 175-kilowatt Ajax-Wyatt low-frequency induction melting furnaces, units widely used in the copper and brass industry.

These furnaces are simple in operation and appearance but contain some 4000 parts. Until the abrupt demand for 4 million pounds of additional capacity came at the outset of the war, they were made one by one. These were mostly in the 75-80 kilowatt range with a capacity of 1200 pounds per hour. Only eight of the large spout tilting type now required had been made in the past decade.

The production of furnaces was comparatively simple for Ajax before the war when the brass mills were increasing capacity progressively and when interchangeability of parts was less important. Each brass mill usually required an individualized furnace to fit its own peculiar requirements and layout and these were literally hand-made by veteran Ajax furnace erectors.

The situation became acute some time before Pearl Harbor when demand for wrought brass and cupro-nickel jumped from around 9,000,000 pounds a day to 23,000,000 and upward. Ajax was faced with the problem of developing a production method that could deliver completed induction furnaces as fast as newer and larger rolling mill equipment. If it could not be done, then the alternative might have been to melt by crucible practice as used long ago. But aside from high metal losses under such practice (20,000 pounds of zinc used to go up the stacks at one plant), there remained the grim and inescapable shortage of Madagascar graphite to meet tremendous crucible needs estimated at scarcely less than 30,000 pounds a day.

These factors together with the larger floor space and elaborate equipment needed and inability to control mixtures to present requirements would tend to make delivery of cartridge brass difficult, if not impossible, under any other practice.

Ajax had two alternatives in attacking the problem of greatly increasing furnace production, first to multiply by 30 the force of induction furnace specialists. But, this was impracticable because of the handwork, supervision and precise know-how required in electric furnace building.

The second involved development of practicable jigs, fixtures and machines for fabricating furnace halves, middle castings, tilting mechanism bearings, arms, brackets, hydraulic cylinders, steel rings, shell tops, covers, transformer and coil parts, switchboards and busses by mass production methods.

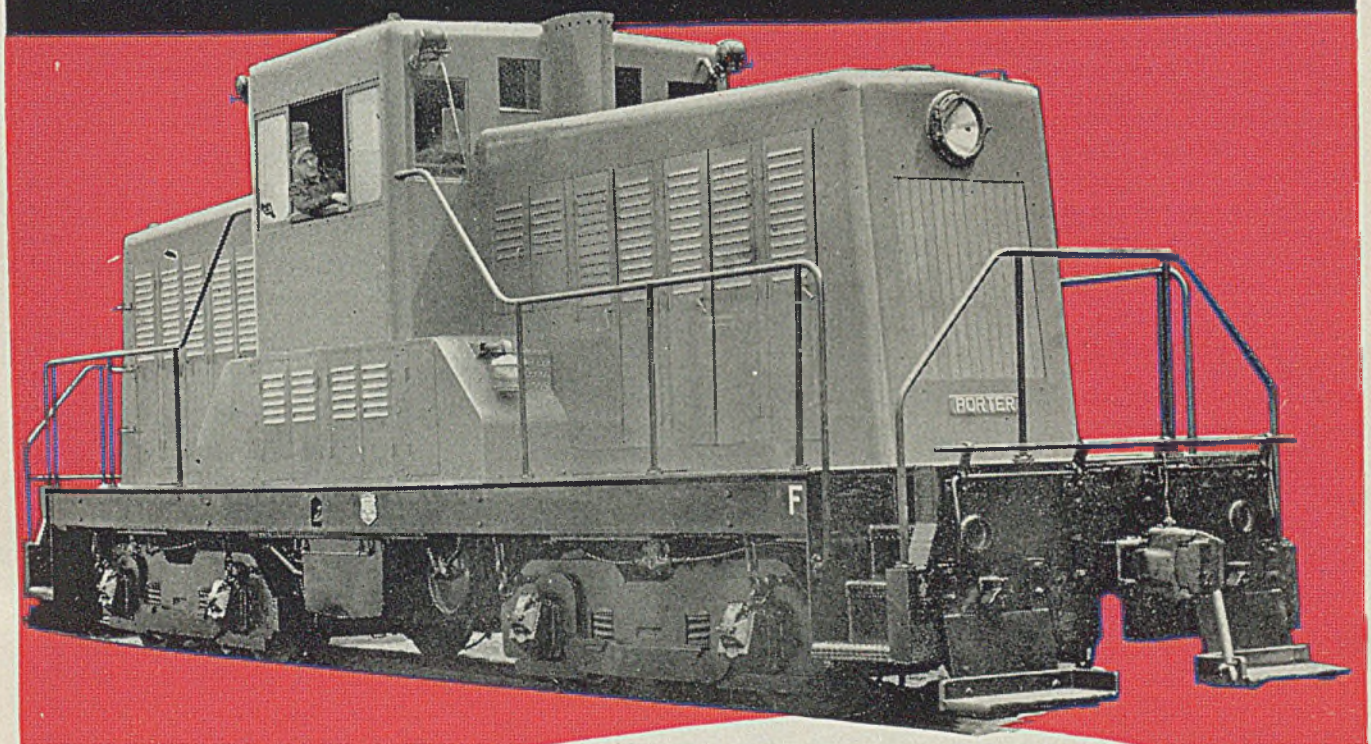
In one of those momentous drafting room and planning sessions where industry always has its birth pangs, a group of key engineers headed by J. R. Wyatt, inventor of the furnace, decided to follow the second course. Soon blueprints were piling up, building walls were broken through and apprentices were being trained for the work ahead. In setting up the new production facilities, considerable resourcefulness and ingenuity were required to keep pace with manpower losses and to improvise equipment which could not be obtained quickly from manu-

Fig. 1. (Left, above)—Complete furnace set up on floor in Ajax plant shows construction details. Note length of extended ram movement

Fig. 2. (Center)—Shown here are the furnace shell, bottom ring and the two lower castings which house and support the transformer and cooling ducts

Fig. 3. (Below)—Reservoir for the hydraulic system is welded from ½-inch plates. Pressure is supplied by a direct-drive pump

PORTER 80 TON DIESEL ELECTRIC SWITCHER



TWO COMPLETE POWER PLANTS

Designed to provide instantly-available motive power for a wide range of switching jobs, the 80-ton Porter Diesel-Electric sets a new high standard of availability and low-cost operation. Modern in every respect, the new PORTER has many features of advanced engineering design, placing it far ahead of its field. The locomotive illustrated is powered by two independent 250 h. p. Diesel-Electric units. Thermostatically-controlled oil cooling system insures proper lubrication at low cost. Safety platform with steps at all corners speeds up switching operations. This mighty 80-ton Porter is an ideal unit for all heavy switching purposes. Complete description sent on request.

ARMY E NAVY

PORTER "Better Built" Locomotives
Established 1866

ONLY PORTER BUILDS A COMPLETE LINE OF LOCOMOTIVES FOR INDUSTRY

H. K. PORTER COMPANY, INC.
PITTSBURGH PENNSYLVANIA

facturers. At the same time, it was necessary to carry on the work of producing furnaces by hand, in the former way. Even so, only 68 days were required to make the change-over to semi-mass production.

The construction of Ajax furnaces is complicated by the oddly-shaped components, especially the tilting mechanism and the complicated bottom and middle furnace castings which house the transformers and cooling system. Fig. 1 shows a complete furnace set up on the floor in the Ajax plant and tilted to emptying position. The long ram is braced at full extension beyond the hydraulic cylinder by means of a structural member called a "tilting" link to which the furnace is coupled through roller bearings. Complete furnace units, of course, include transformers, oil reservoir and pumps, controls and switchboard panels. In setting up the new production facilities, it was necessary to standardize parts as much as possible although meeting the specific requirements of individual brass mills.

Melting Chamber Shell ½-Inch Plate

The furnace melting chamber is housed in a shell of ½-inch tank plate. This shell is rolled into proper shape, welded and subsequently riveted to a cast-steel bottom ring. A refractory material is rammed between the shell and the melting chamber in the course of the assembly operation.

From a production standpoint, the cast-steel bottom ring is largely a foundry problem since it is 1-inch thick with a diameter of 49 inches, further complicated by an additional flange and angle section along its periphery to which the middle and bottom castings are bolted. It is bored and faced on a 5-foot Cincinnati vertical boring mill. The shell is mounted within it and riveted fast after tack welding in position.

To the lower half of this bottom ring is bolted the 900-pound semi-steel middle casting. This consists of two semi-circular plates ending in a box-like opening with sidewalls which support the wind boxes as may be noted in Fig. 2. This casting is poured in two halves and when assembled forms a shape 53-inches in diameter by 12⅝ inches deep. The halves are fitted and planed as a unit, being faced on a New Haven planer, jig-drilled and slotted on a shaper for alignment with the tilting mechanism trunnion rollers. Other manufacturers with similar problems will find this method facilitates both machining and assembly operations.

Duct and wind-box openings are hand finished. In fact, all facing surfaces are machined and ground for the purpose of eliminating stresses which might crack refractory linings.

The bottom casting, similarly made in two halves, weighs 800 pounds, being divided to break the electrical fields. It houses and supports the large transformer and the edgewound primary coil. It also supports the blower system and the air ducts in conjunction with the middle casting as may be seen by again referring to Fig. 2.

Neither of these castings is of a form suited to jig drilling. Hence hand work is used throughout, involving a series of separate layouts on faceplates for drilling and machining. This work is complicated as indicated by the fact there are 50 openings in each half of the bottom casting alone on six separate planes. All must be finished accurately to facilitate interchangeability, repairs or assembly with spare parts.

Openings are cut in the bottom casting segments on a drill press after facing on a boring mill. Smaller holes are drilled on radial drill presses. Brackets and pads for mounting the transformer are finished on a boring mill.

Fig. 4 shows a drill press which has been fitted out as a special purpose machine for edge-winding the transformer primary coils. Soft, annealed copper strip up to 1½ inches wide by ½-inch thick is shaped by a series of forming rollers into coils ranging in inside diameter from 7 to 11¼ inches. The coils then are pulled up tight on a mandrel after insulation is inserted.

Transformers are C-shaped with a butt leg. Silicon steel sheets measuring 36 by 108 inches, 28-gage, are cut singly on a Niagara shear and notched on a progressive pattern to form the center so that when assembled the center leg will be circular in form for the primary coil windings. Tie holes are punched on a Chicago Steel press brake and then trimmed and ground for smooth facing.

Accurate Shearing Essential

In order to make the large number of transformer sheets required, it was necessary to obtain a clean shear within tolerances of 0.003-inch in 6 feet to permit punching rather than blanking with accurate holes and centers. Otherwise, unless shaved as bolted, sheets might vary as much as 0.005-inch in dimensions at the butt joints where perfect face contact is necessary for an efficient low-loss magnetic circuit in transformers involving up to 30,000 amperes in secondaries.

In building the cores, sheets are assembled on their cover plates, one by one, until the core mass is 8 inches thick. About 512 sheets are required to a side. These are fitted over insulated bolts and pulled down with a pressure plate. A test winding is slipped over the core, the butt-leg bolted fast to the "C" and electrical tests made with no-load full voltage for leaks, shorts and open circuits.

The ram and cylinder of the tilting mechanism, to which reference already has been made, carry 98 per cent of

(*Please turn to Page* 126)

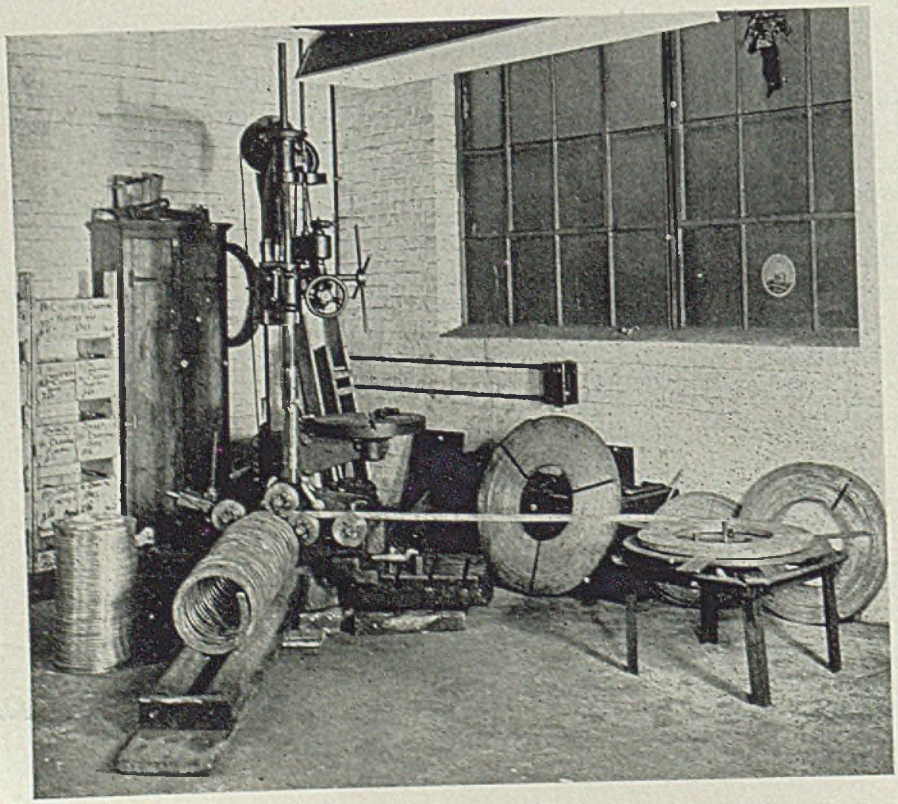


Fig. 4—Ajax engineers designed this special machine for winding transformer coils on edge from copper strip

PRODUCTION INSPECTION BY OPTICAL PROJECTION

Some of the many and varied parts inspected by Jones & Lamson Optical Comparators.

Comparison Inspection of production parts and products with **Jones & Lamson Optical Comparators** sets new standards for speed and accuracy in production inspection.

The most complex forms can be inspected with a rapidity and precision unobtainable by other methods, by operators with a minimum of training or experience.

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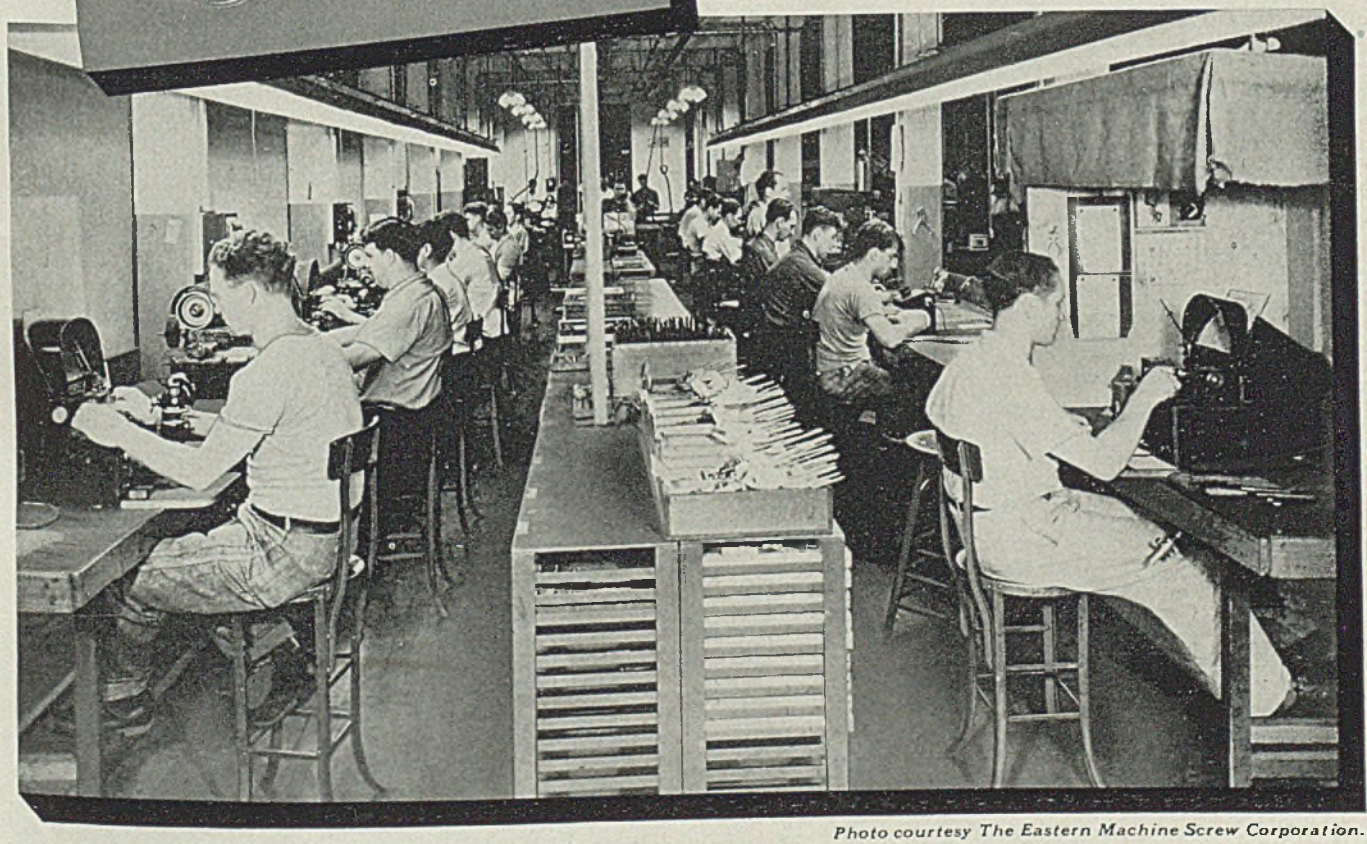

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Profit-producing Machine Tools

Latest List of

AMS (Aeronautical Material Specifications) STEELS

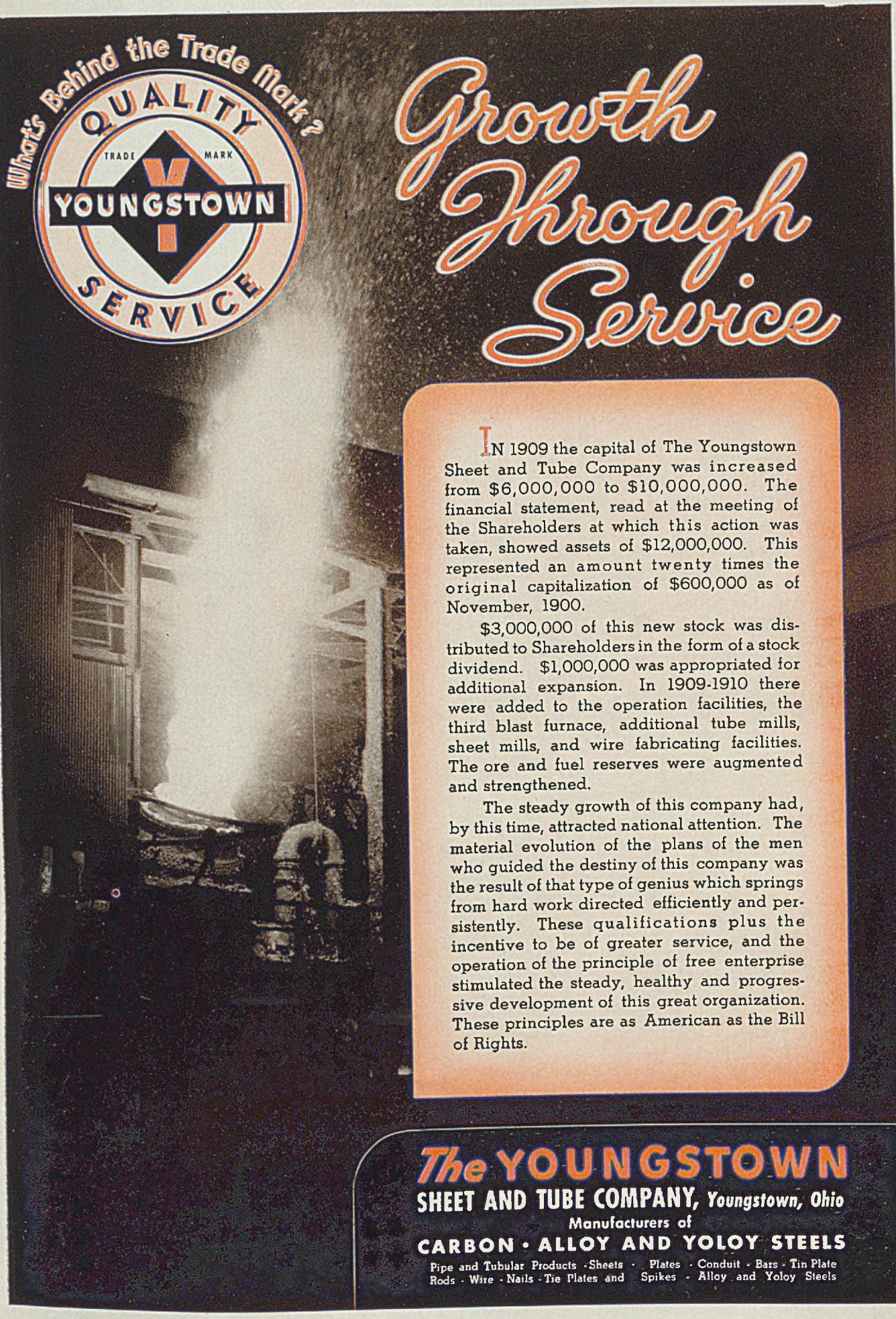
and Nonferrous Alloys

ACCOMPANYING chart lists the latest specifications for AMS (Aeronautical Material Specification) steels as standardized by the Society of Automotive Engineers Inc. and other associated engineering societies, representatives of federal agencies and aircraft manufacturers. Latest revision was in April of this year.

In addition to steels, specifications are listed for aluminum, magnesium and copper alloys; other AMS specifications not listed cover such processes as plating zinc and cadmium, spraying aluminum, various protective and finishing treatments, pressure testing, magnetic inspection, methods of identifying machined parts as well as castings and forgings. Another set of specifications covers nonmetallics such as corrosion preventatives; enamel, solvent, sealer and thinner compounds; synthetic rubbers; gaskets; electric cable and the like. Address the society at 29 West 39th street, New York, for details.

AMS No.		TITLE OF SPECIFICATION	SAE No.	SIMILAR A-N AERO. OR FEDERAL SPEC.
		CARBON STEELS		
AMS 5010A	Bars	—Screw Stock	1112	
AMS 5022A	Bars and Forgings	—1.3 Manganese, Free Cutting	1117	
AMS 5024A	Bars and Forgings	—1.5 Manganese, Free Cutting	1137	
AMS 5025	Bars and Forgings	—1.5 Manganese, Free Cutting—Heat Treated	1137	
AMS 5033	Wire	—Low Carbon, Zinc Coated		
AMS 5036	Sheet and Strip°	—Low Carbon, Aluminum Coated		
AMS 5040B	Sheet and Strip	—Deep Drawing—Annealed—Cold Rolled	1010	
AMS 5042B	Sheet and Strip	—Low Carbon—Cold Rolled	1010	
AMS 5044	Sheet and Strip	—Low Carbon—Half Hard	1010	
AMS 5050	Tubing	—Seamless—Annealed—.15 Max Carbon	1010	
AMS 5053	Tubing	—Welded—Annealed—.15 Max Carbon	1015	
AMS 5060A	Bars and Forgings	—.13-.18 Carbon	1022	AN-QQ-S-646
AMS 5070	Bars and Forgings	—.18-.23 Carbon—55,000 TS	1025	AN-WW-T-846
AMS 5075	Tubing	—Seamless—55,000 TS—.22-.28 Carbon	1025	AN-T-4
AMS 5077	Tubing	—Welded—55,000 TS—.22-.28 Carbon	1035	AN-S-4
AMS 5080	Bars and Forgings	—.32-.38 Carbon	1080	
AMS 5110	Music Wire	—Commercial	1090	AN-QQ-W-441
AMS 5112A	Music Wire	—Best Quality	1070	QQ-W-474
AMS 5115	Wire—Spring	—.65-.75 Carbon—Heat Treated	1070	
AMS 5120	Sheet and Strip—Spring	—.65-.75 Carbon—Annealed	1095	AN-QQ-S-666
AMS 5121	Sheet and Strip—Spring	—.90-1.05 Carbon—Annealed	1095	
AMS 5122	Sheet and Strip	—.90-1.05 Carbon—Hard	1095	
		CORROSION RESISTANT STEELS		
AMS 5132	Bars and Rods	—.90-1.25 Carbon		AN-S-5
AMS 5510B	Sheet	—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-QQ-S-757
AMS 5513A	Sheet	—Pickled 18 Chromium, 8 Nickel	Deep Forming	AN-QQ-S-772 Class II Comp. G Cond. A
AMS 5516A	Sheet	—Cold Rolled 18 Chromium, 8 Nickel	Annealed	AN-QQ-S-772 Class II Comp. G Cond. A
AMS 5517A	Sheet	—Cold Rolled 18 Chromium, 8 Nickel	125,000 TS	AN-QQ-S-772 Class II Comp. G Cond. B
AMS 5518A	Sheet	—Cold Rolled 18 Chromium, 8 Nickel	150,000 TS	AN-QQ-S-772 Class II Comp. G Cond. C
AMS 5519B	Sheet	—Cold Rolled 18 Chromium, 8 Nickel	185,000 TS	AN-QQ-S-772 Class II Comp. G Cond. E
AMS 5540A	Sheet	—Nickel, Chromium, Iron	Heat Resistant	AN-QQ-N-271 Cond. A
AMS 5570C	Tubing	—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-WW-T-858
AMS 5575B	Tubing, Welded	—Pickled 18 Chromium, 8 Nickel	Heat Resistant	AN-WW-T-861
AMS 5580A	Tubing	—Nickel, Chromium, Iron	Heat Resistant	AN-WW-T-831 Cond. A
AMS 5610A	Bars and Forgings	—13 Chromium	Free Machining	
AMS 5615A	Bars and Forgings	—13 Chromium, 1 Nickel, Low Carbon		
AMS 5630A	Bars and Forgings	—17 Chromium, 1 Carbon		
AMS 5632	Bars and Forgings	—17 Chromium, 1 Carbon	Free Machining	
AMS 5640A	Bars and Forgings	—18 Chromium, 8 Nickel	Free Machining	AN-QQ-S-771 Comp. FM Cond. A
AMS 5641	Bars and Forgings	—18 Chromium, 8 Nickel	Swaging	
AMS 5645B	Bars and Forgings	—18 Chromium, 8 Nickel	Heat Resistant	
AMS 5665	Bars and Forgings	—Nickel, Chromium, Iron		AN-QQ-N-268 Cond. A
AMS 5680	Wire—Welding	—18 Chromium, 8 Nickel		
AMS 5682	Rods or Wire	—Coating Alloy, Nickel, Chromium		

(Please turn to Page 94)



Growth Through Service

IN 1909 the capital of The Youngstown Sheet and Tube Company was increased from $6,000,000 to $10,000,000. The financial statement, read at the meeting of the Shareholders at which this action was taken, showed assets of $12,000,000. This represented an amount twenty times the original capitalization of $600,000 as of November, 1900.

$3,000,000 of this new stock was distributed to Shareholders in the form of a stock dividend. $1,000,000 was appropriated for additional expansion. In 1909-1910 there were added to the operation facilities, the third blast furnace, additional tube mills, sheet mills, and wire fabricating facilities. The ore and fuel reserves were augmented and strengthened.

The steady growth of this company had, by this time, attracted national attention. The material evolution of the plans of the men who guided the destiny of this company was the result of that type of genius which springs from hard work directed efficiently and persistently. These qualifications plus the incentive to be of greater service, and the operation of the principle of free enterprise stimulated the steady, healthy and progressive development of this great organization. These principles are as American as the Bill of Rights.

The YOUNGSTOWN SHEET AND TUBE COMPANY, Youngstown, Ohio

Manufacturers of

CARBON • ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit - Bars - Tin Plate
Rods - Wire - Nails - Tie Plates and Spikes - Alloy and Yoloy Steels

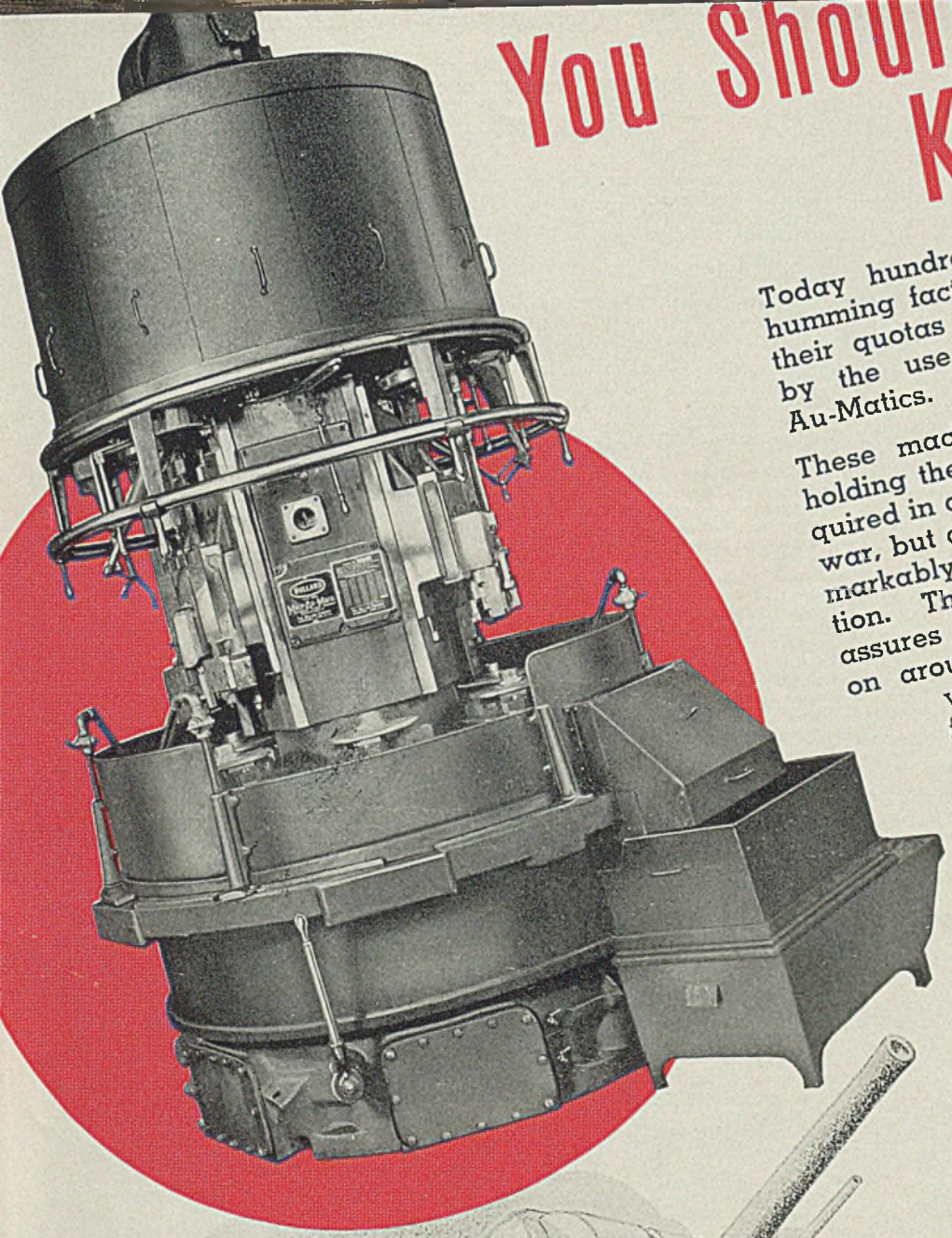
AMS No.		TITLE OF SPECIFICATION	SAE No.	SIMILAR A-N AERO. OR FEDERAL SPEC.†
				AN-N-4 Type 1 or 2
AMS 5683	Wire	—Nickel, Chromium, Iron		
AMS 5685A	Wire—Annealed	—18 Chromium, 8 Nickel		AN-QQ-W-423, Cond. A
AMS 5688A	Wire—Spring	—18 Chromium, 8 Nickel		
AMS 5690A	Wire—Screen	—Chromium, Nickel, Tungsten		
AMS 5700	Steel—Valve	—Chromium, Nickel, Silicon		
AMS 5705	Steel—Valve	—Chromium, Silicon, Nickel		
AMS 5710	Steel—Valve			

LOW ALLOY STEELS

AMS 6240B	Bars and Forgings	—5 Nickel	.09-.14 Carbon	2512	
AMS 6242B	Bars and Forgings	—5 Nickel	.15-.20 Carbon	2517	
AMS 6250C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.08-.13 Carbon	3310	
AMS 6252C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.08-.12 Carbon	3310	
AMS 6253C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.11-.16 Carbon	3316	
AMS 6254C	Bars and Forgings	—3.5 Ni, 1.5 Cr	.14-.19 Carbon	3316	
AMS 6260	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.08-.13 Carbon		
AMS 6262	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.08-.13 Carbon		
AMS 6263	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.11-.16 Carbon		
AMS 6264	Bars and Forgings	—2 Ni, .9 Cr, .35 Mo	.15-.20 Carbon		
AMS 6270A	Bars and Forgings°	—.55 Ni, .5 Cr, .2 Mo	.12-.17 Carbon		
AMS 6272A	Bars and Forgings°	—.55 Ni, .5 Cr, .2 Mo	.15-.20 Carbon		AN-S-13
AMS 6274A	Bars and Forgings°	—.55 Ni, .5 Cr, .2 Mo	.18-.23 Carbon		AN-S-14
AMS 6280	Bars and Forgings	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		
AMS 6290B	Bars and Forgings	—1.8 Ni, .25 Mo	.11-.17 Carbon	4615	
AMS 6292B	Bars and Forgings	—1.8 Ni, .25 Mo	.15-.20 Carbon	4617	
AMS 6294B	Bars and Forgings	—1.8 Ni, .25 Mo	.17-.22 Carbon	4620	
AMS 6300	Bars and Forgings°	—.25 Mo	.35-.40 Carbon	4037	AN-S-9
AMS 6310A	Bars and Forgings	—1.8 Ni, .25 Mo	.33-.38 Carbon	4635	
AMS 6312A	Bars and Forgings	—1.8 Ni, .25 Mo	.38-.43 Carbon	4640	
AMS 6315A	Bars and Forgings	—1.8 Ni, .25 Mo	105,000 TS	4640	
AMS 6317A	Bars and Forgings	—1.8 Ni, .25 Mo	125,000 TS	4640	
AMS 6320A	Bars and Forgings°	—.55 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-S-15
AMS 6322A	Bars and Forgings°	—.55 Ni, .5 Cr, .25 Mo	.38-.43 Carbon		AN-S-16
AMS 6325A	Bars and Forgings°	—.55 Ni, .5 Cr, .25 Mo (105,000 TS)	.38-.43 Carbon		AN-S-16
AMS 6327A	Bars and Forgings°	—.55 Ni, .5 Cr, .25 Mo (125,000 TS)	.38-.43 Carbon		AN-S-16
AMS 6330A	Bars and Forgings	—1.25 Ni, .6 Cr	.33-.38 Carbon	3135	AN-QQ-S-690
AMS 6332	Bars and Forgings	—1.25 Ni, .6 Cr	.40-.45 Carbon	3140	AN-QQ-S-690
AMS 6335	Bars and Forgings	—1.25 Ni, .6 Cr	105,000 TS	3140	AN-QQ-S-690
AMS 6337	Bars and Forgings	—1.25 Ni, .6 Cr	125,000 TS	3140	AN-QQ-S-690
AMS 6350	Sheet—Annealed	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-QQ-S-685
AMS 6352A	Sheet—Annealed	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-QQ-S-686
AMS 6353	Sheet—Annealed°	—1 Cr, .2 Mo	.35-.42 Carbon	4137	
AMS 6355	Sheet—Annealed	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-S-12
AMS 6357	Sheet—Annealed	—.5 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-S-22
AMS 6359	Plate, Sheet and Strip	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	
AMS 6360A	Tubing, Seamless—Normalized	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Type I Cond. N
AMS 6361	Tubing, Seamless—125,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Cond. HT-125
AMS 6362	Tubing, Seamless—150,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Cond. HT-150
AMS 6363	Tubing, Seamless—180,000 TS	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-WW-T-850 Type I Cond. HT-180
AMS 6365	Tubing, Seamless—Normalized	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. N
AMS 6366	Tubing, Seamless—125,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-125
AMS 6367	Tubing, Seamless—150,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-150
AMS 6368	Tubing, Seamless—180,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-180
AMS 6369	Tubing, Seamless—200,000 TS	—1 Cr, .2 Mo	.32-.39 Carbon	4135	AN-WW-T-852 Type I Cond. HT-200
AMS 6370A	Bars and Forgings	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-QQ-S-684
AMS 6371	Tubing, Seamless—For Machined Parts	—1 Cr, .2 Mo	.27-.33 Carbon	4130	
AMS 6380A	Bars and Forgings	—1 Cr, .2 Mo	.35-.42 Carbon	4137	AN-QQ-S-752
AMS 6381	Tubing, Seamless—For Machined Parts	—1 Cr, .20 Mo	.35-.42 Carbon	4140	
AMS 6382A	Bars and Forgings	—1 Cr, .2 Mo	.38-.43 Carbon	4140	AN-QQ-S-752
AMS 6412A	Bars and Forgings	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	AN-QQ-S-756
AMS 6413	Tubing, Seamless—For Machined Parts	—1.8 Ni, .75 Cr, .25 Mo	.35-.40 Carbon	4337	
AMS 6415A	Bars and Forgings	—1.8 Ni, .75 Cr, .25 Mo	.35-.43 Carbon	4340	AN-QQ-S-756
AMS 6440	Bars and Forgings	—1.35 Chromium	.95-1.10 Carbon	52100	
AMS 6448	Bars and Forgings	—Chromium, Vanadium	.48-.55 Carbon	6150	AN-QQ-S-687
AMS 6450	Wire, Spring—Annealed	—Chromium, Vanadium	.47-.55 Carbon	6150	
AMS 6455A	Sheet, Spring—Annealed	—Chromium, Vanadium	.48-.55 Carbon	6150	
AMS 6470A	Bars and Forgings—Nitriding	—Cr, Mo, Al	.38-.45 Carbon		AN-S-19
AMS 6510	Tubing, Welded—Normalized	—1 Cr, .2 Mo	.27-.33 Carbon	4130	AN-T-3
AMS 6530	Tubing, Seamless—Normalized	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-T-15
AMS 6535	Tubing, Seamless—Normalized	—.5 Ni, .5 Cr, .25 Mo	.33-.38 Carbon		AN-T-22
AMS 6550	Tubing, Welded—Normalized°	—.5 Ni, .5 Cr, .2 Mo	.27-.33 Carbon		AN-T-33

(Please turn to Page 96

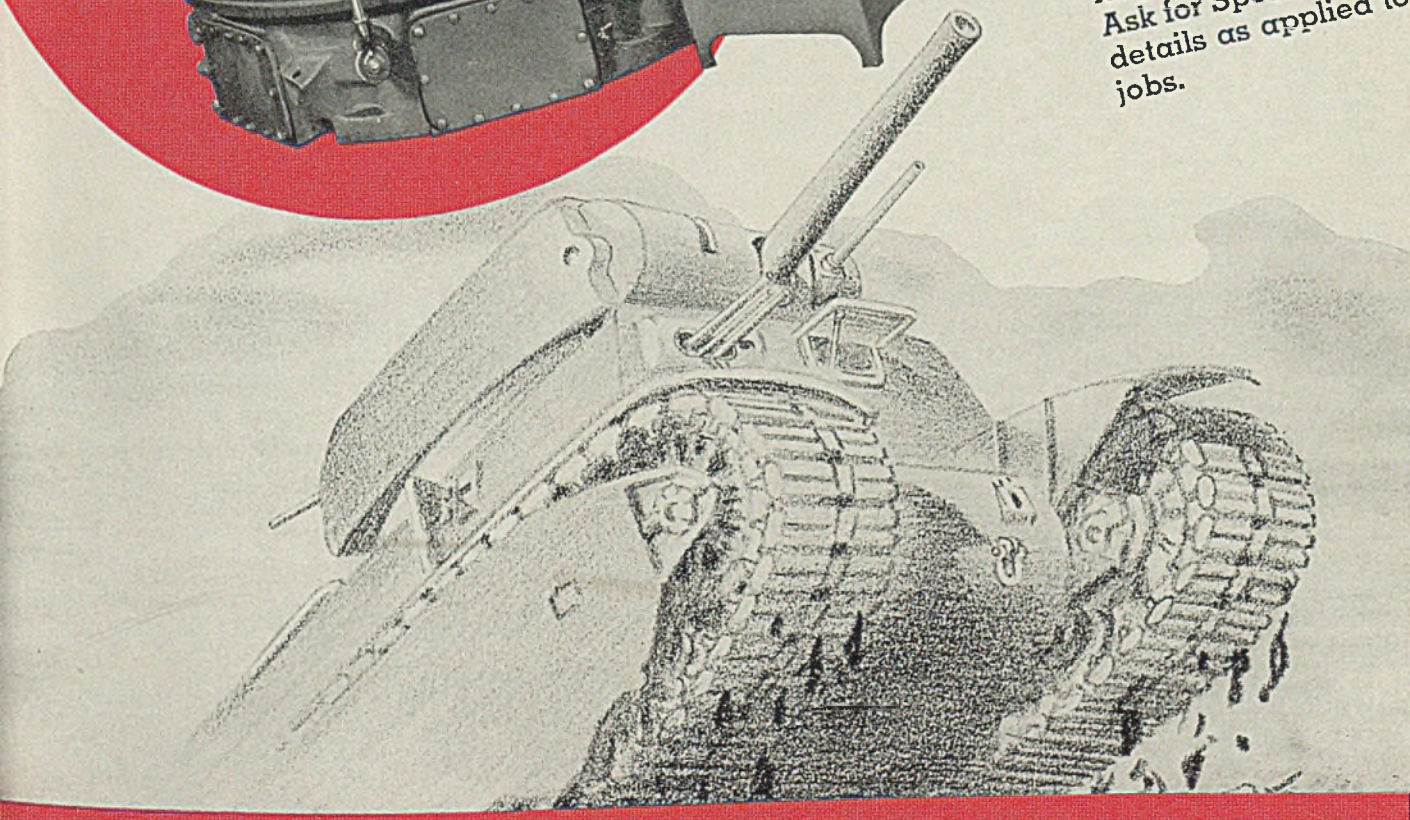
You Should Know—



Today hundreds of America's humming factories are beating their quotas of war weapons, by the use of Bullard Mult-Au-Matics.

These machines are not only holding the close tolerances required in all the tools of modern war, but are also setting the remarkably high rates of production. Their rigid construction assures maintained accuracy on around-the-clock running with minimum time out for maintenance.

These facts will apply to the new Type "D" 34-Inch 4-Spindle Mult-Au-Matic with six operating heads which is now being offered for larger capacities of chucked work crankcases, end shields larger gear blanks, etc. Ask for Specifications and details as applied to your jobs.



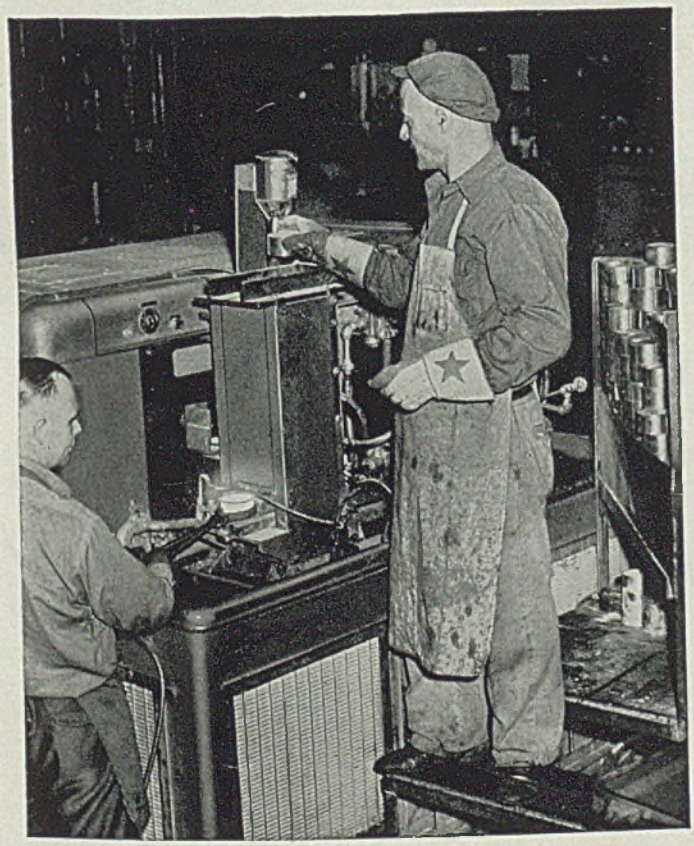
THE BULLARD COMPANY

BRIDGEPORT, CONNECTICUT

AMS No.		TITLE OF SPECIFICATION		SIMILAR A-N AERO. OR FEDERAL SPEC.
		CARBON STEELS		
		ALUMINUM ALLOYS		
AMS 4000	Sheet	—99.7% Aluminum	Annealed	
AMS 4003	Sheet	—99.0% Aluminum	2S-½ H	
AMS 4006	Sheet	—1.25% Manganese	3S-O	QQ-A-359
AMS 4008	Sheet	—1.25% Manganese	3S-½ H	QQ-A-359
AMS 4015A	Sheet	—Magnesium, Chromium	52S-O	
AMS 4016A	Sheet	—Magnesium, Chromium	52S-¼ H	
AMS 4017A	Sheet	—Magnesium, Chromium	52S-½ H	
AMS 4025	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-O	
AMS 4026	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-W	
AMS 4027	Sheet	—Magnesium, Silicon, Copper, Chromium	61S-T	
AMS 4035A	Sheet	—Copper, Magnesium, Manganese	24S-O	QQ-A-355
AMS 4037A	Sheet	—Copper, Magnesium, Manganese	24S-T	QQ-A-355
AMS 4040A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-O	QQ-A-362
AMS 4041A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-T	QQ-A-362
AMS 4042A	Sheet, Alclad	—Copper, Magnesium, Manganese	Alc 24S-RT	QQ-A-362
AMS 4062	Tubing	—99.0% Aluminum	2S-½ H	
AMS 4070A	Tubing	—Magnesium, Chromium	52S-O	WW-T-787
AMS 4076A	Tubing	—Magnesium, Chromium, Silicon	53S-W	
AMS 4080A	Tubing	—Magnesium, Silicon, Copper, Chromium	61S-O	
AMS 4082A	Tubing	—Magnesium, Silicon, Copper, Chromium	61S-T	
AMS 4088A	Tubing	—Copper, Magnesium, Manganese	24S-T	
AMS 4118B	Bars*	—Copper, Manganese, Magnesium	17S-T	
AMS 4120A	Bars	—Copper, Magnesium, Manganese	24S-T	
AMS 4125A	Forgings	—Silicon, Magnesium, Chromium	A51S-T	QQ-A-367
AMS 4130A	Forgings	—Copper, Silicon, Manganese	25S-T	QQ-A-367
AMS 4135A	Forgings	—Copper, Silicon, Manganese, Magnesium	14S-T	QQ-A-367
AMS 4140A	Forgings	—Copper, Nickel, Magnesium	18S-T	QQ-A-367
AMS 4145A	Forgings	—Copper, Silicon, Magnesium, Nickel	32S-T	QQ-A-367
AMS 4152A	Extrusion	—Copper, Magnesium, Manganese	24S-T	
AMS 4210B	Castings	—5% Silicon, Copper, Magnesium	Aged	
AMS 4212B	Castings	—5% Silicon, Copper, Magnesium	Solution Precipitation	AN-QQ-A-376
AMS 4214A	Castings	—5% Silicon, Copper, Magnesium	Solution and Overaged	
AMS 4217	Castings	—7% Silicon, Magnesium	Solution and Aged	AN-QQ-A-394
AMS 4220A	Castings	—Copper, Nickel, Magnesium		AN-QQ-A-379
AMS 4222	Castings	—Copper, Nickel, Magnesium	Solution and Aged	AN-QQ-A-379
AMS 4231	Castings	—4% Copper	Solution Precipitation	AN-QQ-A-390 Class II
AMS 4240A	Castings	—10% Magnesium	220-T4	AN-QQ-A-392
AMS 4280	Castings, Perm. Mold	—5% Silicon, Copper, Magnesium	Solution and Overaged	AN-QQ-A-376 Class B
AMS 4282	Castings, Perm. Mold	—4% Copper, 2% Silicon	Solution Precipitation	AN-QQ-A-383 Class B
AMS 4284	Castings, Perm. Mold	—7% Silicon	Solution and Aged	AN-QQ-A-394
AMS 4290A	Castings, Die	—12% Silicon	13	AN-QQ-A-366 Alloy 13
AMS 4292	Castings, Press. Mold	—11% Silicon	As Cast	
		MAGNESIUM ALLOYS		
AMS 4350A	Bars and Forgings	—6% Aluminum, 1% Zinc		
AMS 4360	Forgings	—8% Aluminum, .5% Zinc		
AMS 4370	Sheet	—1% Manganese	Annealed	
AMS 4380	Sheet	—6% Aluminum, 1% Zinc	Annealed	
AMS 4381	Sheet	—6% Aluminum, 1% Zinc	Hard	
AMS 4420B	Castings, Sand	—6% Aluminum, 3% Zinc	As Cast	AN-QQ-M-56, Comp. A
AMS 4422A	Castings, Sand	—6% Aluminum, 3% Zinc	Solution	AN-QQ-M-56, Comp. A
AMS 4424B	Castings, Sand	—6% Aluminum, 3% Zinc	Solution Precipitation	AN-QQ-M-56, Comp. A
AMS 4434A	Castings, Sand	—9% Aluminum, 2% Zinc	Solution Precipitation	AN-QQ-M-56, Comp. C
AMS 4490A	Castings, Die	—9% Aluminum, .7% Zinc	As Cast	
		COPPER ALLOYS		
AMS 4500	Sheet	—Copper	Annealed	QQ-C-501
AMS 4505A	Sheet	—Brass	Annealed	QQ-B-611
AMS 4510A	Strip	—Phosphor Bronze	Spring	QQ-B-746
AMS 4520A	Strip	—Bronze, 4% Tin, 4% Zinc, 4% Lead	Bushings	
AMS 4555	Tubing	—Brass	Light Annealed	
AMS 4610A	Rod or Bar	—Free Cutting Brass	½ Hard	QQ-B-611
AMS 4611	Rods and Bars	—Naval Brass	Half Hard	QQ-B-636
AMS 4612	Rods and Bars	—Naval Brass	Hard	AN-QQ-B-646
AMS 4614B	Forgings	—Brass		QQ-B-611
AMS 4615	Rods and Bars*	—Silicon Bronze	Hard	
AMS 4619	Forgings	—Manganese Bronze		QQ-B-721
AMS 4625B	Rods and Bars	—Phosphor Bronze	Hard	QQ-B-746
AMS 4630A	Bars and Forgings	—Aluminum Bronze, 9% Aluminum		QQ-B-666, Grade B
AMS 4632	Rods and Bars	—Aluminum Bronze, 9% Aluminum	Hard	QQ-B-666, Grade B
AMS 4635	Bars and Forgings	—Aluminum Bronze, 10% Aluminum	Hard	
AMS 4640	Bars and Forgings	—Aluminum Bronze, 10% Al, 5% Ni, 3% Fe	Heat Treated	
AMS 4650A	Bars and Forgings	—Beryllium Bronze, 2% Beryllium	Solution	
AMS 4665	Tubing	—Silicon Bronze	Annealed	
AMS 4710	Wire, Tie	—Brass	Tinned	
AMS 4720A	Wire	—Phosphor Bronze	Spring	
AMS 4750	Solder	—Tin Lead, 50-50		
AMS 4755	Solder	—Lead Silver, 95-5		
AMS 4770	Brazing Alloy	—Silver, 50% Silver, Copper, Zinc, Cadmium		
AMS 4800	Bearings	—Babbitt		AN-B-7
AMS 4805	Bearings	—Sintered—Bushings		

(please turn to page 99)

BETTER CARTRIDGE CASES...FASTER VIA THE "HOT-CUP"



ONE EVERY 20 SECONDS! Steel slugs are dropped into top of TOCCO inductor which holds 12 slugs. A bottom slug, heated to required temperature, is ejected every 20 seconds—180 per hour.

The 25-year battle to convert cartridge cases from brass to steel has been won, saving critical copper and providing cases that can be reloaded many times.

One successful method of mass production of steel cases is by the "hot-cup" process. For 75 m.m. cases, steel slugs are TOCCO-heated to required temperature, extruded to a depth of 4", then redrawn while still hot to 6" depth. Subsequent stages in forming are by cold-drawing.

Reasons for using TOCCO induction heating for these operations:

TOCCO raises steel slugs to forging temperature so rapidly that scale is practically eliminated, saving wear on dies. Output of each TOCCO machine is 180 white-hot slugs per hour.

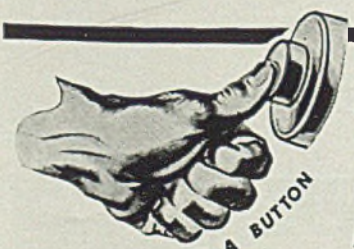
TOCCO heats the slugs uniformly for accurate forming and minimum scrap losses, helping overcome the major obstacle in use of steel for cartridge cases.

TOCCO heats the slugs at a rate to suit the forming operations. If a press delay occurs, no large furnace batches are lost.

TOCCO machine, clean, compact and devoid of radiant heat and hot gases, is located handily next to presses for faster production with good working conditions.

Why not look into the possibilities of TOCCO for improving *your* production for hot forming and forging.

THE OHIO CRANKSHAFT COMPANY
Cleveland, Ohio



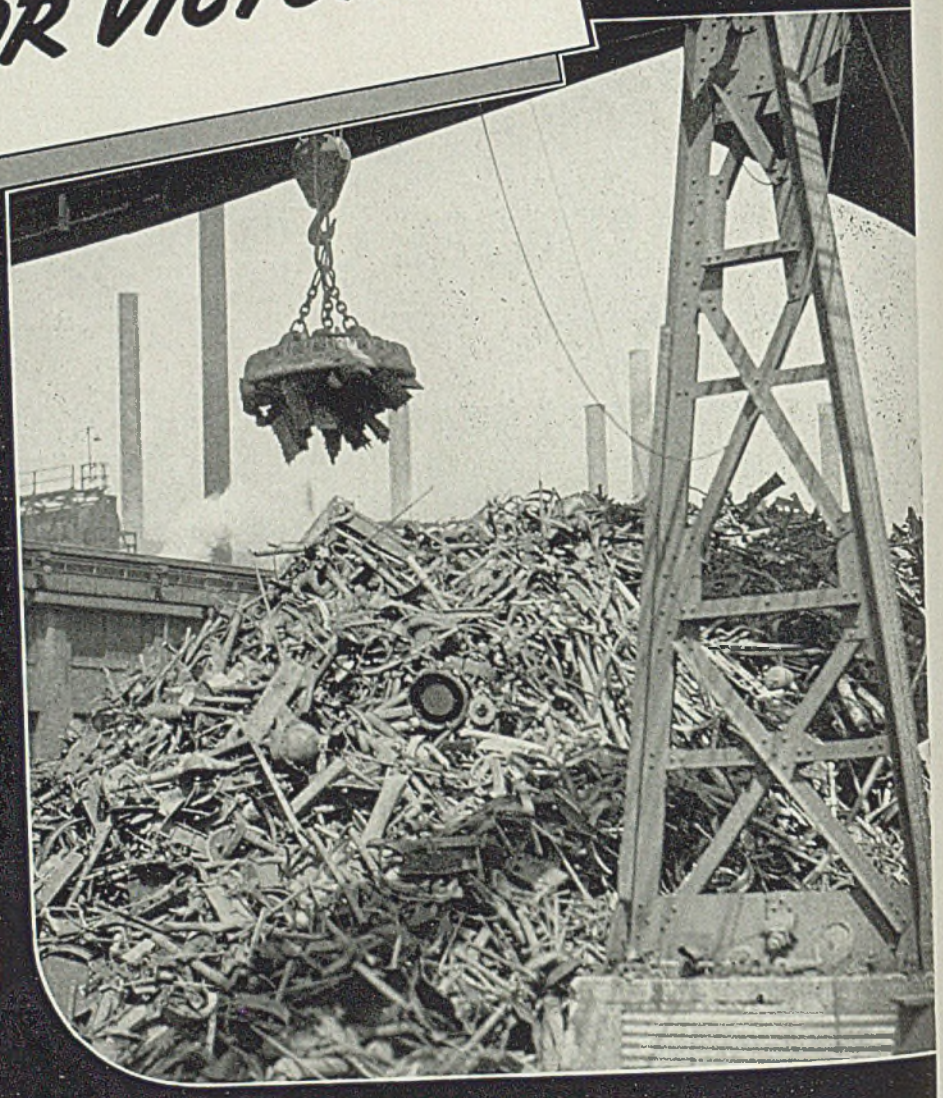
TOCCO

World's Fastest, Most Accurate Heat-Treating Process

HARDENING
ANNEALING
BRAZING
HEATING for
forming and forging

Rx FOR VICTORY

SCRAP SCRAP MORE SCRAP



Ninety million tons of steel in 1943. That's what the doctor ordered to hasten the Axis demise. But to produce 90 million tons the mills must have 45 million tons of scrap metal. Regular sources of supply account for only half that amount. The remaining tonnage must come from scrap metal now lying around factories, garages, homes, farms.

How quickly we terminate this war depends on our ability to outproduce our enemies. And, according to no less an authority than Donald M. Nelson, "Nothing is more important to war production than scrap." Any relaxation in salvaging scrap would sabotage our entire war effort. Do your part in filling the victory prescription.

THE ANDREWS STEEL CO.
NEWPORT, KENTUCKY

DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

AMS No.		TITLE OF SPECIFICATION	SIMILAR A-N AERO. OR FEDERAL SPEC.†
AMS 4815	Bearings	—Silver, Electrolytically Deposited ..... Steel Back	.....
AMS 4817	Bearings	—Silver, Cast ..... Steel Back	.....
AMS 4820	Bearings	—Copper, Lead, 73-27 ..... Steel Back	.....
AMS 4822	Bearings	—Copper, Lead, Tin, 71-25-3 ..... Steel Back	.....
AMS 4825	Bearings	—Copper, Lead, Tin, 74-16-10 ..... Steel Back	.....
AMS 4827	Bushings	—Copper, Lead, Tin, 80-10-10 ..... Steel Back	.....
AMS 4840	Castings	—Bronze, 70% Copper, 25% Lead, 5% Tin	.....
AMS 4842	Castings	—Bronze, 80% Copper, 10% Lead, 10% Tin	.....
AMS 4845A	Castings	—Bronze, 88% Copper, 10% Tin, 2% Zinc	.....
AMS 4860	Castings	—Manganese Bronze	QQ-B-726
AMS 4862	Castings	—Manganese Bronze—High Strength	.....
AMS 4871	Castings	—Aluminum Bronze—Heat Treated	AN-QQ-B-672

*Indicates New and Revised Specifications issued April 1, 1943. (Revisions are marked with an "A" or "B", etc. following the specification number.)

†Please note the concluding paragraph of each specification re SIMILAR SPECIFICATIONS. In cases where the use of a similar specification is proposed the user and the supplier shall determine, on the basis of the facts of the individual case, whether the proposed A-N, or other specification, is considered an acceptable alternate. The basic number of the similar specification is listed. However, the issue in effect at the date of invitation for bids or inquiry applies.

"Planned" Lubrication

(*Continued from Page* 83)

card, indicating that all the spindles of that type have been serviced.

As to the frequency of lubricating the slides, this operation was stepped up. This prevented the grit from accumulating by the washing out process of the lubricant. No more headaches on this score.

Many problems have since been solved by simply stepping up or decreasing the frequency of lubrication. The next step was to set up a definite schedule. This was determined after careful study of each category of lubrication.

Uniform Film Prevents "Floating"

By changing the oil in the No. 5 surface grinder spindle reservoirs at more frequent intervals, lubrication failures were eliminated. Likewise, with this success as a basis, all other spindles were changed more frequently. In damp weather, the frequency is increased to overcome any moisture drawn into and condensed in the machine due to the machine's cooling off when shut down.

In considering the frequency of lubrication, it was kept in mind that a uniform film of lubrication was to be maintained to aid in keeping tolerances and preventing "floating", especially on grinding machines doing super finish work. It was found that the lack of proper frequency of lubrication caused the slides to vary as much as 0.001-inch.

A visible filing system, Fig. 1, brings to the clerk's attention all jobs occurring at less than two-week intervals. These are listed daily on work orders and are given to the supervisors for further handling. When the work is completed, the checked work order is returned to the office and the next service date is recorded on the visible file.

"Say, Bill, did Joe grease this machine this morning? The operator said he missed his machine altogether."

"He's nuts; Joe never misses a machine."

And so the argument started. The question of whether or not a machine was lubricated was solved by the development of a daily record card, Fig. 2. This card is punched in the square provided every time one of the categories of lubrication is performed. When a date is required, as in the cast of a motor being greased, a reservoir changed, etc. a *lead* pencil is used by the first shift, a *blue* by the second and a *red* by the third. This card also bears the name and type of machine, machine number and the number of each lubrication man who may service the machine. The permanent and daily record cards give an accurate and full account of the machine and all lubrication performed on it.

In several instances, where it was a question of whether or not the proper lubricants were used, and whether or not the machine was oiled at the proper interval, the manufacturer, without question, accepted the veracity of the records and made full adjustments for any repairs required.

Apply Changes Universally

It is a known rule of the lubrication department that any falsification of records by anyone means instant dismissal. This service is also checked by the operator of the machine.

Whenever any improvement or adjustment is made on one machine, immediately the change is made on all similar types throughout the entire plant. Just recently, in one of the new machines that had been in operation for about a month, it was found that the wicks in the spindle were not sufficient in number to supply enough lubrication and would eventually cause the spindles to stick. All of the new machines of the same make and type were checked and when this condition was found to be prevalent, two wicks were inserted instead of the one formerly used. This improvement will undoubtedly pay big dividends in uninterrupted production.

Lubrication Time Study

A great step forward was made when a time study was taken of the various categories of lubrication performed in servicing the 450 or more different types of machines and equipment. These categories include such operations as adjusting and filling spindle cups, motor greasing, reservoir changes, general greasing, hand oiling, etc. In order to arrive at a fair average timing, at least 300 operations of a kind were timed. The walking time between machines, time consumed in replenishing stock of oil, punching the card and delayed action were all timed and taken into consideration.

Although this timing seemed endless, it was well worth the effort. The time study showed exactly how many lubrication servicemen were needed in order to allow sufficient time for the work to be done properly without neglecting any machine. It also showed that time was saved if the lubrication personnel specialized in one phase of lubrication. This meant that only one or two oils are used by any individual instead of six or seven, so that again the possibility of error is reduced. This also allows the personnel to develop a high degree of efficiency in their line.

The time study made it possible to set up standards and to pay a bonus accordingly. The daily record card serves as the basis for the bonus and is removed and checked every two weeks.

The daily record card and the time study also makes it possible to establish the cost of the lubrication of any one machine, group of machines, or total number of machines operated in plant.

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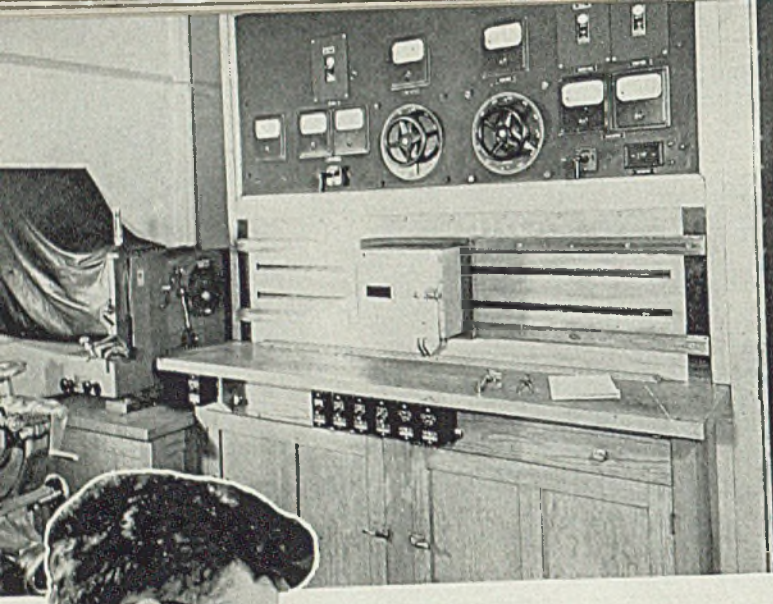

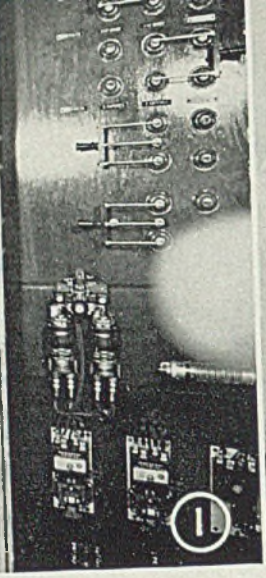

SPECTROGRAPHI

By P. R. IRISH
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Bethlehem Steel Co.
Bethlehem, Pa.

ONE OF the many factors governing the time required for completing a heat of steel is the speed with which tests and analyses can be made during the refining period.

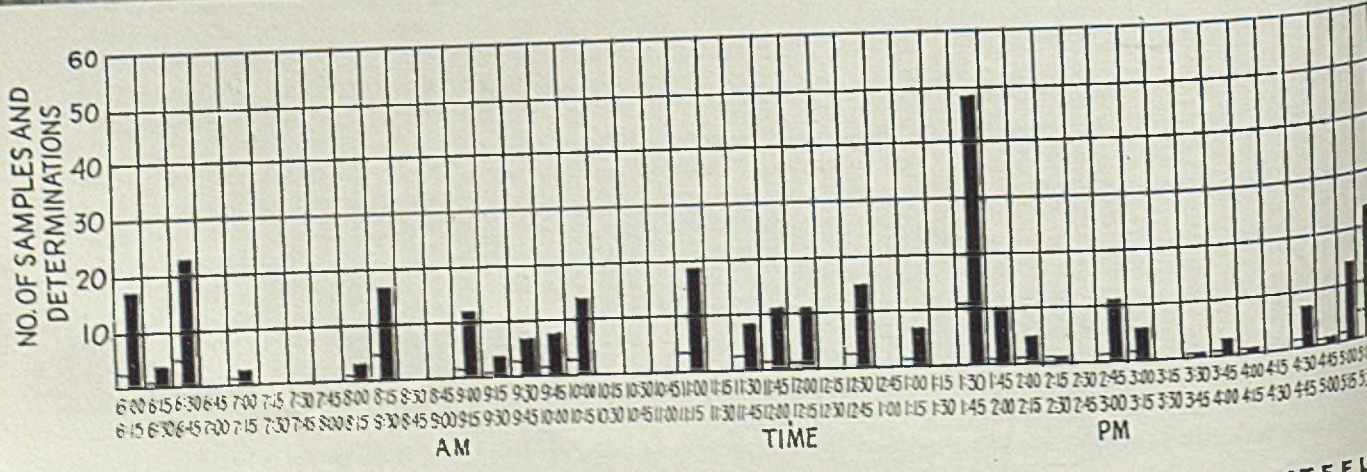
The quicker tests and analyses can be completed, the shorter the heat time, and the greater the output per furnace.

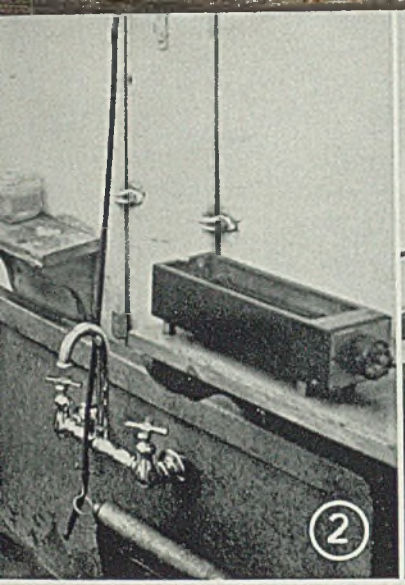
To speed up the analytical control in the production of alloy steels, thereby increasing the output of vital war materials, Bethlehem Steel Co. recently installed a spectrographic laboratory at its

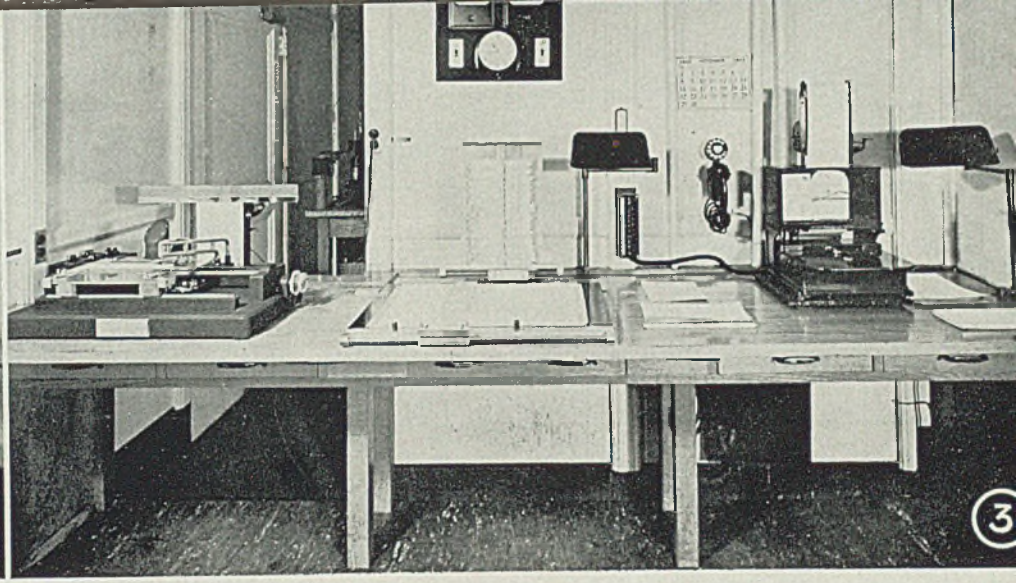
Fig. 1—Excitation source equipment

Fig. 2—One corner of the dark room

Fig. 4—Grinder used in preparing test specimens







NALYSIS OF ALLOY STEEL

plant at Bethlehem, Pa. The unit, which has been in operation for more than a year, is meeting all expectations both in regard to accuracy and speed.

The laboratory furnishes the control and final heat analyses for 15 melting units, all producing alloy steels. Except for carbon, sulphur, phosphorus, and certain ranges of other elements discussed in the final paragraphs of this article all constituents are analyzed spectrographically.

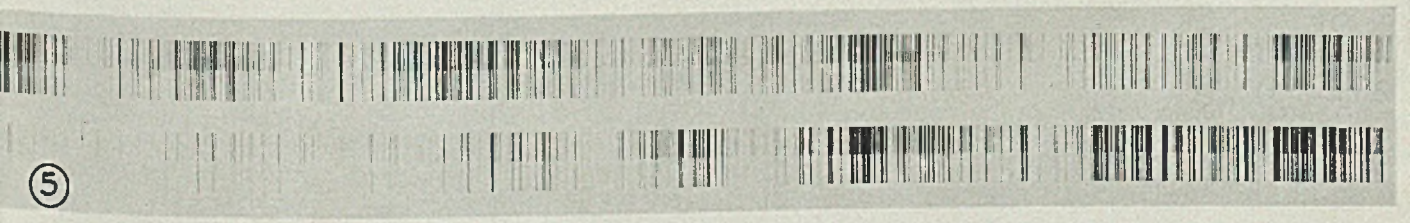
The spectrographic laboratory at Bethlehem, to the best of our knowledge, represents the most extensive application of spectrographic analysis to a direct production control problem, and it is the first installation applying such control to alloy steels. Over 5000 determinations are made each week. A force of five men is employed on each shift to make sure that all determinations are carried out with the greatest possible speed. The analyses are made on steels having narrow specification limits with a large percentage of the concentrations falling in the higher alloy ranges, from 1.00 to 5.00 per cent.

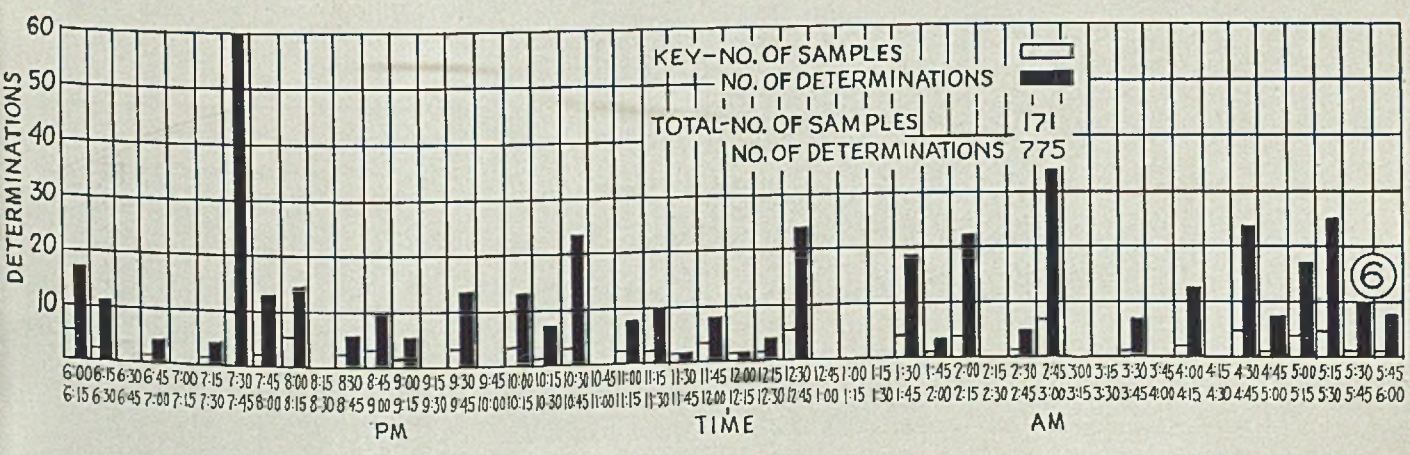
The floor plan of the spectrographic laboratory is shown in Fig. 7. Fig. 1 gives a general view of the excitation source equipment, which consists of a high-voltage interrupted-spark circuit and a high-voltage alternating current arc circuit. The interrupted-spark circuit has a top voltage rating of about 42,000 volts and a maximum condenser capacity of 0.02-microfarad adjustable in steps of 0.002-microfarad. The alternating current circuit is capable of delivering a peak current of 2.5 amperes at 4800 volts,

Fig. 3—Spectrum reading room. Microphotometer at left; telautograph at right

Fig. 5—Typical examples of arc and spark spectrum

Fig. 6—Charts showing number of samples and determinations in an average day's operation





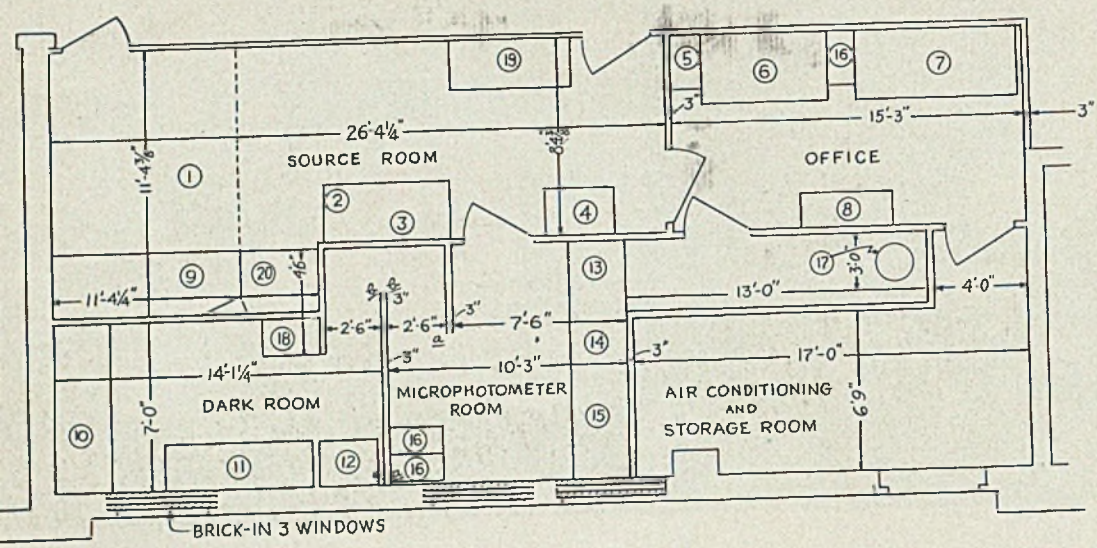
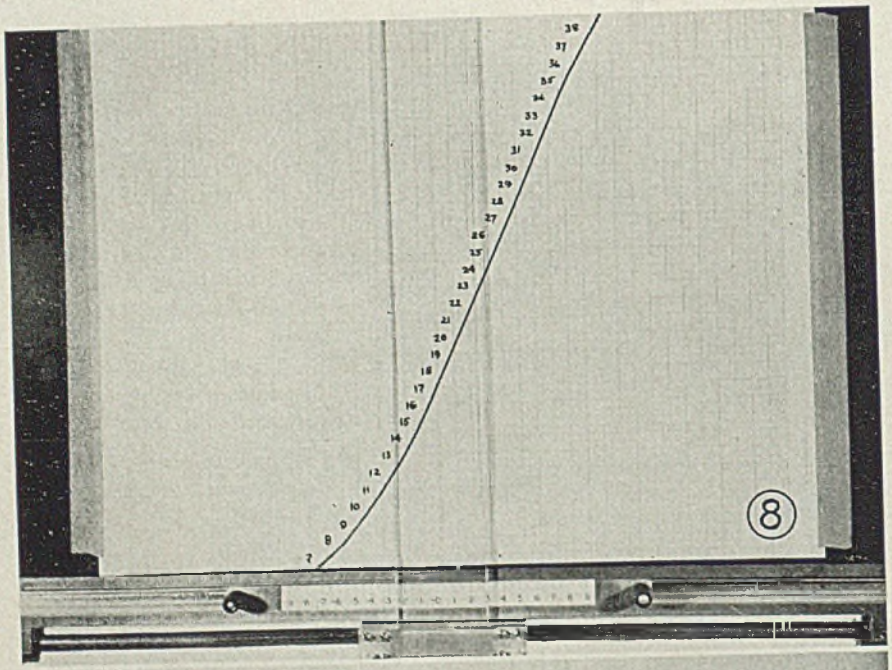
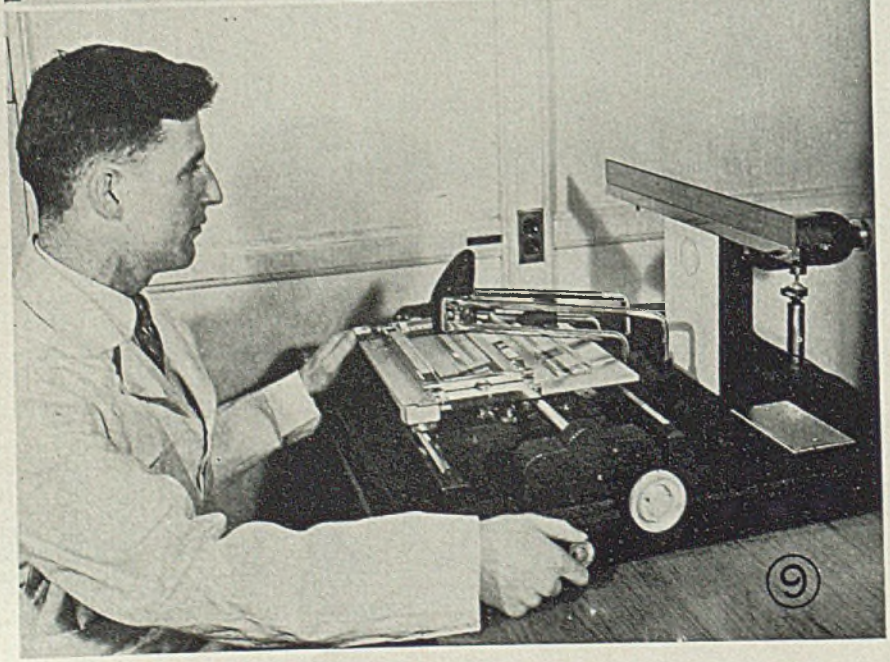


Fig. 7—General floor plan of spectrographic laboratory

Fig. 8—Close-up of calculating board

Fig. 9—Close-up of microphotometer





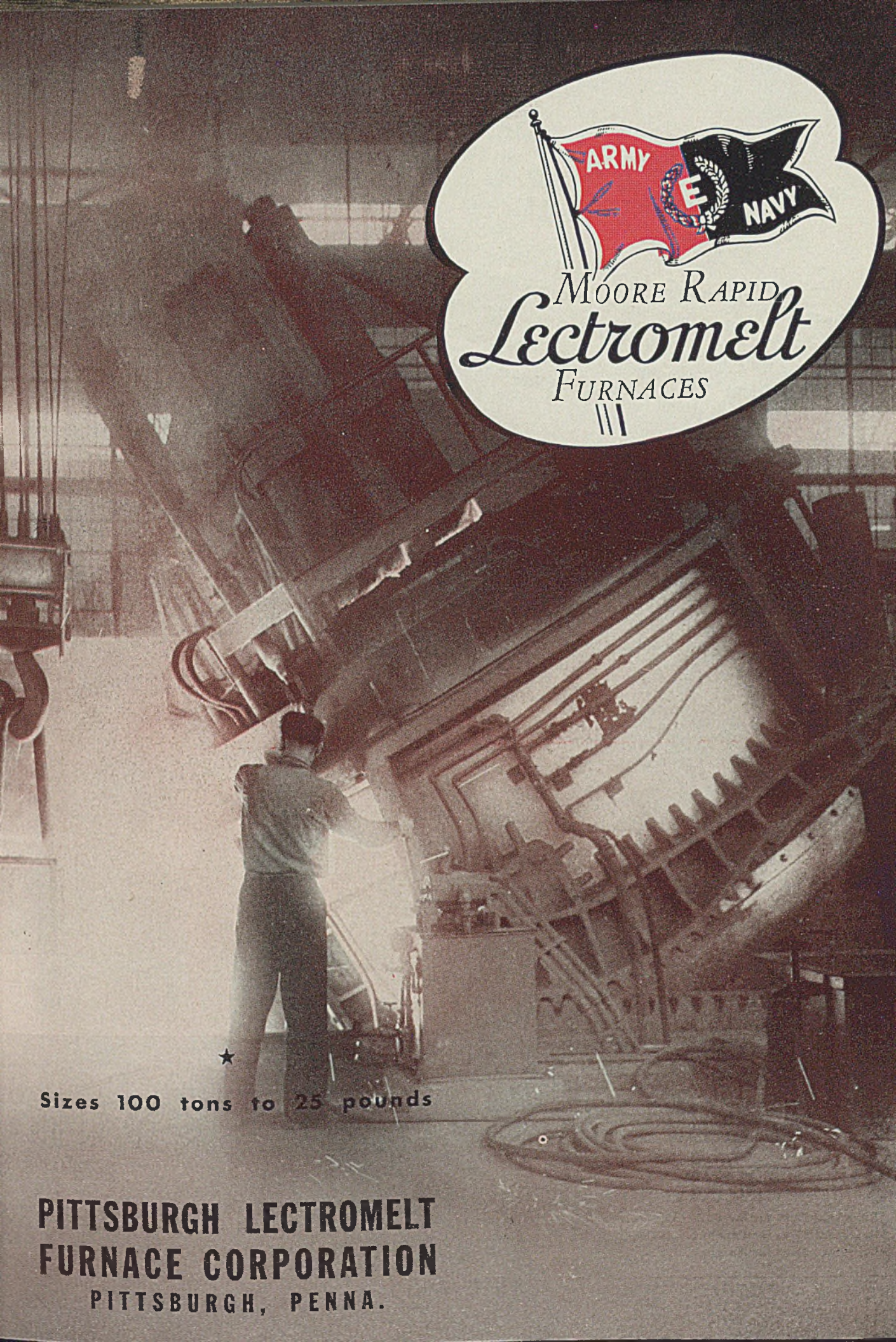
and 5 amperes at 2400 volts. As shown in the illustration, all controls and meters are arranged in a convenient, compact assembly, permitting maximum ease in the operation of the instrument. Spectrum exposures are timed automatically, with one timer for each source of excitation and one for the shutter of the spectrograph. All doors leading to the high-voltage room are equipped with trap switches to protect the operator.

Photographs of the spectra of the electrical discharge are taken with a standard Bausch & Lomb large Littrow spectrograph. A solenoid attachment to the shutter lever provides electrical control of the shutter mechanism. Mounted in front of the slit is a lens holder, making it possible to rotate any one of three lenses into position. A split neutral filter also is mounted in front of the slit. The plate holder of the instrument is covered with a leather hood which extends to an opening in the wall leading to the darkroom. This makes it possible to insert a plate in the instrument from the darkroom without removing the plate holder.

A general view of the darkroom is

TABLE I—Elements Determined Spectographically with Ranges Covered

Element	Range, per cent
Manganese	0.05 -1.00
Silicon	0.002-0.70
Nickel	0.01 -3.50
Chromium	0.03 -2.00
Vanadium	0.005-1.50
Molybdenum	0.002-6.50
Copper	0.04 -0.50
Tungsten	0.25 -1.00
Aluminum	0.004-2.00
Titanium	0.01 -0.07
Tin	0.003-0.10
Boron	0.001-0.01


ARMY
E
NAVY
MOORE RAPID
Lectromelt
FURNACES
★
Sizes 100 tons to 25 pounds
PITTSBURGH LECTROMELT
FURNACE CORPORATION
PITTSBURGH, PENNA.

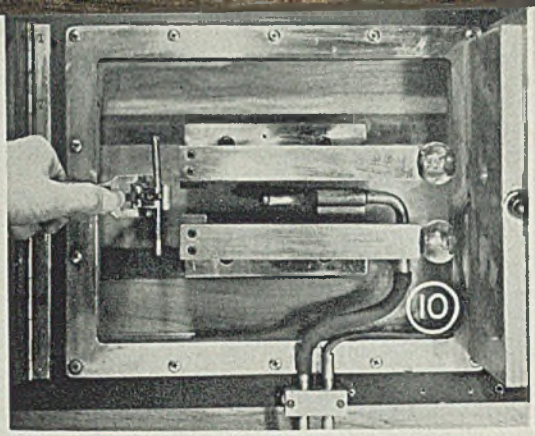


Fig. 10 — Close-up of electrode clamps

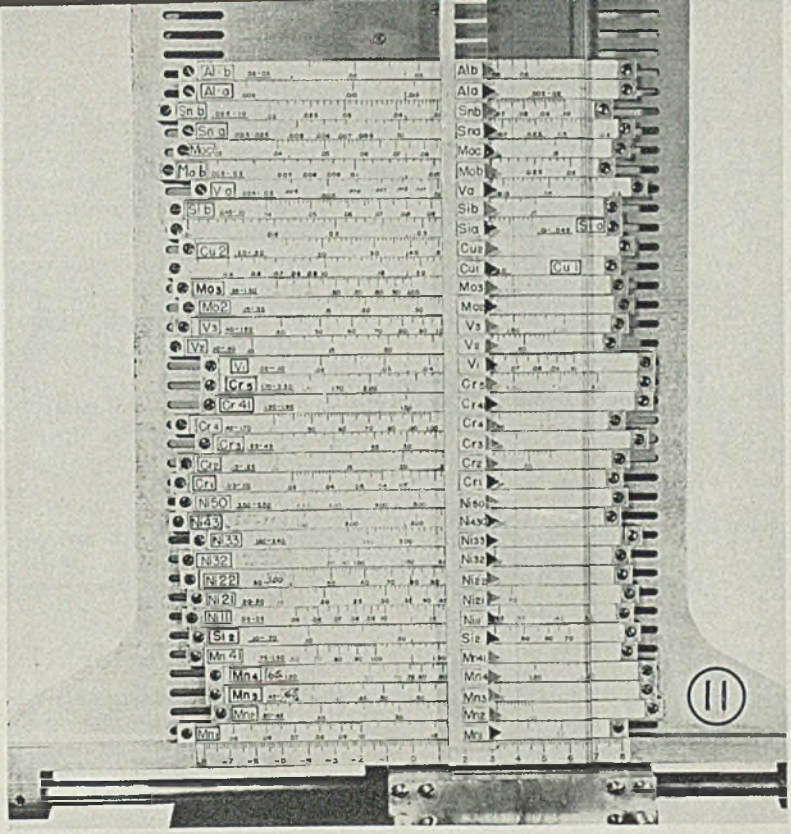


Fig. 11—Close-up of scale board

presented in Fig. 2. The plates are developed in the machine shown at the left. This machine is equipped with automatic temperature control and with two-directional agitators which operate out of step with each other and which have different oscillating periods. This imparts a turbulence to the solutions which is impossible to attain with any set wave pattern or direction as produced in the rocker-type agitator generally used for developing spectrographic plates. About 3 to 4 minutes normally is required in processing a plate.

The spectrum reading room is pictured in Fig. 3. Here the microphotometer is at the left, the calculating board and the scale board in the center, and the telautograph at the right. The microphotometer, which is shown in close-up in Fig. 9, was built by the University of Michigan, Ann Arbor, Mich. One of the important features of the instrument is its ease of operation. Once a plate has been placed in the instrument the operator can make all readings with little shifting of position.

While reading, he has his left hand placed on the front left hand corner of the plate carriage. With this hand he can move the main carriage rapidly along, shifting any portion of the spectrum on the screen. At the same time his left hand is in position for shifting any one of the spectra on the screen by moving the cross carriage. The operator's right arm rests on the table with the hand extending back to the large reading knob. To align the microphotometer slit with the spectral lines, the operator has only to move his right hand to the small knob in front of the driving knob. An image of the unknown spectrum is projected on the viewing screen with a master spectrum below. This screen and the density scale are so arranged that practically no adjustment in the accommodation of the eye is required when the gaze of the operator is shifted from the one to the other.

(*Please turn to Page* 127)

TABLE II—Spectral Lines Employed for Various Elements with Ranges, Source and Filter

Element Line	Iron Line	Range Per Cent	Source	Filter
Mn 2933.06	Fe 2931.60	0.05 -0.20	Spark	
Mn 2933.06	Fe 2936.91	0.20 -0.45	Spark	F
Mn 2933.06	Fe 2897.26	0.45 -0.65	Spark	F
Mn 2558.59	Fe 2553.73	0.65 -1.00	Spark	F
Si 2881.58	Fe 2885.35	0.002-0.015	Arc	
Si 2881.58	Fe 2886.32	0.015-0.06	Arc	
Si 2881.58	Fe 2875.30	0.06 -0.10	Arc	F
Si 2881.58	Fe 2874.17	0.10 -0.70	Spark	
Ni 3414.77	Fe 3431.81	0.01 -0.05	Arc	
Ni 2316.04	Fe 2318.35	0.05 -0.25	Spark	
Ni 2316.04	Fe 2322.33	0.20 -0.50	Spark	F
Ni 2303.00	Fe 2307.31	0.50 -1.00	Spark	F
Ni 2300.09	Fe 2294.61	1.00 -1.60	Spark	
Ni 2302.47	Fe 2303.35	1.60 -2.40	Spark	
Ni 2302.47	Fe 2304.73	2.40 -3.50	Spark	F
Cr 2677.16	Fe 2676.88	0.03 -0.12	Spark	
Cr 2677.16	Fe 2682.52	0.12 -0.25	Spark	F
Cr 2677.16	Fe 2642.02	0.25 -0.45	Spark	F
Cr 2862.57	Fe 2876.80	0.45 -1.20	Spark	F
Cr 2818.36	Fe 2837.29	1.20 -2.00	Spark	
V 3185.40	Fe 3207.09	0.005-0.02	Arc	
V 3110.71	Fe 3106.56	0.02 -0.10	Spark	
V 3110.71	Fe 3075.72	0.10 -0.40	Spark	F
V 3130.27	Fe 3075.72	0.40 -1.50	Spark	F
V 3063.25	Fe 3062.23	0.40 -1.50	Spark	F
Mo 3170.35	Fe 3207.09	0.002-0.008	Arc	
Mo 3170.35	Fe 3196.13	0.008-0.03	Arc	F
Mo 2816.15	Fe 2815.51	0.03 -0.15	Arc	
Mo 2775.40	Fe 2776.18	0.15 -0.55	Spark	
Mo 2775.40	Fe 2770.51	0.55 -2.00	Spark	F
Mo 2644.35	Fe 2682.52	2.00 -3.50	Spark	F
Mo 2644.35	Fe 2649.46	3.50 -6.50	Spark	F
Cu 3273.96	Fe 3277.35	0.04 -0.20	Spark	
Cu 3273.96	Fe 3286.76	0.20 -0.50	Spark	F
Sn 3175.02	Fe 3157.04	0.003-0.01	Arc	
Sn 3034.12	Fe 3012.45	0.01 -0.03	Arc	
Sn 2839.99	Fe 2848.72	0.03 -0.10	Arc	F
Al 3082.16	Fe 3080.11	0.004-0.02	Arc	
Al 3082.16	Fe 3078.43	0.02 -0.05	Arc	F
Al 3082.16	Fe 3053.44	0.05 -0.12	Arc	F
Al 3082.16	Fe 3075.72	0.80 -2.00	Spark	
W 2656.54	Fe 2651.71	0.25 -0.50	Arc	
W 2656.54	Fe 2656.15	0.50 -1.00	Arc	
Ti 3371.45	Fe 3389.75	0.01 -0.04	Arc	
Ti 3371.45	Fe 3387.41	0.04 -0.07	Arc	F
B 2496.78	Fe 2505.01	0.001-0.008	Arc	
B 2496.78	Fe 2496.99	0.008-0.02	Arc	F

ELECTROSTATIC "DETEARING"

. . . . helps control "drain-off" when baking the finish on dipped steel cartridge cases; triples output, cuts man-hours two-thirds, produces superior product

By HAROLD P. RANSBURG
Harper J. Ransburg Co.
Indianapolis, Ind.

MANY CHANGES have taken place in the art of industrial finishing. The dip process has long been handicapped by difficulties experienced at "drain-off" points. Experience has indicated that no matter how efficient an oven is, the final finish is not always that desired because of the difficulty of uniformly removing this excess material before the baking process begins.

Therefore the electrostatic "detearing" process is important because it is being applied successfully on many important war jobs where it has resulted in a satisfactory baked finish being produced.

The several advantages of applying liquid coatings by the dip method are well known. Persons baking such dipped coatings in ovens are also quite aware of the difficulties and limitations of orthodox dipping practices.

Probably the most serious difficulty encountered has been the ever-present accumulation of excess material at "drain-off" points on the work. A happy solution to this problem has long evaded finishing engineers. We have tried to use capillary attraction by the slow pull-out method, centrifugal force, swabbing, cutting off, patching, etc. Expedients such as these, though having merit in certain cases, never were widely accepted because they either failed to satisfactorily remove the excess or they involved other complications of some considerable proportions.

It is the purpose here to describe a new method of eliminating this problem, and in particular to analyze some of its effects on bake oven design and to show how it is proving valuable in facilitating production of steel cartridge cases for our armed forces.

Electrostatic "detearing" applied to the steel cartridge case industry constitutes a very definite contribution toward solving the baking problem. In this instance we are dealing with a part which has a thickness of about ⅜-inch at the head while it is only 0.040-inch thick at the mouth. Heating engineers state that in order to obtain a uniform bake, 80 per cent of the heat required for the whole cartridge case is needed for the heavy end. In spraying, it is necessary to rotate the case while it is supported by a rod inserted in the primer hole. The rod obviously conducts heat away from the head. This condition is further aggravated where the floor of the oven is slotted to permit the rod to move through the slot. Unless the baking oven is kept under substantial pressure, this slot permits the entrance of cold air at the point where 80 per cent of the heat is required. Another difficulty is that the supporting rod closes the primer hole and precludes the possibility of proper ventilation inside the shell.

By the "detearing" method, the shell is hung on a simple springclip in the primer hole, permitting very little conduction of heat from the work and readily lending itself to ample ventilation during the baking operation. The required coating material is claimed to be so heat-critical that the difference between the lower limits, where the coating is still fusible, and the upper limits, where the material becomes excessively brittle, is a period of only 3 or 4 minutes at 350 degrees Fahr.

In the operation of this process, the work is dipped in any suitable manner, then it proceeds along a conveyor over a drainboard, and is permitted to "air dry" or "set" sufficiently so that the coating material has practically ceased flowing. At this stage the sections from which the paint has been dripping, which we call "drain-off points," are subjected to a powerful electrostatic field which is designed to set up an attractive force between the grounded article and a high voltage electrode which is properly spaced from the object.

The interval of time between leaving the dip-tank and entering the electric field is not highly critical. The proper timing is dependent on the size and shape of the article, the flowing characteristics of the coating material, and the evaporation rate of the solvents in the coating material. In general, it can be said that this interval of time will be between 1 and 4 minutes.

The electrodes are designed for the particular application involved, giving consideration to the speed of conveyor and type of article being treated. It is essential that each drain-off point, from which excess material is to be removed, be exposed directly to the high voltage plates. Any portion of the article which is electrically shielded from the field is less effective directly in proportion to the extent to which it is shielded. The electrodes themselves are preferably of flat metal plate or other material which will present a relatively continuous electrical conducting medium.

Conditions such as the length of electrodes, as well as the distance between the electrodes and the grounded work pieces, depend largely upon the radius of the surface at the point from which the excess material is being removed. The smaller the radius, the more responsive the reaction will be. Thus with smaller radii, it is necessary to use a greater distance between the article and the electrode, and a shorter length of time is required for removing the proper amount of excess material. The length of time required for "detearing" a given article will almost invariably be between 15 seconds and 1 minute. This period of time depends not only upon the radius involved but also upon the conductivity of the item itself, as well as the condition (flowability) of the coating material at the time of treatment.

The electric field is energized by a specially designed power pack which produces a half-wave direct-current voltage of considerable magnitude but low power. This unit is so designed that on a dead short it will not produce a current of more than 5 milliamperes. In a normal application it will operate at a value in the neighborhood of 200 microamperes at 85,000 volts. It is a self-contained, oil-immersed unit, with no moving parts. It requires a primary power source of 220 volts, 60 cycles, drawing approximately 3 amperes.

There are quite broad tolerances on the normal application if certain factors are properly correlated, such as the length of time between the tank and electrodes, the evaporation rate of the solvents, the flowing characteristics of the coating material, the shape and size of the article, the distance between the electrode and the article, the radius of the "drain-off" point, and the length of time the article is under treatment.

Though it may appear from this discussion that there are a number of complicated ramifications, the process is quite simple to operate and highly flexible in

(*Please turn to Page* 131)

From a paper presented at American Gas Association's War Conference, Detroit, March 11 and 12, 1943.